



GAIL (India) Limited
(A Government of India Undertaking)
A Maharatna Company

EOI No: GAIL/CGD/06 GA/LMC/2026/01

**NOTICE FOR HIRING OF CONTRACTORS FOR GAIL'S
CGD PROJECT AT SIX GA'S THROUGH WALK-IN
METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**

**Address: M/s GAIL INDIA LIMITED, Plot No. B, 35-36, Block B,
Sector 1, Noida, Uttar Pradesh 201301.**

VOLUME – I OF II



Appointed PMC for Contract Award Process on behalf of GAIL (India) Limited

BRIDGE AND ROOF COMPANY (INDIA) LIMITED
(A Govt. of India Enterprise)

Corporate office:
**KANKARIA CENTER (4TH & 5TH FLOOR), 2/1 RUSSEL STREET,
KOLKATA – 700071, WEST BENGAL (INDIA)**

Head Office and Works:
427/1, GRAND TRUNK ROAD, HOWRAH - 711101.



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DPNG CONNECTION / LMC WORKS**



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SECTION-I

REQUEST FOR PROPOSAL, CUTOUT SLIP AND FORMS & FORMATS



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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SECTION-I
" REQUEST FOR PROPOSAL, CUTOFF SLIP AND FORMS & FORMATS"

Ref No: GAIL/CGD/06 GA/LMC/2026/01

Date: 30.06.2026

To,
PROSPECTIVE BIDDERS

**SUB: NOTICE FOR HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR DPNG CONNECTION /LMC
WORKS.**

Dear Sir/Madam,

- GAIL (India) Limited, Noida, having its registered office at 16, Bhikaji Cama Place, New Delhi – 110066 (CIN: L40200DL1984GOI018976),** a Maharatna Public Sector Enterprise and India's largest state-owned natural gas processing and distribution company, through its Project Management Consultant (PMC), **BRIDGE AND ROOF COMPANY (INDIA) LIMITED (B AND R) (CIN: U27310WB1929 GOI003601),** hereby jointly invites Expressions of Interest (EOI) in the form of firm proposals from eligible bidders/contractors/legal entities for execution of Domestic Piped Natural Gas (DPNG) Connection/ Last Mile Connectivity (LMC) under GAIL's City Gas Distribution (CGD) Projects across six Geographical Areas (GAs), namely Varanasi, Patna, Ranchi, Jamshedpur, Bhubaneswar, and Cuttack, through the Walk-in Selection Process, in accordance with the eligibility criteria, scope of work, terms and conditions, and other requirements specified in the bidding documents.
- The brief details of the EOI are as under:

S.N.	PARAMETERS	DETAILS
1.0	Brief Scope of Works/ Service /Job	LMC works for DPNG connections at Varanasi, Patna, Ranchi, Jamshedpur, Bhubaneswar, and Cuttack for GAIL (India) Limited.
2.0	Method Of Selection	Walk-In Method
3.0	Eligibility And Selection Method	Interested bidders meeting the prescribed qualification criteria may participate in the Walk-In Process by submitting all requisite self-attested documents as specified in the bidding document. Participation shall be considered on a first-in-first-out basis (FIFO), subject to fulfillment of GAIL's requirements and at the sole discretion of GAIL.
4.0	Type of bidding system	Upfront Declared Contract Rate The contract shall be awarded at the upfront declared Schedule of Rates (SOR) specified in the EOI document. No price bid or financial quotation shall be sought from the bidders. The bidder shall be deemed to have accepted the declared rates by participating in the Walk-In Process.
5.0	Completion/Contract Period	Refer SCC and Scope of work
6.0	Bid Security / Earnest Money Deposit (EMD)	Not Applicable

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7.0	Office Addresses for Submission of Documents for Walk-In Methodology (Bidders must submit complete physical documents at the respective office for which they wish to bid)	<u>Varanasi Location office address:</u> M/s GAIL INDIA LIMITED, City Gate Station, Harha, Ring Road, Bhagwanpur-Tulsipatti, Varanasi, Varanasi, Uttar Pradesh, 221003. Contact Details: GAIL, Mob:7268071339, Consultant, Mob:7058664482. <u>Patna Location office address:</u> M/s GAIL INDIA LIMITED, 6th Floor Indra Bhawan, Ram Charitra Singh Path, Boring Canal Road, Patna-800001, (Bihar). Contact Details: Shri. Rajan Kumar Jha, CM(CGD), Mob: 8475049049 Shri. Shubham Kailas Gawali, SE, Mob: 7218698558 <u>Ranchi Location office address:</u> GAIL(INDIA) LIMITED CGD, Shed No. 6 &7 Mecon Head Office Complex, Doranda Ranchi 834002. Contact Details: Shri. Pankaj Biswas, CM (CGD), Mob:8958653333 Shri. Sanjeev Kumar, PMC, Mob:7250940000 Shri Shiv Shyam Singh, PMC, Mob:8127449389 <u>Jamshedpur Location office address:</u> M/s GAIL INDIA LIMITED, J Block, 3rd Floor, Jeevan Prakash Building, Main Road Bistupur, Jamshedpur, East Singhbhum, Jharkhand, 831001. Contact Details: Shri. Durga Prasad Ambedkar, Mob:7838907872 Shri. Pradeep Sharma, Mob:9907072965 <u>Bhubaneswar & Cuttack Location office address:</u> M/s GAIL INDIA LIMITED, City Gas Distribution office, 2nd floor Block-1, BMC Bhawani Mall St, Saheed Nagar, Bhubaneswar, Odisha 751007. Contact Details: Shri. Roman Ranjan Dash, Mob:7978045145 Shri. Sanjib Prusty, Mob:9348633232
8.0	EOI document submission Instruction	Bidders intending to participate in multiple GA(s) shall submit separate sealed envelopes for each GA, along with all required documents as specified in this EOI, only at the designated document receiving office of the respective GA. For example, bidders participating in Varanasi GA shall submit their documents only at the Varanasi document receiving office only, while bidders participating in Bhubaneswar GA shall submit their documents only at the Bhubaneswar document receiving office only, and similarly for the other GAs. Submission of documents for multiple GA(s) at a single GA document receiving office shall not be permitted. - The bidder shall submit one additional copy of the “ Cut-Out” filled-in format at the time of document submission. The same



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		shall be acknowledged and returned as a receipt/token of document submission. 3. The ranking of bidders for each GA shall be determined on a First-In-First-Out (FIFO) basis, based on the date and time of bid submission recorded at the designated bid collection office of the respective GA. 4. Throughout this document, the terms 'EOI', 'Bid', 'Tender', 'Offer', 'Application' & 'Proposal' and their derivatives [Bidder/Tenderer, Bid/Tender/Offer etc.] are synonymous. 5. Offers submitted through e-mail or documents sent by post/courier shall not be considered for participation in the Walk-In Process.
9.0	Walk-in Date & Time	Date: 03.07.2026 to 05.07.2026 Timing: 10:00 AM to 4:30 PM
10.0	Contact Details of Dealing Officer(s)	For participation and initial physical document submission, as per the details provided in the above-mentioned Point No. 6. Any queries pertaining to post-bid document submission requirements or the status of contract award shall be addressed to the authorized contact person(s) mentioned below. Sk. Aman Ali Mob: 7384310966 And Shri. Shashi Ranjan Mob: 7384310966 Bridge And Roof Co (I) Ltd 427/1, Grand Trunk Road, Howrah - 711101. Official communication Email id: tender.gailcgd@bridgeroof.co.in
11.0	Bids From Consortium/ Joint Venture/ NCLT Referred Bidders	Not Applicable.
12.0	Contract Performance Security (CPS)	Applicable.
13.0	Dealing GAIL Office Address	GAIL (India) Limited, Jubilee Tower, B-35 & 36, Sector-1, Noida-201301 (UP)-India.



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CUT-OUT SLIP

(Bidder must Submit all required documents in a sealed envelope with the duly filled cut-out slip pasted over the sealed envelope)

EOI Ref No	:	GAIL/CGD/06 GA/LMC/2026/01, DT-30.06.2026
Job Description	:	NOTICE FOR HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S THROUGH WALK-IN METHOD SELECTION PROCESS FOR DPNG CONNECTION / LMC WORKS
Last Date & Time of submission	:	05.07.2026, 4:30 PM
Bidders' Participation and Submission of EOI Documents for the GA.	:	<u>GA Name</u> (Tick any one which is applicable) VARANASI GA : ☐ PATNA GA : ☐ RANCHI GA : ☐ JAMSHEDPUR GA : ☐ BHUBANESWAR GA : ☐ CUTTACK GA : ☐
Name of the Bidder	:	
Contact No & email address	:	

Note:

- The bidder shall submit one additional copy of the duly filled-in format at the time of document submission, which shall be acknowledged by the receiving authority and returned to the bidder as proof of receipt of the submitted documents.**

FOR GAIL & B AND R OFFICIAL USE PURPOSE

Bid Doc. Received Date:

Bid Doc. Received Time:

Bid Doc. Receiver Name:

[Receiver Signature with Seal]



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3. EVALUATION CRITERIA:

3.1. Category-I: Eligible for award of contracts for Rs. 50 Lakhs.

A. Technical Criteria:

The Bidder must have successfully executed / completed at least one work order for LMC/PNG Connection work in any CGD sector of GAIL (I) Ltd/ GAIL Gas Ltd and/ or their Group Companies, or for any other CGD company during the last seven (7) years, reckoned from the EOI submission due date.

Note:

- a) If a bidder submits experience gained as a sub-contractor in any CGD company for LMC /PNG Connection work and such sub-contracting arrangement is duly supported by documentary evidence, including an approval and/or experience certificate issued by the concerned CGD company in the name of the bidder, thereby establishing that the sub-contracting was officially recognized and permitted, such experience shall be considered valid for evaluation purposes. Accordingly, the bidder shall be eligible to be considered for award of work for Rs. 50 Lac.
- b) A Job executed by a Bidder / contractor for its own plant/ project cannot be considered as experience for the purpose of meeting the criteria mentioned above.

B. Financial Criteria: Not Applicable.

3.2 Category-II: Eligible for award of contracts for Rs. 25 Lakhs.

A. Technical Criteria:

The bidder shall have successfully executed / completed at least one work order of construction work in any industry or sector, within the last seven (7) years preceding the EOI submission due date.

OR

Start-ups seeking exemption from the Technical Qualification Criteria may participate in the Walk-In Process, subject to submission of a valid Start-up Recognition Certificate issued by the Department for Promotion of Industry and Internal Trade (DPIIT). The certificate shall be duly certified/attested by a Chartered Accountant (CA) and shall be valid as on the EOI due date.

The applicable Industry and Sector domains (i.e., Industry & Sector) for Start-ups for the instant tender shall be as under:

- | | | |
|-----------------|---|----------------------------------|
| Industry | : | a) Construction |
| Sector | : | a) Construction |
| | | b) Construction and Engineering. |
| | | c) Home building |

Start-ups operating in industries or sectors other than those specified above shall not be considered for award of work under this Walk-In Process, notwithstanding any exemption available under applicable Government policies.



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Note:

- a) Bidders having construction work experience as a sub-contractor/ labour contractor/ labour supply contractor/ construction machinery supplier/ or 'tools and tackles supplier for construction work under civil/ mechanical/structural/ architectural/ electrical/ OFC/ gas connection / water supply/ drainage/ telecom/ construction activities/ or any other utility sector' shall be considered eligible, subject to submission of acceptable documentary evidence of such experience.
- b) A Job executed by a Bidder / contractor for its own plant/ project cannot be considered as experience for the purpose of meeting the criteria mentioned above.

B. Financial Criteria: Not Applicable.

Note for clause No 3.1 & 3.2:

- a) **All documents submitted by bidders shall be duly self-attested.**
- b) The window for submission of bids in each cycle shall remain open for three (03) business days, i.e., **03.07.2026 to 05.07.2026, from 10:00 AM to 04:30 PM.**
- c) The documents shall be submitted in hard copy to the respective GA office at the address(es) specified in Section I of the EOI.
- d) Initially, the bidder will be evaluated for an award of up to Rs. 50 Lakhs. If found eligible, the bidder will be awarded work up to Rs. 50 Lakhs. If the bidder is not found eligible for Rs. 50 Lakhs but is found eligible for an award of up to Rs. 25 Lakhs, then the bidder will be awarded work up to Rs. 25 Lakhs. No clarification or confirmation regarding the value of the award will be sought from the bidders.
- e) **Existing contractors currently working in a particular Geographical Area (GA) under the GAIL (India) Limited Six CGD Project shall be eligible to participate in the Walk-In Process for that GA only upon achieving 100% Mechanical Completion of earlier awarded work(s). However, this condition shall not apply in cases where short closure of the contract is necessitated due to reasons not attributable to the contractor.**

For the purpose of this methodology, 100% Mechanical Completion shall be deemed to have been achieved if any one of the following criteria is satisfied:

- i. All physical works under the contract scope have been completed.
- ii. The system has attained the "Ready for Commissioning" stage, with a minimum of 80% physical progress achieved under the contract scope.
- iii. A minimum of 80% of the total contract value has been executed.

GAIL and/or its authorized Site Consultant may review the status of the work based on the aforesaid criteria and, at its sole discretion, recommend the contractor for participation in the ₹50 lakh award value category for LMC/DPNG Connection works. Such recommendation/clearance (As per format F-11), duly issued by GAIL (India) Limited for the concerned GA, shall be submitted by the bidder along with the bid documents.

- f) In the event that the number of vendors participating in a Walk-In Methodology cycle exceeds the requirement, contract awards shall be made on a First-In-First-Out (FIFO) basis, based on the ranking determined from the date and time of bid submission recorded at the designated



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- bid collection office of the respective GA.
- g) Any Technical Query (TQ) raised by B AND R/GAIL shall be replied to by the bidder within **24 hours of its issuance**, on a round-the-clock basis, failing which the bid shall be liable for rejection. **Queries shall be sent to the registered email id provided by the bidder during Bid submission.** Evaluation shall be conducted solely based on the documents submitted during the initial physical submission of the original bid documents.
- h) All document evaluation shall be carried out by B AND R from its registered Howrah Office. Any additional document to be submitted against the Technical Query (TQ) raised during the evaluation process shall be replied to by the bidder to the communication email id provided within the stipulated time.
- i) **The official email ID for issuance of Technical Queries (TQs) and submission of TQ replies shall be: tender.gailcgd@bridgeroof.co.in . In addition, physical documents submitted in compliance with the Technical Queries, along with supporting documents, if any, shall be submitted only to the Consultancy Services Department at Howrah office of, Bridge And Roof Company (India) Limited., 427/1, Grand Trunk Road, Howrah – 711101, from 10:00 AM to 04:30 PM.**
- j) GCC for Works shall be applicable and the link for downloading, reading and acceptance of GCC for Works is as under:
<https://gailtenders.in/Gailtenders/gccs/GCCWorksEnglish23112022.pdf>
- k) **MSME or any other preference shall not be applicable as it is walk in methodology and SOR is on upfront declared basis.**
- l) Any change in the firm's name, constitution or any other change affecting the legal status of the bidder during the evaluation process or during the execution of the awarded work shall not be accepted.
- m) Experience certificates, completion certificates, work orders, purchase orders (POs), contracts, FOAs, LOAs, or any other credential documents submitted in support of the bid shall be in the name of the bidder participating in this EOI. **Credentials issued in the name of any other entity, sister concern, parent company, subsidiary company, group company, partnership firm, proprietorship concern, joint venture, or any other legal entity shall not be considered for qualification under this EOI.**
- n) In the case of a proprietorship firm, the bidder shall submit documentary evidence establishing that the proprietorship concern and the proprietor constitute the same legal entity. Any change in proprietorship after submission of the bid shall render the submitted credentials invalid for evaluation and award purposes.
- o) Bidders from countries sharing a land border with India, including entities owned or controlled by persons or organizations from such countries, shall not be eligible to participate in this EOI. Any bid received from such bidders shall be summarily rejected.
- p) Bidders undergoing, or against whom insolvency resolution, liquidation, or bankruptcy proceedings have been initiated under the Insolvency and Bankruptcy Code, 2016, shall not be eligible to participate in this EOI, and such bids shall be rejected outright. The bidder shall inform GAIL/CMC/PMC within 15 days of any order initiating such proceedings. Failure to disclose such information shall result in rejection of the bid or cancellation/termination of the award/contract. GAIL/PMC reserves the right to cancel or terminate the contract without any liability if such proceedings are initiated at any stage. A declaration to this effect shall be submitted by the bidder in the prescribed format.



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4. Documents required to be submitted/uploaded by bidder along with the bid for qualification of BEC:

Bidder must submit copies of below mentioned self-attested documents along with the bid for participation in walk-in process:

1. Document supporting Name and type of Entity (Affidavit / Undertaking on Letter head for Proprietorship, Deed of Partnerships for Partnership and Certificate of Incorporation along with MOA & AOA for Limited Company)
2. PAN
3. GST Registration.
4. PF/ESI Registration, wherever applicable.
5. Form F-1: Bidder's General Information (On Bidder's Letter Head)
6. Form F-2: Declaration on Proceedings as per Insolvency and Bankruptcy Code 2016 (On Bidder's Letter Head)
7. Form F-3: No Deviation Certificate (On Bidder's Letter Head)
8. Form F-4: Agreed Terms & Conditions (On Bidder's Letter Head)
9. Form F-10: Undertaking for deployment capability. (On Bidder's Letter Head)
10. Form F-11: Certificate of Mechanical Completion / Eligibility for Participation in the Walk-In Process (Applicable only to bidder(s) who have previously been awarded work by GAIL (India) Limited under the Six CGD Project).
11. Valid Start-up certificate duly certified/attested by a Chartered Accountant (CA) (In case of Start-up seeking exemption from the Technical Qualification Criteria).
12. Copy of Power of Attorney (As applicable).
13. Work experience documents as mentioned below:

BEC Clause no.	Description	Documents required for qualification
3.1	Category-I: Eligible for award of contracts up to Rs. 50 Lakhs.	
A	Experience criteria: Technical	a) Copy of detailed Work order /FOA/ LOA along with Schedule of Rates. b) The bidder shall submit a recommendation/certification from GAIL (India) Limited confirming 100% Mechanical Completion of the existing order(s) under the Six CGD Project for the particular GA/GA(s) for which the bid is being submitted. <i>“For the purpose of this methodology, 100% Mechanical Completion shall be deemed to have been achieved if any one of the following criteria is satisfied:</i> i. <i>All physical works under the contract scope have been completed.</i>



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		ii. <i>The system has attained the "Ready for Commissioning" stage, with a minimum of 80% physical progress achieved under the contract scope.</i> iii. <i>A minimum of 80% of the total contract value has been executed."</i> c) Execution / Completion certificate in case bidder submits experience of CGD company other than six CGD of GAIL (India) Ltd.
3.2	Category-II: Eligible for award of contracts up to Rs. 25 Lakhs.	
	Experience criteria: Technical	a) Copy of detailed work order /FOA/ LOA/ Agreement. b) Copy of the Completion/Execution Certificate issued by the Client/End User/Owner. OR In case the bidder has executed the work as a sub-contractor, a Completion/Execution Certificate issued by the Main Contractor shall also be acceptable, provided that the certificate clearly specifies the details of the project executed by the bidder.
	For Start-Up	a) Certificate towards Start-up enterprise registration issued by Department for Promotion of Industry and Internal Trade (DPIIT) duly certified / attested by Chartered accountant.

5. EOI EVALUATION METHODOLOGY:

GAIL intends to award contracts under this cycle for the respective GAs as per its requirement.

S/N	GA Name
1	Varanasi
2	Patna
3	Ranchi
4	Jamshedpur
5	Bhubaneswar
6	Cuttack

- The ranking of bidders for each GA shall be determined on a First-In-First-Out (FIFO) basis, based on the date and time of bid submission recorded at the designated bid collection office of the respective GA.
- If any bidder is found to be technically non-responsive, disqualified, or otherwise ineligible during the evaluation process, the work shall be awarded to the next technically qualified bidder.
- Submission of all requisite documents as stipulated in this EOI is mandatory. In the absence of any required document(s), M/s GAIL/B AND R reserves the right to reject the bid outright without seeking any clarification from or making any reference to the bidder(s). Further, GAIL reserves the right to discontinue the EOI process at any stage and shall have the sole discretion to qualify, accept, or reject any application or proposal for award of work, in whole or in part,



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without assigning any reason whatsoever.

- d) List of bidders, as provided by GAIL (I) LTD for the respective GA, who are ineligible for bid evaluation and contract award, as per note to Clauses 3.1 and 3.2 under point no (d).

6. DISTRIBUTION OF WORK / AWARD OF CONTRACT

- a) GAIL/ BANDR shall award the work under this cycle for the respective GAs to technically qualified bidders on a First-In, First-Out (FIFO) basis, based on the bids received at the respective GA bid collection offices. Contracts shall be awarded until the GA-wise requirement of GAIL for the respective cycle is fulfilled.
- b) FOA/LOA shall be issued by B AND R on behalf of GAIL (I) LTD. to the technically qualified bidder (s).
- c) The successful bidder shall collect the hard copy of the FOA from the respective GAIL GA office and submit the duly signed acceptance to the same GA office. All post-award activities, correspondence, execution, administration, and contract management related to the awarded work shall be handled exclusively by the respective GAIL GA site(s).
- d) Contractor awarded through walk-in methodology under GAIL six CGD project may be offered job upto Rs.50 Lacs, after satisfactory performance in the awarded job before next cycle start.

7. POST-AWARD CONTRACT INSTRUCTIONS

- a) The successful bidder shall execute the Contract Agreement in the prescribed format on a non-judicial stamp paper of a minimum value of INR 100/- (Rupees One Hundred only), at its own cost, within Seven (07) days from the date of issuance of the Fax of Acceptance (FOA). The duly executed Contract Agreement shall be submitted to the Consultancy Services Department, Bridge And Roof Company (India) Limited., 427/1, Grand Trunk Road, Howrah – 711101.
- b) After issuance of the Contract/FOA, the successful bidder shall furnish Contract Performance Security (CPS) (ISD) equivalent to 10% of the awarded Contract Value. The bidder can submit CPS for 10% of the total awarded value.

OR

Initially, the bidder shall submit an Initial Security Deposit (ISD) equivalent to 2.5% of the awarded Contract Value in the form of **DD/IMPS/NEFT/RTGS** within thirty (15) days from the date of issuance of the Contract/FOA, as per the details provided below. **Submission of the CPS in any other form, such as Bank Guarantee (BG), Surety Bond, Fixed Deposit Receipt (FDR), or any other instrument, shall not be accepted.**

The balance 7.5% shall be recovered through deductions from the Running Account (RA) Bills until the total Security Deposit, including the ISD and deductions from RA Bills, reaches 10% of the awarded Contract Value.

Documentary evidence of CPS/ISD submission or payment shall be furnished to the respective GA EIC/responsible official(s), as instructed by GAIL. The CPS amount shall be released as per the terms and conditions mentioned in GAIL GCC for works.



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For submission through online banking transactions such as IMPS/NEFT/RTGS, the details of GAIL's bank account are as under:

Beneficiary Name	GAIL (India) Limited
Correspondence address	STATE BANK OF INDIA Corporate Accounts Group II. 4 th & 5 th Floor, Red Fort Capital, Parsvnath Towers, Bhai Veer Singh Marg, Near Gole Market, New Delhi - 110 001.
Account no.	00000032849362991
Branch Code	17313
IFSC CODE	SBIN0017313
SWIFT CODE	SBININBB824
MICR CODE	110002562
PAN No. (SBI)	AAACS8577K
TAN No.	DELS55939C
Fax no. :	011-23745580
Email	agmib.cag2del@sbi.co.in

Note:

- i. Contract/ Order Value as mentioned above shall be exclusive of taxes and duties.
 - ii. The Contract Performance Security (CPS)/Security Deposit (SD) will be retained for a period of 90 days beyond the contract period/ duration and applicable Warranty/ Guarantee /Defect Liability Period (if any). And shall be released there after by GAIL.
 - iii. Contract Performance Security (CPS) is to be submitted by bidder within 15 days after issuance of Fax of Acceptance (notification of Award) and in event of delay in submission of CPS, the contract can be terminated.
 - iv. The Contract Performance Security (CPS) shall be submitted only in the in the form of **DD/IMPS/NEFT/RTGS**. Submission of the CPS in any other form, such as Bank Guarantee (BG), Surety Bond, Fixed Deposit Receipt (FDR), or any other instrument, shall not be accepted.
- c) The successful bidder shall submit all requisite insurance policies, labour licenses, indemnity bonds, registrations, permits, and other statutory documents as required under the Contract, FOA, LOA, GCC, SCC, and bidding documents to the respective GAIL Site/GA Office within the stipulated time period and prior to commencement of the work, as applicable.
- d) The successful bidder shall coordinate with the respective GAIL GA/Site officials for all post-award activities, including but not limited to kick-off meetings, allocation of work locations, issuance of Free Issue Materials (FIM), approval of technical documents, site execution, statutory clearances, permissions, legal and regulatory compliances, certification of measurements, billing, and all other contract administration matters. All site-related activities and contract execution matters shall be handled and administered exclusively by the respective GAIL GA/Site team.
- e) **PRS shall not be applicable for contracts awarded through the Walk-In Methodology.** However, periodic/intermittent vendor performance evaluations shall be carried out and, in the event of default in the prescribed parameters, the contract may be short-closed by the SIC on the recommendation of the EIC and with the approval of the OIC, without any liability on either side. Such defaulting contractors/agencies shall also be restricted from participating in subsequent



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Walk-In cycles in GAIL (I) Ltd six CGD Project.

- f) To improve work progress, motivation, and accountability, GAIL may, at its sole discretion, decide to pay the proposed incentive directly to the plumbers instead of routing it through the contractors. The incentive, if approved by GAIL, shall be ₹200 (Rupees Two Hundred only) per domestic PNG connection and shall be linked to the actual execution of work, subject to certification by the Engineer-in-Charge (EIC). The decision of GAIL regarding the applicability, continuation, modification, or withdrawal of the incentive scheme shall be final and binding on all concerned.

Separate vendor codes for individual plumbers shall not be created. Instead, payments towards such incentives shall be processed through a designated common vendor code and disbursed directly to the concerned plumbers, or coupons of equivalent amount will be provided. The payment shall be made (out of VIM) based on certification by the concerned SIC/CIC. Incentive to plumbers shall be admissible only against new completed PNG connections. Existing connections where only GAS IN is pending shall not be considered.

Reconciliation statement of plumber incentive payments vis-à-vis actual number of PNG connections completed shall be prepared and duly certified by EIC.

- g) Bills under contracts awarded through Walk-In Methodology shall be processed through VIM based on certification by EIC & SIC/CIC without mandatory routing through Anjani Portal. bills under contracts awarded through Walk-In Methodology shall be processed through VIM, based on SES & Invoice certification by EIC & SIC/CIC without mandatory routing of measurements through the Anjani Portal. However, measurement sheet prepared and maintained by SIC /EIC at their end.
- h) GAIL has implemented Vendor Invoice Management (VIM) system titled as #SARATHI# for automation, digitization & centralization of Account Payable process w.e.f. 01.04.2023.

Accordingly, Supplier/ Contractor/Service Provide/ Consultant is required to upload digital invoice on 'Sparsh' portal. The system optimizes and simplifies the process of receiving, managing, monitoring and forwarding invoices for payment process. The link of 'Sparsh' portal is as under:

<https://sparsh.gail.co.in/flipper/#/login>

The 'Help Manual' hyperlink to access the detailed User Manual, Demo Videos, FAQ#s and other relevant information is available on 'Sparsh' portal.

Only digital invoice is to be uploaded on 'Sparsh' portal and all other supporting documents along with copy of invoice are to submitted to concerned as defined in Purchase Order (PO)/ Letter of Acceptance (LoA).

Further, vendors/contractors would be required to mention details of Purchase Order/ Letter of Acceptance number on the face of Invoice.

Invoices should be system generated and no handwritten invoices shall be eligible for OCR conversion.

- i) **DOCUMENTS FOR PAYMENT:**

Payment terms shall be as mentioned in SCC.



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



However, for release of payment, Contractor is required to submit invoice along with other documents as mentioned in SCC. The final bill is to be submitted within one month after completion.

Further, GAIL is in process of implementing Vendor Invoice Management (VIM). After implementation of same (to be communicated separately), Contractor/ Vendor to forward the invoice on VIM Collection Center or upload digital invoice on Portal (details of same will be provided separately). The copy of invoice and all other document mentioned above or in order/ contract is to be forwarded to address provided in order/contract.

j) ORDER TRANSMITTAL SYSTEM:

The complete PO/LOA shall be shared through order/contract transmittal system after intimation through email.

Contractor is requested to visit <https://gailonline.com/home.html> and click on link order/contract transmittal system (It can be found under Vendor Zone (Portal for Suppliers)) or https://gailebank.gail.co.in/GOGA_AUDIT/frmUserLogin.aspx

Therein, in order to access the detailed order/contract, supplier/contractor shall be prompted to enter your email id. Further an OTP shall be sent on your registered mobile number. After entering OTP, supplier/contractor shall be allowed to download complete PO/LOA.

- k) In case contractor is not able to submit all required documents along with the invoice, up to 75% of invoice amount/ admissible payment may be released within seven (07) days of submission of invoice based on certification of SES by EIC & SIC/CIS. This is to enable sufficient liquidity with the contractor for fast-track work progress.

The Contractor shall submit the invoice at a minimum interval of 15 (fifteen) days, provided that the value of work executed is at least 20% of the awarded contract value.

Balance payment shall be released after submission and verification of complete supporting documents. EIC and SIC to ensure that all the retention are released on or before the release of final bill.

- l) Free-issue materials shall be issued to the contractor only after submission of the initial Contract Performance Security (CPS), the applicable insurance, and an Indemnity Bond covering the free-issue materials.**

- m) The first payment to the contractor shall be released only after submission of the Contract Performance Security (CPS)/Security Deposit (SD) in accordance with the provisions of the Contract/FOA.

- n) Execution and Monitoring

The contractors/agencies shall deploy adequate manpower, tools & tackles, machinery, safety equipment and supervisory staff for timely execution of works.

Execution progress shall be monitored regularly by:

EIC,

SIC/CIC

Concerned OIC.



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Periodic vendor performance evaluation shall be carried out considering:

- i. Execution progress,
- ii. Resource deployment,
- iii. Quality of work,
- iv. Safety compliance,
- v. Adherence to committed milestones.

Further allocation and award of order for additional quantities shall be considered only in case of satisfactory performance.

- o) GAIL has the sole discretion to qualify or accept the applications for award of additional job or reject the proposal without assigning any reason whatsoever.
- p) Sub-contracting shall not be permitted for contracts awarded through this Walk-In Methodology.
- q) A bidder who has been awarded work in a particular cycle under the Walk-In Methodology for the GAIL Six CGD Project shall not be considered for award in the immediately subsequent cycle within the same GA unless substantial completion of the previously awarded work has been achieved, subjected to the following conditions:
 - Completion of at least 80 % of job awarded during the contract period with Satisfactory performance,
 - After submission of an undertaking that a separate and independent team/resources shall be deployed for execution of the new job.
 - Compliance with quality and safety requirements.
- r) Merely submitting of documents to the GAIL (I) team does not guarantee the award of work.



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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FORMS & FORMAT



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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LIST OF FORMS & FORMAT

Bidders may download the editable copy of the below mentioned format from the link provided below:
<https://workdrive.publicmgovcloud.in/external/ea899ba34e34d11529f54833a346ba15/download>

Form No.	Description
F-1	BIDDER'S GENERAL INFORMATION
F-2	DECLARATION ON PROCEEDINGS AS PER INSOLVENCY AND BANKRUPTCY CODE 2016
F-3	NO DEVIATION CERTIFICATE FORMAT
F-4	AGREED TERMS & CONDITIONS
F-5	REAL TIME GROSS SETTLEMENT (RTGS) / NATIONAL ELECTRONIC FUNDS TRANSFER (NEFT) MANDATE FORM
F-6	INDEMNITY BOND
F-7	NO CLAIM CERTIFICATE
F-8	CONTRACT AGREEMENT
F-9	PROFORMA OF INDEMNITY BOND FOR SUPPLY OF MATERIALS BY EMPLOYER
F-10	UNDERTAKING FOR DEPLOYMENT CAPABILITY
F-11	CERTIFICATE OF MECHANICAL COMPLETION / ELIGIBILITY FOR PARTICIPATION IN WALK-IN PROCESS
F-12	POWER OF ATTORNEY



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



F-1

BIDDER'S GENERAL INFORMATION

**To,
M/s GAIL (INDIA) LIMITED**

**SUB: NOTICE FOR HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR DPNG CONNECTION /LMC
WORKS.**

EOI NO: GAIL/CGD/06 GA/LMC/2026/01

1	Bidder Name	M/s.
2	Status of Firm	Proprietorship Firm/Partnership firm/ Limited Liability Partnership (LLP) firm/Public Limited/ Pvt. Limited/ Govt. Dept. / PSU/ Others If Others Specify: _____ [Enclose relevant certificates / partnership deed/certificate of Registration, as applicable]
3	Name of Power of Attorney holders of bidder	
4	Number of Years in Operation	
5	Bidder Registered Office address (As per GST certificate)	
6	Bidder's address where order/contract is to be placed	
7	Telephone Number/ Mobile no. of address where order is to be placed	
8	E-mail address	
9	Website	
10	Mobile Number:	
11	PAN No.	
12	GST No.	
13	EPF Registration No.	



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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14	ESI code No.	
15	Whether Micro or Small Enterprise	Yes / No
	Whether MSE is owned by SC/ST Entrepreneur(s)	Yes / No
	Whether MSE is owned by Women	Yes / No
16	Whether Bidder is Startups or not	Yes / No <i>(If Yes, the bidder shall submit a valid Startup Recognition Certificate issued by DPIIT, Government of India, specifically covering the field/sector relevant to the scope of work specified in this EOI, duly self-attested by the bidder and certified by a Chartered Accountant.)</i>
	In case of Start-up confirm the following:	
	(i) Date of its incorporation/ registration [The certificate shall only be valid for the entity upto ten years from the date of its incorporation/ registration]	
	(ii) Whether turnover for any financial years since incorporation/ registration has exceed Rs.100 Crores.	
17	Name of the GA bidder Participating For: <i>(Mentioned any one GA name: Varanasi/ Patna/Ranchi/Jamshedpur/ Bhubaneswar/ Cuttack)</i>	

Note: * GAIL intent to place the contract directly on the address from where Works are to be supplied. In case, bidder wants contract at some other address or Works are to be supplied from multiple locations, bidder is required to provide in their bid, the address on which contract is to be placed.

Place:
Date:

[Signature of Authorized Signatory of Bidder]
Name:
Designation:
Seal:



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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F-2

DECLARATION ON PROCEEDINGS AS PER INSOLVENCY AND BANKRUPTCY CODE 2016

**To,
M/s GAIL (INDIA) LIMITED**

**SUB: NOTICE FOR HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR DPNG CONNECTION /LMC
WORKS.**

EOI NO: GAIL/CGD/06 GA/LMC/2026/01

Dear Sir,

I/ We hereby declare that I/We, M/s_____, declare that:

I/We am/are not undergoing insolvency resolution process or liquidation or bankruptcy proceeding as on date.

Further, I/We also confirms that in case there is any change in status of this declaration at any stage of bidding/ execution (in case of award), the same will be promptly informed to GAIL.

It is understood that if this declaration is found to be false, GAIL (India) Limited shall have the right to reject awarded contract, and forfeit the CPS. If the bid has resulted in a contract, the contract will be liable for termination without prejudice to any other right or remedy (including banning or holiday listing) available to GAIL (India) Limited.

Place:

Date:

[Signature of Authorized Signatory of Bidder]

Name:

Designation:

Seal:



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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No Deviation Certificate Format

(To be printed on the Bidder's Official Letterhead)

Date:

**To,
M/s GAIL (INDIA) LIMITED**

SUB: NO DEVIATION CERTIFICATE

**Ref: NOTICE FOR HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR DPNG CONNECTION /LMC
WORKS.**

EOI NO: GAIL/CGD/06 GA/LMC/2026/01

Dear Sir/Madam,

With reference to the above-mentioned bid, I/We hereby certify that I/We have carefully read and clearly understood all the terms, conditions, technical specifications, and requirements mentioned in the bid document.

I/We hereby confirm that our bid/offer is submitted strictly in accordance with all the bid conditions, and there are no deviations or variations of any kind (technical or commercial) from the stipulated terms.

In the event of observance of any deviation in any part of our offer at a later date, whether implicit or explicit, I/We agree that such deviations shall stand null and void, and our bid may be rejected.

Thanking you,

Yours faithfully,

(Signature of Authorized Signatory)

Name: [Name of Signatory]

Designation: [Designation]

Company Seal:



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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AGREED TERMS & CONDITIONS

**To,
M/s GAIL (INDIA) LIMITED**

**SUB: NOTICE FOR HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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WORKS.**

EOI NO: GAIL/CGD/06 GA/LMC/2026/01

This Questionnaire duly filled in, signed & stamped must form part of Bidder's Bid and should be returned along with Un-priced Bid. Clauses confirmed hereunder need not be repeated in the Bid.

Sl.	DESCRIPTION	BIDDER'S CONFIRMATION
1.	The Bidder hereby confirms its unconditional acceptance of all bid conditions, terms and clauses, including the applicable Terms of Payment specified in the Bid Document, without any deviation, exception, reservation, or qualification.	
2.	The bidder hereby confirms that the contract shall be executed entirely at their own risk and liability. GAIL shall not be held responsible for any misconduct, negligence, or unlawful act committed by the bidder during the execution of the contract.	
3.	Bidder confirms that Contract Performance Security will be furnished as per Bid Document within 15 days of FOA in case of successful bidder.	
4.	The bidder hereby confirms and agrees that the contract may be terminated by GAIL at any stage, without assigning any reason whatsoever, under the following conditions: a) Involvement in any corrupt, fraudulent, collusive, or coercive practices, whether before or after award of the contract. b) Any dispute arising during the execution of the contract. c) Non-performance or unsatisfactory performance as determined by the Engineer-in-Charge.	
5.	Bidders confirm compliance to Completion Schedule as specified in Bid document and the same shall be reckoned from the date of Fax of Acceptance.	
6.	The bidder hereby confirms that the contract shall be executed in full compliance with all applicable laws, rules, regulations, and statutory provisions, including but not limited to the Minimum Wages Act, labour laws, insurance requirements, and other applicable Acts and policies.	
7.	The bidder hereby confirms that all responsibilities and liabilities pertaining to manpower, machinery, tools, equipment, and related resources deployed for execution of the contract shall solely rest with the bidder throughout the contract period.	



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Sl.	DESCRIPTION	BIDDER'S CONFIRMATION
8.	All correspondence must be in ENGLISH language only.	
9.	The bidder hereby confirms that they have carefully reviewed the rates specified in the Schedule of Rates (SOR) and unconditionally accept the same for execution of the contract.	
10.	The bidder hereby confirms that they have acquainted with complete scope of work, sites etc to execute work.	
11.	Bidder confirms that all Bank charges associated with Bidder's Bank regarding release of payment etc. shall be borne by Bidder.	
12.	Bidder understands that bid Document is not exhaustive. In case any activity though specifically not covered in description of 'Schedule of Rates' but is required to complete the work as per Scope of Work, Conditions of Contract, or any other part of Bidding document, the accepted rates will deem to be inclusive of cost incurred for such activities unless otherwise specifically excluded. Bidder confirms to perform for fulfilment of the contract and completeness of the supplies in all respect within the scheduled time frame and accepted price.	
13.	Bidder hereby confirms that they are not on 'Holiday' by GAIL or Public Sector Project Management Consultant (like EIL, Mecon, BANDR only due to "poor performance" or "corrupt and fraudulent practices") or banned by Government department/ Public Sector on due date of submission of bid. Further, Bidder confirms that neither they nor their allied agency/(ies) (as defined in the Procedure for Action in case of Corrupt/ Fraudulent/ Collusive/ Coercive Practices) are on banning list of GAIL or the Ministry of Petroleum and Natural Gas. Bidder also confirms that they are not under any liquidation, court receivership or similar proceedings or 'bankruptcy'. In case it comes to the notice of GAIL that the bidder has given wrong declaration in this regard, the same shall be dealt as 'fraudulent practices and action shall be initiated as per the Procedure for action in case of Corrupt/ Fraudulent/ Collusive/ Coercive Practices. Further, Bidder also confirms that in case there is any change in status of the declaration prior to award of contract, the same will be promptly informed to GAIL by them.	
14.	Bidder confirms that they have read and understood the General Conditions of Contract – Works available on GAIL's Tender website (http://gailtenders.in/Gailtenders/gccs.asp) & no 'exception / deviation' anywhere has been taken in the same and that they shall abide by provisions of relevant GCC.	
15.	Bidder certifies that they would adhere to the Fraud Prevention Policy of GAIL [available on GAIL's website (www.gailonline.com)] and shall not indulge themselves or allow	



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Sl.	DESCRIPTION	BIDDER'S CONFIRMATION
	others (working in GAIL) to indulge in fraudulent activities and that they would immediately apprise GAIL of the fraud/suspected fraud as soon as it comes to their notice. Concealment of facts regarding their involvement in fraudulent activities in connection with the business transaction(s) of GAIL is liable to be treated as crime and dealt with by the procedures of GAIL as applicable from time to time.	
16.	Bidder confirms that (i) any variation in GST at the time of supplies for any reasons, other than statutory, including variations due to turnover, shall be borne by them and (ii) any error of interpretation of applicability of rate of GST (CGST & SGST/ UTGST or IGST) on components of an item and/or various items of tender by them shall be dealt as per bid document , GAIL policy and terms and condition.	
17.	Further, GAIL/B AND R reserve the right to seek in physical form (original/notarized true copy) of any document(s) submitted, at any time during the processing of EOI and execution of contract. In the event of failure of a bidder/vendor/contractor to submit original/notarized true copy of any document(s) within the specified time schedule, CPS of the bidder/vendor/contractor shall be forfeited.	

Place:

Date:

[Signature of Authorized Signatory of Bidder]

Name:

Designation:

Seal:



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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**REAL TIME GROSS SETTLEMENT (RTGS) / NATIONAL ELECTRONIC FUNDS
TRANSFER (NEFT) MANDATE FORM**

(To be issued on vendors letter head)

1. Vendor/customer Name :
2. Vendor/customer Code:
3. Vendor /customer Address:
4. Vendor/customer e-mail id:
5. Particulars of bank account:
 - a) Account Holder / Beneficiary Name
 - b) Name of Bank:
 - c) Name of branch:
 - d) Branch code:
 - e) Address:
 - f) Telephone number:
 - g) Type of account (current/saving etc):
 - h) Account Number:
 - i) IFSC code of the bank branch:
 - j) Reason (if) Vendor (S.N.1) and Account
Holder / Beneficiary name (S.N. 5 (a)) is not
the same

I/We hereby authorize GAIL (India) Limited & its wholly owned subsidiary to release any amount due to me/us in the bank account as mentioned above. I/We hereby declare that the particulars given above are correct and complete. If the transaction is delayed or lost because of incomplete or incorrect information, we would not hold the GAIL(India) Limited responsible.

(Signature of vendor/customer)

BANK CERTIFICATE

We certify that Account Holder/Beneficiary_____has an
Account no. _____and IFSC Code :_____with us
and we confirm that the details given above are correct as per our records.

Bank stamp

Date

(Signature of authorized officer of bank)



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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DPNG CONNECTION / LMC WORKS**



**F-6
INDEMNITY BOND**

WHEREAS GAIL (India) Ltd. (hereinafter referred to as “**GAIL**”) which expression shall, unless repugnant to the context include its successors and assigns, having its registered office at 16, Bhikaiji, Cama Place, R.K. Puram, New Delhi 110066 has entered into a contract with M/s*..... (hereinafter referred to as the “**Contractor**”) which expression shall unless repugnant to the context include its representatives, successors and assigns, having its registered office at *..... and on the terms and conditions as set out, inter-alia in the [mention the work order/LOA/EOI No.]and various documents forming part thereof, hereinafter collectively referred to as the ‘**CONTRACT**’ which expression shall include all amendments, modifications and / or variations thereto.

GAIL has also advised the Contractor to execute an Indemnity Bond in general in favour of GAIL indemnifying GAIL and its employees and Directors including Independent Directors from all consequences which may arise out of any prospective litigation or proceedings filed or may be initiated by any third party, including any Banker / financial institution / worker(s) / vendor(s)/ subcontractor(s) etc. who may have been associated or engaged by the Contractor directly or indirectly with or without consent of GAIL for above works.

NOW, THEREFORE, in consideration of the promises aforesaid, the Contractor hereby irrevocably and unconditionally undertakes to indemnify and keep indemnified GAIL and all its employees, Directors, including Independent Directors, from and against all/any claim(s), damages, loss, which may arise out of any litigations/ liabilities that may be raised by the Contractor or any third party against GAIL under or in relation to this contract. The Contractor undertakes to compensate and pay to GAIL and/or any of its employees, Directors including Independent Directors, forth with on demand without any protest the amount claimed by GAIL for itself and for and on behalf of its employees, Directors including Independent Directors together with direct/indirect expenses including all legal expenses incurred by them or any of them on account of such litigation or proceedings.

AND THE CONTRACTOR hereby further agrees with GAIL that:

- (i) This Indemnity shall remain valid and irrevocable for all claims of GAIL and/or any of its employees and Directors including Independent Directors arising out of said contract with respect to any such litigation / court case for which GAIL and/or its employees and Directors including Independent Directors has been made party until now or here-in-after.
- (ii) This Indemnity shall not be discharged/revoked by any change/modification/amendment/assignment of the contract or any merger of the Contractor with other entity or any change in the constitution/structure of the Contractor's firm/Company or any conditions thereof including insolvency etc. of the Contractor, but shall be in all respects and for all purposes binding and operative until any/all claims for payment of GAIL are settled by the Contractor and/or GAIL discharges the Contractor in writing from this Indemnity.

The undersigned has full power to execute this Indemnity Bond for and on behalf of the Contractor and the same stands valid.



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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SIGNED BY :

For [*Contractor*]

Authorised Representative

Place:

Dated:

Witnesses:

- 1.
- 2



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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NO CLAIM CERTIFICATE

(TO BE SUBMITTED BEFORE RELEASE OF CPS/SECURITY DEPOSIT)

[On the Letter-head of Supplier/Vendor]

We, _____, a company incorporated under the laws of India/ a Consortium between *___ and *___ (*name of Consortium partners to be inserted*)/ a Partnership Firm consisting of *___ and *___ (*name of Partners to be inserted*)/ a Sole Proprietorship (as the case may be), having its registered office at _____ and carrying on business under the name and style M/s. _____ were awarded the contract by GAIL (India) Ltd. in reference to EOI No. _____ dated _____ ("Order/Contract").

After completion of the above-said items/job under the Order/Contract, we have scrutinized all our claims, contentions, disputes, issues and we hereby confirm that after adjusting all payments received by us against our R.A. Bills and final bill, we have no claims, dues, issues and contentions from GAIL (India) Ltd.

We further absolve GAIL (India) Ltd. from all liabilities present or future arising directly or indirectly out of the Contract.

There is no economic duress or any other compulsion on us for submission of this no claim certificate.

Signature with Seal of Supplier/Vendor

Dated:



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F-8

PROFORMA FOR CONTRACT AGREEMENT

FOA No.:

DATE:

Contract Agreement for the work of _____ of GAIL (INDIA) LTD.
made on _____ between (Name and Address) _____
_____, hereinafter called the "CONTRACTOR" (which term shall unless
excluded by or repugnant to the subject or context include its successors and permitted assignees) of the one
part and GAIL (INDIA) LIMITED hereinafter called the "EMPLOYER" (which term shall, unless excluded
by or repugnant to the subject or context include its successors and assignees) of the other part.

WHEREAS

- A. The EMPLOYER being desirous of having provided and executed certain work mentioned, enumerated or referred to in the Tender Documents including Letter Inviting Tender, General Tender-Notice, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings, Plans, Time Schedule of completion of jobs, Schedule of Rates, Agreed Variations, other documents has called for Tender.
- B. The CONTRACTOR has inspected the SITE and surroundings of WORK specified in the Tender Documents and has satisfied himself by careful examination before submitting his tender as to the nature of the surface, strata, soil, sub-soil and ground, the form and nature of site and local conditions, the quantities, nature and magnitude of the work, the availability of labour and materials necessary for the execution of work, the means of access to SITE, the supply of power and water thereto and the accommodation he may require and has made local and independent enquiries and obtained complete information as to the matters and thing referred to, or implied in the tender documents or having any connection therewith and has considered the nature and extent of all probable and possible situations, delays, hindrances or interferences to or with the execution and completion of the work to be carried out under the CONTRACT, and has examined and considered all other matters, conditions and things and probable and possible contingencies, and generally all matters incidental thereto and ancillary thereof affecting the execution and completion of the WORK and which might have influenced him in making his tender.
- C. The Tender Documents including the Notice Letter Inviting Tender, General Conditions of Contract, Special Conditions of Contract, Schedule of Rates, General Obligations, SPECIFICATIONS, DRAWINGS, PLANS, Time Schedule for completion of Jobs, Letter of Acceptance of Tender and any statement of agreed variations with its enclosures copies of which are hereto annexed form part of this CONTRACT though separately set out herein and are included in the expression "CONTRACT" wherever herein used.

AND WHEREAS

The EMPLOYER accepted the Tender of the CONTRACTOR for the provision and the execution of the said WORK at the rates stated in the schedule of quantities of the work and finally approved by



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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EMPLOYER (hereinafter called the "Schedule of Rates") upon the terms and subject to the conditions of CONTRACT.

NOW THIS AGREEMENT WITNESSETH AND IT IS HEREBY AGREED AND DECLARED AS FOLLOWS:-

1. In consideration of the payment to be made to the CONTRACTOR for the WORK to be executed by him, the CONTRACTOR hereby covenants with EMPLOYER that the CONTRACTOR shall and will duly provide, execute and complete the said work and shall do and perform all other acts and things in the CONTRACT mentioned or described or which are to be implied there from or may be reasonably necessary for the completion of the said WORK and at the said times and in the manner and subject to the terms and conditions or stipulations mentioned in the contract.
2. In consideration of the due provision execution and completion of the said WORK, EMPLOYER does hereby agree with the CONTRACTOR that the EMPLOYER will pay to the CONTRACTOR the respective amounts for the WORK actually done by him and approved by the EMPLOYER at the Schedule of Rates and such other sum payable to the CONTRACTOR under provision of CONTRACT, such payment to be made at such time in such manner as provided for in the CONTRACT.

AND

3. In consideration of the due provision, execution and completion of the said WORK the CONTRACTOR does hereby agree to pay such sums as may be due to the EMPLOYER for the services rendered by the EMPLOYER to the CONTRACTOR, such as power supply, water supply and others as set for in the said CONTRACT and such other sums as may become payable to the EMPLOYER towards the controlled items of consumable materials or towards loss, damage to the EMPLOYER'S equipment, materials construction plant and machinery, such payments to be made at such time and in such manner as is provided in the CONTRACT.

It is specifically and distinctly understood and agreed between the EMPLOYER and the CONTRACTOR that the CONTRACTOR shall have no right, title or interest in the SITE made available by the EMPLOYER for execution of the works or in the building, structures or work executed on the said SITE by the CONTRACTOR or in the goods, articles, materials etc., brought on the said SITE (unless the same specifically belongs to the CONTRACTOR) and the CONTRACTOR shall not have or deemed to have any lien whatsoever charge for unpaid bills will not be entitled to assume or retain possession or control of the SITE or structures and the EMPLOYER shall have an absolute and unfettered right to take full possession of SITE and to remove the CONTRACTOR, their servants, agents and materials belonging to the CONTRACTOR and lying on the SITE.

The CONTRACTOR shall be allowed to enter upon the SITE for execution of the WORK only as a licensee simpliciter and shall not have any claim, right, title or interest in the SITE or the structures erected thereon and the EMPLOYER shall be entitled to terminate such license at any time without assigning any reason.



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The materials including sand, gravel, stone, loose, earth, rock etc., dug up or excavated from the said SITE shall, unless otherwise expressly agreed under this CONTRACT, exclusively belong to the EMPLOYER and the CONTRACTOR shall have no right to claim over the same and such excavation and materials should be disposed off on account of the EMPLOYER according to the instruction in writing issued from time to time by the ENGINEER-IN-CHARGE.

In Witness whereof the parties have executed these presents in the day and the year first above written.

Signed and Delivered for and on
on behalf of EMPLOYER

GAIL (INDIA) LIMITED

Date:

Place:

Signed and Delivered for and
on behalf of the CONTRACTORs

(M/s. NAME OF THE CONTRACTOR)

Date:

Place:

IN PRESENCE OF TWO WITNESSES

1. _____

2. _____

1. _____

2. _____



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PROFORMA OF INDEMNITY BOND FOR SUPPLY OF MATERIALS BY EMPLOYER

(To be executed on non-judicial stamped paper of appropriate value)

WHEREAS GAIL (INDIA) LTD. (hereinafter referred to as GAIL) which expression shall unless repugnant to the context includes their legal representatives, successors and assigns having their registered office at 16, Bhikaiji Gama Place; R.K.Puram New Delhi has entered into a CONTRACT with _____ (hereinafter referred to as the CONTRACTOR which expression shall unless repugnant to the context include their legal representatives, successors and assigns) for _____ on the terms and conditions as set out, inter-alia, in the CONTRACT No _____ Dated _____ and various documents forming part thereof hereinafter collectively referred to as the "CONTRACT" which expression shall include all amendments, modifications and/or variations thereto.

AND WHEREAS

- i. GAIL has agreed to supply to the CONTRACTOR, equipment, plants and materials (finished, semi-finished and raw) for the purpose of EXECUTION of the. said CONTRACT by the CONTRACTOR (the equipment, plants and materials to be supplied by GAIL to the CONTRACTOR, hereinafter for the sake of brevity referred to as the "said materials") and pending execution by the CONTRACTOR of the CONTRACT incorporating the said materials, the said materials shall be under the custody and charge of the CONTRACTOR and shall be kept, stored, altered, worked upon and/or fabricated at the sole risk and expense of the CONTRACTOR.
- ii. As a pre-condition to the supply of the said materials by GAIL to the CONTRACTOR, GAIL has required the CONTRACTOR to furnish to GAIL an Indemnity Bond in the manner and upon terms and conditions hereinafter indicated.

NOW, THEREFORE, in consideration of the premises aforesaid the CONTRACTOR hereby irrevocably and unconditionally undertakes to indemnify and keep indemnified GAIL from and against all loss, damage and destruction (inclusive but not limited to any or all loss or damage or destruction to or of the said materials or any item or part thereof by theft, pilferage, fire, flood, storm, tempest, lightning, explosion, storage, chemical or physical action or reaction, binding, warping, exposure, rusting, faulty workmanship, faulty fabrication, or faulty method or technique of fabrication, strike, riot, civil commotion, or other act or omission or commission whatsoever within or beyond the control of the CONTRACTOR, misuse and misappropriation (inclusive but not limited to the misuse or misappropriation by the CONTRACTOR and the Contractor's servants and/or agents) whatsoever to, or of in the said materials or any part of them thereof from the date that the same or relative part of item thereof was supplied to the CONTRACTOR upto and until the date of return to GAIL of the said materials or relative part of item thereof or completed fabricated works(s) incorporating the said material and undertake to pay to GAIL forthwith on demand in writing without protest or demur the value as specified by GAIL of the said material or item or part thereof, lost, damaged, destroyed, misused and/or misappropriated, as the case may be or, together with GAIL'S costs and expenses (inclusive of but not limited to handling, transportation, cartage, insurance, freight, packing and inspection costs/or expenses upto) and aggregate limit of Rs. _____ Only (Rupees in word only).



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AND THE CONTRACTOR hereby agrees with GAIL that:

- i. This Indemnity/Undertaking shall be a continuing Indemnity/ Undertaking and shall remain valid and irrevocable for all claims of GAIL arising hereunder upto and until the midnight of _____. However, if the CONTRACT for which this Indemnity/Undertaking is given is not completed by this date, the CONTRACTOR hereby agrees to extend the Indemnity/Undertaking till such time as is required to fulfil the CONTRACT.
- ii. This Indemnity/Undertaking shall not be determined by any change in constitution or upon insolvency of the CONTRACTOR but shall be in all respects and for all purposes be binding and operative until payment of all moneys payable to GAIL in terms of hereof.
- iii. The mere statement of allegation made by or on behalf of GAIL in any notice or demand or other writing addressed to the CONTRACTOR as to any of the said material or item or part thereof having been lost , damaged, destroyed, misused or misappropriated while in the custody of the CONTRACTOR and/or prior to completion of the completed fabricated work(s) and delivery to job site thereof incorporating the said materials shall be conclusive of the factum of the said material or item or part thereof having been supplied to the CONTRACTOR and/or the loss, damage, destruction, misuse or misappropriation thereof, as the case may be, while in the custody of the CONTRACTOR and/or prior to the completion of the completed fabricated work(s) and delivery to job site thereof incorporating the said materials without necessity on the part of GAIL to produce any documentary proof or other evidence whatsoever in support of this.
- iv. The amount stated in any notice of demand addressed by GAIL to the CONTRACTOR as to the value of such said materials lost, damaged, destroyed, misused or misappropriated, inclusive relative to the costs and expenses incurred by GAIL in connection therewith shall be conclusive of the value of such said materials and the said cost and expenses as also of the amount liable to be paid to GAIL to produce any voucher, bill or other documentation or evidence whatsoever in support thereof and such amount shall be paid without any demur and on demand and no dispute shall be raised concerning the same.

The undersigned has full power to execute this Indemnity Bond on behalf of the CONTRACTOR under the Consortium Attorney dated. _____.

(SIGNED BY COMPETENT AUTHORITY)

Place:

Dated:

Official seal of the CONTRACTOR



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UNDERTAKING FOR DEPLOYMENT CAPABILITY

**To,
M/s GAIL (INDIA) LIMITED**

**SUB: NOTICE FOR HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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WORKS.**

EOI NO: GAIL/CGD/06 GA/LMC/2026/01

Dear Sir,

I/We, M/s _____, having our registered office at _____, hereby undertake and confirm the following:

1. We have carefully examined and understood all the terms and conditions of the EOI Document.
2. In the event of award of the work, we shall mobilize and deploy adequate manpower, tools & tackles, equipment, machinery, vehicles, and other required resources for execution of the work at the respective Geographical Area(s) (GA) within the time stipulated in the Contract.
3. We confirm that we possess the necessary organizational capability, technical expertise, financial resources, and operational infrastructure to execute multiple work orders simultaneously, if awarded.
4. We further undertake that the minimum required manpower, along with the necessary supervisory personnel, shall be deployed throughout the contract period to ensure the timely and quality execution of the work.
5. We agree to augment the deployed resources, if required by GAIL/Engineer-in-Charge, to meet the project schedule and maintain the desired progress without claiming any additional cost.
6. We understand that failure to mobilize and deploy adequate resources within the stipulated time or maintain the required deployment during the execution of the contract may result in action as per the provisions of the Contract, including cancellation of the award, forfeiture of Contract Performance Security, and/or any other action deemed appropriate by GAIL.
7. We hereby certify that the above declaration is true and correct. In the event that any information furnished by us is found to be false, incorrect, or misleading at any stage, GAIL and/or its authorized consultant shall have the right to reject our bid, cancel the contract, and take such action as deemed appropriate in accordance with the provisions of the EOI and the applicable policies, procedures, and guidelines of GAIL.

This undertaking is submitted voluntarily as part of our bid.

For and on behalf of the (Bidder's company Name)

Authorised signature & Seal

Name Authorized Signatory:

Designation:

Date:



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**CERTIFICATE OF MECHANICAL COMPLETION / ELIGIBILITY FOR PARTICIPATION IN
WALK-IN PROCESS FOR DPNG CONNECTION/ LMC WORK UNDER EOI NO: GAIL/CGD/06
GA/LMC/2026/01.**

*(To be issued on the letter head of GAIL (India) Limited of the concerned Geographical Area (GA) and
submitted in original along with the bid document.)*

1. Name of Contractor:

2. Name of Geographical Area (GA):

3. Number of Contract(s) Previously Awarded in the Above GA:

A. Status of Mechanical Completion

This is to certify that the contractor has achieved 100% Mechanical Completion of the above-mentioned contract(s), based on any one of the following criteria (✓ whichever is applicable):

- ☐ **Option-I:** All physical works under the contract scope have been completed.
- ☐ **Option-II:** The system has attained the "**Ready for Commissioning**" stage, with a minimum of **80% physical progress** achieved under the contract scope.
- ☐ **Option-III:** A minimum of **80% of the total contract value** has been executed.

Accordingly, the contractor is **eligible to participate in the Walk-In Process for LMC/DPNG Connection Works** for the above-mentioned Geographical Area (GA), in accordance with the provisions of the Walk-In Methodology.

Issued By

On Behalf of GAIL (I) LTD.

Authorized Signature and Stamp

Name:

Designation:

Date:



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POWER OF ATTORNEY

(To be submitted on the letter-head of company)

**To,
M/s GAIL (INDIA) LIMITED**

**SUB: NOTICE FOR HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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WORKS.**

EOI NO: GAIL/CGD/06 GA/LMC/2026/01

Name of Bidder:

"The undersigned _____ (Name of LEGAL PERSON*) is lawfully
Authorized to represent and act on behalf of the company M/s. _____
(Name of bidder) whose registered address is _____

_____ and does hereby appoint
Mr./Ms _____ [name of authorized person/(s)] _____ (Designation)
of M/s _____ (Name of bidder) whose signature appears below to
be the true and lawful attorney/(s) and authorize him/her to sign the bid (both digitally and manually) and all
subsequent communications, agreements, documents etc., in the name and on behalf of the company in
connection with the above mentioned work.

The signature of the authorized person/(s) herein constitutes unconditional obligations of
M/s _____ (Name of bidder).

This Power of Attorney shall remain valid and in full force and effect before we withdrawal it in writing (by fax,
or mail or post). All the documents signed (within the period of validity of the Power of Attorney) by the
authorized person/(s) herein shall not be invalid because of such withdrawal.

SIGNATURE OF THE LEGAL PERSON

(Name of person with Company seal)

SIGNATURE OF THE AUTHORIZED PERSON/(S)

(Name of person)

Designation:

Contact No:

E-mail id:



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SECTION II

GENERAL CONDITIONS OF CONTRACT (GCC)

*General Conditions of Contract - Works
is available on GAIL's Tender website
(<http://gailtenders.in/Gailtenders/gccs.asp>).*





SECTION-III

SPECIAL CONDITIONS OF CONTRACT (SCC)

**Note: Special Conditions of Contract shall be read in conjunction with the
General Conditions of Contract (GCC)-WORKS.**

**GAIL Special Condition of Contract (SCC) shall prevail over GCC Works
where there is conflict on terms & conditions**



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1. GENERAL

- 1.1 Special conditions of contract (SCC) shall be read in conjunction with the General Conditions of Contract (GCC). Schedule of rates, specifications of work, drawings and any other document form-ing part of this contract wherever the context so requires.
- 1.2 Notwithstanding the sub-division of the document into these separate sections and volumes, every part of each with and into the contract so far as it may be practicable to do so.
- 1.3 Where any portion of the GCC is repugnant to or at variance with any provisions of the special conditions of contract, then unless a different intention appears, the provision(s) of the special conditions of contract shall be deemed to override the provision(s) of GCC only to the extent that such repugnancies of variations in the special conditions of contract are not possible of being reconciled with the provisions of GCC.
- 1.4 Wherever it is stated in this Bidding Document that such and such a supply is to be effected or such and such a work is to be carried out, it shall be understood that the same shall be effected/carried out by the contractor at his own cost, unless a different intention is specifically and expressly stated herein or otherwise explicit from the context. Contract value (also referred to as Contract price) shall be deemed to have included such cost.
- 1.5 The materials, design and workmanship shall satisfy the applicable relevant Indian Standards, the job specifications stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied. In the absence of any Standard/ Specifications/codes of practice for detailed specifications covering any part of the work covered in this Bidding on the contractor.
- 1.6 In partial modification to Clause No.21.0 of GCC the following shall apply:
In case of contradiction between Indian or other applicable Standards, General Conditions of Contract, Special Conditions of Contract, Specifications, drawings, Schedule of Rates, the following shall prevail in order of precedence:
 - i) Contract Agreement
 - ii) Detailed Letter of acceptance alongwith statement of Agreed variations.
 - iii) Fax / Letter of Intent / Fax of Acceptance
 - iv) Schedule of Rates as enclosures to letter of acceptance
 - v) Job / Particular Specifications
 - vi) Drawings
 - vii) Technical / Material Specifications
 - viii) Special Conditions of Contract
 - ix) Instructions to Bidders (ITB)
 - x) General Conditions of Contract
 - xi) Indian Standards
 - xii) Other Applicable Standard
- 1.7 It will be contractor's responsibility to bring to the notice of Engineer-in-charge any irreconcilable conflict in the contract documents before starting the work(s) of making the supply with reference which the conflict exists.



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- 1.8 In the absence of any specifications covering any material, design of work(s) in the same shall be performed / supplies / executed in accordance with Standards Engineering Practice as per the instructions / directions of the Engineer-in-charge, which will be binding on the Contractor.
- 1.9 The requirements of any statutory body and authority like Indian boiler regulation, Tariff Advisory Committee, Chief controller of Explosives, etc, shall govern where these are more stringent than the requirements specified above.
- 1.10 Owner's representative means authorized representative of Owner (i.e. M/s GAIL (INDIA) LTD) and / or Consultant.
- 2.0 **THE WORK**
- 2.1 **Scope of work**
The scope of work covered in this Contract will be as described in Annexure-1 to SCC at Particular job specifications, Standard Specifications, Schedule of Rates etc.
- 2.2 **Scope of Supply**
The scope of supply covered in this Contract will be as described in Annexure-2 to SCC Particular Job Specifications, Standard Specifications, and Schedule of Rates etc.
- 2.3 **Time schedule**
- 2.3.1 The work shall be executed strictly as per time schedule given in Annexure-3 to SCC. The period of completion given includes the time required for mobilization as well as testing, rectifications, if any, retesting, demobilization and completion in all respects to the satisfaction of the Engineer-in-Charge
- 2.3.2 A joint program of execution of work will be prepared by the Engineer-in-Charge and Contractor. This program will take into account the time of completion mentioned in 2.3.1 above.
- 2.3.3 Monthly/Weekly execution program will be drawn up by the Engineer-in-Charge jointly with the Contractor based on availability of materials, work fronts and the joint program of execution as referred to above. The contractor shall scrupulously adhere to the Targets/Programs by deploying adequate personnel, Construction Equipment, Tools and Tackles and also by timely supply of required materials coming within his scope of supply as per Contract. In all matters concerning the extent of target set out in the weekly/monthly program and the degree of achievement, the decision of the Engineer-in-Charge will be final and binding on the Contractor.
- 2.3.4 Contractor shall give every day category-wise labour and equipment deployment report along with the progress of work done on previous day in the proforma prescribed by the Engineer-in-Charge.
- 2.4 **Measurement of Works**
In addition to the provisions of Clause 88.1 of the General Conditions of Contract and associated provisions thereof, the provisions of Annexure – 4 to SCC shall apply.
- 2.5 **Terms of Payment**
Terms of Payment will be as specified in Annexure – 5 to SCC.
- 2.6 **Temporary Works**



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All temporary works, ancillary works, enabling works, including dewatering of surface and subsoil water, temporary drains at the work site, preparing approaches to working areas, wherever required, for execution of the work, shall be the responsibility of Contractor.

2.7 Temporary Fencing

The Contractor shall, at his own costs and expenses, erect and maintain in good condition temporary fences and gates along the boundaries of the site assigned to him wherever required as per instruction of Engineer-in-charge. Wherever trenching is being done specially at crossing site near habitation and public movement. The contractor shall provide barricading as per sketch enclosed and provide proper night light as per requirement and to the satisfaction of EIC. The Contractor shall, except when authorized by the Engineer-in-Charge, confine his men, materials and plant etc. within the site of which he is given possession. The Contractor shall not use any part of the site for purpose not connected with the works unless prior written permission or consent of the Owner/Engineer-in-Charge has been obtained. Access to site shall be made only through the approved gateways. The Contractor shall maintain sufficient watchmen at site to the satisfaction of the Owner/Engineer-in-Charge.

2.8 Contractor's Temporary Structure

The Contractor may, at his own costs and expenses and subject to the approval of the Engineer-in-Charge and statutory authorities, construct offices, stores, workshop and remove the same as per the orders of the Engineer-in-Charge on completion of the contract. Whenever required the Contractor shall furnish such details of his temporary works as may be called for by the Owner/Engineer-in-Charge as to their safety and efficiency. The Owner/Engineer-in-Charge may direct those temporary works which he considers unsafe or, inefficient be removed and replaced in a satisfactory manner. The Contractor shall immediately follow Owner/Engineer-in-Charge's direction/instruction, on maintenance of all the equipment's and he shall ensure that they are suitable for the work and is maintained in such a manner as to ensure their efficient working. The Owner/Engineer-in-Charge, may if they deem fit, direct the Contractor to remove from site any equipment which are not efficient and/or prejudicial to the quality of work to be replaced by equipment to their satisfaction. The Contractor shall immediately follow Owner/Engineer-in-Charge's direction/instruction.

2.9 Statutory Approvals

2.9.1 All associated activities required for obtaining necessary clearances, permissions, approvals, all licenses from all concerned authorities in respect of pipeline crossing & all related works shall be the responsibility of the Contractor and the cost of the same shall be deemed to have been included in the accepted prices.

The approval from any authority required as per statutory rules and regulations of Central / State Government shall be the Contractor's responsibility unless otherwise specified in the Bidding Document. The application on behalf of the Owner for submission to relevant authorities along with copies of required certificate complete in all respects shall be prepared and submitted by the Contractor well ahead of time so that the actual construction of the work is not delayed for want of the approval/inspection by concerned authorities. The inspection of the works by the authorities shall be arranged by the Contractor and necessary coordination and liaison work in this respect shall be the responsibility of the Contractor. However statutory fees paid, if any, for all inspections and approvals by such authorities shall be reimbursed at actual by the Owner to the Contractor on production of documentary evidence.



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Any change/addition required to be made to meet the requirements of the statutory authorities shall be carried out by the Contractor free of charge. The inspection and acceptance of the work by statutory authorities shall however, not absolve the Contractor from any of his responsibilities under this Contract.

2.10 Quality Assurance

2.10.1 Bidder shall include in his offer the quality assurance program containing the overall quality management and procedures, which is required to be adhered to during the execution of contract. After the award of contract detailed quality assurance program shall be prepared by the contractor for the execution of Contract for various works, which will be mutually discussed and agreed to.

2.10.2 The Contractor shall establish document and maintain an effective quality assurance system as outlined in recognized codes.

2.10.3 Quality Assurance System plans/procedures of the Contractor shall be furnished in the in the form of QA manual. This document should cover details of the personnel responsible for the quality assurance, plans or procedures to be followed for quality control in respect of Design, Engineering, Procurement, Supply, Installation, Testing and Commissioning.

The quality assurance system should indicate organizational approach for quality control and quality assurance of the construction activities, at all stages of work at site as well as at manufacturer's works and dispatch of materials.

2.10.4 The Employer/ consultant / Consultant or their representative shall reserve the right to inspect / witness, review any or all stages of work at shop/site as deemed necessary for quality assurance.

2.10.5 The Contractor has to ensure the deployment of quality Assurance and Quality Control Engineer(s) depending upon the quantum of work. This QA /QC group shall be fully responsible to carry out the work as per standards and all code requirements. In case Engineer-in-charge feels that contractor's QA/QC Engineer (s) are incompetent or insufficient, contractor has to deploy other experienced Engineer(s) as per site requirement and to the full satisfaction of engineer-in-charge.

2.10.6 In case contractor fails to follow the instructions of Engineer –in-charge with respect to above clauses, next payment due to him shall not be released unless until he complies with the instructions to the full satisfaction of Engineer –in –charge.

2.10.7 The contractor shall adhere to the quality assurance system as per specification enclosed in the bidding document as Annexure-6.

2.11 Notice and Licenses

The Contractor shall at his costs and expenses give to the Municipal or Panchayat, Police and other authorities all notices etc., that may be required in law to be given and obtain all necessary permissions and licenses etc., for temporary obstructions, enclosures and pay all fees, taxes charges etc. which may be leviable by such authorities for that purpose. The Contractor shall make good any damage to the adjoining property whether public or private.

2.12 Working Hours

Depending upon the requirements, time schedule/ drawn up programs and the target set to complete the job in time the works may have to continue beyond normal working hours to the extent of round the clock and on holidays also for which no extra claim shall be entertained.



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2.13 Responsibility of Contractor

Preparing approaches and working area for the movement and operation of the cranes, levelling the area for assembly and erection shall also be the responsibility of the Contractor. The Contractor shall acquaint himself with access availability, facilities such as railway siding, local labour etc.

The procurement and supply in sequence and at the appropriate time of all materials and consumables covered under Contractor's scope of supply shall be entirely the Contractor's responsibility. Contractor shall not use any of the equipment or materials issued to him by Owner for temporary works, manufacturing erection aids etc. Misuse of materials will be seriously viewed and deduction at penal rates will be made from the Contractors bill for such quantities that are misused.

Contract Price is deemed to be inclusive of all expenses towards above responsibilities.

2.14 Additional Works/Extra Works

Owner reserve their right to execute any additional works/ extra works, during the execution of Work, either by themselves or by appointing any other agency, even though such works are incidental to and necessary for the completion of works awarded to the Contractor. In the event of such decisions taken by Owner, Contractor is required to extend necessary cooperation and act as per the instructions of Engineer-in-Charge.

2.15 Compensation for Idle Time

The owner shall make every reasonable effort to have the materials and working front available so as not to delay laying activities. No idle time claim shall be entertained under any circumstances.

2.16 Power and Water Connection

The Purchaser / Consultant will not provide any power and water during construction period. Contractor shall apply and obtain necessary power and water during connection from relevant authority and will pay its usage charge or arrange the same from the other sources.

3.0 Construction

OWNER reserves the right to inspect all phases of Contractor's operations to ensure conformity to the SPECIFICATIONS. Owner will have Engineers, Inspectors or other duly authorized representatives, made known to the Contractor present during progress of the WORK and such representatives shall have free access to the WORK at all times. The presence or absence of an Owner's representative does not relieve the Contractor of the responsibility for quality control in all phases of the WORK. In the event that any of the WORK being done by the Contractor or any Sub-Contractor is found by Owner's representatives to be unsatisfactory or not in accordance with the DRAWINGS, procedures and SPECIFICATIONS, the Contractor shall, upon verbal notice of such, revise the work in a manner to conform to the relevant DRAWINGS, procedures and SPECIFICATIONS.

3.1 Rules and Regulations

Contractor shall observe in addition to Codes specified in respective specification, all national and local laws, ordinances, rules and regulations and requirements pertaining to the work and shall be responsible for extra costs arising from violations of the same.

3.2 Procedures



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Various procedures and method statements to be adopted by Contractor during the construction as required in the respective specifications shall be submitted to Engineer-in-Charge in due time for approval. No construction activity shall commence unless approved by Engineer-in-Charge in writing.

3.3 Security

The work being in protected area, entry into the work area shall be restricted and governed by issue of photo gate passes by the Security/CISF. The Contractor shall arrange to obtain through the Engineer-in-Charge, well in advance, all necessary entry permits/gate pass for his staff and labour and entry and exit of his men and materials shall be subject to vigorous check by the security staff. The Contractor shall not be eligible for any claim or extension of time whatsoever on this account.

3.4 Drawings and Documents

- 3.4.1 The drawings accompanying the bid document (if any) are of indicative nature and issued for bidding purpose only. Purpose of these drawing is to enable the bidder to make an offer in line with the requirements of the Employer/Consultant. However, no extra claim whatsoever, shall be entertained for variation in the "Approved for Construction" and "Bid document drawings" regarding any changes/units. Construction shall be as per drawings/specifications issued/approved by the Engineer-in-Charge during the course of execution of work. Detailed construction drawings (wherever required) on the basis of which actual execution of work is to proceed will be prepared by the contractor.
- 3.4.2 The drawings and documents to be submitted by the Contractor to Employer/Consultant after award of the work as per the requirements enlisted in the bidding document shall be for Employer/Consultant's review, information and record. The Contractor shall ensure that drawings and documents submitted to Employer/Consultant are accompanied by relevant calculations, data as required and essential for review of the document/ drawings. Owner/CMC shall review the drawings/ documents within two weeks from the date of submission provided the same are accompanied by relevant calculations, data as required and essential for review.
- 3.4.3 All documents and drawings including those of Contractor's sub-vendors manufacturers etc. shall be submitted to Employer/Consultant after fully vetted in detail, approved and co-opted by the Contractor & shall bear Contractor seal/ certifications to this effect. All documents/drawings & submissions made to Employer/Consultant without compliance to this requirement will not be acceptable and the delay & liability owing to this shall be to the Contractor's account.
- 3.4.4 The review of documents and drawings by Employer/Consultant shall not absolve Contractor from his responsibility to meet the requirements of specifications, drawings etc. and liabilities for mistakes and deviations. Upon receiving the comments on the drawing/documents reviewed by Employer/Consultant, Contractor shall incorporate the comments as required and ensure their compliance.
- 3.4.5 Copies of all detailed working drawing relating to the works shall be kept at the contractors' office at the site and shall be made available to the Engineer-in-charge/ Employer/Consultant at any time during execution of the contract. However, no extra claim what so ever shall be entertained for any variation in the "approved/issued for construction drawings" and "tender/bid drawings" regarding any changes/units unless otherwise agreed.
- 3.4.6 The Contractor shall rectify any inaccuracies, errors and non-compliance to contractual requirements. Any delay occurring on this shall not construed a reason for delay/ extension.

3.5 Excavation by blasting



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Excavation by blasting is not permitted wherever required in hard strata other mechanical tools shall be used.

3.6 Construction Equipment & Mechanization of Construction Activities

Contractor shall, without prejudice to his overall responsibility to execute and complete the Work as per specifications and time schedule, adopt as far as practicable, mechanized construction techniques for major site activities. However, Contractor agrees that he will deploy the required numbers and types of the part & machinery applicable for different activities in consultation with the Engineer-In-Charge during execution of works.

The Contractor shall mechanize the construction activities to the maximum extent by deploying all necessary construction equipment/machinery in adequate numbers and capacities.

Wherever Structural/Piping works are included in the scope, the Contractor's responsibilities shall include establishing and maintaining of a proper fabrication workshop with transportation facilities to site to carryout fabrication of steel structures, piping specials etc., preparing approaches working areas for the movement/operation of cranes and levelling the areas for assembly/erection to ensure effective mechanization on the works. The Contractor shall acquaint himself with availability of access, facilities such as railway siding, local labour etc. and the Contractor may have to build temporary access roads to aid his work and the agreed rates shall be deemed to include the same. It may be noted that all fabrication work shall be carried out in fully mechanized workshops to reduce site fabrication to minimum.

For speedy execution of work, Contractor shall also ensure use of computer software for at least the following:

- (i) Billing
- (ii) Planning & Scheduling
- (iii) Progress Reporting
- (iv) Material Control & Warehousing
- (v) Safety Records
- (vi) Resource Deployment
- (vii) Communication

Contractor further agrees that Contract price is inclusive of all the associated costs) which he may incur for actual mobilization, required in respect of use of mechanized construction techniques and that the Owner/Consultant in this regard shall entertain no claim whatsoever.

3.7 Site Organization

The Contractor shall provide all necessary superintendence during the design and execution of the Works and as long thereafter as the Engineer-in-Charge may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. Such superintendence shall be given by sufficient persons having adequate knowledge of the operations to be carried out including the methods and techniques required the hazards likely to be encountered and methods of preventing accident for the satisfactory and safe execution of the Work. The workmen deployed, by the Contractor should also possess the necessary license etc., if required under any law, rules and regulations.

Subject to the provisions in the Contract Document and without prejudice to Contractor's liabilities and responsibilities to provide adequate qualified and skilled personnel on the Work, Contractor shall augment the same as decided by the Engineer-in-Charge depending on the exigencies of Work.

3.7.1 Supervision



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All construction work will be carried out as per direction of EIC, and this will be the primary point of contact between the Contractor and GAIL, on site. All work will be issued and sanctioned through the EIC and site control exercised by site engineers. The Contractor shall ensure that technical quality standards are maintained, that construction is carried out cost effectively and that a good customer and public image is maintained for GAIL.

The Contractor will appoint his own supervisors of minimum number instructed by EIC. These personnel will be responsible to the SE for monitoring construction standards and for ensuring that all detailed technical requirements are met on each and every job which is undertaken. The Contractor's supervisor(s) will have day to day liaison with the SE, and will provide the SE with technical reports and audits, and other management information as is required on work progress and construction quality standards.

The Contractor's supervisor shall have smart mobile phones with internet facility to ensure that they can be contacted & communicated at all times. The Contractor will also nominate one person who can be contacted, if necessary, out of hours, for the duration of the works. The Contractor's supervisor will have access to transport at all times to allow them to visit sites and attend meetings with client/ owner as and when are required. The normal day to day issue of work instructions, communication between GAIL, and the Contractor's supervisor and the SE. No deviation from the approved technical specification / issued construction drawings shall be undertaken without written approval of EIC.

The successful bidder / contractor will as far as possible engage local workers/manpower in the activities to be undertaken / executed by them for GAIL.

3.8 Health Safety and Environment (HSE) Management

After the award of the contract, detailed Health, Safety and Environment (HSE) program to be followed for execution of contract under various divisions of works will be mutually discussed and agreed between Contractor, Client & consultant.

The Contractor shall establish document and maintain an effective Health, Safety and Environment (HSE) management system. In case contractor fails to follow the instructions of Engineer-in-charge with respect to above clauses, next payment due to him shall not be released unless until he complies with the instructions to the full satisfaction of Engineer-in-charge.

The Contractor shall adhere to the Health, Safety and Environment (HSE) management system as per GAIL Specification and General Conditions of Contract.

It will be the Contractor's responsibility to acquaint his site staff and operatives of all current safety legislation, statutory requirements and GAIL's safety standards/Safety Management system. In addition, and before any work takes place all the Contractor's operatives shall be given training in site safety by the trained person under supervision of GAIL. If the Contractor wishes to start any new operatives on site, he must first inform the SE, who will arrange for such training to be arranged.

3.9 General Guidelines During and Before Erection

- 3.9.1 The Contractor shall be responsible for organizing the lifting of the structural element, equipment in the proper sequence, that orderly progress of the work is ensured and access routes for erecting the other structures/ equipment are kept open.



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- 3.9.2 During the performance of the work the Contractor at his own cost, shall keep structures, materials and equipment adequately braced by guys, struts or otherwise approved means which shall be Supplied and installed by the Contractor as required till the installation work is satisfactorily completed. Such guys, shoring, bracing, strutting, planking supports etc. shall not interfere with the work of other agencies and shall not damage or cause distortion to other works executed by him or other agencies.
- 3.9.3 Manufacturer's recommendations and detailed specifications for the installation of the various equipment and machines shall be fulfilled by the Contractor.
- 3.9.4 Various tolerances required as marked on the drawings and as per specifications and instructions of the Engineer-in-Charge, shall be maintained. Verticality shall be maintained. Verticality shall be verified with the Theodolite/advanced instruments.
- 3.10 **Construction Photographs**
- The Owner desires to have two sets of monthly/weekly progress reports with photographs showing the progress of construction. Before utilizing any photograph for publicity, the Contractor shall obtain prior approval of the Owner.
- 3.11 **Schedule of Labour Rates**
- Schedule of Labour Rates attached as Annexure-10 to SCC shall be used for analysis rates for extra items.
- Schedule of equipment rates attached as Annexure-11 to SCC shall be used for analysis rates for extra items.
- 3.11.1 **Construction Equipment**
- Minimum construction equipment to be deployed is enclosed as Annexure-8 to SCC. However, any other equipment required for completion of pipeline laying work but not specifically mentioned here, shall be deployed by contractor without any additional cost. The list of equipment mentioned in Annexure-8 is the minimum to be deployed by contractor and contractor shall ensure the availability at site of listed equipment in good working condition.
- 3.12 **Specific Requirements**
- Specific requirements spelt out in various technical parts of the Bidding Document shall be followed by Contractor.
- 3.13 **Site Cleaning**
- 3.13.1 The BIDDER shall take care for cleaning the working site from time to time for easy access to work site and also from safety point of view.
- 3.13.2 Working site should be always kept cleaned up to the entire satisfactions of the Engineer-in-charge.
- Before handing over and work to owner, the BIDDER in addition to other formalities to be observed as detailed in the document shall clear the site to the entire satisfaction of Engineer-in-charge.
- 3.14 **SURVEY OF WORK**



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Before the WORK or any part thereof are begun, the Contractor's agent and the Engineer-in-Charge's representative shall together survey the SITE and decide the tentative route considering all obstructions on which the pipeline is to be laid and on which measurements of the WORK are to be based. Such particulars shall be plotted by the BIDDER and trial pits started thereon.

The Contractor shall be entirely responsible for the correctness of every part of the WORK and shall rectify any errors or imperfections therein. Such rectifications shall be carried out by the Contractor at his own cost, when instructions are issued to this effect by the Engineer-in-Charge or his representative. WORK shall be suspended for such times as necessary for checking lines and levels on any part of the WORK.

The Contractor shall at his own expense provide all assistance, which the Engineer-in-Charge may require for checking the setting out to WORKS.

Before commencement of any activity, Contractor's quality control set up duly approved by company must be available at site.

3.15 MANPOWER DEPLOYMENT

3.15.1 Bidder shall meet the requirement regarding deployment of minimum skilled manpower as specified in the bidding document at Annexure-9.

3.15.2 Minimum 10 (Ten) numbers of plumber teams to be deployed by contractor for contract award value upto Rs.25 Lac and Minimum 20 (Twenty) numbers of plumber teams to be deployed by contractor for contract award value upto Rs.50 Lac.

3.15.3 Schedule of Labour & Equipment Rates

Hiring / Recovery Rate for Deployment of Manpower attached as Annexure- 10 to SCC shall be used for analyzing rates for extra items and recovery for non- deployment of manpower.

3.15.4 Equipment Hiring / Recovery Rates attached as Annexure-11 to SCC shall be used for analyzing rates for extra items and recovery for non-deployment of equipment.

3.16 MOBILIZATION OR SHORTFALL IN MOBILISATION OF MINIMUM EQUIPMENT AND MANPOWER.

3.16.1 Contractor shall maintain record of actual mobilization of each equipment and key personnel and offer the same to EIC on fortnightly basis.

3.16.2 If found necessary, GAIL / Consultant may deploy any equipment / manpower and recover the amount for such deployment as per rates provided at Annexure-10 & 11 to SCC respectively.

3.16.3 In case of early mobilization or additional mobilization of equipment as compared to required equipment's to meet the schedule requirement. Contractor shall not be entitled for any extra claim.

3.16.4 Equipment and key personnel may be demobilized by the contractor on completion works at site after written clearance of Engineer-in-charge. Unilateral withdrawal of any equipment / key manpower by the contractor will attract recovery as per the hiring / recovery rates specified in Annexure-10 & 11 to SCC.

3.16.5 A copy of hindrance registers for the specified period (RA bill period) duly signed by contractor, consultant / GAIL shall be maintained and submitted along with each RA bill.



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4 PERFORMANCE EVALUATION

The performance of execution by contractor shall be regularly evaluated by GAIL /EIC. The contractors/agencies shall deploy adequate manpower, tools & tackles, machinery, safety equipment and supervisory staff for timely execution of works

Intermittent vendor performance evaluation shall be carried out considering:

- o Execution process,
- o Resource deployment,
- o Quality of work
- o Safety compliance
- o Adherence to committed milestones.

Short closure: In case of non-satisfactory performance or default in any of the above parameters, the contract may be short closed by GAIL without any liability on either side, in order to avoid disruption to project timelines and PNG connection targets.

Also, such defaulting contractors may be restricted from participating subsequent walk In cycles of EOI/award.

5 SUB-SEQUENT ORDERS:

GAIL may award further sub-subsequent orders upto Rs 50 lakh on same term and condition, for additional quantities may be awarded to the contractor selected in the walk in methodology without processing new cycle.

The allocation of additional quantities may be considered based on:

- a. Satisfactory performance,
- b. After confirmation and submission of an undertaking that a separate and independent team/resources shall be deployed for execution of the new job.
- c. Compliance with quality and safety requirements.
- d. Completion of at-least 80% of the job awarded.

In case of a subsequent award to the same contractor while the previous contract is still in progress, the contractor shall deploy a separate team for execution of the new work and shall submit an undertaking to this effect. However, subsequent award shall be sole prerogative of GAIL and same shall be exercised as per the requirements.

6. PAYMENT OF INCENTIVE TO PLUMBERS:

GAIL may pay some incentive to plumbers deployed by the contractor under the contract based on the performance of work by plumber as certified by EIC.

- 6.1 Incentive to plumbers shall be admissible only against actual new completed PNG connections and payment shall be made directly to plumbers.
- 6.2 The payment of incentive is sole prerogative of GAIL without any contractual obligation.

7. TESTS, INSPECTION AND COMPLETION

7.1 Tests and Inspection of Material under Contractor's Scope

Inspection and test prior to shipment of material and at final acceptance shall be as specified in Technical Specification. However, without prejudice to the provision of Technical Specification following shall hold good.



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The Owner/Consultant or its representative shall have the right to inspect and or to test the material to conform their conformity to the specification.

If any inspected or tested material fail to conform the specification, the Owner/Consultant may reject them and the contractor shall either replace the rejected materials or make all the alteration necessary to meet the specification, free of cost to the purchaser/consultant.

The Purchaser / Consultant's right to inspect, test and where ever necessary reject the material after the material's arrival in the purchaser / consultant site shall in no way be limited to or waived by reason of the material having previously been inspected, tested and passed by the purchaser/ Consultant or their representative prior to the material shipment from the material supplier.

7.2 Tests and Inspection during execution

The Contractor shall carry out the various tests as enumerated in the technical specifications of this Bidding Document and technical documents that will be furnished to him during the performance of the work at no extra cost to the Owner.

All the tests either on the field or at outside laboratories concerning the execution of the work and supply of materials by the Contractor shall be carried out by Contractor at his own cost.

The work is subject to inspection at all times by the Engineer-in-Charge. The Contractor shall follow all instructions given during inspection and shall ensure that the work is being carried out according to the technical specifications of this Bidding Document, the technical documents that will be furnished to him during performance of work and the relevant codes of practice.

The Contractor shall provide for purposes of inspection access ladders, lighting equipment for testing, necessary instruments etc. at his own cost, low voltage lighting equipment for tray fixing and inspection work.

Compressed air for carrying out works shall be arranged by the Contractor at his own cost.

For material supplied by Owner, Contractor shall carry out the tests, if required by the Engineer-in-Charge, and the cost of such tests shall be reimbursed by the Owner at actual to the Contractor on production of documentary evidence.

Contractor shall inspect carefully all equipment before receiving them from Owner for installation purposes. Any damage or defect noticed shall be brought to the notice of Engineer-in-Charge immediately.

All results of inspection and tests will be recorded in the inspection reports, proforma of which will be approved by the Engineer-in-Charge. These reports shall form part of the completion documents. Any work not conforming to execution drawings, specifications or codes shall be rejected and the Contractor shall carryout the rectifications at his own cost.

Inspection and acceptance of the work shall not relieve the Contractor from any of his responsibilities under this Contract.

7.3 Final Inspection during execution

After completion of all tests as per specification the whole work will be subject to a final inspection to ensure that job has been completed as per requirement. If any defect is noticed, the Contractor will be notified by the Engineer-in-Charge and he shall make good the defects at his own cost and risk with utmost speed. If, however, the Contractor fails to attend to these defects within a reasonable time (time period shall be fixed by the Engineer-in-Charge) then Engineer-in-Charge may have defects rectified at Contractor's cost.



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When these works are carried out at the risk and cost of the Contractor, the Engineer-in-charge would recover the actual cost incurred towards labour, supervisions and material, consumables or otherwise, plus 100% towards overheads from any pending bill of the Contractor or the security deposit.

7.4 Documentation

7.4.1 As- Built Drawings

Notwithstanding the provisions contained in standard specifications, upon completion of commissioning, the BIDDER shall complete all of the related approved drawings along with bill of materials to the "AS BUILT" stage provide to a scale of 1:200 and submit to GAIL, the following:

- a) One complete set in reduced size (279 mm x 432 mm).
- b) One complete set of Soft Copy in CD of all original drawings.
- c) Four complete sets of approved prints in A2 / A3 sizes.

7.4.2 Completion Document

The following documents shall be submitted in hard binder by the BIDDER in FOUR sets, as a part of completion documents: -

- a) Copies of the Inspection reports, Laying Graphs, HDD Profiles (IF ANY) and valve pit drawings (IF ANY).
- b) Pre testing, final Hydrostatic / pneumatic and other Test results and reports.
- c) Consumption statements of PE / GI certified by Owner's Site Engineer.
- d) Final Material Reconciliation, stores issue & return statements
- e) All other requirements as specified in the respective specifications.
- f) Completion Certificate issued by Owner's Site Engineer.
- g) No claim certificate by the BIDDER.
- h) Completion certificate for embedded and covered up works wherever applicable.
- i) Recovery statement, if any.
- j) Deviation statement.
- k) Statement for reconciliation of all the payments and recoveries made in the progress bills.
- l) Copies of deviation statement and order of extension of time, if granted.
- m) Any other contractual documents required on completion.
- n) Total list of houses in the area allotted to him giving details of connections provided & reasons where connection could not be given / completed.
- o) The details recorded in measurement cards of every domestic house.
- p) Details of houses where extra piping done along with materials used.
- q) Total material consumption report.
- r) Material reconciliation with respect to the materials issued.
- s) Test reports & test certificates of gauges etc.
- t) Any other documents / records required.

7.5 Statement of Final Bills-Issue of No Demand Certificate

The final bill of Contractor shall be accompanied by no-demand certificate from the following departments of the Owner:

- a) Administration & Personnel Department regarding vacation of land, housing accommodation, recovery of tents etc.
- b) Fire and Safety Officer and CISF. (IF REQUIRED)



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The Contractor shall obtain such no-demand certificates from the concerned authorities and furnish the same to the Engineer-in-Charge.

7.6 Issue and Reconciliation of Material

Refer Annexure-7 to SCC for details.

8. **LIMITATION OF LIABILITY**

"Clause no. 80.3 of GCC-Works is modified to the following extent:

Following shall stand appended to clause no. 80.3 of GCC-Works:

The final payment by the Employer in pursuance of the Contract terms shall not mean release of the Contractor from all of his liabilities under the Contract. The Contractor shall be liable and committed under this contract to fulfil all his liabilities and responsibilities, till the time of release of contract performance guarantee by the Employer.

9. **CONTRACT PERFORMANCE GUARANTEE**

After issuance of the Contract/FOA, the successful bidder shall furnish Contract Performance Security (CPS) (ISD) equivalent to 10% of the awarded Contract Value. The bidder can submit CPS for 10% of the total awarded value.

OR

Initially, the bidder shall submit an Initial Security Deposit (ISD) equivalent to 2.5% of the awarded Contract Value in the form of DD/IMPS/NEFT/RTGS within thirty (15) days from the date of issuance of the Contract/FOA, as per the details provided below. Submission of the CPS in any other form, such as Bank Guarantee (BG), Surety Bond, Fixed Deposit Receipt (FDR), or any other instrument, shall not be accepted.

The balance 7.5% shall be recovered through deductions from the Running Account (RA) Bills until the total Security Deposit, including the ISD and deductions from RA Bills, reaches 10% of the awarded Contract Value.

Documentary evidence of CPS/ISD submission or payment shall be furnished to the respective GA EIC/responsible official(s), as instructed by GAIL. The CPS amount shall be released as per the terms and conditions mentioned in GAIL GCC for works.

- a. The Contract Performance Security (CPS)/Security Deposit (SD) will be for a period of 90 days beyond the contract period/ duration and applicable Warranty/ Guarantee /Defect Liability Period (if any).
- b. Contract Performance Security (CPS) is to be submitted by bidder within 15 days after issuance of Fax of Acceptance (notification of Award) and in event of delay in submission of CPS, the contract can be terminated.
- c. In case, GAIL allows additional time for submission of CPS beyond 30 days, a penal interest of Marginal Cost of Fund based Lending Rate (MCLR) for one year charged by SBI (applicable on due date of submission of CPS i.e. 30th day after issuance of FOA/Notification of award) plus 4.0% per annum (on CPS amount) shall be charged for delay beyond 30 days i.e. from 31st days after issuance of FOA.



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- d. The Contract Performance Security (CPS) shall be submitted only in the in the form of DD/IMPS/NEFT/RTGS. Submission of the CPS in any other form, such as Bank Guarantee (BG), Surety Bond, Fixed Deposit Receipt (FDR), or any other instrument, shall not be accepted.

10. SUBSEQUENT LEGISLATION

- 10.1 All duties, taxes (including trade tax/ turnover tax/GST as applicable), fees, charges, expenses, etc. (except where otherwise expressly provided in the Contract) as may be levied/ imposed in consequence of execution of the works or in relation thereto or in connection therewith as per the Acts, Laws, Rules, Regulations in force shall be to Contractor's account. However, any new taxes /duties imposed after the date of submission of last price bid & up to Contractual Completion date shall be to the GAIL's account but such Taxes /duties imposed beyond Contractual Completion date shall be to the Contractor's account. However, if such new taxes etc. is in substitute of existing taxes, same will be considered on merit of each case.

11. ISSUE OF CERTIFICATE- PERTAINING TO IMPORT

GAIL shall not provide any kind of certificate in this regard.

12. IMPORT LICENCE

- 12.1 Contractor shall arrange import of all materials required for permanent incorporation in the works as well as construction equipment as per the guidelines laid down by the Government of India. Employer shall not provide import license.

13. INTELLECTUAL PROPERTY

- 13.1 Neither Employer nor Contractor nor their personnel, agents nor any sub-contractor shall divulge to any one (other than persons designated by the party disclosing the information) any information designated in writing as confidential and obtained from the disclosing party during the course of execution of the works so long as and to the extent that the information has not become part of the public domain. This obligation does not apply to information furnished or made known to the recipient of the information without restriction as to its use by third parties or which was in recipient's possession at the time of disclosure by the disclosing party. Upon completion of the works or in the event of termination pursuant to the provisions of the contract, Contractor shall immediately return to Employer/Consultant all drawings, plans, specifications and other documents supplied to the Contractor by or on behalf of Employer/Consultant or prepared by the Contractor solely for the purpose of the performance of the works, including all copies made thereof by the Contractor.

14. FIRM PRICE

- 14.1 The awarded prices shall be firm and shall not subject to price escalation till the work is completed in all respects.

15. WORKS CONTRACT

- 15.1 The work covered under this contract shall be treated as "Works Contract".

16. PROVIDENT FUND ACT



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- 16.1 The Contractor shall strictly comply with the provisions of Employees Provident Fund Act and register themselves with RPFC before commencing work. The Contractor shall deposit Employees and Employers contributions to the RPFC every month. The Contractor shall furnish along with each running bill, the challan/ receipt for the payment made to the RPFC for the preceding months.

17. TERMS OF PAYMENT

- 17.1 Basis and terms of payment for making "On Account Payment" shall be as set out in Annexure-5 to SCC.

18. COORDINATION WITH OTHER AGENCIES

- 18.1 Work shall be carried out in such a manner that the work of other agencies operating at the site is not hampered due to any action of the Contractor. Proper coordination with other agencies will be Contractor's responsibility. In case of any dispute, the decision of Engineer-in-Charge shall be final and binding on the Contractor.

19. SINGLE POINT RESPONSIBILITY

The entire work as per scope of work covered under this contract (to be awarded to any bidder as per evaluation methodology) shall be awarded on single point responsibility basis.

20. ROYALTY

- 20.1 Contractor's accepted rate should include the royalty on different applicable items as per the prevailing Government rates. In case, Employer is able to obtain the exemption of Royalty from the State Government, the contractor shall pass on the same to Employer for all the items involving Royalty.

21. THE FACILITIES FOR WORKMEN

- 21.1 Following facilities are to be ensured at all work places where workmen are deployed/ engaged by Contractor & any other, as required by law at the time of execution.

- Arrangement of first aid
- Arrangement for clean drinking water.
- Toilets
- Canteen where tea & snacks are available
- A crèche where 10 or more women workmen are having children below the age of 6 years.

22. ARBITRATION

All issue(s)/dispute(s) excluding the matters that have been specified as excepted matters and listed at clause no. 2.6 and which cannot be resolved through Conciliation, such issue(s)/dispute(s) shall be referred to arbitration for adjudication by Sole Arbitrator.

The party invoking the Arbitration shall have the option to either opt for Ad-hoc Arbitration as provided at Clause 2.1 below or Institutionalized Arbitration as provided at Clause 2.2 below, the remaining clauses from 2.3 to 2.7 shall apply to both Ad-hoc and Institutional Arbitration:-

- 2.1 On invocation of the Arbitration clause by either party, GAIL shall suggest a panel of three independent and distinguished persons (Retd Supreme Court & High Court Judges only) to the other party from the Panel of Arbitrators maintained by 'Delhi International Arbitration Centre (DIAC) to select any one among them to act as the Sole Arbitrator.



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In the event of failure of the other party to select the Sole Arbitrator within 30 days from the receipt of the communication from GAIL suggesting the panel of arbitrators, the right of selection of the sole arbitrator by the other party shall stand forfeited and GAIL shall appoint the Sole Arbitrator from the suggested panel of three Arbitrators for adjudication of dispute(s). The decision of GAIL on the appointment of the sole arbitrator shall be final and binding on the other party. The fees payable to Sole Arbitrator shall be governed by the fee Schedule of "Delhi International Arbitration Centre".

OR

- 2.2 If a dispute arises out of or in connection with this contract, the party invoking the Arbitration shall submit that dispute to any one of the Arbitral Institutions i.e ICADR/ICA/DIAC/SFCA and that dispute shall be adjudicated in accordance with their respective Arbitration Rules. The matter shall be adjudicated by a Sole Arbitrator who shall necessarily be a Retd Supreme Court/High Court Judge to be appointed/nominated by the respective institution. The cost/expenses pertaining to the said Arbitration shall also be governed in accordance with the Rules of the respective Arbitral Institution. The decision of the party invoking the Arbitration for reference of dispute to a specific Arbitral institution for adjudication of that dispute shall be final and binding on both the parties and shall not be subject to any change thereafter. The institution once selected at the time of invocation of dispute shall remain unchanged.
- 2.3 The cost of arbitration proceedings shall be shared equally by the parties.
- 2.4 The Arbitration proceedings shall be in English language and the seat, venue and place of Arbitration shall be New Delhi, India only.
- 2.5 Subject to the above, the provisions of Arbitration & Conciliation Act 1996 and any amendment thereof shall be applicable. All matter relating to this Contract and arising out of invocation of Arbitration clause are subject to the exclusive jurisdiction of the Court(s) situated at New Delhi.
- 2.6 List of Excepted matters:
 - a) Dispute(s)/issue(s) involving claims below Rs 25 lakhs and above Rs 25 crores.
 - b) Dispute(s)/issue(s) relating to indulgence of Contractor/Vendor/Bidder in corrupt/fraudulent/collusive/coercive practices and/or the same is under investigation by CBI or Vigilance or any other investigating agency or Government.
 - c) Dispute(s)/issue(s) wherein the decision of Engineer-In-Charge/owner/GAIL has been made final and binding in terms of the Contract.
- 2.7. Disputes involving claims below Rs 25 Lakhs and above Rs. 25 crores:- Parties mutually agree that dispute(s)/issue(s) involving claims below Rs 25 Lakhs and above Rs 25 crores shall not be subject matter of Arbitration and are subject to the exclusive jurisdiction of the Court(s) situated at New Delhi.
3. **GOVERNING LAW AND JURISDICTION:**

The Contract shall be governed by and construed in accordance with the laws in force in India. The Parties hereby submit to the exclusive jurisdiction of the Courts situated



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at New Delhi for adjudication of disputes, injunctive reliefs, actions and proceedings, if any, arising out of this Contract.

23. PROJECT PLANNING, SCHEDULING AND MONITORING SYSTEM

23.1 The Contractor shall follow the specifications with respect to Project Planning, Scheduling and Monitoring system as giving in Bidding Document.

24. CHECKING OF LEVELS

24.1 The Contractor shall be responsible for checking levels, orientation plan of all foundations, foundation bolts, etc., well in advance of taking up the actual erection work and bring to the notice of Engineer-in-Charge discrepancies, if any. In case of minor variations in levels etc. the Contractor shall carry out the necessary rectifications to the foundations within his accepted price.

24.2 The Contractor shall also be responsible for checking with templates, wherever necessary, the disposition of foundation bolts with the corresponding bases of structure and shall effect rectifications, as directed, within his accepted rate.

25. STORAGE FACILITIES

25.1 The Contractor shall maintain wherever required an air-conditioned room for the storage of the instruments as well as for calibration and testing of the instruments at his own cost. The contractor shall provide these facilities within the accepted price.

26. BUILDING AND OTHER CONSTRUCTION WORKER'S ACT

In order to govern welfare and working conditions of labourers engaged in construction activities, the Building and other Construction Workers' (Regulation of Employment and Conditions of Service "RE &CS") Act, 1996 came into force. RE&CS Act'1996 is applicable in respect of building and other construction work. Wherever applicable, The CONTRACTOR shall strictly comply with the following provisions pertaining to RE &CS Act'1996.

- a) The CONTRACTOR must be registered with the concerned authorities under the Building and Other Construction Workers' (RE&CS) Act, 1996 or in case of non-registration; the CONTRACTOR should obtain registration within one month of the award of contract.
- b) The CONTRACTOR shall be responsible to comply with all provisions of the Building and Other Construction Workers' (RE&CS) Act, 1996, the Building and Other Construction Workers' Welfare Cess Act, 1996, the Building and other Construction Workers' (RE&CS) Rules, 1998 and the Building and Other Construction Workers Welfare Cess Rules, 1998.
- c) Cess as per the prevailing rate, shall be deducted at source from bills of the CONTRACTOR by the engineer-in-Charge of the contract and remitted to the "Secretary, Building and Other Construction Workers Welfare Board" of the concerned State. The CONTRACTOR shall be responsible to submit final assessment return of the cess amount to the assessing officer after adjusting the cess deducted at source.

27. ORDER PLACEMENT OF BOUGHT OUT ITEMS



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The contractor is required to place firm order for all bought out items of adequate quantity (including 1st lot in those cases where items are required to be procured in more than one lot, if so stated in SOR/ SCC) within 30 days from the date of placement of order, failing which owner reserves the right to procure the same at the risk & cost of the contractor. However, the contractor shall always take prior approval of owner and consultant for items required to be procured.

Further lots (for those cases where items are required to be procured in more than one lot, if so, stated in SOR/ SCC) shall be procured after suitable period so as to ensure adequate availability of material at site throughout the execution period).

28. REQUIREMENTS FOR CONTRACTOR AT SITE

- 28.1 Contractor shall establish site office in the respective areas with adequate facilities like tables, chairs, telephone, and computer with mailing facility etc. for effective communication and documentation.
- 28.2 Contractor shall provide as and when required a wagon(s) suitable for soil removal, for the delivery or reinstatement materials and for the transport of pipe to and from site.
- 28.3 Contractor shall supply transport for their technical staff and operatives to move from site to site, and to move tools and equipment from site to site, this vehicle will also be fitted with a tow bar suitable for the towing of a mobile air compressor or pipe trailer.
- 28.4 Contractor shall make appropriate arrangements to ensure that their supervisor(s) are adequately mobile and can attend sites or meeting with GAIL / Consultant & other authorities or customers as required, without any undue delay.
- 28.5 Contractors shall provide cell phones to their supervisors for day-to-day communication with GAIL / consultant and site representatives of GAIL / Consultant.
- 28.6 Owner will not allow switching/ swapping of key personnel of any contractor working at site from one contractor to another during the continuity of the contract.

29. COMPLIANCE WITH LAWS

- 29.1 The Contractor shall abide by all applicable rules, regulations, statutes, laws governing the performance of works in India, including but not limited to the following:
 - a) Contract Labour (Regulation & Abolition) Act 1970 & the centre rules, 1971 framed there under.
 - b) Payment of Wages Act.
 - c) Minimum Wages Act.
 - d) Employer's Liability Act.
 - e) Factory Act.
 - f) Apprentices Act.
 - g) Workman's Compensation Act.
 - h) Industrial Dispute Act.
 - i) Environment Protection Act.
 - j) Wild life Act.
 - k) Maritime Act.
 - l) Any other Statute, Act, Law as may be applicable.
 - m) PNGRB Act.

30. NOTES TO SCHEDULE OF RATES (SOR)



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- a) The SOR items would be operatable as per job requirement.
- b) The quantities stated in SOR are tentative and may vary considerably on $\pm$ side depending upon site condition, methodology adopted as per site requirement. The payment will be made as per actual certified Measurement at site and as instructed by EIC.
- c) The scope as mentioned in the SOR is of indicative nature only and shall include all activities as detailed in the relevant clauses of the specifications attached and other relevant documents enclosed with bid.
- d) Any other materials & activities not mentioned/covered in SOR, but otherwise required for satisfactory completion/safety of work as defined in tender/bid has to be supplied /done by contractor with in the specified schedule at no extra cost to owner.
- e) Contractor shall be required to deploy adequate no. of plumbing teams to ensure domestic conversions expeditiously. In this regard, no. of independent teams shall be decided by Engineer-in-charge.
- f) Efforts shall be made to offer complete work front in nearby areas based on availability. However, it is to be noted that offered the work front may be at different locations (which may not be near to each other) in staggered basis across the GA. Bidder to understand to execute the required work at various locations and be prepared as per the allotted fronts at scattered locations across the GA.

31. INSURANCE

All kind of Insurances including transit Insurance shall be borne & arranged by the bidder in line with clause no. 101 of GCC-Works. SOR price shall be inclusive of this cost.

32. PRICE REDUCTION SCHEDULE (PRS)- Not Applicable

33. SUB-LETTING OF WORKS- Not applicable

34. BONUS FOR EARLY COMPLETION- Not Applicable

35. JOINTS MEASUREMENT OF WORK EXECUTED, BILLING, INVOICE AND PAYMENTS.

Measurement shall be recorded as per the methods of measurement spelt out in Specification/Contract Documents/ Procedure of GAIL.

36. WAY BILL / ROAD PERMIT

Shall be issued by Owner only for transportation of free issue material from one state to another.

37. LOCAL EMPLOYMENT

In order to encourage local employment, contractor shall endeavor to deploy personnel pass-out from local institutes including execution of non-critical activities through local agencies. However, preference should be given to engage more unskilled manpower resources locally to boost local employment.

**38. COMPLETION CERTIFICATE
AS PER GCC.**



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39 PRADHAN MANTRI SURAKSHA BIMA YOJANA (PMSBY) AND PRADHAN MANTRI JEEVAN JYOTI BIMA YOJANA (PMJJBY)

Contractor shall ensure that all its personnel deployed under this contract have obtained additional insurance coverage under the Pradhan Mantri Suraksha Bima Yojana (PMSBY) and Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY) through the participating banks and submit the proof of such insurance coverage to the satisfaction of GAIL. The cost of the insurance premium amount for both the above schemes shall be borne by the contractor giving evidence/proof to GAIL in this respect and the Contractor shall suitably consider the same in their bid.

Both the schemes are to be regulated continuously on yearly basis and the same should be renewed on each successive relevant date in subsequent years.

40. PLANNING AND DESIGNING IN PURVIEW OF VULNERABILITY ATLAS OF INDIA

The following provision shall be considered as a part of General Conditions of Contract-Works: Vulnerability Atlas of India (VAI) is a comprehensive document which provides existing hazard scenario for the entire country and presents the digitized State/UT- wise hazard, maps with respect to earthquakes, winds and floods for district-wise identification of vulnerable areas. It also includes additional digitized maps for thunderstorms, cyclones and landslides. The main purpose of this Atlas is its use for disaster preparedness and mitigation at policy planning and project formulation stage.

This atlas is one of its kind single point source for the various stakeholders including policy makers, administrators, municipal commissioners, urban managers, engineers, architects, planners, public etc. to ascertain proneness of any city/location/site to multi-hazard which includes earthquakes, winds, floods thunderstorms, cyclones and landslides. While project formulation, approvals and implementation of various urban housing, buildings and infrastructures schemes, this Atlas provides necessary information for risk analysis and hazard assessment.

The Vulnerability Atlas of India has been prepared by Building Materials and Technology Promotion Council under Ministry of Housing and Urban Affairs, Government of India and available at their website www.bmtpc.org. It is mandatory for the bidders to refer Vulnerability Atlas of India for multi-hazard risk assessment and include the relevant hazard proneness specific to project location while planning and designing the project in terms of.

- a. Seismic zone (II to V) for earthquakes,
- b. Wind velocity (Basic Wind Velocity: 55, 50, 47, 44, 39 & 33 m/s)
- c. A reliable to floods and Probable max, surge height
- d. Thunder storms history
- e. Number of cyclonic storms/ severe cyclonic storms and max sustained wind specific to coastal region
- f. Landslides incidences with Annual rainfall normal
- g. District wise Probable Max. Precipitation.

41. The contractor fully understands that timely completion of the work as per the schedule is of paramount necessity as otherwise it would lead to adversely affecting the schedules of other works/project with resultant financial and other losses to the owner. In view of this, the contractor unconditionally agrees and binds himself to be liable for all the consequences for unsatisfactory performance and non-completion of the work within the stipulated time.



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ANNEXURES TO SCC

C O N T E N T S

Annexure-1	:	Scope of Work
Annexure-2	:	Scope of Supply
Annexure-3	:	Time Schedule
Annexure-4	:	Measurement of Work
Annexure-5	:	Terms of Payment
Annexure-6	:	Quality Assurance
Annexure-7	:	Conditions for issue & reconciliation of material
Annexure-8	:	Construction equipment to be deployed
Annexure-9	:	Minimum no. of skilled manpower to be deployed
Annexure-10	:	Schedule of Labour Rate
Annexure-11	:	Schedule of Equipment Hourly Rental Rate



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SCOPE OF WORK

(ANNEXURE-1 TO SPECIAL CONDITIONS OF CONTRACT)



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ANNEXURE-1 TO SCC

1.0 SCOPE OF WORK

Scope of work shall be as detailed in Particular Job Specification, Technical Specifications, Schedule of Rates & various other parts of this Bidding Document.



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SCOPE OF SUPPLY

(ANNEXURE-2 TO SPECIAL CONDITIONS OF CONTRACT)



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ANNEXURE-2 TO SCC

1.0 SCOPE OF SUPPLY

1.1 Owner's Scope of Supply (Free Issue Item)

Owner's scope of supply shall be as specified in Particular Job Specification, Technical specifications, Schedule of Rates & various other parts of the Bidding Document.

In order to speed up the project Free Issue Materials on replacement basis shall be issued to the Contractor from the designated store(s) of GAIL (I) Ltd. Contractor shall be responsible for lifting the free issue materials from Owner's storage point(s) and transporting the same to work site(s) at his own cost.

Conditions for Issue and Reconciliation of Materials shall be as per Document enclosed as

Annexure-7 to Special Conditions of Contract.

1.2 Contractor's Scope of Supply

All materials except what is under Owner's scope of supply as mentioned in Clause No. 1.1 above, and required for successful completion of works in all respects shall be supplied by the Contractor and the cost of such supply shall be deemed to have been included in the accepted price without any additional liability on the part of Owner.



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TIME SCHEDULE

(ANNEXURE-3 TO SPECIAL CONDITIONS OF CONTRACT)



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ANNEXURE-3 TO SCC

TIME SCHEDULE

Validity of the contract shall be as below.

Name of Work	Scope of work	Time of Completion
LMC and associated works for City Gas Distribution.	For Contract value up to 25 Lakhs/proportionate DPNG connections	To be completed within 60 days from the date issuance of FOA.
	For Contract value up to 50 Lakhs/ proportionate DPNG connections	To be completed within 90 days from the date issuance of FOA.

Note:

- 1) The above time schedule is inclusive of mobilization period of 07 days.
- 2) The time indicated is for completing all the works in all respects as per specifications, codes, drawings and instructions of Engineer-in-charge.
- 3) It is to be noted that the completion period of complete scope of works mentioned above and/or in tender/bid document includes preparation of drawings (if required), procurement and supply of materials including their inspection & testing, mobilization at site, construction, laying/ installation, fabrication, erection, testing, inspection, testing, rectification (if any), pre-commissioning, commissioning and demobilization works etc. complete in all respects to the entire satisfaction of Owner/ Engineer-in- charge.
- 4) Performance shall be evaluated based on pro rata achievements in line with above schedules through intermittent vendor evaluation process.
- 5) In case work could not be completed in above stated period for reasons solely attributable to owner, suitable time extension shall be given. Successful bidder(s) shall be bound to carry out the work at same rates, terms & conditions within the extension granted.



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**MEASUREMENT OF WORK
(ANNEXURE-4 TO SPECIAL CONDITIONS OF CONTRACT)**



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ANNEXURE-4 TO SCC

MEASUREMENT OF WORK

1.0 GENERAL

- 1.1 The mode of measurement shall be as mentioned in relevant standard specification incorporated in the Bidding Document. Any other mode of measurements not covered in above specifications shall be followed in accordance with relevant BIS codes/ Schedule of Rates/ Specifications etc. and/ or as decided by Engineer-in-charge.
- 1.2 Payment will be made on the basis of joint measurements taken by Contractor and certified by CMC/Site Consultant Engineer. Measurement shall be based on "Approved for Construction" drawings, to be the extent that the work conforms to the drawings and details are adequate. 3-5% checking of measurement work shall be by GAIL engineer.
- 1.3 Payment will be made on the basis of joint measurements taken by Contractor and certified by CMC Engineer. Measurement shall be based on "Approved for Construction" drawings, to be the extent that the work conforms to the drawings and details are adequate. 3-5% checking of measurement work shall be by GAIL (I) engineer.
- 1.4 Wherever work is executed based on instructions of Engineer-in-charge or details are not adequate in the drawings, physical measurements shall be taken by Contractor in the presence of Engineer-in-charge.
- 1.5 Measurements of weights shall be in metric tonnes corrected to the nearest Kilogram. Linear measurements shall be in meters corrected to the nearest centimeters.
- 1.6 The weights mentioned in the drawing or shipping list shall be the basis for payment. If mountings for panels etc. are packed separately, their erection weights shall include all mountings.
- 1.7 Welds, bolts, nuts, washers etc. shall not be measured. Rates for structural steel work shall be deemed to include the same.
- 1.8 No other payment either for temporary works connected with this Contractor for any other item such as weld, shims, packing plates etc. shall be made. Such items shall be deemed to have been included for in the rates accepted.
- 1.9 Measurement will be made for various items under schedule of rates on the following basis as indicated in the unit column.
 - i) Weight : MT or Kg
 - ii) Length : M (Meter)
 - iii) Number : No.
 - iv) Volume : Cu.M
 - v) Area : Sq.M



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2.1 **PIPING**

- 2.2 Length of pipes shall be measured along the curvilinear center of the pipelines laid/ installed and shall include all types of fittings, bends etc. but excluding all types of valves. Length of valves shall be excluded from piping measurement and shall be considered on number basis.

3.0 **FOR PIPELINE CROSSINGS BY HDD (if required) / BORING / MOLING METHOD**

Payment shall be made as specified in SOR, PJS and Technical Specification.



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TERMS OF PAYMENT

(ANNEXURE-5 TO SPECIAL CONDITIONS OF CONTRACT)



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ANNEXURE-5 TO SCC

1. TERMS OF PAYMENT

Pending completion of the whole works, provisional progressive payments for the part of work executed by the contractor shall be made by Owner on the basis of said work completed and certified by the Owner's representative as per the agreed milestone payment schedule and the percentage break-ups given below.

Each invoice will be supported by documentation acceptable to Owner and certified by the Owner's representative. Payments made by owner to the contractor for any part of the work shall not deem that the Owner has accepted the work.

The Contractor shall submit the invoice at a minimum interval of 15 (fifteen) days, provided that the value of work executed is at least 20% of the awarded contract value.

2. No mobilization advance is permissible.
3. Milestone Payment breakup for all items.

A. For SOR item A00101 to A00105, A00201

70%	In continuous stretches including trench less laying or total scope whichever is less after completion of trenching, lowering, electro-fusion jointing of pipeline, back-filling and compaction for the complete stretch as per the scope of work. Testing of network, installation of Permanent Markers & Valve chambers and restoration of pits.
25%	After commissioning with Natural Gas. If natural gas is not available and the delay is attributable to the Owner then commissioning to be done with Nitrogen after 10 days from the date of Testing.
5%	Submission of all documents of complete network, Final Bill & Closure of contract.

B. For SOR item A00301 to A00308, B00201

80%	After Civil works/ Cutting/ Breaking and complete Restoration area wise as per the standards (bidder may note that restoration work shall be carried out after successful laying & testing in respective area).
15%	After 90 days of GAS charging of pipe/obtaining NOC from respective local authorities / Third party agencies designated by land owning agencies whichever is earlier.
5%	After Completion of all works and closure of contract.

C. For SOR item A00501 to A00507, A00701 to A00704, A00801, H00301

80%	Upon supply and Complete installation of item's and all its associated work.
15%	After commissioning.
5%	After submission of documents and closure of contract.

D. For SOR item B00101 to B00112, B00701 to B00703, B00401, B00501, H00101 to H00102, H00201 to H00204, H00401 to H00403

75%	Completion of installation of pipes including all fittings, valves, etc. and clamping. Testing of installations and after updating data at SAHAJ Portal (case decided by EIC).
20%	After commissioning with Natural Gas. If natural gas is not available and the delay is attributable to the Owner then with Nitrogen after 10 days from the date of Testing. Submission of As-built/Isometric drawings.
5%	After submission of documents and closure of contract.

E. For SOR item B00601



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70%	Upon Complete installation of Items and its associated work, restoration of all damages to its original conditions & submission of isometric drawing & updating data at SAHAJ Portal
25%	Testing of installations and Pre-commissioning with Nitrogen at positive pressure or commissioning with gas charging including all related activities (case decided by EIC) and submission of JMR within 02 working days of conversion, updating data at SAHAJ Portal (case decided by EIC).
5%	After submission of documents and closure of contract

- F. For SOR item A00309 to A00313, B00602, C00101 to C00102, I00101 TO I00102, J00101, K00101 TO K00105, E00101 TO E00111

95%	After completion of the work in all respects.
5%	After submission of documents and closure of contract

- G. For SOR item D00101 to D00106

95%	On deployment to the Satisfaction of EIC
5%	After submission of documents and closure of contract

- H. Any Other work (Not mentioned above)

95%	On deployment & completion of work in all respect and Satisfaction of EIC.
5%	After submission of documents and closure of contract

Note:

- a. **Any further breakup of each activity for the payment purpose can be done depending upon the site situation / requirement and recommendation by EIC and approval of construction in-charge.**
- b. Notes for SOR Items for valve pit: For the payment of changed size of valve pit other than SOR item due to site requirements, the following to be adopted.
 1. In case of any change in size of valve pit, the following shall be adopted for proportionate payment at the accepted rates for reduced or increased dimensions than sizes specified in item the quantity shall be arrived proportionately based on the actual perimeter constructed and specified perimeter of items

4. Payment Methodology

- A. The contractor shall raise invoices and shall enclose all documents as per check list issued by CMC/ Owner during kick off meeting or later. All the RA bills are to be submitted to EIC (Consultant/ GAIL).
- B. The bidder shall submit the initial Contract Performance Security (CPS), Contract Agreement, and all other documents specified in the EOI before submitting any RA bill to GAIL (I) LTD.
- C. Employer will release payment through e-payments only as detailed in the Bidding Document.
- D. Further break-up of Lumpsum Prices, if deemed necessary for any progressive payment of individual item may be mutually arrived at between Engineer-in-Charge and the Contractor.
- E. All payments against running bills are advance against the work and shall not be taken as final acceptance of work / measurement carried out till the final bill.



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- F. The Contractor shall be responsible to submit the invoices to EIC or designated person in GAIL for measurement certification and bills shall be processed through VIM based on certification by SIC/CIC.
- G. The contractor shall submit RA bills in prescribed pro-forma. Following documents are to be provided along with Measurement Book & Abstract of Measurement.
- H. Measurement sheets duly verified and certified by EIC, in support of the works executed as per SOR for the billing period along with below documents.
 - I. Copy of PF remittance challan.
 - II. Copy of ESIC remittance.
 - III. Copy of Wage register.
 - IV. Two sets of Construction Photographs
- I. In the absence of the requisite documents, the Measurement Book / Abstract of Measurement shall be returned to the contractor.
- J. Successful bidder(s) to submit material reconciliation certificate along with each bill.
- K. Bills shall be raised by contractor in line with check list attached in Tender/bid document.
- L. As per CBDT Notification No. 95/2015 dated 30.12.2015, mentioning of PAN no. is mandatory for procurement of goods / services/works/consultancy services exceeding Rs. 2 Lacs per transaction.

Accordingly, supplier/ contractor/ service provider/ consultant should mention their PAN no. in their invoice/ bill for any transaction exceeding Rs. 2 lakhs. As provided in the notification, in case supplier/ contractor/ service provider/ consultant do not have PAN no., they have to submit declaration in Form 60 along with invoice/ bill for each transaction.

Payment of supplier/ contractor / service provider/ consultant shall be processed only after fulfilment of above requirement.

5. E Payment

- I. GAIL has initiated payments to Contractors electronically, and facilitate the payments electronically through 'e-banking'.
- II. GAIL Limited has implemented Vendor Invoice Management (VIM) system titled as #SARATHI# for automation, digitization & centralization of Account Payable process.
- III. Supplier/ Contractor/Service Provide/ Consultant is required to upload digital invoice on 'Sparsh' portal. The system optimizes and simplifies the process of receiving, managing, monitoring and forwarding invoices for payment process. The link of 'Sparsh' portal is as under:
- IV. <https://sparsh.gail.co.in/flipper/#/login>
- V. The 'Help Manual' hyperlink to access the detailed User Manual, Demo Videos, FAQ#s and other relevant information is available on 'Sparsh' portal.
- VI. Only digital invoice is to be uploaded on 'Sparsh' portal and all other supporting documents along with copy of invoice are to submitted to concerned as defined in Purchase Order (PO)/ Letter of Acceptance (LOA).

Note:

- a) Up to 75% of admissible payment against certified works may be released at the sole discretion of GAIL within seven (07) days of submission of invoice based on certification by EIC & SIC/CIS.
- b) Balance payment shall be released after submission and verification of complete supporting documents.



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QUALITY ASSURANCE

(ANNEXURE-6 TO SPECIAL CONDITIONS OF CONTRACT)

(For details- Refer our Technical Specification No. BR/QA/001 of the same is enclosed in Vol.-II of bid document.)



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CONDITIONS FOR ISSUE AND RECONCILIATION OF MATERIAL

(ANNEXURE-7 TO SPECIAL CONDITIONS OF CONTRACT)



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ANNEXURE-7 TO SCC

1.1 CONDITIONS FOR ISSUE OF MATERIALS

Whenever any material is issued by Owner, following conditions for issue of material in addition to other conditions specified in the contract shall be applicable.

- 1.2 Necessary indents will have to be raised by the Contractor as per procedure laid down by the Engineer-in-charge from time to time, when he requires the above material for incorporation in permanent works.
- 1.3 Materials will be issued only for permanent works and not for temporary works, enabling works etc. unless specifically approved by the Engineer-in-charge and the same shall not be taken into account for the purpose of materials reconciliation.
- 1.4 The contractor shall bear all other cost including lifting, carting from issue points to work site/ contractor's store, custody and handling etc. and return of surplus/ serviceable scrap materials to Owner's storage points to be designated by the Engineer-in-charge etc. No separate payment for such expenditure will be made.
- 1.5 No material shall be allowed to be taken outside the plant without a gate pass.
- 1.6 The contractor shall be responsible for proper storage, preservation and watch & ward of the materials.

1.7 Reconciliation of Owner supplied materials

- 1.7.1 Every month, the contractor shall submit an account for all materials issued by Owner in the proforma prescribed by the Engineer-in-charge. On completion of the work the contractor shall submit "Material Appropriation Statement" for all materials issued by the Owner in the proforma prescribed by the Engineer-in-charge.

Waste materials like part lengths of pipes and other partly used items are the property of GAIL (I) LTD. and must be returned to the store with the appropriate documentation so that they can be considered as part of the material reconciliation.

Item	Unaccountable	Scrap
Regulators & Meters	0%	0%
PE Pipes	2%	2% (less than 20.0 mtrs.)
GI Pipes*	2%	2% (less than 1.0 mtrs.)
Consumables	Discretionary	-

* In case supplied by Owner

Unaccountable wastage / scrap shall be at actual as per site assessment subject to maximum as stated above.

The percentage allowance shall be accounted on the basis of final measurement book.

- 1.7.2 All unused, scrap materials and salvageable materials shall be the property of the Owner and shall be returned by the Contractor category-wise at his cost to the Owner's designated store yard(s). In case the Contractor fails to do so/ or exceeds the limits of allowances specified above for scrap/ serviceable materials, then recovery for such quantities not returned as well as returned in excess of permitted limit



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by the Contractor will be done at the penal rate i.e. 125% of landed cost at the time of final bill/ closing of contract by Engineer-in-charge shall be effected from the Contractor's bill(s) or from any other dues of the Contractor to the Owner. Contractor shall be responsible for the adjustment/ weighment/ measurement of the surplus materials to be returned to the store. Contractor shall also be responsible for suitable segregation of returned materials into separate stacks of serviceable and scrap materials.

- 1.7.3 Wherever certain material is covered under Contractor's scope of supply whether part or in full for any item of work covered under SOR, no allowance towards wastage / scrap etc. shall be accounted for during execution stage.



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CONSTRUCTION EQUIPMENT TO BE DEPLOYED

(ANNEXURE-8 TO SPECIAL CONDITIONS OF CONTRACT)



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**ANNEXURE-8
CONSTRUCTION EQUIPMENT TO BE DEPLOYED**

Sl. No.	Description of Item	Min Qty. to be Deployed* per requirement
i.	Electro-fusion machine with Bar Code, GPS antenna, Memory to store up to 2048 weld data, USB interface and control box with leads	As and when required
ii.	Moling Equipment	As and when required
iii.	PE Squeeze Tools for 20mm / 32mm Pipes	2
iv.	Universal pipe scrapper 20mm, 32mm / hand scrappers	2
v.	Tapping tools for PE service tees	1 sets of all size
vi.	PE pipe cutter / Guillotine	2
vii.	Cable and pipe locator	As and when required
viii.	PE closure plugs / test ends for 20mm / 32mm pipes	As and when required
ix.	Towing heads	As required
x.	Pipe alignment clamps, jointing of elbow, tee, top loading clamps for top tee	2
xi.	Pipe straighteners, re-rounding tools of all pipe sizes	2
xii.	Jumping Jack compactor	As and when required
xiii.	Roller for asphalting	As and when required
xiv.	Water tanker	As and when required
xv.	Hammer Drill	As and when required
xvi.	Power Generator a) 5.5 kVA, b) 2.5kVA	As and when required
xvii.	Piston Drill	As and when required
xviii.	Conversion Kit	As and when required
xix.	Pneumatic Test Pumps	2
xx.	Die sets for thread preparation	2
xxi.	Soldier Torch	2
xxii.	Cleaning pads	5
xxiii.	Cleaning Brush	5
xxiv.	Voltage Stabilizer	2
xxv.	Calibrated Pressure Gauge (0-6 Bar)	As and when required
xxvi.	Acetone/ H2O2 (pipe cleaner)	As and when required
xvii.	Harness belts & clamps	As and when required
xviii.	live-wire dictator	2

* Number of equipment indicated hereinabove may be revised by Engineer In-charge for various sites depending on quantum of work and work front made available to the contractor. Any additional equipment requirement, whenever asked for by the Engineer In-charge, shall be deployed by the contractor at site without any additional cost to Owner.

Notes:

- Any other equipment required for completion of pipeline laying work but not specifically mentioned hereinabove, shall be deployed by contractor without any additional cost to Owner. Contractor shall deploy above mentioned equipment's in good working condition & properly calibrated.



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2. Mobilization shall be considered complete only after equipment's having quantity specifically mentioned hereinabove / quantity decided by engineer-in-charge on case-to-case basis at site are made available at site in good working condition as verified by EIC.



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**MINIMUM NO. OF SKILLED MANPOWER TO BE DEPLOYED
(ANNEXURE-9 TO SPECIAL CONDITIONS OF CONTRACT)**



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ANNEXURE-9

NUMBER OF SKILLED MANPOWER TO BE DEPLOYED

S. No	Description	Requirement per contractor for contract award value up to ₹25 lakh.	Requirement per contractor for contract award value up to ₹50 lakh.
1	Foreman/Supervisor	1	1
2	Fusion Operation/ Jointer	As required	As required
3	Skilled Workers (GI Plumber)	10	20
4	Plumber's Helper	As required	As required
5	NG Conversion Team	As required	As required
6	Skilled Workers (Moling Team)	As and when required	As and when required
7	Conversion team	As required	As required
8	Unskilled Workers (Labour)	As and when required	As and when required

The above proposed list of skilled manpower is the minimum to be deployed by Contractor.

NOTES: -

1. The details of minimum manpower required to be mobilized by the execution contractor to complete the work within schedule is given above and is not exhaustive. Contractor is required to augment the above list with additional numbers/categories of workmen as required and directed by Engineer-In charge to complete the work within the completion time schedule.
2. The Manpower as identified above should have required qualification and adequate relevant experience.
3. The minimum no. of. skilled manpower to be deployed may however vary (increase/decrease) depending on availability of work front. The decision of EIC in this regard shall be final.



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**SCHEDULE OF LABOUR RATES
(ANNEXURE-10 TO SPECIAL CONDITIONS OF CONTRACT)**



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ANNEXURE –10 to SCC

**SCHEDULE OF LABOUR RATES
(FOR EXTRA WORKS)**

1. The Labour rates are “all inclusive”. These rates include but are not limited to all payroll costs and allowances, payroll taxes, fringe benefits, protective and/or special clothing, construction supplies required for work of a nature included in this contract, overhead, profit, insurance, transportation and travel time.
2. The rates are inclusive of providing hand tools and consumables such as electrodes, filler wire, gases, grinding wheels where the concerned category of labour is expected to use in execution of the job but exclusive of all major equipment and machineries.
3. The normal time labour rates shall apply for all hours worked upto eight (8) hours in a day and overtime rates shall apply for all hours worked in excess of eight (8) hours in one working day, Sunday and Public Holidays. The payment for part of the day shall be made on prorata basis.

SR NO.	CLASSIFICATION PERSONNEL	RATE PER DAY OF NORMAL HOURS	RATE PER HOUR FOR OVER TIME, SUNDAY & HOLIDAY
		IN RS.	IN RS.
1	FOREMAN	3217	402
2	SURVEYOR	2275	284
3	SUPERVISOR	3575	446
4	ENGINEER	4550	568
5	SAFETY OFFICER	3575	446
6	GAS CUTTER	1502	187
7	GRINDER	1502	187
8	BRICK MASON	1040	130
9	STONE MASON	1040	130
10	STRUCTURAL WELDER	2145	268
11	QUALIFIED ARC WELDER- AUTOMATIC	2925	365
12	QUALIFIED ARC WELDER-MANUAL	2275	284
13	WATCHMAN/HELPER	845	105
14	CIVIL LABOUR (UNSKILLED LABOUR)	845	105
15	PIPELINE FITTER	1300	162
16	STRUCTURAL FITTER	1105	138
17	COATER	1105	138
18	MECHANIC	1105	138
19	SITE EQUIPMENT/MACHINE OPERATOR	1105	138
20	HEAVY MACHINE OPERATOR	1300	162
21	HEAVY DUTY DRIVER	1300	162



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22	ELECTRICIAN	1300	162
23	FABRICATOR	1300	162
24	CARPENTER	1040	130
25	PLUMBER	1040	130
26	PAINTER	1040	130
27	CABLE JOINTER	1040	130
28	FUSION OPERATION/JOINTER	1105	138
29	INSTRUMENTATION	1105	138
30	INSULATOR	910	114
31	RIGGER	975	122
32	BHISTI (WATER MAN)	845	106
33	DOCUMENT CONTROLLER	1300	163
34	ACCOUNT OFFICER	1950	244
35	STORE KEEPER/INCHARGE	1300	163

NOTES:-

1. Rates are final and bidder is to sign only without deviation.
2. In case of foreign bidder, conversion rate applicable on one day prior to price bid opening date published by the State Bank of India will be considered.
3. The recovery rates shall be the rates provided above plus 20% (twenty percent).



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**EQUIPMENT HOURLY RENTAL RATES FOR EXTRA WORKS
(ANNEXURE-11 TO SPECIAL CONDITIONS OF CONTRACT)**



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ANNEXURE-11 TO SCC

EQUIPMENT HOURLY RENTAL RATES FOR EXTRA WORKS

Sl. No.	Equipment	HIRING / RECOVERY RATES (IN INR) (Per Day): 8 Hrs INCLUDING CONSUMABLES & FUEL
1	Excavator / Back Hoe-Ex 280 / 300 & Above or Equivalent	10,000
2	Excavator / Back Hoe-Ex 200 & Above or Equivalent	8,000
3	Pipe Layer/Side Boom – 70 T & Above Capacity	15,000
4	Pipe Layer/Side Boom – 60 T & Above Capacity	12,000
5	Pipe Layer/Side Boom – 40 T & Above Capacity	10,000
6	Pipe Bending Machine	12,000
7	Dozer with Ripper – D7/D6 or Equivalent	12,000
8	DG Welding Machines	3,350
9	Semi Auto Welding Machines	2,500
10	Dozer with Ripper – D8 or Equivalent	13,600
11	Hydra (upto 10 MT)	5,000
12	Hydra (above 10 MT - upto 25 MT)	7,850
13	Hvdra (above 25 MT to 40T)	8,950
14	Hvdra (above 41 MT to 80T)	16,800
15	Horizontal Auger Boring Machine with Rock breaking tool	7,500
16	Pipe Clamp (Pneumatic/Hydraulic) – Internal	2,000
17	Tyre Mounted Cranes (above 10 and upto 30 MT)	7,850
18	Tyre Mounted Cranes (above 30 and upto 75 MT)	9,500
19	Tyre Mounted Cranes (above 75 MT)	16,800
20	X-Ray M/C – Internal Crawler	3,500
21	X-Ray M/C – External	3,000
22	Gamma Source	3,000
23	Water Lifting Pump (400 m3/hr. & above)	5,000
24	Filling Pumps (400 TO 1000 M3/HR)	8,000
25	Pressurization Pump – Motorized	6,000
26	Induction/Resistance Heating Equipment or LPG Multi Torch.	4,000
27	Air Compressor – (300CFM)	8,900
28	Air Compressor – (450/600/800 CFM)	14,100
29	Air Compressor – (1000-1500) CFM	25,000
30	D.G. Sets : 62.5 KVA to 200 KVA (inclusive of generators)	3,300
31	Blast Cleaning Machine	3,500
32	Pipe Trailers (FB / Semi Low Bed)	10,000
33.	Mono drill crawler mounted	4,500



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34	Hand drill(pneumatic)for rock blasting	8,400
35	Rock breaker attachment	9,136
36	Dozing Pump	1,000
37	Bevel Cutting Machine –Manua	5,000
38	UT Machine with operator	3,500
39	Dewatering Pump	2,500
40	Holiday Detector Unit	1,250
41	Dead WT Tester	2,200
42	Dumper / Tippers	4,200
43	Pipe locator	1,000
44	Pipe Clamp – External	1,000
45	Pipe Trailer for Coated Line Pipe	10,000
46	Rock Breaking Machine with Excavator	8,536
47	Grinding machine	300
48	Gas cutting set with cylinders	750
49	Trucks (upto 9 T) with driver	5,000
50	Car/Jeep with driver (5 Seater)	5,000
51	Car/Jeep with driver (7 Seater)	8,000
52	Tractor with trolley	2,000
53	Tripod with 5 Tons Chain Pulley Block	3,350
54	Pneumatic Drill (Tractor mounted for blasting) with Compressor	8,400
55	JCB Excavator	8,000
56	JCB Excavator with rock breaking tool	12,000
57	Moling machine (Manual)	3,000
58	Moling machine (Machine)	5,000
59	Fusion jointing Machine	5,000
60	Concrete mixer 0.25 to 0.40 Cum with hopper or as required.	1,000
HDD equipments		
61.	HDD Rig with all Equipments & Accessories (Cap upto 50 T) (Soft Strata)	20,000
62.	HDD Rig with all Equipments & Accessories (Cap upto 50 T) (Rock Strata)	25,000
63.	HDD Rig with all Equipments & Accessories (Cap above 50 T and upto 100 T) (Soft Strata)	30,000
64.	HDD Rig with all Equipments & Accessories (Cap above 50 T and upto 100 T) (Rock Strata)	40,000
65.	HDD Rig with all Equipments & Accessories (Cap above 100 T and upto 200 T) (Soft Strata)	80,000
66.	HDD Rig with all Equipments & Accessories (Cap above 100 T and upto 200 T (Rock Strata)	100,000
67.	HDD Rig with all Equipments & Accessories (Cap above 200 T and upto 350T) (Soft Strata)	115,000
68.	HDD Rig with all Equipments & Accessories (Cap above 200 T and upto 350T (Rock Strata)	140,000



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69.	HDD Rig with all Equipment's & Accessories (Cap above 350 T) (Soft Strata)	150,000
70.	HDD Rig with all Equipment's & Accessories (Cap above 350 T) (Rock Strata)	180,000

NOTES: -

1. Rates are inclusive of operators / drivers / Fuel /POL and consumables.
2. Rates are inclusive of contractor's overheads & profit.
3. In case of foreign bidder, conversion rate applicable on one day prior to price bid opening date published by the State Bank of India will be considered.
4. The recovery rates shall be the rates provided above plus 20% (twenty percent).
5. Hiring rates of above equipment's are for one shift (i.e. 8 Hrs). Hiring rates for two shifts i.e. 16 hrs are 1.25 times of above rates & hiring rates for three shifts i.e. 24 hrs are 1.5 times of above Rates.
6. **Notes for HDD equipment: -**
 - a. Rates are inclusive of operators / drivers / Fuel /POL and consumables.
 - b. Rates are inclusive of contractor's overheads & profit.
 - c. In case of foreign bidder, conversion rate applicable on one day prior to price bid. opening date published by the State Bank of India will be considered.
 - d. The recovery rates shall be the rates provided above plus 20% (twenty percent).



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STANDARD CONDITIONS OF SCC: PART II

The contractor has to fully comply with all applicable labour laws and regulations passed, modified and notified from time-to-time by the central, state and local government agencies/authorities. Specific attention of the contractor is drawn to the following obligations amongst other:

1. The Minimum Wages Act 1948, Payment of Wages Act, 1936 and Payment of Bonus Act 1965 or The Code on Wages, 2019 (after it comes into force)

1.1 Minimum Wages:

- a) During the tenure of the contract, the Contractor must ensure the payment of minimum wages, as notified by the Central Government or State Government whichever is higher, as per the provisions of the Minimum Wages Act, 1948 / Code on Wages, 2019 (after it comes into force).
- b) **Wage period and monthly wages:** Wage period shall be monthly and wages for a month shall be calculated by multiplying daily rate of Minimum Wages by 26. The monthly wages include the wages of the weekly days of rest as applicable to the office/establishment of GAIL.

Deduction in case of any days of absence other than weekly days of rest shall be calculated using the following formula:

Deduction for absence = days of absence x applicable wage rate

1.2 Payment of Wages:

The Contractor shall disburse monthly wages **through e-banking / digital mode through cashless transaction only**, and avoid illegitimate deductions and maintain records /returns as prescribed. The Contractor shall be solely responsible for the payment of wages and other dues to the resources, if any, deployed by him latest by 7th day of the subsequent month as per the provisions of the Payment of Wages Act, 1936 / as applicable under Code on Wages, 2019 (after it comes into force) in the presence of Engineer In-charge (EIC) or authorized representative of GAIL. After disbursement of wages, the representative of the Contractor and EIC/ authorised representative of GAIL. have to certify the payment of wages to the resources and sign the Wage Register - Form B (under The Ease of Compliance to Maintain Registers under various Labour Laws Rules, 2017) / FORM-I of Code on Wages, 2019 (after it comes into force) with specific seal detailing name/designation/Company.

1.3 Payment of Wages:

Contractor shall ensure payment of bonus as per the provisions of the Payment of Bonus Act, 1965 / Code on Wages, 2019 (after it comes into force). Present minimum rate of payment of

Bonus as per the Payment of Bonus Act, 1965 is 8.33% of minimum wages per month
or

8.33% of Rs.7, 000/- per month whichever is higher. The rate shall be subject to amendments made from time to time to the legislation.



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Payment of Bonus / ex-gratia shall be made preferably before Deepawali festival falling after the end of relevant financial year(s) and the balance payment at the time of closure of contract.

For service contracts, the payment towards the bonus/ex-gratia (**made on yearly basis**) shall be released / reimbursed to the contractor, after submission of proof of payment. No reimbursement shall however be applicable in works contract.

2. Leaves/ Leave with wages/ Holiday:

The Contractor shall comply with all the applicable leave Rules including leave with wages in terms of applicable labour legislations i.e. Factories Act, 1948 / Shops & Establishment Act/ *Industrial Establishment (national & festival holidays, casual & sick leave) Act, 1965.*

The Contractor shall extend the leave with wages and maintain the Register of Leave pertaining to the resource deployed. The payment towards un-availed leave, as per the Factories Act, 1948 / Shops & Establishment Act, shall be settled with the resource at the time of closure of the contract or separation of resource from the contract by the contractor.

- a) As per the **Factories Act, 1948 (if applicable)**:-Annual Leave with Wages @ 01 day for every 20 days of work performed by him in the previous calendar year becomes due.
- b) As per the **Shops & Establishment Act(if applicable)** : Privilege Leave not less than 15 days and Sickness/Casual Leave not less than 12 days (this provision may vary from state to state).
- c) *As per the Industrial Establishment (national & festival holidays, casual & sick leave) Act, 1965 /Negotiable Instrument Act 1881/ shops & Establishment Act (as applicable):*
 - (a) Three national holidays of one whole day each on the 26th January, 15th August and 2nd October
 - (b) Five other holidays on any of the festivals specified in the – Schedule appended to this Act.
 - (c) Every worker shall in each calendar year, be allowed by the employer 07 casual leave and 14 sick leave in such manner and on such conditions as may be prescribed (This provision may vary from state to state).

3. The Employees' Provident Fund & Miscellaneous Provisions Act 1952

- a) The Contractor shall have independent PF code no. with the RPFC as required under the Employees' PF & Misc. Provisions Act, 1952.
- b) The Contractor has to ensure compliance (as per prevailing rates) and extend benefits under the Employees' Provident Fund Scheme 1952, the Employees' Pension Scheme 1995 & the Employees' Deposit Linked Insurance Scheme, 1976 to the resources deployed by him.



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- c) The Contractor is required to submit copies of ***separate e-Challans / ECR alongwith proof of payment/receipt*** in respect of resources engaged through this contract only, on monthly basis. **Common challans would not be acceptable in GAIL (I) Ltd..** The Contractor should submit copies of previous months EPF e-Challans / ECR alongwith current month's bill. The TRRN. No. of the ECR would be verified online from EPFO portal by the Engineer- in-charge to confirm the status of payment and names of the resources deployed.
- d) **PF is mandatory irrespective of the number of resources deployed** by the Contractor under this contract. PF membership and deposit of PF contribution is also mandatory even if the wage payment to the resource is exceeding the prescribed monthly wage ceiling (i.e. Rs. 15,000/-) under the Empl oyees' PF & Misc . Provi sions Act, 1952 and in such cas e the liability of the Contractor towards PF contribution shall be limited to the prescribed monthly wage ceiling notified from time to time (i.e. Rs. 15,000/- currently).
- e) In case, the Contractor deploys any **“International Worker”**, the Contractor should also make compliance under para 83 of EPF Scheme, 1952 i.r.o the “International Workers” and must register on the ***International Worker Portal of EPFO.***
4. **The Employees' State Insurance Act, 1948 (If applicable and as per prevailing rates)**
- a) The Contractor shall have his own ESI code No. allotted by Employees' State Insurance Corporation (ESIC) as required under the Employees' State Insurance Act, 1948.
- b) The Contractor has to arrange **Smart Cards (i.e. ESI Identity Card) /e-Penchan Card** for the resource(s) engaged by him from the Corporation.
5. **The Employees' Compensation Act 1923 (wherever applicable)**
- In case, the work place is out of the notified coverage area under ESIC i.e. ESIC is not implemented in the area **or** in case of excluded employees under ESIC, the Contractor is required to take Employee Compensation / Workmen Compensation Policy from IRDAI approved Insurance Company taking into consideration the **maximum compensation liability** as per provisions of Employees' Compensation Act, 1923. It must be ensured that the contractor/contracting firm should extend coverage to the contract workers through Employee Compensation Policy, to meet the **Compensation Liability** under **Employee's Compensation Act, 1923** along with **Medi-claim Floater Policy with a coverage of Rs. 3 Lakhs per resource covering his/her spouse and two children.**
6. **Group Personal Accident Insurance Policy**
- The Contractor is required to take a Group Personal Accident Insurance Policy with coverage of Rs. 5 Lakhs (covering death, permanent disability + partial disability) per resource for the entire period of contract covering all resources deployed under the contract.
7. **The Payment of Death Gratuity Act, 1972**
- In case of Death or permanent disablement of a resource during execution of work under the contract, the Contractor has to pay the Gratuity as per the provision under the Payment of Gratuity Act, 1972 to the nominee(s) of the resource as per the details maintained in the duly



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signed Nomination Form maintained by the Contractor. The proof of disbursement may be submitted to the EIC for claiming reimbursement of amount paid towards death Gratuity from GAIL.

8. The Contract Labour (R&A) Act, 1970

- a) The Contractor is required to obtain Labour license under the provisions of the Contract Labour (R&A) Act, 1970 from the office of Licensing Officer, Central Labour Authority, Ministry of Labour and Employment, Govt. of India having jurisdiction of the Region.
- b) The Contractor shall discharge obligations as provided under the Contract Labour (R&A) Act, 1970 rules and regulations framed under the same and enforced from time to time.
- c) The Contractor shall ensure regular and effective supervision and control over the resources deployed for which a supervisor / representative of the Contractor should be available at all the times for giving suitable direction for undertaking the Contractual Obligations.
- d) The Contractor is solely responsible for payment of wages to each resource deployed by him and such wages shall be paid before the expiry of such period as may be prescribed.
- e) It shall be the duty of the Contractor to ensure the disbursement of wages to resource(s) through e-banking/digital mode. In case the resource does not have a bank account, the disbursement of wages may be made in cash in the presence of the Engineer-in-charge / authorized representative of GAIL. initially and Contractor shall simultaneously arrange for opening the bank account of each contract labour deployed by him.
- f) In case, the Contractor fails to make payment of wages and deposit of PF contribution within the prescribed period or makes short payment of wages / short deposit of PF contribution, it shall be treated as FAILURE and action as per the provisions of General Conditions of Contract shall be taken. Further, GAIL., as Principal Employer, will make payment of wages in full or the unpaid balance due, as the case may be, to the resource(s) deployed by the Contractor and deposit the PF contribution with PF authorities. Such amounts will be recovered from the Contractor either by deduction from any amount payable to the Contractor under any contract or as a debt payable by the Contractor.

9. The contractor is required to comply with all applicable labour laws and regulations including, but not limited to the following:

- a) The Factories Act, 1948 / The Shops & Establishment Act, 1948 (which ever applicable)
- b) The Maternity Benefit Act, 1961
- c) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1979 & Building and Other Construction Workers Welfare Cess Act, 1996
- d) The Inter State Migrant Workmen (RECS) Act 1979 (if applicable)
- e) Contract Labour (R&A) Act-1970
- f) Employees' Provident Fund & Misc. Provisions Act-1952
- g) Employees' State Insurance Act-1948
- h) Employees' Compensation Act, 1923
- i) Payment of Gratuity Act,1972



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- j) Minimum of ages Act, 1948
- k) The Payment of Wages Act, 1936
- l) The Payment of Bonus Act, 1965



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Responsibilities of the Contractor

1. The Contractor shall be solely responsible and indemnify GAIL against all charges, dues, claim etc. arising out of the disputes relating to the dues and employment of resources, if any, deployed by him.
2. The Contractor shall indemnify GAIL against all losses or damages, if any, caused to it on account of acts of the resource(s) deployed by him.
3. Any loss of life, personal injury, or damage to property occurring during the execution of the work shall be the sole responsibility of the contractor. GAIL (I) LTD or its authorized consultant shall not be liable for any civil, criminal, statutory, or financial obligations arising out of such incidents.
4. The Contractor shall indemnify GAIL from all claims, demands, actions, cost and charges etc. brought by any court, competent authority / statutory authorities against GAIL.
5. The Contractor shall also indemnify GAIL for any action brought against him for violation, non-compliance of any act, rules & regulation of center / state / local statutory authorities.
6. All resources deployed by the Contractor are deemed to be on the rolls of the Contractor.
7. **Age:** No resource below the age of 18 years shall be deployed by the contractor for the execution of the contract. However, maximum age of resources deployed under the contract would be 60 years. (In case of Security and Fire & Safety Services, no resource below the age of 18 years shall be deployed by the contractor for the execution of the contract. However, in view of nature of business operation and nature of duty, for efficacy & efficiency purpose, resources will be deployed up to the age of 58 years. However, the age limit can be relaxed for a further period of two (02) years up to the age of 60 years if the contract worker is competent, efficient and medically fit i.e. physically fit with good health, good eye sight without any disease. The contractor has to produce Medical Fitness Certificate, to this effect, against such contract workers if deployed beyond 58 years.)
8. **Appointment/Nomination of supervisor:**
As a part of the contract, the Contractor is required to appoint/nominate a supervisor (s) who will supervise, control and give directions to the resource(s) for discharging the contractual obligations. Accordingly, the Contractor has to give in writing the name and contact details of the supervisor (s) to the EIC. A copy of the same is also to be sent to HR In-charge and Security In-charge for records.
9. A copy of the Letter of Acceptance (LOA) should be submitted to the Security Department by the Contractor / his representative or supervisor for facilitating the movement of resource(s) including machine & materials involved in the contract.
10. The resources to be deputed/ deployed by the Contractor shall observe all security, fire and safety rules of GAIL while at the site/work. All existing and amended safety / fire rules of GAIL are to be followed at the work site by the Contractor and his deployed resource(s).
11. **Personal Protective Equipment/ Safety Kit and Liveries:** Contractor shall ensure adequate supply of personal protective equipment / Safety Kit and Liveries as mentioned in the Scope of Work to all such resources deployed.
12. In case of accident, injury or death caused to the resource(s) while executing the Work under the contract, the Contractor shall be solely responsible for payment of adequate compensation, insurance



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money etc. to the next kith & kin of injured / diseased. Contractor shall indemnify GAIL from such liabilities.

13. The Contractor shall not deploy any resource suffering from any contagious or infectious disease. The Contractor shall get the deployed resource(s) examined from a civil Govt. Doctor / GAIL's Doctor.
14. No resource(s) or representatives of Contractor (including Contractor) be allowed to consume alcoholic drinks or any narcotics within the premises of GAIL (including Plant, Office and Residential etc.). If found under the influence of above, the Contractor shall immediately replace that resource(s) with intimation to the EIC.
15. While engaging / deploying the resources, the Contractor is required to make efforts to provide opportunity of employment to resources belonging to **Schedule Caste, Schedule Tribe and Other Backward Class** in order to have a fair representation of these sections of the society.
16. While engaging the resources, the Contractor is required to make efforts to provide an **opportunity to** candidates with experience of **apprentice training in GAIL** under the provisions of the Apprentices Act, 1961.
17. The Contractor is required to maintain all Registers and other records in an **office** within the premises of GAIL or at a place **within a radius of three kilometers**.
18. Contractor shall provide proper **Employment cards (FORM XII)** for the resource to be deployed by him, duly signed by the Contractor or authorized person on behalf of Contractor.
19. **Gate/ Entry Pass or Authorization:**

Entry to the premises of GAIL is restricted and is subject to appropriate entry authorization in the prescribed format of a Gate Pass or any other entry authorization w.r.t police verification as per instruction of Security department from time to time. Similarly, entry for material/ equipment's/ tools/ tackles etc. is restricted & subject to entry authorization by security department.

20. The Contractor shall issue Identity cards in his firm's name to the resource deployed.
21. Discipline of the resource(s) during discharge of duties must be regulated by the Contractor himself or by his representative.
22. **Police verification**
 - a) The Contractor (including his sub-Contractors/Petty Contractors etc, if allowed) will undertake police verification in respect of the resource(s) engaged by him in GAIL's premises. Such verification will have to be carried out from concerned police station of their permanent place of residence/present place of residence.
 - b) Further, the Contractor is advised not to deploy any resource having past criminal record in the establishment/premises of GAIL under this contract awarded to him.
 - c) In the event of violation of above clauses at (a) and (b), the Contractor will be solely responsible for the same.

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- d) If any such resource(s) having criminal record is deployed by the Contractor in the premises of GAIL and has come to the notice of GAIL at any point of time, the Contractor shall immediately replace that resource(s), failing which that particular resource(s) of the Contractor will not be allowed to enter into the premises of GAIL.
23. While confirming to any of these conditions, the Contractor must ensure that all applicable Laws of State regarding labour, their welfare, conduct etc. are complied.
24. The contractor shall ensure the KYC of contract workers in EPFO portal at all time during the period of contract and submit a proof of the same to the Engineer-in-charge.
25. The contractor shall ensure that the nomination of contract workers deployed by him under the said contract is duly updated in the EPFO Portal.



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Compliance of Government of India Directives

1. Pradhan Mantri Suraksha Bima Yojna (PMSBY) and Pradhan Mantri Jeevan Jyoti Bima Yojna (PMJJBY)

Contractor shall, ensure that all its resources deployed under this contract have obtained additional insurance coverage under the Pradhan Mantri Suraksha Bima Yojana (PMSBY) and Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY) through the participating banks and submit the proof of such insurance coverage to the satisfaction of GAIL. The Contractor shall submit evidence / proof to GAIL in this respect. Both the schemes are to be regulated continuously on yearly basis and the same should be renewed on each successive relevant date in subsequent years during the period of the contract.

2. Labour Identification Number (i.e. LIN) Registration (Mandatory)

The Unified Shram Suvidha Portal, developed by Government of India, facilitates reporting of Inspections & submission of Returns and has also been envisaged as a single point of contact between employer, resources and enforcement agencies bringing in transparency in their day-to-day interactions. For integration of data among various enforcement Agencies, the Contractor, as an inspectable unit, is required to register and obtain Labour Identification Number (i.e. LIN) from Shram Suvidha Portal and submit the same in GAIL.

3. Pradhan Mantri Rojgar Protsahan Yojna (PMRPY) / Aatmanirbhar Bharat Rozgar Yojana (ABRY)/ Pradhan Mantri Garib Kalyan Yojana- if applicable

In order to support the Govt. of India's Initiative on Employment Generation, the Contractor must register for Pradhan Mantri Rojgar Protsahan Yojna (PMRPY) Scheme / Aatmanirbhar Bharat Rozgar Yojana (ABRY) /Pradhan Mantri Garib Kalyan Yojana (as applicable). In service contracts, the Contractor shall inform GAIL/Engineer in Charge about the benefit availed, if any, against the scheme for adjustment against the invoice(s) / bill(s).

Records and Registers

1. Maintenance of records and registers

The Contractor is required to maintain statutory records and registers for applicable labour laws as prescribed under the following rules:

- a) Ease of Compliance to Maintain Registers under the various Labour Laws, 2017
- b) Rationalization of Forms and Reports under Certain Labour Laws Rules, 2017
- c) Labour Codes (after they are made effective by Government of India)

2. The Contractor has to maintain the following (but not limited to) Registers/ Forms/ Reports / Returns at all times:



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- a) Employee Register in FORM A (to be replaced by FORM-IV of Code on Wages-2019 after it comes into force)
 - b) Wage Register in FORM B (to be replaced by Register of Wages, Overtime, Fine, Deduction for damage and Loss in FORM-I of Code on Wages-2019 after it comes into force)
 - c) Register of Loan / Recoveries in FORM C
 - d) Attendance Register in FORM D
 - e) Register of rest/leave/leave wages in FORM E
 - f) Copies of Wage Slips in FORM XIX (to be replaced by FORM- V of Code on Wages-2019, after it comes into force)
 - g) Copies of Employment Card in FORM XII
3. **Documents to be submitted by the Contractor to EIC at various stages during the currency of the contract**
- a) **Immediately after issuance/receiving of (Letter of Acceptance (LOA))**
 - i. Details as required for issuance of **FORM - VII (Notice of Commencement of Work)**
 - ii. Application for issuance of **FORM -III (Form of Certificate by Principal Employer)** for obtaining Labour License from Licensing Authority for engaging 20 or more resources.
 - iii. Copy of **FORM - VI (License)** before commencement of work if 20 or more resources are engaged.
 - iv. Copy of **Provident Fund Registration Certificate** issued by concerned Regional Provident Fund Commissioner.
 - v. Copy of **ESI Registration Certificate** issued by concerned ESIC.
 - vi. Copies **Insurance Policy(ies)** as mentioned at **Annexure-iv**
 - vii. Copy of **Labour Identification Number (i.e. LIN)** Registration done in **Shram Suvidha Portal** of Govt. of India.
 - viii. Copy of registration under the Building and Other Construction Workers (RE&CS) Act, 1996 in case he employs ten or more building workers in any building or other construction work.
 - b) **At the time of submission of RA Bills**
 - i. Copy of **Employee Register in FORM - A** under The Ease of Compliance to Maintain Registers under various Labour Laws Rules, 2017 (to be replaced by FORM- IV (of Code on Wages-2019, after it comes into force).
 - ii. Copy of **Wage Register in FORM-B** under The Ease of Compliance to Maintain Registers under various Labour Laws Rules, 2017 (to be replaced by Register of Wages, Overtime, Fine, Deduction for damage and Loss in FORM-I of Code on Wages-2019, after it comes into force) duly certified by **authorized representative** of the Contractor and **authorized person** in GAIL certifying as "**Certified that the amount shown in the column No. ---- has been paid to the workman concerned in my presence on----- (date) at ----- (place)**" along with copy of bank statement duly certified by bank and copy of online transaction statement against each resource with details of name, account number,



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amount paid & date of payment as proof of **Cashless Transaction / Payment of wages through e-banking/digital mode.**

- iii. As a part of compliance and proof of depositing Provident Fund, EDLI and ESI contributions the Contractor shall submit copies of the ***Separate e-Challans / ECR***, bank receipts/bank statement **in respect of resources deployed in GAIL in the previous month in this contract.** The documents should also contain details of resources, PF account No., ESI No., contributions of resources and employer etc.
- iv. Dully filled in statement as per ***Annexure- i.***
- v. Copy of Wage Slips in FORM XIX
- vi. *Proof of deposit of Cess under The Building and Other Construction Workers' Welfare Cess Act, 1996, (if applicable)*

c) At the time of closure of contract

- i. **Indemnity Bond** of Rs. 100/- duly notarized from Notary indemnifying GAIL from all liabilities w.r.t. the resource engaged by the Contractor regarding payment of wages, Provident Fund/ESI contributions, Insurance and other statutory payments. Format for Indemnity Bond is enclosed at ***Annexure- ii.***
- ii. Copy of the **Wage Register in FORM- B** (to be replaced by FORM-I of Code on Wages- 2019 after it comes into force) for the last month.
- iii. Copies of Service Certificates issue to resource in **FORM VIII**
- iv. Copy of the ECR related to EPF and ESIC Compliance in respect of Resource.
- v. Details as required for issuance of **FORM- VII (Notice of Completion of Work)**
- vi. Copies of FORM-C & FORM -D under the Payment of Bonus Act 1965 as proof of payment towards Bonus.
- vii. Copy of proof towards release of Leave Encashment
- viii. Copies of No Dues Certificate from contract workers stating they have received all statutory payments and social benefits.
- ix. *Proof towards PF KYC compliance of contract workers*
- x. *Proof of deposit of total Cess under The Building and Other Construction Workers' Welfare Cess Act, 1996, (if applicable) with final assessment from respective Cess Collector(s).*

4. Verifications of bills and documents submitted by the Contractor

Before certifying/verifying the running/ final bill/invoice of the Contractor, the designated EIC of the respective contract of GAIL, shall verify from the ECRs of PF/ESI, through respective web portals, the detail/status of the payment made by the Contractor. In case the information furnished by the Contractor is found to be incorrect, GAIL shall take appropriate action against the Contractor under relevant conditions as available in the tender/bid document.



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Annexure-I

Statement in support of RA Bill for the Month of _____, 20__

- (1) Name of the Firm/Agency/Contractor _____
- (2) Nature of Contract: Job/ Service _____
- (3) Period of Contract: From _____ to _____
 - (a) Extension Period of Contract, if any from _____ to _____
 - (b) Place where contract workmen are working _____
- (4) Postal address of the Contractor: _____
- (5) Phone No. of the Contractor: _____
- (6) Fax No. and Email of the Contractor: _____
- (7) Name and Address of PF office from where EPF Code No. has been allotted: _____
- (8) EPF CodeNo. allotted by PF office: _____
- (9) Name and Address of ESIC office from where ESI Code No. has been allotted: _____
- (10) ESI Code No. allotted by ESIC office: _____
- (11) Labour License No. _____ dated _____
- (12) Validity period of Labour License from _____ to _____
- (13) Detail of Resource engaged by the Contractor:

Category	No. of Resources		Prevailing Minimum Wages
	Male	Female	
Unskilled			
Semi-skilled			
Skilled			
Highly skilled			
Total			

- (14) Copy of Wage Register in FORM-B (to be replaced by FORM-I as per Code on Wages-2019, after it comes into force)
- (15) Details of deposit of contribution towards EPF:
 - a) EPF Challan No. _____ Amount _____ Date _____
- (16) Details of Deposition of contribution towards ESI
 - a) EPF Challan No. _____ Amount _____ Date _____
- (17) Whether any arrangement / agreement has been entered with any resource for extending benefits under Inter-state Migrant Workmen (RE&CS) Act, 1979: _____(Yes /No)
If Yes, No. of such Inter-state Migrant Workers: _____

SIGNATURE OF CONTRACTOR/AUTHORIZED REPRESENTATIVE

Place:

Date:



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Annexure - iv

Summary of Insurance Policies

Contractor is required to cover all resources deployed by him with the following insurances / schemes:

Sl. No.	SCHEME	APPLICABILITY	PREMIUM/ CONTRIBUTION	SUM ASSURED/ BENEFITS	REMARKS
1	The Employees' State Insurance Act, 1948	Applicable to all resources of the Contractor (within ESI wage limit) working in notified area.	3.25% of wages by employer 0.75% of wages by employees	Benefits under the Employees' State Insurance Act, 1948.	
2	The Employees' Compensation Act, 1923 (in lieu of ESI – mentioned at Sl. 1)	Applicable to excluded employees under ESI and those who are working in non-notified area to extend similar benefits as available under ESI Act, 1948	Premium to be calculated considering wage limit under EC Act, 1923 (i.e. Rs. 15,000/- p.m currently)	Maximum Compensation Liability under Employee's Compensation Act, 1923 along with a Mediclaim floater policy with a coverage of Rs. 3 Lakhs per resource covering his/her spouse and two children.	Provides compensation and medical facility to resources.
3	Group personal Accident Insurance	Applicable to all resources of the Contractor	Based on the coverage	Insured value: Rs. 5 Lakh to cover expenses associated with any accident.	Death, permanent disablement, temporary total disability or any other medical expenses related to
4	Pradhan Matri Suraksha Bima Yojana (PMSBY)	Eligibility – age group 18 to 70 years	Rs. 12/- per annum	Accidental death and permanent disability: (i) Permanent total disability – Rs.2 lakhs. (ii) Permanent partial disability – Rs. 1 Lakh.	



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5	Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJB)	Eligibility – age group 18 to 50 years. (can continue upto 55 years)	Rs. 330/- per annum.	Risk coverage – Rs. 2 Lakhs- in case of death due to any reason
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SECTION-VI

TECHNICAL SPECIFICATION /DRAWINGS

& LIST OF APPROVED MAKES



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1.0 PROJECT DESCRIPTION & SCOPE OF WORK

1.1 Project Description

M/s GAIL (India) Limited, is in the process of development of CNG & City Gas Distribution Infrastructure at different Geographical Areas namely Varanasi (UP); Patna (Bihar); Ranchi & Jamshedpur (Jharkhand) and Bhubaneswar & Cuttack (Odisha).

1.2 Scope of Work

The scope of work involves job for Last Mile Connectivity (LMC) as per the SOR (i.e., domestic PNG Connections). The LMC work shall include supply, installation and testing of GI pipes including associated fittings, Copper service Pipes, Isolation and Appliance valve etc. along with laying, testing and commissioning of underground Polyethylene (PE) service pipelines of size of mentioned in SOR from existing PE network in any GA under GAIL Six Cities CGD Project.

The scope of work also covers laying, testing and commissioning of underground Poly-ethylene (PE) pipelines of sizes as per SOR from the DRS / Decompression Unit to various end point consumers of Piped Natural Gas (PNG) in any GA under GAIL Six Cities CGD Project. Other than DRS / Decompression Unit, PE pipe, GI pipe (Qty as per SOR), Meter and Regulators (which shall be Free Issue Items) all other materials shall be pro-cured by the contractor as indicated in SOR and elsewhere.

The last mile Connectivity, at the end points of various domestic consumers, includes supply (Qty as per SOR), Installation and testing of GI pipes, Copper service pipes, Me-ters and Regulators (meters and regulators to be provided as free issue), Isolation and ap-pliance valve with all fittings etc. The job is to be executed as per instruction, direction of EIC.

The broad scope of this /bid comprised of but not limited to the following:

- Laying, testing & commissioning of PE service line (of size 20mm to 32mm) including jointing along with Fittings and valves from the nearest existing branch line of various sizes to the Housing complex / society / individual houses etc including PE/GI transition pipe. Supply of fittings & valves are in the Bidders scope..
- Supply and installation of tapping saddle on existing PE pipe of various sizes of existing network.
- Installation of Regulators, meters & other associated fittings (including supply of fittings).
- Supply and above ground GI installation including riser kit (PE to GI transition fittings) from regulator at consumer end.
- Supply of copper tube, MLC pipe, isolation valves & appliance valves.
- Supply & installation of GI Pipe connection within Kitchen of Domestic consumers including installation of meters (free issue), regulators (free issue), anaconda, MLC pipe, appliance / isolation valve, brass fittings, copper tube etc complete in all respect.



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- Conversion of Domestic appliances (like burner, hotplate etc) for application / use of PNG.
- Supply, fabrication and installation of Plate marker.
- Making of PCC pedestal of grade (1:2:4) and size (8"X6"X4").
- Supply and Installation of TF along with GI Sleeve.
- Registration of Domestic PNG Connections.
- Reconciliation of material received from store each time before submission of RA bills.
- It will be the responsibility of the contractor to follow Mobile APP based safety work permit system of GAIL. Contractor/its supervisor shall compulsorily download these Mobile APP, authorization for work permit will be given as per GAIL procedure.
- It will be responsibility of the contractor to implement "Call before you dig" CBuD application and make entry of any excavation / digging activities. Familiarization with the Mobile APP will be done by GAIL Site Engineer/In charge.
- Contractor will be required to fill the LMC Checklist provided by GAIL. Format of the same is also provided in the tender/bid document.
- Contractor will be bound to follow the Standard Operating Procedure (SOP) of GAIL for carrying out the various jobs assigned.

2. GENERAL TERMS AND CONDITION

- i. Special Condition of Contract shall be read in Conjunction with the General Conditions of Contract, SOR, PJS of work, specifications, Drawings and any other documents forming part of this contract wherever the context so requires.
- ii. Notwithstanding the sub-division of the documents into these separate sections and volumes every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.
- iii. Where any portion of the General Condition of Contract is repugnant, to or at variance with any provisions of the Special Conditions of Contract, unless a different intention appears, the provisions of the Special Conditions of Contract shall be deemed to over-ride the provisions of the General Condition of Contract and shall to the extent of such repugnancy, or variations, prevail.
- iv. The materials, design and workmanship shall satisfy the relevant INDIAN STANDARDS, the TECHNICAL SPECIFICATIONS contained herein and CODES referred to. Where the technical specification stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied.



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- v. Wherever it is mentioned in the specifications that the CONTRACTOR shall perform certain work or provide certain facilities, it is understood that the CONTRACTOR shall do so at his cost and the VALUE OF CONTRACT shall be deemed to have included cost of such performance and provisions, so mentioned.
- vi. It will be Contractor's responsibility to bring to the notice of Engineer-in-charge any irreconcilable conflict in the contract documents before starting the work(s) or making the supply with reference which the conflict exists.
- vii. In the absence of any specifications covering any material, design of work(s) the same shall be performed/ supplied/ executed in accordance with Standard Engineering Practice as per the instructions/ directions of the Engineer-in-charge, which will be binding on the Contractor.

3. PROCUREMENT

- 3.1.1 CONTRACTOR shall procure and supply all the materials other than OWNER supplied materials, required for permanent installation of pipeline and aboveground GI Installation in sequence and at appropriate time. All equipment, materials, components etc. shall be suitable for the intended service. Approved vendor list has been indicated in the bid package for various items. For items which are not covered in the vendor list, CONTRACTOR shall obtain Owner's prior approval for the vendor based on PTR document.
- 3.1.2 CONTRACTOR shall procure all materials, components, equipment, consumable etc. required for successful completion of the pipeline system. CONTRACTOR shall also procure and supply spares required for pre-commissioning and commissioning/ start up as recommended for all items supplied by him as per specifications provided in the bid package. Where no specification is available in the contract, the same shall be prepared by the CONTRACTOR based on the piping material specification / PNGRB (T4S for City or Local natural Gas Distribution Networks) and shall be subject to Owner's approval.
- 3.1.3 Material take-off with complete description of size, rating, material, thickness and specifications to be prepared by contractor.
- 3.1.4 Only single offer shall be provided by the bidder fully complying to specifications/ drawings/ requirements for Owner's review and approval. CONTRACTOR shall provide for inspection of the items at vendor's works by the OWNER/ Owner's REPRESENTATIVE or by a reputed inspection agency and shall submit inspection reports for Owner's clearance.
- 3.1.5 Stores management including receipt, warehousing, preserving the material in good condition, issue of material to construction site, reconciling/ handing over surplus material to OWNER for OWNER supplied items.
- 3.1.6 Carryout proper documentation of inspection and quality assurance programs for all equipment and bulk materials duly approved by OWNER. CONTRACTOR shall maintain an accurate and traceable listing of procurement records for the location, quality and character of all permanent materials in the Project.



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- 3.1.7 CONTRACTOR shall immediately report to the OWNER of all changes which will affect material quality, and recommend any necessary corrective actions to be taken.
- 3.1.8 Submit periodic progress reports highlighting hold ups and slippages, if any, to OWNER and take remedial measures.
- 3.1.9 Interact with authorities such as Sales Tax, Octroi, Excise, Customs etc. as necessary and arrange for transportation of the materials under his scope of supply to site.
- 3.1.10 All purchase requisitions including purchase orders shall be approved by Owner/ Owner's Representative.
- 3.1.11 Compliance with vendor's and supplier's instructions and recommendations for transportation, handling, installation & commissioning.

3.2 Construction

3.2.1 General

- 3.2.1.1 All construction works shall be carried out as per "Approved for Construction" drawings, procedures, specification and applicable codes and standards. Any changes at site shall also need prior approval from the OWNER and revision of drawings. Construction drawings will be submitted by the Contractor in a phased manner for Owner's approval in accordance with the procurement and construction plan prepared and furnished by contractor & agreed by Owner.

Owner will take minimum 7 working days from the date of submission of the documents / drawings submitted by the contractor for Owner's comments / approval.

3.2.1.2 Statutory Approvals

The Owner shall provide to the Contractor the basic / in principal approval for laying the pipeline. However, the Contractor at his own initiative shall obtain all permissions, permits and licenses necessary for the performance of the work. If any such permission, permit or license required for the performance of the work by the contractor can only be granted at the request or recommendation of the Owner, the Owner shall at the request of the Contractor, provide recommendatory letters to the contractor to obtain or procure the same. The contractor shall not, however be entitled to any additional compensation over and above contracted rates of services for any hardship or increased cost caused by any idleness, suspension or disruption of work or any other account whatsoever as a result of the inability of the contractor to obtain the permission(s), permit(s), license(s) aforesaid to match with the progress of the work nor shall the same constitute a ground for extension of time.

- a) The approval from any authority required as per statutory rules and regulations of Central/ State Government agencies etc. shall be the contractor's responsibility unless otherwise specified in the tender document. The application on behalf of the Owner for submission to relevant authorities along with



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copies of required certificates complete in all respects shall be prepared and submitted by the Contractor well ahead of time so that the actual construction/ commissioning of the work is not delayed for want of the approval/ inspection by concerned authorities. The Contractor shall arrange the inspection of the works by the authorities and necessary coordination and liaison work in this respect shall be the responsibility of the Contractor. However statutory fees paid, if any, for all inspections and approvals by such authorities shall be reimbursed at actual by the Owner to the Contractor on production of documentary evidence.

- b) The defective work resulting from poor workmanship and/ or material supplied by contractor, as pointed out by any statutory authority shall be rectified by the contractor at no extra cost to the Owner. Any change/ addition required to be made to meet the requirements of the statutory authorities; the same shall be carried out by the contractor free of charge. The inspection and acceptance of the work by statutory authorities shall, however, not absolve the contractor from any of his responsibilities under this contract.

- 3.2.1.3 The Contractor shall comply with all the conditions and requirements issued by Authorities having jurisdiction in the area where the work is to be performed.

It shall be the Contractor's sole responsibility to make arrangements for land for setting up of its string fabrication yards, all storage areas for line pipe and other materials, wherever required, and all other work areas.

The Contractor shall make all arrangements for access to his work site at his own cost and responsibility. If no public road exists Contractor shall arrange on his own for access to his work area at no extra cost to the COMPANY.

The CONTRACTOR shall be responsible for claims if any arising out of damage/ obstruction to public utilities like lines of DOT etc. where the claims will cover the restoration costs as well as loss of revenue due to down time.

- 3.2.1.4 Providing schedules, progress reporting, organization chart at construction site, quality assurance plan and developing quality control procedures, as per requirements indicated elsewhere in the bid package.

- 3.2.1.5 Coordination and supervising the work of sub-contractors.

- 3.2.1.6 Transportation of appropriate materials and taking delivery of Company supply materials, store, worksite, intermediate storage points, maintaining and operating an adequate material control procedure at worksite.

- 3.2.1.7 Fabrication of all GI piping, structural components as per approved drawings.



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3.2.1.8 All civil/ structural works, electrical and instrumentation, laying and commissioning works shall be performed in accordance with relevant specifications and requirements enclosed elsewhere in the bid package.

3.2.1.9 CONTRACTOR shall provide complete details of manpower, equipment etc. to be deployed. Mobilizing and providing all equipment's, manpower (skilled and unskilled), consumable and other resources etc. for each spread as required for the execution of the complete job defined herein and thereafter demobilizing the same upon completion of work.

3.2.1.10 Provide, maintain and operate all temporary facilities required for the construction related works and remove after completion of work. Providing barricading at trench in city area as per instruction of engineer in charge for safety.

3.2.1.11 Hook up / tie-in of pipeline and piping system with other facilities etc.

3.2.1.12 All works related to cleaning, testing, dewatering, swabbing, drying, pre-commissioning and commissioning of the work tendered.

3.2.1.13 Idle time preservation of pipeline, if required.

3.2.1.14 All incidental and associated works and any other works not specifically listed therein but are required to be carried out to complete entire work related to pipelines and terminals.

3.2.2 Branch / service Pipeline

3.2.2.1 Familiarization of Pipeline Route

Bidders are advised to make site visits to familiarize themselves with all the salient features of available infrastructure along the proposed pipeline in concerned GA area (cities). Contractor shall be deemed to have considered all constraints and eventualities on account of site conditions while formulating his bid. Contractor shall not be eligible for any compensation in terms of cost and / or time, on account of site conditions varying to any extent from whatever described in the Bid Package.

3.2.2.2 The city condition field / other fields may have lots of PVC, PE & utility pipelines or other pipelines & cables being used for city utility / other utilities purposes. CONTRACTOR shall ensure that these lines shall not be damaged/ cut affecting the water / power / communication / other supply to concerned Users / Owners / Authorities. Wherever required, temporary necessary precautions have to be maintained for uninterrupted supply.

3.2.2.3 Supply, loading, unloading, handling, stacking, storing and transportation to workshop/ work site of all materials that may be used for the construction of pipeline system at their designated stack yard/ dump site/ store and/ or by CONTRACTOR as the case may be.

3.2.2.4 Stacking, clearing, grading as required, trenching to all depths in all types of soil including soft & hard rock by chiseling or otherwise cutting etc. to a width to accommodate the PE pipeline as per relevant



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standards, drawings, specification etc. transportation of PE pipes along the route, stringing, aligning, bending, jointing including testing, inspection, field jointing including supply of all materials as per specifications, laying and lowering of the pipeline, back filling, Supply and installation of pipeline as shown in approved drawings and as directed by OWNER, installation of supports wherever required, supply of select backfill material as required, clean- up, flushing, pneumatic testing, nitrogen purging / pre-commissioning and commissioning of complete pipeline system, including all associated works as per relevant specifications, standards and approved drawings.

3.2.2.5 Sand / soft soil padding around pipe wherever required in areas where trenching has been done in hard soil area / rocky area including supply of sand/ soft soil. The thickness of sand/ soft soil padding at the top of pipe shall be minimum 150 mm and bottom of pipe shall be minimum 150 mm or as per drawing enclosed whichever is more.

3.2.2.6 Installation of all inline / online instruments / valves / fittings / transition fittings / appurtenances etc. as per requirements of approved drawings.

3.2.2.7 Testing & Purging

A) Testing

Pressure testing will be carried out with compressed air. Compressed air will be provided by Contractor for testing purposes and is to be included in the rates.

Measuring instruments shall have been calibrated and their accuracy and sensitivity confirmed. For testing of Network, calibrated pressure gauges of suitable range shall be supplied by the contractor. The pressure gauges shall be calibrated from time to time as desired by Engineer-in-Charge. All testing shall be witnessed and approved by the EIC or his delegated representative. Tie-in joints may be tested at working pressure following commissioning.

For service lines in some cases testing will be carried out for the test duration of 4 hrs. The service testing in this case will be performed after the service installation is complete but before the service tee has been tapped. Also, in some cases the tapping of the service tee will be delayed pending the completion and purging of the main pipelines.

B) Purging

Purging shall be carried out in accordance with the principles defined in the American Gas Association publication 'Purging Principles and Practice'.

Nitrogen required for purging will also be provided by the Contractor. Nitrogen shall be supplied in labeled, tested and certified cylinders, and completed with all necessary regulators, hoses and connections, which will be in good condition and working order.

In addition, the Contractor shall submit and get approved a Purging Plan before commencing any purging work. The Plan shall include, but not be limited to, the provision of the following materials and



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equipment: Personal safety equipment, Fire extinguisher, purging adaptor, Purge stack with flame trap and gas sampling point, Gas sampling equipment (may be gas leak detector), squash-off tool, Polyethylene connecting pipe work.

The Plan shall also include the purging process along with detail on the sequence of events. The process is to also specifically mention the need to lay a wet cloth over the PE main and in contact with the ground, to disperse static electricity during the purging work.

A purge stack with flame trap shall be used when purging services. Care shall be taken to ensure that the purge outlet is so located that vent gas cannot drift into buildings.

3.2.2.8 Markers

Installation of all types of markers including all associated civil works. Any other work not specifically mentioned above but required for making the entire pipeline system ready for operation.

3.2.2.9 Priorities

The Contractor shall start the execution work as per approved execution methodology / plan / procedure to complete the scope of work and shall deploy adequate manpower, machinery, tool & tackles etc. accordingly.

However, Owner may, at its sole option, assign priority of construction to any part/ segment of the work. Contractor shall comply with such priority of execution and their deployment without any time and cost implication to the Owner.

3.2.2.10 Pre-commissioning and Commissioning Assistance

- Pre-commissioning including supply of all materials, consumables and manpower of the complete pipeline system.
- Making the entire system ready for commissioning and providing assistance during the complete duration of commissioning operations.
- Completion of all pipeline activities as detailed in SOR.

3.2.2.11 Civil Works

Civil works shall be carried out as per scope mentioned at SOR and as per Indian Standard norms.

Any other work not specifically listed herein but required for the completion of the work.

3.2.2.12 Installation of welded Riser and Lateral Pipes in High Rise Building for PNG connection



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- Erection, Fabrication, Socket Welding of GI Pipes (heavy duty, as per IS-1239 Part-I duly Zinc coated in accordance with IS 4736) & wrought steel fittings (forged fittings, conforming to IS-1239 Part-II). The threading of GI pipe shall be NPT and conforming to ANSI B120.1
- Erection, Fabrication, Socket Welding, Testing & Installation of welded GI Pipes & Fittings etc., including NPT threading as per technical specification and sketch attached.
- Preparation and approval of sketches, schedules, execution procedures & WPS as per technical specification. All consumables e.g. electrodes, flux etc. for welding pipes and fittings are under contractor's scope.
- Supply & fixing of MS angle clamps, Ceiling clamps & dowel plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape / lock tight, Supply and fixing of studs & bolts of various sizes ranging from 1/2" to 2" and 3/4" to 2", Jointing of transition fittings to above ground GI pipes, purging, testing and commissioning of the complete installation.
- Welding of Riser is to be carried out in line with duly approved PQR / WPS.
- Galvanized (Zinc) coating shall be removed by light duty grinder or by any other suitable tool at both ends of riser pipe at about 25mm in length where welding is to be performed.
- The entire riser assembly shall be fabricated with socket welds both for threaded riser assembly and plain ended pipes. Threaded joints are permitted after first isolation valve on laterals where riser is not approachable from balcony and in case if riser is in approach of balcony within 300 mm gap from balcony laterals may be threaded with tee of welded riser on account of workability and future maintenance considerations
- Pipe and required fittings shall be first coupled with threaded (NPT) joints. The threaded joints to be made using male tapered thread and female parallel thread fittings.
- Teflon/PTFE Tape or any other joining compound shall not be used in threaded joints for welded riser. Alternatively plain ended pipes and fitting can also be used for welding in welded riser.
- Risers and laterals must be designed to run through the optimal possible route, taking into consideration potential meter positions, design regulations and access for future maintenance. A riser must not be constructed so that the laterals face directly into the wall from the riser.
- Risers and laterals must be laid a minimum of 300 mm from any electrical equipment or installations. On occasions where the pipe has to cross over a cable, this has to be done at right angles and a minimum gap of 25 mm must be maintained between the pipe and cable. Consideration may be given to wrapping the pipe with electrical insulation tape for protection against electrical short circuiting.
- The riser shall be installed in a vertical line from its point of support to its highest point with a minimum of changes in direction. All riser and lateral pipe shall be clamped to the building at intervals not



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exceeding 1.5 mtrs. Maximum distance between clamps shall be 1.0 - 1.5 m when pipe goes to the straight, if any tee or fittings lies in between the pipe then clamp shall be placed 150 mm far away from center line of fittings at every sides. However, the same may be changed as per site conditions/as directed by EIC. Minimum gap between pipe & wall shall be 25 mm.

- Only pretested riser shall be erected using pulley. Pretesting shall be done with compressed air @ 2 bar (g) for minimum duration of 30 minutes.
- Supply and Installation of lateral GI pipes of 1/2" to 2" dia. from welded riser tapping TEE (Isolation Valve) to customer's kitchen appliances including NPT threading of GI pipes, supply of proper seal outs for threads to join fittings such as elbows, tees, connectors, regulators (free issue), meters (free issue), appliance & isolation valves etc., as per approved procedures and specification including clamping and sealing etc.
- The lateral extending from the riser at right- angles must extend a minimum of 400 mm from the riser before passing through a wall. Where the 400 mm length cannot be achieved, a flexible fitting such as stainless-steel hose (anaconda) shall be fitted.
- For the laterals beyond eighth floor, flexible Anaconda shall be used in compliance to the material specification of SS316, fittings shall be used with brass connections conforming to IS 319, in order to account for the temperature induced stresses.
- Where pipe passes through the balcony and the surface is slightly elevated around the service pipe or its surrounding, sleeves to be provided to prevent the accumulation of water at that point.
- Pipe shall preferably be entered into building above ground and remain in a ventilated location. The location for entry shall be such that it can be easily routed to the usage points by the shortest practicable route.
- Risers and laterals shall be Leak tested with compressed air @ 2 bar (g) for minimum 2 hrs after vertical installation.
- The joints/ fittings of the GI installation shall be painted only after carrying out testing of the installation
- Making temporary but stable platforms/scaffolding/rope ladder etc., required for installation of pipes/fittings at all heights/multi storied flats and locations.
- Any other material & activities not mentioned/covered above, but otherwise required for satisfactory completion/safety of work as defined in tender/bid has to be supplied / done by contractor within specified schedule at no extra cost to Owner.

4.1 SCOPE OF SUPPLY

4.2 Owner's Scope of Supply (Free Issue Item)



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Owner's scope of supply includes MDPE pipe, GI Pipe (Qty as per SOR), Meters & Regulators only as required.

In addition to above, in order to speed up the project other Materials if available with Owner shall be issued on replacement basis to the Contractor from the designated store(s) of GAIL (I) Ltd. Contractor shall be responsible for lifting the free issue materials from Owner's storage point(s) and transporting the same to work site(s) at his own cost.

4.3 Material to be supplied by Contractor

The procurement and supply, in sequence and at the appropriate time, of all materials and consumables required for completion of the work as defined in this Bid document except the materials specifically listed above, shall be entirely the CONTRACTOR'S responsibility and item rates accepted for the execution of the CONTRACT shall be inclusive of supply of all these materials. The material to be supplied by the Contractor shall be as per specification and preferred make as indicated in Appendix-I or duly approved / recommended for use by GAIL (I) Ltd. / CMC. The materials will be, but not by way of limitations, as follows:

All materials except what is under Owner's scope of supply as mentioned in Clause No. 4.1 above, and required for successful completion of works in all respects shall be supplied by the Contractor and the cost of such supply shall be deemed to have been included in the accepted price without any additional liability on the part of Owner.

The following materials to be supplied by the contractor as required for completing the work. However other additional/ Supplementary materials required for execution of the project is to be supplied by the contractor.

Material under Contractor's Scope of Supply

A) **HDPE Casing Pipes PE 63/80, PN 6**

- i) HDPE Ducting Pipes (65mm)
- ii) HDPE Ducting Pipes (75mm)

B) **Coupler / bends / elbows as required**

- i) For 20mm (PE)
- ii) For 32 mm (PE)

C) **End Caps**

- i) Ends caps 20mm (PE)
- ii) End cap 32mm (PE)

D) **Equal Tee**



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- i) Equal Tee 20mm OD (PE)
- ii) Equal tee 32 mm OD (PE)

E) Saddle Tapping Tee

- i) Saddle Tapping Tee 32x20 (PE)
- ii) Saddle Tapping Tee 63x20 (PE)
- iii) Saddle tapping Tee 63x32 (PE)

F) Reducer

- i) Reducers 32x20 (PE)
- ii) Reducers 63x32(PE)
- iii) Reducers 125x63 (PE)

G) Transition Fitting

- i) PE to G.I. (20 mm to 1/2")-01(Imp)
- ii) PE to G.I. (32 mm to 1")

H) Warning mat

Warning Mat 300mm Wide-1mm Thick

I) GI Fittings

- i) Elbows F End (1/2") (GI)
- ii) Elbows F End (3/4") (GI)
- iii) Elbows F End (1") (GI)
- iv) Elbows F End (1 1/2") (GI)

- v) M & F Elbows End (1/2") (GI)
- vi) M & F Elbows End (3/4") (GI)
- vii) M & F Elbows End (1") (GI)
- viii) M & F Elbows End (1 1/2") (GI)

- ix) Equal Tee (1/2") (GI)
- x) Equal Tee (3/4") (GI)
- xi) Equal Tee (1") (GI)
- xii) Equal Tee (1 1/2") (GI)

- xiii) Union (1/2") (GI)
- xiv) Union (3/4") (GI)
- xv) Union (1") (GI)



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xvi) Union (1½") (GI)

xvii) Sockets (½") (GI)

xviii) Sockets (¾") (GI)

xix) Sockets (1") (GI)

xx) Sockets (1½") (GI)

xxi) Reduced Elbows (¾" x ½") (GI)

xxii) Reduced Elbows (1" x ¾") (GI)

xxiii) Reduced Elbows (1½" x ¾") (GI)

xxiv) Reduced Elbows (1½" x 1") (GI)

xxv) Reduced Elbows (2" x 1½") (GI)

xxvi) Hex Nipple Size (½" x 2") Long (GI)

xxvii) Hex Nipple Size (½" x 3") Long (GI)

xxviii) Hex Nipple Size (¾" x 2") Long (GI)

xxix) Hex Nipple Size (1" x 2") Long (GI)

xxx) Hex Nipple Size (1½" x 2") long (GI)

xxxi) Reduced Sockets (¾" x ½") long (GI)

xxxii) Reduced Sockets (1" x ¾") (GI)

xxxiii) Reduced Sockets (1½" x ¾") (GI)

xxxiv) Reduced Sockets (1½" x 1") (GI)

xxxv) Reduced sockets (2" x 1½") (GI)

xxxvi) GI Plugs ¾"

Anaconda (flexible hoses) (lateral & riser buildings) (before meter)

a) 12mm dia.

b) 8mm dia.

Steel reinforced rubber hose (before burner)

a) 8mm dia.

Any other fittings not specified above but required for GI, Cu and PE lines is to be provided by the contractor other than any free issue materials provided by GAIL as mentioned in the SOR of the tender/bid documents.

5.1 DOCUMENTS, SPECIFICATIONS, STANDARDS & DRAWINGS

5.2 Owner shall furnish tender/bid purpose drawings as listed in content of Volume-II of II of the tender/bid document and other typical standard drawings attached with respective technical specifications enclosed with Volume-II of II of the tender/ bid document. Contractor shall prepare detail engineering



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drawing, bill of materials and all construction drawings and submit to consultant for approval prior to start of the job / any procurement.

- 5.3 Contractor shall prepare isometric drawings, any specific detail drawings (if required by Engineer-in-charge) & bill of materials and submit the same for Owner/ Consultant's approval / record.

Contractor shall prepare drawing for utilities line as required or as per SOR and submit the same for Owner/ Consultant's approval/ record.

- 5.4 No construction small or big shall be carried out without proper construction / standard drawings duly approved by Owner's Engineers at Delhi or site office or Owner's representative duly authorized to do so.

- 5.5 After Completion of construction & commissioning of pipeline system, Contractor shall incorporate all the correction in drawings, prepare and issue the drawings "as built drawings" as listed below to Owner as final submission of drawings. For pipeline alignment sheet, all block valve's location & details, pipe book etc. and for tap-off point & consumers premises, piping GAD, Isometric and all civil drawings including hook-up arrangement with Meter Regulator. For final submission only 4 sets of documents shall be handed over by Contractor. Any construction done by Contractor without duly approved drawings shall be wholly at his risk and cost. Contractor shall also submit soft copy of pipe book in excel along with hard copy. Soft copy of all as- built drawings shall be also submitted in AutoCAD.

- 5.6 Specifications

The work shall be carried out by CONTRACTOR strictly in accordance with the following specifications enclosed in Volume-II o II of this document: -

- 1) Laying of Underground PE Pipeline
- 2) Installation of Aboveground GI Piping for Domestic Consumers
- 3) PE Pipes
- 4) GI Pipe
- 5) GI Fittings
- 6) HDPE Pipes
- 7) Cu pipe
- 8) Cu fitting
- 9) Warning mats
- 10) MDPE Fittings and Electro-fusion
- 11) Brass Fitting
- 12) Flexible Hose (anaconda)
- 13) Flux
- 14) Isolation valve & Appliance Valve
- 15) Health safety and environment
- 16) Quality Assurance
- 17) Steel reinforced rubber hose



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5.7 Drawings

The drawings to the extent available are included in Vol.-II of the bid package for BIDDER's reference purpose only; Bidders are advised to go through these drawings and also visit the site before submitting their bids. The Contractor shall develop all drawings including for all crossings, along with the all-connection drawings required for construction works as detailed in respective SCC, PJS & SOR etc.

6.1 **RESOURCES / FACILITIES**

6.2 Recruitment of Personnel by Contractor

- . The Contractor shall not recruit personnel of any category from among those who are already employed by the other agencies working at the sites but shall make maximum use of local labour available.

6.3 Construction Water and Power Supply

No water and power will be provided by the Owner. It should be the responsibilities of the contractor to arrange water and power at his own cost.

6.4 Land for Residential Accommodation

Owner shall not provide any land for residential accommodation of contractor's staff and labour.

7.1 **PROJECT SCHEDULING & MONITORING**

The following schedules/documents/reports shall be prepared and submitted by the Bidder/Contractor for review/approval at various stages of the contract.

7.2 Along with Bid

a) Time Schedule

The Completion Time Schedule for the work (including arc period) as per SCC Annexure- 3 of Tender/ bid in all respect, from the date of issue of Fax of Intent/Acceptance (FOA).

The Bidder is required to submit a Project Time Schedule in Bar Chart Form, along with the Bid. The Schedule shall cover all aspects like sub-ordering, manufacturing and delivery, indicated in the Bid Document. The Owner interface activities shall be clearly identified with their latest required dates. Owner reserves the right to disqualify the Bidder if the above Schedule submitted by the Bidder is not in line with the overall Project requirement.

b) Scheduling & Monitoring System



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The Bidders should describe their system of Project Scheduling and monitoring, the extent of computerization, level of detailing, tracing methodology etc. with the name of computer package and sample outputs.

7.3 After the Award of Contract

a) Overall Project Schedule

The Contractor shall submit within 1 week of Fax of Intent, a sufficiently detailed overall Project Schedule in the activity network form, clearly indicating the major milestones, interrelationship/ interdependence between various activities together with analysis of critical path and floats.

The network will be reviewed and approved by Engineer- in-Charge and the comments if any shall be incorporated in the network before issuing the same for implementation. The network thus finalized shall form part of the contract document and the same shall not be revised without the prior permission from Engineer-in- Charge during the entire period of contract.

b) Progress Measurement Methodology

The contractor is required to submit within 1 week of award of WORK, the methodology of progress measurement of sub-ordering, manufacturing/ delivery, sub- contracting construction and commissioning works and the basis of computation of overall services/physical progress informed. Owner reserves the right to modify the methodology in part or in full.

c) Functional Schedules

The contractor should prepare detailed functional schedules in line with network for functional monitoring and control and submit scheduled progress covers for each function viz. ordering, delivery and construction.

7.4 Project Review Meetings

The Contractor shall present the programme and status at various review meetings as required.

a) Weekly Review Meeting

Level of :	Contractor's / Consultant's
RCM/ Participation	Site In charge & Job Engineers.

Agenda:	a) Weekly programme v/s actual achieved in the past week & program for next week.
	b) Remedial Actions and hold up analysis.
	c) Client query/ approval.

Venue :	Site Office
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b) Review Meeting

Level of : Senior Officers of GAIL (I) LTD. CMC and Participation Contractors.

- Agenda :
- a) Progress Status/ Statistics
 - b) Completion Outlook
 - c) Major holdups /slippages
 - d) Assistance required
 - e) Critical issues
 - f) Client query / approval

Venue : GAIL (I) LTD. /CMC Office/ Site at the discretion of Owner/ CMC

7.5 Progress Reporting Performa

A) Monthly Progress Report

This report shall be submitted on a monthly basis within 10 (ten) calendar days from cut-off date, as agreed upon covering overall scenarios of the work. The report shall include, but not limited to the following:

- a) Brief Introduction of the work.
- b) Activities executed / achievements during the month.
- c) Schedule versus actual percentage progress and progress curves for Detail Eng. Sub-ordering, Manufacturing / Delivery, Sub- contracting, Construction, Commissioning and Overall and quantum wise status & purchase orders against schedule.
- d) Area of concern/ problem/ hold-ups, impacts and action plans.
- e) Resources deployment status.
- f) Annexures giving status summary for drawings, MRs, deliveries, sub-contracting and construction.
- g) Procurement status for items to be supplied by Contractor.

B) Weekly Reports

The report will be prepared and submitted by the Contractor on weekly basis and will cover following items:

- a) Activities programmed and completed during the week.
- b) Resource deployed men and machines.
- c) Quantities achieved against target in construction
- d) Record of Man-days lost.
- e) Construction percentage progress schedule and actual.



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C) Daily Repots

- a) Activity programme for the day
- b) Progress of the previous day and commutative progress.
- c) Manpower & machinery deployed.

7.6 PROGRESS REPORTS

7.5.1 CONTRACTOR shall make every effort to keep the OWNER adequately informed as to the progress of the WORK throughout the CONTRACT period.

CONTRACTOR shall keep the OWNER informed well in advance of the construction schedule so as to permit the OWNER to arrange for requisite inspection to be carried out in such a manner as to minimize interference with progress of WORK. It is imperative that close coordination be maintained with the OWNER during all phases of WORK.

7.5.2 By the 10th (tenth) of each month, CONTRACTOR shall furnish the OWNER a detailed report covering the progress as of the last day of the previous month. These reports will indicate actual and scheduled percentage of completion of construction as well as general comments of interest or the progress of various phases of the WORK. The frequency of progress reporting by the CONTRACTOR shall be weekly.

7.5.3 Once a week, CONTRACTOR shall submit a summary of the WORK accomplished during the preceding week in form of percentage completion of the various phases of the WORK, to the OWNER.

7.5.4 Progress reports shall be supplied by CONTRACTOR with documents such as chart, networks, photographs, test certificate etc. Such progress reports shall be in the form and size as may be required by the OWNER and shall be submitted in at least 3 (three) copies.

7.5.5 Contractor shall prepare daily progress report (DPR) in the desired format and submit it to Engineer-in-charge along with schedule of next day to Engineer-in- charge.

8.1 CONSTRUCTION

OWNER reserves the right to inspect all phases of CONTRACTOR's operations to ensure conformity to the SPECIFICATIONS. Owner will have Engineers, Inspectors or other duly authorized representatives, made known to the CONTRCTOR present during progress of the WORK and such representatives shall have free access to the WORK at all times. The presence or absence of a OWNER's representative does not relieve the CONTRACTOR of the responsibility for quality control in all phases of the WORK. In the event that any of the WORK being done by the CONTRACTOR or any SUB-CONTRACTOR is found by OWNER's representatives to be unsatisfactory or not in accordance with the DRAWINGS, procedures and SPECIFICATIONS, the CONTRACTOR shall, upon verbal notice of such, revise the work in a manner to conform to the relevant DRAWINGS, procedures and SPECIFICATIONS.



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8.2 Rules & Regulations

CONTRACTOR shall observe in addition to Codes specified in respective specification, all National and Local Laws, Ordinances, Rules and Regulations and requirements pertaining to the WORK and shall be responsible for extra costs arising from violations of the same.

8.3 Procedures

Various procedures and method statements to be adopted by CONTRACTOR during the construction as required in the respective specifications shall be submitted to OWNER in due time for APPROVAL. No such construction activity shall commence unless approved by OWNER in writing.

8.4 Field Inspection

CONTRACTOR shall have at all times during the performance of the WORK, a Competent Superintendent on the premises. Any instruction given to such superintendent shall be construed as having been given to the CONTRACTOR.

8.5 Erection and Installation

The CONTRACTOR shall carry out required supervision and inspection as per quality Assurance plan and furnish all assistance required by the OWNER in carrying out inspection work during this phase. The OWNER will have engineers, inspectors or other authorized representatives present who are to have free access to the WORK at all times. If an OWNER's representative notifies the CONTRACTOR's authorized representative not lower than a Foreman of any deficiency, or recommends action regarding compliance with the SPECIFICATIONS, the CONTRACTOR shall make every effort to carry out such instructions to complete the WORK conforming to the SPECIFICATIONS and approved DRAWINGS in the fullest degree consistent with best industry practice.

8.6 Construction Aids, Equipment, Tools & Tackles

CONTRACTOR shall be solely responsible for making available for executing the work, all requisite Construction Equipment's, Special Aids and Tools, Tackles and testing equipment's and appliances. Such construction equipment's etc. shall be subject to examination by Owner and approval for the same being in first class operating condition. Any discrepancies pointed out by OWNER shall be immediately got rectified, repaired or the equipment replaced altogether, by CONTRACTOR. OWNER shall not in any way be responsible for providing any such equipment, machinery, tools and tackles.

The OWNER reserves the right to rearrange such deployment depending upon the progress and priority of work in various sections.

Tie-end between main line and starting point of terminal is included in the scope of contract, as and when main line section is available for Tie-ins.

9.1 DOCUMENTATION



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9.2 As - Built Drawings

Notwithstanding the provisions contained in standard specifications, upon completion of commissioning, the BIDDER shall complete all of the related approved drawings along with bill of materials to the "AS BUILT" stage provide to a scale of 1:200 and submit to GAIL (I) LTD., the following:

- a) One complete set in reduced size (279 mm x 432 mm).
- b) One complete set of Soft Copy in portable drive of all original drawings.
- c) Four complete sets of approved prints in A2 / A3 sizes.

9.3 Completion Document

The following documents shall be submitted in hard binder by the BIDDER in one set for GAIL (I) site office in original and one set for GAIL (I), NOIDA, as a part of completion documents: -

- a) Copies of the Inspection reports, Laying Graphs, HDD Profiles (if required) and valve pit drawings (if required).
- b) Pre testing, final Hydrostatic / pneumatic and other Test results and reports.
- c) Consumption statements of PE / GI certified by Owner's Site Engineer.
- d) Material Reconciliation, stores issue & return statements
- e) All other requirements as specified in the respective specifications.
- f) Completion Certificate issued by Owner's Site Engineer.
- g) No claim certificate by the BIDDER.
- h) Completion certificate for embedded and covered up works wherever applicable.
- i) Recovery statement, if any.
- j) Deviation statement.
- k) Statement for reconciliation of all the payments and recoveries made in the progress bills.
- l) Copies of deviation statement and order of extension of time, if granted.
- m) Any other contractual documents required on completion.
- n) Total list of houses in the area allotted to him giving details of connections provided & reasons where connection could not be given / completed.
- o) The details recorded in measurement cards of every domestic house.
- p) Details of houses where extra piping done along with materials used.
- q) Total material consumption report.
- r) Material reconciliation with respect to the materials issued.
- s) Test reports & test certificates of gauges etc.
- t) Any other documents / records required.

10.1 SURVEY AND LEVEL / SETTING OUT WORK

- 10.2** Before the WORK or any part thereof are begun, the CONTRACTOR's agent and the Engineer-in-Charge's representative shall together survey and take levels of the SITE and decide all particulars on which the survey is to be made, and on which measurements of the WORK are to be based. Such particulars shall be plotted by the CONTRACTOR and after agreement the drawings shall be signed by the Engineer-in-Charge.



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- 10.3 The CONTRACTOR shall be entirely responsible for the horizontal and vertical alignment, the level and correctness of every part of the WORK and shall rectify any errors or imperfections therein. Such rectifications shall be carried out by the CONTRACTOR at his own cost, when instructions are issued to this effect by the Engineer-in-Charge or his representative.
- 10.4 The Engineer-in-Charge shall furnish the relevant existing grid point with Bench Mark on the land. It shall be CONTRACTOR's responsibility to set out the necessary control points in and to set out the alignment of the various works. The CONTRACTOR shall have to employ efficient survey team for this purpose and the accuracy of such setting out work shall be CONTRACTOR's responsibility.
- 10.5 The CONTRACTOR shall give the Engineer-in-Charge not less than 24 (twenty four) hours notice in writing of his intention to set out or give levels for any part of the WORK so that arrangements may be made checking the same.
- 10.6 WORK shall be suspended for such times as necessary for checking lines and levels on any part of the WORK.
- 10.7 The CONTRACTOR shall at his own expense provide all assistance, which the Engineer-in-Charge may require for checking the setting out of WORKS.
- 10.8 Before commencement of any activity, contractor's quality control set up duly approved by company must be available at site.
- 11.1 **ORDER OF WORKS / PERMISSIONS / RIGHT OF ENTRY / CARE OF EXISTING SERVICES**
- 11.2 The order in which the WORK shall be carried out shall be subject to the approval of the Engineer-in-charge and shall be so as to suit the detailed method of construction adopted by the CONTRACTOR, as well as the agreed joint programme. The WORK shall be carried out in a manner so as to enable the other contractors, if any, to work concurrently.

OWNER reserves right to fix up priorities which will be conveyed by Engineer-in-Charge and the CONTRACTOR shall plan and execute work accordingly.

11.3 Existing Service

- 11.3.1 Drains, pipes, cables, overhead wires and similar services encountered in course of the works shall be guarded from injury by the CONTRACTOR at his own cost, so that they may continue in full and uninterrupted use to the satisfaction of the Owners thereof, or otherwise occupy any part of the SITE in a manner likely to hinder the operation of such services.
- 11.3.2 Should any damage be done by the CONTRACTOR to any mains, pipes, cables or lines (whether above or below ground etc.), whether or not shown on the drawings the CONTRACTOR must make good or bear the cost of making good the same without delay to the satisfaction of the Engineer-in-Charge.



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12.0 MAKE OF MATERIAL / BOUGHT OUT ITEMS

Approved vendors for various major items are enclosed as Appendix-I to Particular Job Specification with this tender/ bid document. The bidder shall consider such names only as indicated in the aforesaid list and clearly indicate in the bid the name(s) as selected against these items. For any other item not covered in the list enclosed with this tender/ bid document, prior approval shall be obtained by the contractor from GAIL/ GAIL Authorized site consultant for its make/ supplier's name.

13.0 INSPECTION OF SUPPLY ITEMS

All inspections and tests shall be made as required by the specifications forming part of this contract. Contractor shall advise Owner/ Consultant in writing at least 10 days in advance of the date of final inspection/tests. Manufactures inspection or testing certificates for equipment and materials supplied, may be considered for acceptance at the discretion of Owner/ Consultant. All costs towards testing etc. shall be borne by the contractor within their accepted rates. All inspection of various items shall be carried out based on Quality Assurance Plan, which will be submitted by the Contractor and duly approved by Owner/ Consultant.

14.0 ESCALATION

The Unit Rates accepted shall be kept firm till completion of work and no price Escalation shall be paid.

15.0 DOCUMENTS TO BE SUBMITTED / PRODUCED ALONGWITH R.A. BILLS

Refer 'the checklist' for details of the documents to be submitted. Checklist duly signed will become part of RA bill.

16.0 INSURANCE FOR FREE ISSUE MATERIAL

Insurance for Free Issue Material

Contractor shall at his own expense arrange, secure and maintain insurance cover for Owner's supplied free issue materials as defined in Tender/ bid Document of adequate value as intimated by Owner / consultant. Contractor's awarded price shall be inclusive of all costs on account of insurance liabilities covered under the Contract. Contractor shall note that the beneficiary of insurance cover shall be GAIL (I) Ltd. The approximate cost of free issue material of this tender/ bid quantity is as given below:

Contract Type	Cost In INR
For Contract Award Value up to ₹25 Lakh	₹7.50 Lakh
For Contract Award Value up to ₹50 Lakh	₹15.0 Lakh

The contractor shall obtain the applicable insurance before the issuance of free-issue materials.

16.2. Insurances in India

16.2.1 Contractor shall at his own expense arrange, secure and maintain insurance with Indian insurance companies to the satisfaction of the Owner as may be necessary and to its full value for all such amounts to protect the works in progress from time to time and the interest of Owner against all risks as detailed herein. The form and the limit of such insurance as defined herein together with the under writer works thereof in each case should be as acceptable to the Owner. However, irrespective of work acceptance



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the responsibility to maintain adequate insurance coverage at all times during the period of Contract shall be that of Contractor alone. Contractor's failure in this regard shall not relieve him of any of these responsibilities and obligations under Contractor.

16.2.2 Any loss of damage to the equipment during inland transportation, storage, erection and commissioning till such time the Work is taken over by Owner shall be to the account of Contractor. Contractor shall be responsible for preferring of all claims and make good for the damage or loss by way of repairs and/ or replacement of the parts of the Work damaged or lost. Contractor shall provide the Owner with a copy of all insurance policies and documents shall be submitted to the Owner immediately upon the Contractor having taken such insurance coverage. Contractor shall also inform the Owner regarding the expiry cancellation and/ or changes in any of such documents and ensure revalidation/ renewal etc., as may be necessary well in time.

16.2.3 The risks that are to be covered under the insurance shall include, but not be limited to the loss or damage in handling, transit, theft, pilferage, riot, civil commotion, weather conditions, accidents of all kinds, fire, war risk etc. The scope of such insurance shall cover the entire value of supplies of equipment's, plants and materials.

16.2.4 All cost on account of insurance liabilities covered under this Contract will be to Contractor's account and will be included in Contract Price. However, the Owner may from time to time, during the currency of the Contract, ask the Contractor in writing to limit the insurance coverage risk and in such a case, the parties to the Contract will agree for a mutual settlement, for reduction in Value of Contract to the extent of reduced premium amounts.

Contractor as far as possible shall cover insurance with Indian Insurance Companies.

17.1 SPECIAL POINTS PERTAINING TO SPECIFICATION

The technical specification & safety standards as prescribed in PNGRB is to be followed further

The minimum pipeline cover shall be kept as follows:

Pipeline Burial Requirement

The entire pipeline shall be buried and provided with a minimum cover as given in Table below:

Pipeline Burial Requirements	
Location	Min. Cover (m)
a) minor water crossing (below firm bed level)	1.5
b) Cased/ Uncased Road/ cart track crossings	1.2
c) Drainage, ditches at roads crossings	1.0
d) Residential and other locations including rocky areas	1.0

Note:



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- i) The depth of cover shall be measured from the top of the pipe to the top of the undisturbed surface of soil or the top of graded working strip, whichever is lower. The fill material in the working strip shall not be considered in the depth of cover.
- ii) The cover shall be measured from the top of road or top of rail, as the case may be.
- iii) For water courses that are prone to scour and erosion, adequate safe cover as mentioned above or as advised by concerned authorities (whichever is stringent) shall be provided below the predicted scour profile expected during the life time of the pipeline.
- iv) When scour level is not known, an additional cover of at least 1 m or as advised by concerned authorities shall be provided from the existing firm bed of the river / water course except in case of rocky river bed;
- v) Minimum cover mentioned above against Sl. no. a), b), c), d) & e) category may be increased based on the statutory requirements from concerned authorities and requirement shall be final and binding to the contractor.
- vi) soft soil / sand padding of minimum 150 mm thickness or as mentioned in standard drawing (whichever is stringent) to be provided around the pipeline where gravel / hard soil or rocky area is encountered.
- Piping at consumer ends, connection at existing tap-off location and for future connections along with bill of materials.

Contractor shall develop General Arrangement Drawings (GADs) good for construction for size 32 / 20mm and locations based on typical sketches/ drawings along with bill of materials and submit to Owner for reviews/ approval. Construction work shall be carried out based on construction drawings duly approved by Owner/ Consultant.

- The detailed engineering for above ground installation shall include detail engineering pertaining to all disciplines (if required) along with bill of materials.
 - All the documents/ drawings prepared by the Contractor shall be submitted to Owner/ Engineer-in-charge for review and approval. All works shall be executed based on the approved drawings/ documents only.
 - Contractor shall obtain all clearance from Government authorities (if required). However, bank guarantee/ required fee or charges shall be submitted by Owner.
- 17a. If any ambiguity arises between SCC (Tech.) & Particular Job Specification in that case later shall govern. However, in some cases, decision of Engineer-in-charge shall be final and binding to the contractor.
- 17b **Following points shall be taken care by the contractor before during execution works.**



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- i) Contractor shall be responsible for taking necessary precautions regarding traffic (installation of notice / warning boards).
- ii) Contractor shall be totally responsible for the occurrence of any accident during excavation of road and shall be liable for damages / expenses due to the same.
- iii) Concerned authority / Owner shall not be responsible for any loss / damage.
- iv) One copy of the permission shall be made available with contractor's responsible workman (if required) at the place where excavation is undertaken.
- v) While executing the subject work, excavation shall be done in consultation with the concerned authority engineer of that area.
- vi) Necessary safety measures shall be taken for the gas pipeline, since high tension lines and other services carriers are running along with in gas pipeline route in the area.

17c Additional Clause

17c.1 Contractor to note that the minimum requirements of inspection and testing of the bought- out items shall be governed by attached QAP with the tender/ bid document. However, contractor shall submit their QAP in line with the requirement specified in attached QAP for Owner's/ CMC's approval.

17c.2 Contractor to note that all the documents/drawings submitted by them as a part of bid shall be considered only to assess Bidder's technical capability and shall in no way absolve them from complying with all the requirements of the Tender/ bid. All works to be performed by the Bidder shall be strictly in accordance with tender/ bid conditions.

17c.3 Contractor shall submit duly signed & stamped hard copies of all required documents/ drawings/ data sheets etc. to CMC for their review & approval as per terms & condition of tender/ bid documents. The date of receipt of these documents/ drawings/ data sheets etc. at CMC shall be deemed as the date of submission. If any documents/ drawings/ data sheets etc. require re-submission due to any error/ deficiency noticed during review/ approval stage, in that event the additional time required by the contractor to get the revised document/ drawing reviewed/approved by CMC shall be solely to contractor's account and in no case, contractor shall be entitled for any time or cost benefit.

17c.4 The drawings/documents/ data sheets etc. shall be reviewed, checked, approved and duly signed/stamped by successful contractor before submission. Revision number shall be changed and revisions shall be highlighted by clouds during submission of revised documents/drawings/data sheets by the successful contractor. Whenever the successful contractor requires any sub-supplier drawings to be reviewed/approved by CMC, the same shall be submitted by the contractor after review/ approval and



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stamped by the Contractor. Direct submission of the sub-supplier's drawings/documents/data sheets etc. without contractor's approval shall not be entertained.

- 17c.5 Review/Approval of the contractor's submitted drawings/ documents/ data sheets etc. by CMC would be only to review the compatibility with basic design and concepts including construction work procedure and in no way absolve the successful contractor of his responsibility/contractual obligation to comply with tender/ bid requirements, applicable codes, specifications and statutory rules/regulations. Any error/deficiency noticed during any stage of manufacturing/execution/installation shall be promptly corrected by the contractor without any extra cost or time, whether or not comments on the same were received from CMC during the drawing review stage.

Inspection/ Site supervision as per QA/QC of the contractor's carried out works and their supplied material etc. at site by CMC/consultant would be only to inspect / supervise the activities/works randomly to check the compatibility with the requirement of technical specification of the Contract document and in no way absolve the successful contractor of his responsibility/contractual obligation to comply with contract document requirements, applicable codes, specifications and statutory rules/regulations. Any error/deficiency noticed during any stage of manufacturing/execution/installation shall be promptly corrected by the contractor without any extra cost or time, whether or not observation/comments on the same were received from CMC/consultant either in inspection report / work procedure during the construction works to commissioning stage.

- 17c.6 Contractor shall make & maintain their own suitable sized Storage yard/ area (covered as well as open space) to store Free Issue Materials (FIM) in proper manner. Contractor shall also maintain the FIM in good condition during entire storage period by using all type of servicing/overhauling such as cleaning, greasing, protecting from rusting/ pitting etc.

- 17c.7 Storage Yard/ Area shall have proper motorable approach, adequate indoor & outdoor area lighting, potable & service water, proper rack & wooden sleeper etc. for staking/ storing the material, availability of material handling equipment of adequate capacity etc.

Owner/CMC's Site In-charge shall visit & inspect the Contractor's Storage yard/ Area and upon his concurrence only, the FIM shall be stored by the Contractor at the particular Storage Yard/ Area.

- Delay in issuance of FIM due to non-acceptance of Contractor's Storage yard/Area i.e. mainly because of noncompliance of the minimum condition as Mentioned Above for Storage Yard/ Area) shall not be attributable to Owner / consultant.

- 17c.8 During construction, Owner / CMC/consultant, on their discretion, have reserve right to take samples for any bought-out item received at site and test the same in a NABL approved or equivalent laboratory even if the lot has already been Inspected and cleared by CMC/Consultant / Owner for use in construction. The cost for such testing shall be borne by the Contractor. In case of failure of the samples,



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the lot shall be rejected and the same shall be replaced by the Contractor without any additional cost to Owner.

18.1 SPECIAL NOTES PERTAINING TO SCHEDULE OF RATES (SOR)

- i) The contract shall be awarded at the upfront declared Schedule of Rates (SOR) specified in the bidding document. No price bid or financial quotation shall be sought from the bidders. The bidder shall be deemed to have accepted the declared rates by participating in the Walk-In Process.
- ii) The quantities given above against individual items are indicative and shall not be considered to be binding. The quantities may be increased, decreased or deleted at site at the time of actual execution and as per discretion of Owner/ Engineer-in- charge. The unit rate shall be operated to work out the final payment due to Contractor.
- iii) The payment will be made as per actual certified measurement at site.
- iv) The scope as mentioned in the SOR is of indicative nature only and shall include all activities as detailed in the relevant clauses of the respective Particular Job Specifications, Technical Specifications, Data Sheets & drawings, etc.
- v) Installation of PE Pipes of size 20 -125 mm is to be laid underground considering for domestic consumers as required in respective city.
- vi) Restoration works of pipeline trench made by open cut method are included in Contractor's scope as indicate in SOR. Owner's / Engineer-in-Charge's decision in this regard shall be final and binding to the contractor.

19.1 Addendum/Modification/Corrigendum/Change made in the Clauses/ Statement/ Descriptions, etc. of technical specification enclosed in Volume II of II

19.2 Refer clause no. 9.5 of TECHNICAL SPECIFICATION FOR LAYING OF PE MAIN PIPELINES AND SERVICE PIPELINES Shall be read as-

Contractor shall maintain a Project site office, Material store with following facilities:

- Telephone/ Mobile phones, Printers/Scanning/Xerox machines, Computer with internet facility
- 1 No. air-conditioned four-wheeler reasonably in good condition with valid license holder driver for site survey, meetings at site, etc. to be kept for Owner/Owners representative. Also, it shall be well equipped with tools and tackles for attending any emergency complaints and ongoing execution work.

On award of the contract, the contractor shall establish the Project site office, Material store with required facilities as mentioned above and shall submit the documentary evidence, which will be verified by Owner/Owners representative before start of the works. Delay in non-compliance of above may result into the termination of contract.



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19.3 Refer clause no. 18.0 (i.e. CASING PIPE) of TECHNICAL SPECIFICATION FOR LAYING OF PE MAIN PIPELINES AND SERVICE PIPELINES Shall be read as-

The tentative sizes of the HDPE casing pipe for Moling/ HDD shall be as follows: -

Size of PE pipe	Size of HDPE pipe
20 mm	50mm
32 mm	75 mm
63 mm	125 mm
90mm	180mm
125mm	250mm

19.4 Refer clause no. 2.6 of TECHNICAL SPECIFICATION FOR INSTALLATION OF ABOVE GROUND GI /CU PIPING FOR DOMESTIC, COMMERCIAL AND INDUSTRIAL CONSUMERS Shall be read as-

Installation of GI pipes of ½”, ¾”, 1” dia. between transition fittings (installed by PE contractor) and customer's kitchen which would include NPT threading of pipes, and jointing of fittings such as elbows, tees, connectors, regulators, meters, isolation valves etc., as per laid procedures and specification including supply of GI fittings & Teflon tapes for sealing of joints. Painting of GI Pipes & fittings as per specification.

Installation of CS pipes of 1½” & 2” dia. complete along with all associated works between transition fittings (installed by PE contractor) and battery limit of Commercial & Industrial Consumer's premises shall be carried out as per separate TS [i.e. SPECIFICATION FOR PIPING FABRICATION AND ERECTION SPECIFICATION]. Painting of CS Piping system along with fittings, flanges, valves & equipment's as per specification.



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APPENDIX-I

List of Manufacturer / Supplier for Bought Out Items (Mechanical & Fire Fighting Equipment)

LIST OF PREFERRED MANUFACTURER/SUPPLIER FOR BOUGHT OUT ITEMS

PE FITTINGS & PE VALVES

- 1) M/s Friatech AG, Germany (represented by M/s Sherman Sales in India)
- 2) M/s Jain Irrigation Systems Ltd. Jalgaon (Fusion, UK)
- 3) M/s George Fisher
- 4) M/s Plasson Ltd.
- 5) M/s Agru, Australia
- 6) M/s Kimplas, Nasik (PE Fittings only)
- 7) M/s Innogaz & M/s Frialen of M/s Aliaxis Utilities & Industry Pvt. Ltd. (formerly Glynwed pipe systems)
- 8) M/s. Al-Aziz Plastics Pvt Ltd Mumbai
- 9) M/s Kimplas Piping Systems ltd., Nashik
- 10) M/s Aliaxis Utilities & Industry Pvt. Ltd (Formerly Glynwed pipesys-tems)

HDPE PIPES & HDPE DUCT

- 1) M/s Climax Synthetics (P) Ltd., Vadodra
- 2) M/s Indian Poly Pipes, Calcutta
- 3) M/s Jain Irrigation Systems Ltd., Jalgaon
- 4) M/s Kirti Industries (India) Ltd., Indore
- 5) M/s Ori Plast Limited, Calcutta
- 6) M/s Phoel Industries Limited, Delhi
- 7) M/s Sangir Plastics (P) Ltd., Mumbai
- 8) M/s Veekay Plast, Jaipur
- 9) M/s Kisan Irrigation
- 10) M/s Dutron Polymers Ltd.
- 11) M/s Manikya Plastics (P) Ltd
- 12) M/s Mangalam Pipes Pvt. Ltd., Bengaluru
- 13) M/s Shand Pipe industry Pvt. Ltd., Bengaluru
- 14) M/s Varun Pipes Pvt. Ltd., Bengaluru
- 15) M/s EPP Composite Pvt. Ltd., Rajkot
- 16) M/s DM Engineering Co., Mumbai
- 17) M/S EONNPLAST INDIA PVT LTD Noida
- 18) M/S EPP Composite Pvt. Ltd. Rajkot
- 19) M/S Sangir Plastics Pvt Ltd Mumbai
- 20) M/s Goodluck steel tubes ltd, Ghaziabad
- 21) M/s Indus tubes ltd, New Delhi
- 22) M/s Jindal pipes ltd, New Delhi / Bengaluru
- 23) M/s Jyotindra steel & tubes ltd, Firozabad



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- 24) M/s Rama Steel tubes ltd, New Delhi
- 25) M/s Surya Roshni ltd, Bhadurgarh
- 26) M/s Vishal Pipes Ltd. New Delhi
- 27) M/s Advance Steel Ltd. New Delhi
- 28) M/s Swastik Pipe Ltd, New Delhi / Bengaluru
- 29) M/s Indian seamless metal tubes ltd., Pune
- 30) M/s Appolo tubes., Bengaluru
- 31) M/s Fortune Pipes Ltd
- 32) M/s Nezone Tubes Ltd., Kolkata
- 33) M/s. Godavari Polymers Pvt. Ltd. Secunderabad.

GI PIPES

- 1) M/s Goodluck Steel Tubes Ltd, Ghaziabad
- 2) M/s Indus Tubes Ltd, New Delhi
- 3) M/s Jindal Pipes Ltd, New Delhi
- 4) M/s Jyotindra Steel & Tubes Ltd, Firozabad
- 5) M/s Rama Steel Tubes Ltd, New Delhi
- 6) M/s Surya Roshni Ltd, Bhadurgarh
- 7) M/s Vishal Pipes Ltd.
- 8) M/s Advance Steel Ltd.
- 9) M/s Swastik Pipe Ltd.
- 10) M/s Fortune Pipe Ltd.
- 11) M/s Indian Seamless Metal Tubes Ltd., Pune
- 12) M/s Appolo Tubes, Bengaluru
- 13) M/s Nezone Tubes Ltd., Kolkata
- 14) M/s Topworth Pipes & Tubes Pvt. Ltd., Navi Mumbai
- 15) P.S STEEL TUBES LIMITED
- 16) RIDDHI STEEL AND TUBE LIMITED
- 17) APL APOLLO TUBES LIMITED

WARNING MAT

- 1) M/s Sparco Multiplast Pvt. Ltd., Ahmedabad
- 2) M/s Singhal Industries, Ahmedabad
- 3) M/s Raychem RPG Ltd.
- 4) M/s Puja Packings, Mumbai
- 5) M/s Bina Enterprises, Mumbai
- 6) M/s Shree Vijay Wire & Cables Industries, Jaipur

GI FITTINGS

- 1) M/s Jainsons Industries, Jalandhar



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- 2) M/s Jupiter Metal Industries Ltd.
- 3) M/s Rajnesh Malleables Ltd., Delhi
- 4) M/s Industrial Valves & Components, Delhi
- 5) M/s Sarin Industries, Delhi
- 6) M/s Excel Metal & Engineering Industries, Mumbai
- 7) M/s Modern Stores & Engineering Concern, Kolkata
- 8) M/s Jinan Meide Casting Co. Ltd., China
- 9) M/s Mehta Brother & Co., Mumbai- (Make: M/s Jinan Meide Casting Co. Ltd., Japan) confirming to IS 1879:2010 latest standard
- 10) M/s Chokhawala Distributors
- 11) SHAKTI FORGE INDUSTRIES PVT. LTD
- 12) M/s Green Manufacturing Co. Limited, Jalandhar, Punjab (For ½" Elbow, ½" Male female Elbow, ¾" Elbow, ½" Equal Tee, ½" Socket only)

COPPER TUBES AND COPPER FITTINGS

- 1) M/s Paras Industries Ltd.
- 2) M/s Rajco Metal
- 3) M/s Chandan Enterprises
- 4) M/s Mehta Tubes
- 5) M/s Cofit Industries, Bengaluru
- 6) M/s Mandev Tubes
- 7) M/s Sagardeep Alloys
- 8) M/s Pallavi Copper Pipes
- 9) M/s Janya Extrusions Pvt Ltd, Mumbai

BRASS FITTINGS

- 1) M/s Chandan Enterprises
- 2) M/s Paras Industries Ltd.
- 3) M/s Umesh Enterprises
- 4) M/s Om brass Enterprises
- 5) M/s KPC Flexi Tubes
- 6) M/s Mehta Bros, Mumbai
- 7) M/s Mehta Tubes, Mumbai
- 8) OM Brass Industries

FLEXIBLE HOSE (ANACONDA)

- 1) M/s KPC Flex Tubes
- 2) M/s Vestas Hose Division
- 3) M/s Alfa Flexitubes
- 4) M/s Bengal Industries Pvt. Ltd.
- 5) M/s Vikram & co.
- 6) M/s Gaytri Industrial Corporation, Thane (W)



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- 7) AEROFLEX INDUSTRIES LTD
- 8) FLEXATHERM EXPANLLOW PVT LTD
- 9) ALFA FLEXITUBES PVT LTD

PE PIPES

- 1) M/s Jain Irrigation System Ltd., New Delhi
- 2) M/s Pennwalt Agru Plastics Ltd., Navi Mumbai
- 3) M/s Pioneer Polyfeb Ltd. Ghaziabad
- 4) M/s Kriti Industries (i) Ltd., Indore
- 5) M/s Ori Plast Ltd., Kolkata
- 6) M/s.Purma Plast Pvt Ltd, Rajasthan

ISOLATION (PE) VALVES

- 1) M/s Friatech AG, Germany
- 2) M/s George Fisher, Germany
- 3) M/s Plasson Ltd., Israel
- 4) M/s Agru, Austria
- 5) M/s Aliaxis Utilities & Industry Pvt. Ltd (Formerly Glynwed pipesystems)

METERS AND REGULATORS

- 1) M/s Actaris Metering System, New Delhi
- 2) M/s Elster Messtechnik Gmbh, Lampertheim
- 3) M/s Emerson Process Management (India) Pvt. Limited, Mumbai
- 4) M/s Equimeter Inc., USA
- 5) M/s Gorter Controls B.V., Netherlands
- 6) M/s Instromet International, Belgium
- 7) M/s Invensys Metering Systems India Ltd., Pune
- 8) M/s Mesura SA, France
- 9) M/s Pietro Fiorentini S.p.A, Italy
- 10) M/s RMG Regal – Messtechnik Gmbh, Germany
- 11) M/s Raychem RPG Limited, Kolkata
- 12) M/s Rockwin Flowmeter India Pvt. Ltd., New Delhi
- 13) M/s Itron India Pvt. Limited, Noida
- 14) M/s. Daniel Solutions Pvt. Ltd. Gurgaon
- 15) M/s. Capital Innotech Private Limited
- 16) M/s.Genus Power Infrastructures Limited
- 17) M/s.Greenlobe Fuel Solutions Private Limited
- 18) M/s.Kimpex Flow Private Limited
- 19) M/s.Mesura Nirmal Gas Controls Pvt Ltd
- 20) Pietro Fiorentini Db India Private Limited



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STEEL REINFORCED RUBBER HOSE

- 1) M/s Suraksha Products Pvt. Ltd.
- 2) M/s Vansh Industries
- 3) M/s T & L Gases
- 4) M/s Vikram & Co.
- 5) M/s Gayatri
- 6) M/s Luxmi Rubtech

ISOLATION VALVES AND APPLIANCE VALVES

- 1) M/s Universal Srl
- 2) M/s Tiemme Raccorderie Sede
- 3) M/s Jainson Industries
- 4) M/s Enolgas Bonimu s.a.s.
- 5) M/s Fratelli Fortis s.r.l
- 6) M/s Giacomo Climbrio
- 7) M/s Parker Hannifin S.P.A.
- 8) M/s Singapore Valve & Amp; Fittings Pte Limited, Singapore
- 9) M/S Rubinetterie Utensilerie Bonomi (RUB)
- 10) M/s Zhejiang Valogin Technology Co. Ltd. , China
- 11) M/s Ningbo Huaping Metalwork Co. Ltd., China
- 12) M/s Mehta Brothers, Mumbai.
- 13) M/s Chokhawala Distributors
- 14) M/s Zhejiang DunAn valve Co.Ltd, China

PAINT

1. M/s Asian Paints
2. M/s Berger Paints
3. M/s Kansai Nerolac Paints.
4. Durolac paints

PIPE CARBON STEEL TO INDIAN STANDARDS

1. A.S.T.Pipes Pvt. Ltd.(Ast Group)
2. Advance Steel Tube Ltd.
3. Apl Apollo Tubes Ltd.(Er.Bihar Tubes Ltd.
4. Asian Mills Pvt.Ltd.
5. Asrani Tubes Limited
6. Dadu Pipes(P) Ltd.
7. Essar Steel Limited (Erhazira Pipes Mill)
8. Gaurang Products Pvt Ltd.(Ast Group)
9. Goodluck Steel Tubes Ltd.



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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DPNG CONNECTION / LMC WORKS**



10. Hi-Tech Pipes Limited
11. Indus Tube Limited
12. Jindal Industries Ltd
13. Jindal Pipes Ltd.
14. Jindal Saw Ltd(Kosi Works)
15. Jotindra Steel & Tube Ltd
16. Lalit Pipes And Pipes Ltd.
17. Maharashtra Seamless Ltd.
18. Man Industries(India) Ltd.–Pithampur
19. Man Industries(India) Ltd.Anjar
20. Mukat Tanks & Vessels Ltd.
21. Nezone Tubes Limited
22. North East Erntubes Limited
23. Pratibha Industries Limited
24. Pratibha Pipes & Structural Ltd.
25. Pslltd(Chennai)
26. Pslltd(V1,V2&Nc)
27. Rama Steel Tubes Ltd.
28. Ratnamani Metals And Tubes Ltd.
29. Ravindra Tubes Limited
30. Samshi Pipei Ndustrries Limited
31. Surya Roshni Ltd.
32. Swastik Pipes Ltd.
33. Utkarsh Tubes & Pipes Ltd.(Formerly Bmw)
34. Zenith Birla(India)Limited

PIPE & TUBULARS TO A.P.I. STANDARDS

1. Arcelor Mittal Tubu-Lar Product Sro-Mansa, Romania
2. Bhel(Trichy), India
3. Dalmine Spa(Enquiry To Tenaris),Uae
4. Eew Korea Co. Ltd(Germany),Korea
5. Eew Korea Co. Ltd.(Korea), Korea
6. Eisenbau Kramer Gmbh,Germany
7. Hyundai Rbco. Ltd. South Korea
8. Ilva Lamiere E Tubi Srl(Enq To Ilva Spa,Italy)
9. Inox Tech. Spa, Italy
10. Ismt Ltd.Ahmedngr, India
11. Ismt Ltd. Baramati, India
12. Jinda Lpipes Ltd., India
13. Jindal Saw Ltd.(Kosi Works), India
14. Jindal Saw Ltd.(Nashik Works), India
15. Lalit Pipes And Pipes Ltd., India
16. Maharashtra Seamless Ltd., India
17. Man Industries (I) Ltd.(Pithampur),India
18. Mukat Tanks &Vessels Ltd.,India



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19. Pratibhaindustrieslimited,India
20. Ratnamani Metals And Tubes Ltd.,India
21. Siderca S.A.I.C (Enquiry To Tenaris),Uae
22. Sumitomo Metal Ind.Ltd.,India
23. Surya Roshni Ltd.,India
24. Swastik Pipes Ltd,India
25. Tata Steel Uk Limited(Formerly C702)
26. Tubos De Acero De Mexico Sa(Enq.Tenaris),Uae
27. Tubos Reunidos Sa Spain
28. Umran Steel Pipe Inc(Turkey),Turkey
29. Valcovny Trub Chomutov, Czech Republic
30. Vallourec And Mannesmann Tubes, France
31. Welspun Corp Limited (Dahej), India

PIPE / TUBE CS (SEAMLESS) TO ASTM STDS

1. Arcelor Mittal Tubular Product Sromansa, Romania
2. Bhel (Trichy),India
3. Changshu Seamless Steel Tube Co. Ltd., China
4. Dalmine Spa (Enquiry To Tenaris, Uae)
5. Heavy Metals & Tubes Limited (Mehsana), India
6. Ismt Ltd. Ahmedngr, India
7. Ismt Ltd.Baramati India
8. Jfe Steel Corporation, Uae
9. Jindal Saw Ltd(Nashik Works) India
10. Klt Automotive And Tubular Products Ltd. India
11. Mahalaxmi Seamless Limited, India
12. Maharashtra Seamless Ltd, India
13. Products Tubular Ess. A. U, Spain
14. Ratnadeep Metal Tubes Ltd., India
15. Stainlees Tubes Pvt Ltd., India
16. Sumitomo Metal Ind. Ltd., India
17. Tubos Reunidos Sa Spain
18. Valcovny Trub Chomutov, Czech Republic
19. Vallourec And Mannesmann Tubes France
20. Yangzhou Chengde Steel Pipe Co. Ltd Du-Bai(Uae)

PIPE CARBON STEEL (WELDED) TO ASTM STDS

1. Eew Korea Co. Ltd. (Germany), Korea
2. Eew Korea Co. Ltd.(Korea) , Korea
3. Eisenbau Kramer Gmbh, Germany
4. Hyundai Rbco.Ltd., South Korea
5. Inox Tech. Spa, Italy
6. Jindal Saw Ltd(Kosi Works), India



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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7. Lalit Pipes And Pipes Ltd., India
8. Man Industries (I)L Td.(Pithampur), India
9. Man Industries(India) Ltd. Anjar, India
10. Mukat Tanks & Vessels Ltd., India
11. Ratnamani Metals And Tubes Ltd., India
12. Sumitomo Metal India Ltd., India
13. Tata Steel Uk Limited

Valve

Globe Valves

- 1) M/S Weir BDK Valves (A Unit Of Weir India Pvt.Ltd.)
- 2) M/S Datre Corpn (Calcutta)
- 3) M/S KSB Pumps Ltd., Coimbatore, India
- 4) M/S L&T Audco
- 5) M/S Neco Schuber &Salzer Ltd. (New Delhi)
- 6) M/S Niton Valve India Pvt. Ltd.,I Ndia
- 7) M/S Ornate Valves (Mumbai)
- 8) M/S Panchavati Valves &Flages (P)Ltd.,I Ndia
- 9) AV Valves Ltd., India
- 10) BHEL (Trichy), India
- 11) Econo Valves Pvt Ltd, India
- 12) Fouress Engg (I) Ltd (Aurangabad), India
- 13) Leader Valves Ltd, India
- 14) Oswal Industries Ltd,India
- 15) Petrochemical Engineering Enterprises, India (Fouress Group)
- 16) Sakhi Engineers Pvt Ltd.,India
- 17) Shalimar Valves Pvt Ltd.,India
- 18) Steel Strong Valves India Pvt Ltd, India
- 19) Petro Valves Pvt. Limited, Ahmedabad
- 20) Fluid Line Valves Co.(P)Ltd., India
- 21) MICON Engineers (Hubli)(P) Ltd., India

Check Valves

1. M/s Advance Valves Pvt. Ltd., Noida
2. M/s Aksons &Mechanical Enterprises, Mumbai
3. M/s Larsen &Toubro Limited (M/s Audco India Limited, Chennai)
4. M/s AV Valves Ltd.,India
5. M/s Weir BDK Valves (A unit of Weir India Pvt. Ltd.)
6. M/s BHEL,Trichy
7. M/s Datre Coroportion Limited, Calcutta
8. M/s Leader Valves Ltd., Jalandhar
9. M/s Neco Schubert &Salzer Ltd., New Delhi
10. M/s Niton Valves Industries (P) Ltd., Mumbai



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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11. M/s Precision Engg. Co., Mumbai
12. Econo Valves Pvt Ltd, India
13. Fouress Engg (I) Ltd (Aurangabad)
14. KSB PumpsLtd (Coimbatore), India
15. NSSL Ltd. (Neco Schubert & SalzerLtd)
16. Oswal Industries Ltd,India
17. Panchvati Valves& Flanges Pvt Ltd, India
18. Petrochemical Engineering Enterprises, India (Fouress Group)
19. Sakhi Engineers Pvt Ltd
20. Shalimar Valves PvtLtd
21. Steel Strong Valves India Pvt Ltd, India
22. Fluid Line Valves Co.(P)Ltd., India
23. MICON Engineers (Hubli) (P) Ltd., India

Plug Valves

1. M/s Breda Energia Sesto Industria Spa, Italy
2. M/s Fisher Sanmar Ltd.,Chennai
3. M/s Larsen &Toubro Ltd., (Audco) New Delhi
4. M/s Nordstrom Valves, USA
5. M/s Serck Audco Valves,UK
6. M/s Sumitomo Corporation India Pvt.Ltd., New Delhi
7. M/s Z Corporation, Korea
8. M/s Hawa Valves(India)Pvt.Ltd., Mumbai
9. M/s Steel Strong Valves India Pvt.Ltd., Navi Mumbai
10. M/s Econo Valves Pvt. Ltd., India (WSSL Ltd. Group Co.)
11. M/s Flow-Serve PTE (Mfr. SERCK),India
12. M/s.ZED valves Company Private Limited, Ahmedabad

Ball Valves

1. M/s Hawa Valves(India)Pvt. Ltd, Navi Mumbai
2. M/s Larsen &Toubro (Audco), India
3. M/s Oswal Industries Ltd., India
4. M/s Virgo Engineers Ltd., Delhi
5. M/s Boteli Valve Group Co. Ltd., China
6. M/s Cameron Italys.r.l.,Italy
7. M/s Dafram S.P.A., Italy
8. M/s Fangyuan Valve Group Co. Ltd., China
9. M/s Franz Schuck GmbH, Germany
10. Kita Mura Valve Manufacturing Co.Ltd., India
11. Petrol Valve S.R.Italy
12. Piplviesse S.P.A.Italy
13. Tormene Gas Technology S.P.A. Valvetalia Group, Italy
14. Valbart S.R.L.Italy



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15. KMC Corporation, SouthKorea
16. MSA a.s. CzeekRepublic
17. OMS Aleri, Italy
18. PCC Valvess.r.l.Italy
19. Perar s.p.a.(Engineering. ToTRPsrl),Italy
20. Italys.r.l., Italy
21. MIR Valves,Malaysia
22. M/s.ZED valves Company Private Limited, Ahmedabad

Flow Tee

- 1) M/s Coprosider SPA, Italy
- 2) M/s GEA Energy System India Limited,Chennai
- 3) M/s Multitex Filtration
- 4) M/s Pipeline Engineering,UK
- 5) M/s Scomark Engg. Limited (U.K.)
- 6) M/s Skeltonhall Limited,Engaland(U.K.)
- 7) M/s Technospecial SPA, Italy
- 8) M/s Tectubi SPA,Italy
- 9) M/s RMA Germany

Split Tee

- 1) M/s Ipsco, Canada
- 2) M/s TD Willamsons,USA

Flanges

1. M/s Aditya ForgeLtd.,Vadodara
2. M/s Amforge Industries Ltd.,Mumbai
3. M/s CD Engineering Co.,Ghaziabad
4. M/s Echjay Forgings Pvt.Ltd. (Bombay),Mumbai
5. M/s Echjay Industries Ltd., Rajkot
6. M/s Forge & ForgePvt. Ltd.,Rajkot
7. M/s Golden Iron &Steel Works,New Delhi
8. M/s JK Forgings,New Delhi
9. M/s Metal Forgings Pvt .Ltd., Mumbai
10. M/s Perfect Marketings Pvt.Ltd., New Delhi
11. M/s SkyForge, Faridabad
12. M/s S&G, Faridabad
13. Chaudhry Hammer Works Ltd, India
14. JAV Forgings (P)Ltd, India
15. Kunj Forgings PvtLtd, India
16. MS Fittings Mgf. Co.Pvt.Ltd.



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17. R.N. Gupta & Co.Ltd, India
18. R.P.Engineering Pvt Ltd,India
19. Sanghvi Forgings &Engineering Ltd
20. Shri Ganesh ForgingsLtd., India
21. Uma Shankar Khandelwal &Co., India
22. Sawan Engineers, Baroda
23. Stewarts &Lloyds of India Ltd., Kolkata
24. Engineering Services Enterprises
25. Abasi Engineersing Works, India
26. Anandmayee ForgingsPvtLtd, India
27. CD Industries., India
28. Fivebros Forgings VotLtd., India
29. Good Luck EngineeringCo., India
30. Korea Flange, SouthKorea
31. Lal MetalForgeLtd, India
32. Melesi Officine
33. Amlrojie Melesi &C. srl.Italy
34. Nicola Galperti & Figlio S.P.AIndia
35. Paramount Forge, India
36. Pradeep Metal Limited, India
37. Punjab Steel Works(the), India
38. R.D.Forge, India
39. Shah Industrial &Comml. Corporation, India
40. Ulma Forja S. Coop.
41. Vivial Forge Pvt.Ltd.,Vadodara
42. N J Engineers

Fittings

1. M/s Commercial Supplying Agency,Mumbai
2. M/s Dee Development Engineers Ltd.
3. M/s EbyIndustries, Mumbai
4. M/s Flash Forge Pvt.Ltd., Vishakhapatnam
5. M/s Gujarat Infra Pipes Pvt.Ltd., Vadodara
6. M/s M.S. Fittings Mfg.Co. Pvt.Ltd., Kolkata
7. M/s Stewarts& Lloyds of India Ltd.,Kolkata
8. M/s Teekay Tubes Pvt. Ltd.,Mumbai
9. M/s PipeFit,Baroda
10. M/s Sky Forge,Faridabad
11. M/s S&G,Faridabad
12. M/s Sawan Engineers, Baroda
13. Eby Fasteners, India
14. R.N. Gupta & Co.Ltd, India
15. Exten Engg PvtLtd
16. Sivananda Pipe& Fittings Ltd



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17. Chero PipingSPA,Italy
18. CSA Fittings, India
19. EBY Fasteners, India
20. FittnoxSRL, Italy
21. Keonsae High PressureCo. Ltd.,SouthKorea
22. Munro &Miller FittingsLtd., U.K.
23. TK Corporation,SouthKorea
24. TubeTurn (India)PvtLtd., India
25. Topaz Piping Industries,India
26. Technoforge SPA, Italy
27. P.K.Tubes& FittingsPvt. Ltd., India
28. Vivial Forge Pvt. Ltd.,Vadodara
29. N J Engineers

Gaskets

1. IGP Engineers (P)Ltd.,Madras
2. Madras Industrial Products, Madras
3. Dikson & Company,Bombay
4. Banco Products (P) Ltd.,Vadodara
5. Goodrich Gaskets Pvt Ltd
6. Starflex Sealing India Pvt Ltd, India
7. Teekay Meta Flex Pvt Ltd
8. UNIKLINGER Ltd
9. HEM Engg. Corp.
10. Unique Industrial Packing Pvt.Ltd.

Fasteners

1. Nireka Engg.Co.(P)Ltd., Calcutta
2. PrecisionTaps&Dies,Bombay
3. AEP Company,Vithal Udyoug Nagar
4. FixFitFasteners, Calcutta
5. Precision Engg. Industries, Baroda
6. Echjay Forgings Pvt. Ltd., Bombay
7. Capital Industries,Bombay
8. Boltmaster India PvtLtd,India
9. Deepak Fasteners Limited, India
10. Fasteners &Allied Products PvtLtd,India
11. Hardwin Fasteners PvtLtd, India
12. J.J. Industries, India
13. Multi Fasteners Pvt Ltd, India
14. Nexo Industries,India
15. Pacific Forging & Fasteners PvtLtd,India



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16. Pioneer Nuts & Bolts Pvt Ltd, India
17. Precision AutoEngineers, India
18. President Engineering Works, India
19. Sandeep Engineering Works, India
20. Syndicate Engineering Industries, India
21. BEA SRL, Italy
22. Korea Parts & Fasteners(KPF), South Korea
23. Kundan Industries Ltd., India
24. Mega Engineering Pvt.Ltd., India
25. OME Metallurgica ERBESES.R.L, Italy
26. Pankaj International, India
27. Udehra Fasters Ltd., India

Welding Electrodes

1. For Mainline –Lincoln /Bohler make
 2. For Terminal –For rootpass-Lincoln / Bohler Make
- For other passes –Lincoln, D&H or equivalent make

NDT AGENCY

1. NDT Services, Ahmedabad
2. GEECY Industrial Services Pvt.Ltd., Mumbai
3. Corrosion Control Services, Mumbai
4. Perfect Metal Testing & Inspection Agency, Calcutta
5. Inter Ocean Shipping Co., New Delhi
6. RTD, Mumbai
7. Sievert, Mumbai
8. X-Tech, Vizag
9. Industrial X Ray and Allied Radiographers (I) Pvt. Ltd.
10. Inspection Technology, Mumbai

Fire Extinguishers

1. Avon Services (Production&Agencies) Pvt.Ltd., Bombay
2. Kooverji Devshi&Co., Bombay
3. Zenith Fire Services, Bombay
4. Safex Fire Services, Bombay
5. Reliable (FireProtection) India Ltd., Bombay
6. Brij Basi Hi
7. tech Udyog
8. Bharat Engg Works, India
9. Gunnebo India Ltd
10. Nitin Fire Protection Industries Ltd, India
11. Supremex Equipments, India
12. Vimal Fire Controls PvtLtd., India



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Fire Hydrants, Monitors, Deluge Valve, Nozzles

1. Zenith
2. Minimax
3. Newage
4. HDFire
5. VijayFire
6. Asco Strumech PvtLtd, India
7. Brij Basi Hi
8. tech Udyog
9. Gunnebo India Ltd
10. Nitin FireProtectionPvtLtd
11. Shah Bhogilal Jethamal&Brothers
12. Venus Pumps&Engineering Works
- c) RRL Hose
 1. Jayshree
 2. Newage
- d) Hoses
 1. Ashit Sales Corporation,Bombay
 2. Royal India Corporation,Bombay
 3. Gayatri Industrial Corporation
 4. Simplex Rubber Products Ltd., Ahmedabad
 5. Zaverchand Marketing Pvt. Ltd.,Baroda
 6. Presidency Rubber Mill,Calcutta
 7. The Cosmopolite, Calcutta
 8. SimplexRubber Products, Thane
- e) Hose Delivery
 1. Chhatarya Rubber &Chemical Industries,
 2. Nitin Fire Protection Industries Ltd, India
- f) Fire Hose Accessories
 1. Asco StrumechPvtLtd
 2. Brij Basi Hi-tech Udyog
 3. Gunnebo India Ltd
 4. Shah Bhogilal Jethamal & Brothers
 5. Vimal Fire Controls PvtLtd., India

Heat Shrinkable Sleeves

1. Covalence Raychem (Berry Plastics Corporation)
2. Canussa – CPS
3. Shri Narayan Impac India LLP

Cold Applied Tapes

1. Denso GmBH
2. Polyken (BerryPlastics Corporation)



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PUR Coating

1. Powercrete (BerryPlastics Corporation)

Casing End Closure

1. Raci, Italy
2. Raychem RPG Limited

Warning mat

1. Sparco Multiplast Pvt. Ltd., Ahmedabad
2. M/s Raychem RPG Limited
3. Singhal Industries Private Limited

Rock shield

1. Raychem RPG Limited

High Build Epoxy Coating

1. Berry Plastics –Powercrete
2. Specialty Polymer Canada
3. Denso Protal,Canada

Casing Insulators

1. Raci, Italy
2. Raychem RPG Limited
3. Veekay Vikram

LONG RADIUS BENDS

- i) M/s BHEL,Trichy,Tamilnadu
- ii) M/s Jindal SAWLimited,(Koshi Works), U.P.
- iii) M/s PSL Limited, Gandhidham, Gujarat
- iv) M/s Welspun,Gujarat
- v) M/s Fabricon,Belgium

INSULATING JOINTS (IJ)

- i) M/s IGP Engineers,chennai
- ii) M/s Basco (UK)
- iii) M/s Bramsthal Postfach,Germany
- iv) M/s Nuovagiungas ,Italy
- v) M/s Phoceene DeMetallurgic,France



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- vi) M/s Piping Technology, France (Erstwhile M/s Lall Storm)
- vii) M/s Prochind SPA, Italy
- viii) M/s Zunt Italiana
- ix) M/s Meteor Pvt. Ltd.
- x) M/s Alpha Engineering, Italy
- xi) M/s Igawara Industrial Services and Trading Pvt. Ltd.
- xii) M/s Sanghai Fiorentini Equipment
- xiii) M/s RMA Maschinen
- xiv) M/s Franz Schuk
- xv) M/s Advance Electronics Systems, Vadodara
- xvi) M/s Veekay Vikram, Vadodara
- xvii) M/s Langfang VBA Mechanical Co. Ltd., China

SOLENOID VALVES

- i) M/s Asco Numatics (India) P. Limited
- ii) M/s Precision Instrument Company
- iii) M/s Avcon Controls Pvt. Ltd
- iv) M/s Asco Joucomatic Ltd
- v) M/s Schrader Duncan Limited
- vi) M/s Herion Werke
- vii) M/s Thompson valves Ltd
- viii) M/s Rotex Automation Ltd
- ix) M/s Asco Joucomatic SA
- x) M/s Alcon Alexander Controls Limited

Gas Detector

- i) M/s Endee Engineering Pvt Ltd
- ii) M/s Respo Products
- iii) M/s Emerson Process Management India Pvt Ltd.
- iv) M/s Drager safety AG & CO. KGAA
- v) M/s Uniphos Envirotronic Pvt Ltd.
- vi) M/s Net Safety Monitoring Inc
- vii) M/s Honeywell Analytics
- viii) M/s Gastron Co Limited
- ix) M/s Detector Electronics Corp (Kidde Co.)

Shut off- Valve

- i) M/s Emerson Process Management India Pvt Ltd
- ii) M/s Flowserve India Control Pvt Ltd.
- iii) M/s Tyco Valves and Control
- iv) M/s Advance Valve Private Limited



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- v) M/s Trillium Flow Technology India Pvt Ltd.
- vi) M/s Samson Controls Pvt Ltd
- vii) M/s El-O-Matic India Pvt Ltd.

TRANSITION FITTINGS

- i. M/s George Fisher
- ii. Kimplas Piping Systems ltd.
- iii. M/s Jey Network

FLOW CONTROL VALVE

- i. M/s Forbes Marshall (Pune)
- ii. M/s ABB Ltd.(Nashik)
- iii. M/s Fisher Xomox(NewDelhi)
- iv. M/s Fouress Engg. (NewDelhi)
- v. M/s Instrumentation Ltd.(Palghat)
- vi. M/s MIL Controls Ltd. (Noida)
- vii. M/s Samson Control (Thane)
- viii. M/s Dresser

ULTRASONICFLOWMETER

- i. M/s Emerson Process (represented by M/s Daniel Measurement & Control)
- ii. M/s Instromet International, Belgium (represented by M/s Siddha Gas Instromet(I) Ltd.)
- iii. M/s FMCMeasurementSolution, UK(representedbyM/sTrimax Engg., Mumbai)
- iv. RMGMesstechnikGMBH
- v. M/s SICK MAHAIK, (Represented byChemtrolsIndustries, Mumbai)

TURBINE METER

- i. M/s Instromet(Belgium)
- ii. M/s RMG (Germany)
- iii. M/s Elster (Germany)
- iv. M/s FluidComponents(USA)
- v. M/s Barton Instruments(UK)
- vi. M/s Bopp &Reuther (Germany)
- vii. M/s Daniel Industries (USA)
- viii. M/s Hoffer Flow(USA)
- ix. M/s Rockwin Flow Meters

PANEL MOUNTED FLOW COMPUTERS



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- i. M/s Barton Instruments System Ltd. (UK)
- ii. M/s Daniel Measurement and Controls (M/sEmerson Group)
- iii. M/s Instromet International, Belgium (M/sEster-Instromet, India)
- iv. M/s RMGMesstechnikGmbH (Germany)
- v. M/s Omni Flow Computers Inc. (USA)/(RockwinFlow Meter India)

FIELD MOUNTED FLOWCOMPUTER

- i. M/s Barton Instruments System LLC (UK)
- ii. M/s Daniel Measurementand Controls (M/s Emerson Group)
- iii. M/s Bristol Babcock(USA)

GAS CHROMATOGRAPH

- i. ABB Ltd, India
- ii. Daniel Measurement&Control AsiaPacific, India
- iii. InstrometInternationa,NV
- iv. RMG Regal+MesstechnikGmbH

L.E.L DETECTION SYSTEM

- 1) Crowcon Detection Instruments Ltd
- 2) Detection Instruments (I) PvtLtd
- 3) Detector Electronics Corporation
- 4) MSA – Minessafetyappliances.
- 5) Oldham France S.A.
- 6) Drager SafetyAG&Co.KGAA
- 7) Honeywell

CONTROL AND SIGNAL CABLES

1. M/s ASSOCIATED CABLES
2. M/s DELTON Cables Ltd,India
3. M/s KEI Industries LtdINDIA
4. M/s – Cords Cable Industries Ltd, India
5. M/s Polycab Wires Pvt Ltd, India
6. M/s. T. C. Communication Pvt. Ltd., Delhi



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ZENER BARRIERS/ISOLATORS

- 1) M/s MTL
- 2) M/s P& F

RTDs

- 1) M/s General Instruments Ltd., Mumbai
- 2) M/s Nagman Sensors (Pvt.) Ltd.
- 3) M/s Pyro Electric, Goa

PRESSURE TRANSMITTERS, TEMP. TRANSMITTERS & DIF. PRESSURE TRANSMITTER

- 1) M/s Fisher Rosemount(Emerson)
- 2) M/s Yokogawa
- 3) M/s Honeywell

PRESSURE GAUGES, D. P. GAUGES & TEMPERATURES GAUGES

- 1) M/s AN Instruments Pvt. Ltd., New Delhi
- 2) M/s General Instruments Ltd., Mumbai
- 3) M/s WIKA

SS TUBE FITTINGS

- 1) M/s Swagelok(USA)
- 2) M/s Parker (USA)
- 3) M/s Dawsons Tech Components LLP

SS TUBE

- 1) M/s Sandvik, Sweden
- 2) M/s Ratnamani metals&tubes
- 3) M/s Heavy Metals& Tube Limited (Mehasana)
- 4) M/s Choksy Tube Co Ltd.



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SS VALVES & MANIFOLDS

- 1) M/s Swagelok(USA)
- 2) M/s Parker (USA)
- 3) M/s Dawsons Tech Components LLP

JUNCTION BOXESAND CABLESGLANDS

- 1) M/s EX-PROTECTA
- 2) M/s FLAMEPROOFCONTROLGEARS
- 3) M/s BALIGA
- 4) M/s FLEXPOR ELECTRICALS

PUSHBUTTONS/LAMPS:

- 1) L&T
- 2) SIEMENS

MCB'S:

- 1) HAVELL'S
- 2) INDO ASIAN
- 3) MDS

RELAYS:

- 1) OEN
- 2) JYOTI

POWER SUPPLY UNIT:

- 1) ELNOVA
- 2) APLAB

CONTROL ROOME QUIPMENT CONTROL PANEL & ACCESSORIES



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- 1) M/s Keltron Controls Ltd., Kerala
- 2) M/s RITTAL
- 3) M/s Pyrotech
- 4) M/s Positronics Pvt. Ltd.

INDICATORS/CONTROLLERS/RECORDERS

- 3) M/s ABB
- 4) M/s EUROTHERN
- 5) M/s TATA HONEYWELL
- 6) M/s MASIBUS

TPI AGENCY

Only enlisted, approved, and valid TPI agencies as per PNGRB T4S guidelines for CGD shall be considered.

ADDITIONAL BOUGHT OUT MATERIAL VENDOR LIST

M/s. Chandan Enterprise for:

- 1.Brass Fittings (For size-3/4" and below)
- 2.Copper Pipe/Tube (For size-12 mm and below)
- 3.Anaconda
- 4.Isolation Valve (For size-1/2" and below)
- 5.Appliance Valve (For size-1/2" and below)
- 6.GI Fittings (For size-3/4" and below)
- 7.MLC Pipe And Fittings (upto Size 3/4")

M/s. Jey Network for:

- 1.GI fittings -For size-1/2"
- 2.GI pipe Nipple/ Pipe Piece -For size upto 1"
- 3.Meter Adaptor G 1.6 -For size-1/2"
- 4.Isolation Ball Valve (Brass) -For size-1/2"
- 5.Appliance Valve -For size 1/2"
- 6.GI clamp- For size upto 1"
- 7.Meter Adaptor, MS-Blind – For size upto 3/4"
8. Transition Fittings – for Size -20mm
9. Anaconda Hose S.S
10. Warning Mat

M/s. Sumeru Infra Solution

- 1.Isolation Valve (For size-upto 1")
- 2.Appliance Valve (For size-upto 1/2")



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M/s. Poline Technologies Private Limited

1. GI pipe Nipple (For size upto 1")
2. Meter Adaptor G 1.6 (For size upto 1/2")
3. MS-Blind (For size upto 3/4")

Notes:

- 1) For procuring the above listed bought out item(s) from the vendor/ supplier, whose name is not appearing in the above preferred make list, bidders can supply those item(s) from such vendors/suppliers who have earlier supplied same item(s) for the intended services and the offered item(s) is in their regular manufacturing/ supply range and the same may be accepted subject to following:-
 - a) The Vendor/ Supplier of bought out item(s) is a Manufacturer/ Supplier of the said item(s) for intended services and the same are in their regular manufacturing/ supply range.
 - b) The vendor/supplier should not be in the Holiday list of Client/ BANDR/ Other PSU.
 - c) For items to be procured with the unit of measurement in length, weight, or number (Nos.), the vendor/supplier shall have supplied, for the intended service, at least 15% of the SOR quantity of the same or higher size, class, thickness, schedule, pressure rating, temperature rating, SDR, or other applicable technical specifications, as specified in the SOR and Tender/Bid Specification. Such supplies shall have been made within the last seven (07) years preceding the date of the contractor's request for approval.

Remarks for Note 1:

- i. To meet the criterion mentioned above, the successful bidder/ contractor is required to submit documentary evidences such as copy of FOA/ Purchase Order (PO)/ sub-purchase order and their supply record like Inspection certificates/report, Inspection release note, Tax paid invoice, performance certificates (if available), etc. from which it can be established that vendor have executed supplied the order. These documents shall require to be submitted by them within 15days from date of Placement of Order for approval to GAIL/ GAIL authorized site Consultant.
- ii. The details of vendors indicated in this list are based on the information available with GAIL/ BANDR CGD projects under PSU's. The contractor shall verify the capabilities of each vendor to produce the required quantity and ensure that the items are within their regular manufacturing range. GAIL/ consultant does not take any guarantee or responsibility for the performance of the vendor. It is the contractor's responsibility to verify the correct status of the vendor and their quality control before proposing the vendor's name to the GAIL/ GAIL authorized site Consultant for approval. It is also the responsibility of the contractor to expedite the material in time.
- iii. For those vendors whose names do not appear in the above-listed items but are registered with CGD projects under any PSU's, they can also be considered for the supply of the items. The contractor has to propose such vendors' names along with their valid registration letter issued by authority, or the vendor



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has to submit the PTR with all documents showing they have supplied materials for CGD in gas service for any PSU/government sector within the last 7 years.



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SECTION-V

SCHEDULE OF RATE (SOR)

1. **Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Individual Geographical Areas (GAs): Varanasi, Patna, Ranchi, Jamshedpur, Bhubaneswar, and Cuttack.**
2. **Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Individual Geographical Areas (GAs): Varanasi, Patna, Ranchi, Jamshedpur, Bhubaneswar, and Cuttack.**



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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1. Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh

Sl. No	Description	Annexure Detail
1	SOR for Varanasi	Annexure-i
2	SOR for Patna	Annexure-ii
3	SOR for Ranchi	Annexure-iii
4	SOR for Jamshedpur	Annexure-iv
5	SOR for Bhubaneswar	Annexure-v
6	SOR for Cuttack	Annexure-vi

2. Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh

Sl. No	Description	Annexure Detail
1	SOR for Varanasi	Annexure-A
2	SOR for Patna	Annexure-B
3	SOR for Ranchi	Annexure-C
4	SOR for Jamshedpur	Annexure-D
5	SOR for Bhubaneswar	Annexure-E
6	SOR for Cuttack	Annexure-F



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
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**Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for
Varanasi GA (Annexure-i)**

SCHEDULE OF RATES (Annexure-i)

Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / Moling - (without casing)/ Moling (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Moling without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth upto 1.5 Meter	A00102	Nos	20.00	3115.00	62300.00
27	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	20.00	4615.00	92300.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	200.00	489.00	97800.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	2400.00	567.00	1360800.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipments, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					

SCHEDULE OF RATES (Annexure-i)

Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H>=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	50.00	644.00	32200.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.					
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	30.00	438.00	13140.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	30.00	1196.00	35880.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	20.00	500.00	10000.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	20.00	1182.50	23650.00
56	Tiles/ Paver/ Blocks/ Curb Stones,Red sand stone	A00306	Meter	300.00	447.00	134100.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	10.00	326.00	3260.00
58	Providing, hoisting, and placing of 75 mm thick precast reinforced cement concrete slab of M-20 grade over the pipeline as mechanical protection including the cost of required centering, shuttering, reinforcement complete as per tender drawing and direction of the EIC. Note: Size (Length x Width) of the precast slab will be decided as per site condition and as per instruction of EIC. Precast slab will be placed in multiple numbers and various locations as per site condition and as per instruction of EIC.	A00308	Cum	4.00	11026.40	44105.60
59	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick leveling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labor, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.	A00309				
60	Type I : Inside size 1000 mm x 1000 mm	A00310	Each	2.00	47250.50	94501.00
61	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
62	32mm PE Valve	A00313	Each	2.00	8430.00	16860.00
63	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
64	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
65	GI Sleeves /Concrete Sleeves					
66	2 1/2" NB, 1 FOOT Length	A00501	Nos	20.00	280.00	5600.00
67	4" NB, 1 FOOT Length	A00502	Nos	10.00	501.00	5010.00
68	2 1/2" NB, 3 FEET Length	A00503	Nos	30.00	552.00	16560.00
69	4" NB 3 FEET Length	A00504	Nos	2.00	985.60	1971.20
70	Concrete Sleeve (NPS 2 Class)					
71	4" NB, 3 FEET Length	A00506	Nos	10.00	278.00	2780.00
72	6" NB, 3 FEET Length	A00507	Nos	10.00	447.00	4470.00
73	Note: The decision regarding the use of types of sleeves to be used at various locations shall be made by the Engineer-In-Charge (EIC) / Owner.					
74	Fabrication & Installation of Markers	A00700				
75	RCC Route Markers					
76	Supply, fabrication, and installation of RCC route markers including application of approved color and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	40.00	473.00	18920.00
77	Steel Pole Markers with Foundation					
78	Supply, fabrication, and installation of Steel Pole markers, including application of approved color and quality of primer and paint as per the standard drawings, along with all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete, cleaning, stench letter cutting of lettering, numbers, direction, etc. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00702	Nos	2.00	2631.20	5262.40
79	Warning Plate Markers					
80	Supply, fabrication, and installation of plate markers including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	180.00	489.50	88110.00
81	Paver Block Tiles Markers					
82	Supply, fabrication, and installation of Paver Block Tiles markers of standard size as per industry practice along the route on Paver Block/Thee on foot Path/As per the Instruction of EIG including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. Carrying out all associated works for fixing / grouting / anchoring the marker with the surface. These works shall be carried out as per installation methodology approved by EIC based on site requirement.	A00704	Nos	4.00	457.60	1830.40
83	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
84	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per standard drawing.	A00801	Nos	4.00	3150.40	12601.60
85	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
86	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				

SCHEDULE OF RATES (Annexure-i)

Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
87	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labor, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labor, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
88	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
89	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
90	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
91	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
92	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
93	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colors to match the original, replacement of damages during drilling, restoring the area to its original condition.					
94	In case of multistory buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201, B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
95	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Loctite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
96	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
97	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
98	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
99	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
100	1/2" All floors (including connectivity from TF to regulator) with supply of GI Pipes by Contractor.	B00102	Meter	30.00	416.00	12480.00
101	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	4400.00	298.00	1311200.00
102	3/4" All Floors (including Installation of Risers) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00104	Meter	18.00	523.00	9414.00
103	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	600.00	369.00	221400.00
104	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	10.00	643.00	6430.00
105	1" Dia All floors (for Riser Installations & for Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	10.00	416.00	4160.00
106	Supply & laying/ Installation including fabrication of Contractor supplied MS piping system of all sizes & thickness including fabrication Installation of required compatible isolation ball valves, fittings, flanges, gaskets, valves, NRV, Strainer, couplings, etc. of all sizes, thickness & ANSI pressure rating including Pressure Gauge (PG) etc. as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out & complete the works at the site as per instruction of EIC. Flushing, Pneumatic testing, purging with nitrogen (including supply of Nitrogen as Inert gas by the contractor) and commissioning or make ready for commissioning as per specification and as per Instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by the contractor within specified schedule time. - 1 1/2" (1.5") Dia All Floors (For Commercial Connections) - (Payment for Welding will be made separately mentioned elsewhere in the SOR)	B00108	Meter	10.00	512.60	5126.00
107	Supply, laying, installation, and visual testing including fabrication of contractor-supplied carbon steel piping system of all sizes and thickness. This includes fabrication, installation, and visual testing of required compatible fittings, flanges, gaskets, valves, NRV, strainer, couplings, etc., of all sizes, thicknesses, and ANSI pressure ratings, including Pressure Gauge (PG), as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out and complete the works at the site as per the instruction of EIC. Flushing, pneumatic testing, purging with nitrogen (including the supply of nitrogen as an inert gas by the contractor), and commissioning or making ready for commissioning as per specifications and as per the instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned or covered explicitly above but otherwise required for satisfactory completion, safety, statutory requirements, or maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time. 2' Dia All Floors (For Commercial & Industrial Connections) - payment for welding will be made separately as mentioned elsewhere in the SOR.	B00109	Meter	10.00	669.90	6699.00
108	TPI Inspection of Internal Piping as per SOR B00108 and B00109 shall be done by the Contractor and payment shall be made separately as per below SOR Item.					
109	TPI Inspection of Internal Piping : Commercial and Industrial Customer	B00110	Nos	2.00	13600.00	27200.00
110	Carrying out Welding of MS/GI/CS Pipes as per latest applicable code & standard for above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00111	Inch-Dia	21.00	573.00	12033.00
111	Carrying out NDT/Radiography of welded joints of CS/GI Pipes as per the latest applicable code & standard for the above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00112	Inch-Dia	20.00	191.40	3828.00
112	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TF) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item given elsewhere. iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos., B00102, B00104 & B00106 (under SOR item No. B00101)					
113	Cutting/Breaking and Restoration	B00200				
114	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
115	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00201	Cum	2.00	2998.00	5996.00
116	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
117	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and along with associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
118	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					

SCHEDULE OF RATES (Annexure-i)

Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
119	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	10.00	539.00	5390.00
120	Supply, Installation, Testing & Commissioning of Multi Layer Composite (MLC) Pipes	B00500				
121	Supply and installation of MLC Pipe according to the latest ISO17484-1 standard and installation of Appliance Ball valves as per technical specifications along with associated accessories/fittings, including brass fittings at the outlet of the meter and at the entry of the appliance valve as per the satisfaction and instructions of EIC. The MLC Pipe and fittings shall be procured from Jindal /Uniflex Pipe/Any ISI approved make or from vendors who have previously supplied these items for a similar application in any PSU with prior approval from the Owner/consultant.					
122	MLC pipe shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The Contractor must provide all equipment, tools, tackles, and associated materials necessary to execute the work efficiently by cutting, cleaning, bending, fixing with clamps, etc. The work includes the supply of all tools, tackles, and consumables, including clamps for fixing the MLC pipe, and restoration of the work area to the customer's satisfaction.					
123	<i>NOTE::Approved vendor list for MLC pipes ~Jindal/Uniflex Pipes/UNIPRO/Any ISI approved make.</i>					
124	16.0 mm OD	B00501	Meter	50.00	304.00	15200.00
125	Note: i) Supply of Appliance Ball Valves shall be paid as a separate SOR Item. ii) SOR item No. B00400 & B00500 shall be carried out including supply of materials, only after getting instruction / approval from EIC.					
126	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
127	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as as free issue Items)	B00601	Nos	400.00	557.00	222800.00
128	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	400.00	400.00	160000.00
129	Note: Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
130	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
131	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
132	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	600.00	302.00	181200.00
133	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	56.00	489.00	27384.00
134	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	300.00	300.00	90000.00
135	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. Incase of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
136	Registration of Domestic PNG Connections	C00100				
137	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	200.00	120.00	24000.00
138	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	100.00	180.00	18000.00
139	Providing the Services of Resources as per site requirement	D00100				
140	Providing the services of Plumber(Manday= 8 Working Hours)	D00101	Manday	2.00	1144.00	2288.00
141	Providing the services of Helper(Manday= 8 Working Hours)	D00102	Manday	2.00	929.50	1859.00
142	Providing the Services of Welder(Manday= 8 Working Hours)	D00103	Manday	2.00	2502.50	5005.00
143	Providing the Services of Electrician(Manday- 8 Working Hours)	D00104	Manday	2.00	1430.00	2860.00
144	Providing the Services of Conversion Technician(Manday= 8 Working Hours)s)	D00105	Manday	2.00	1430.00	2860.00
145	Providing the Services of Grinder(Manday- 8 Working Hours)	D00106	Manday	2.00	1661.00	3322.00
146	Note for all above SOR Items Nos. A00100 to D00106 :- i) Quantities mentioned against all above SOR items are estimated & tentative and may vary up to any extent as per site condition and/or as per instruction of EIC. ii) If certain documents, drawings, datasheets, specifications etc. are not included in the bid, the same will be made available to the successful bidder. While formulating the bid, bidders are requested to quote such items based on practices followed by the similar nature of industries. However procurement & installation of such items will be done as per site requirement after due approval of EIC. iii) Quantities mentioned against all above SOR items are estimated & tentative and may required to be executed in Varanasi GA, in any ratio, as per site requirement and/or as per instruction of EIC. In this regard, decision of EIC shall be final and binding to the contractor. Hence, bidder is requested to familiarize themselves with both the GAs mentioned above while formulating their bid.					
147	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, etc. in old riser to make the connection ready for conversion as per instruction and direction of EIC.					
148	By 1/2" GI upto length less than or equal to 4 Mtr	E00105	Nos	50.00	1500.00	75000.00
149	NOTE: (1) In case length of tapping by 1/2" against Item E00105 is beyond 4 Mtr then separate payment shall be paid for length beyond 4 Mtr as per applicable SOR Items B00102 and B00103 given elsewhere. For supply, Installation of IV, AV, Meter Installation, Conversion in against Leftout Work the payment shall be made against applicable SOR Items from E00106 to E00111, as per instruction and direction of EIC.					
150	Domestic Meter installation (GI.6)	E00106	Nos	50.00	557.00	27850.00
151	Domestic Regulator installation 100mBar to 21mBar	E00107	Nos	20.00	176.00	3520.00
152	Domestic Regulator installation 4 to 21 mbr	E00108	Nos	20.00	176.00	3520.00
153	Domestic Conversion (Domestic Appliances)	E00109	Nos	100.00	500.00	50000.00
154	Anaconda installation (Supply in contractor scope)	E00110	Nos	50.00	301.40	15070.00
155	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	500.66	81.00	40553.80
156	Note:					
157	i) Technical specification of Anaconda shall be in accordance with applicable National /Interantion Stadnard, PNGRB					
158	ii) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR E00111.					
159	Testing, commissioning of any additional GI piping installed by the contractor shall be paid in accordance with SOR B00102 and B00103. Contractor has to do the testing and commissioning of entire GI connection in customer house before conversion.					
160	Installation of GI Service Pipe (For Commercial/Industrial Connection and Installation of Service Regulator)	H00100				
161	Supply, loading, storing, unloading and laying of GI pipes, including supply of GI fittings/accessories of all sizes & thickness like Elbows, Tees, unions, sockets, reducers, GI plugs, sleeves etc., installation of GI line (alongwith installation of required accessories as mentioned above) of following sizes, including fabrication with supply of all materials, consumables, labour and other incidental works. Carrying out all temporary, ancillary, auxiliary works required to make the GI line ready for commissioning as per drawings specifications.					
162	Finalisation of optimum route with consent of customer, from transition fitting to cooking oven/ appliance.					
163	Making temporary but stable platforms/ scaffolding/ rope ladders and all other safety devices.					
164	Installation of GI Pipes, Fittings, Valves, warning plate including NPT threading, painting as specified (installation of meters & regulators forms a separate SOR item).					
165	Drillings of holes through walls (Brick, RCC), Granite, Marble, Glass Cutting with proper heavy duty hammer drill machine tools and tackle, using proper sealant /grout material colors to match the original replacement of damages during drilling, restoring the area to original condition.					
166	Supply & Fixing of approved clamps, Dowel Plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape/ lock tight, drilling of holes through tiles/ wood/ marble/ Granite etc. jointing of PE to above Ground service GI pipes, testing, purging with Nitrogen and commissioning of the complete installation as per specification.					

SCHEDULE OF RATES (Annexure-i)

Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
167	Painting of entire length of pipe along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification & direction of EIC. Restoring the wall surface to origin					
168	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
169	Handing over the completed works to Client for operation/ use, reconciliation of material area wise.					
170	Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule time.					
171	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required (Only Meters and Regulators shall be provided as free issue) and all associated works. As per instruction and direction of EIC, Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration (Diaphragm Meter) Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00101	Nos	2.00	6600.00	13200.00
172	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required (Only Meters and Regulators shall be provided as free issue) and all associated works. (RPD Meter) Including supply, installation of #150 Flange of size 3"/2"/1.5"/1" (2 set with meter and 2 set with regulator), Stud-Nut, Gaskets, Elbow, L-Clamp, Grouting, Reducer, U-Clamp with rubber, and 01 Pressure Guage (0-4.2 Kg/Cm2) of reputed make and to the satisfaction of EIC. Works include installation of Free issued Strainer, NRV in all respects. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00102	Nos	2.00	30800.00	61600.00
173	Supply and installation of Isolation Valves as per Technical Specification and as directed by EIC,(Approved make L&T/Audco or as mentioned in tender)	H00200				
174	Isolation Ball Valve 2 " max. 6 bar (g)	H00201	Nos	2.00	16500.00	33000.00
175	Isolation Ball Valve 1.5 " max. 6 bar (g)	H00202	Nos	2.00	11000.00	22000.00
176	Isolation Ball Valve 1 " max. 6 bar (g)(Threaded)	H00203	Nos	2.00	2750.00	5500.00
177	Isolation Ball Valve 1 " max. 6 bar (g)(Flanged)	H00204	Nos	2.00	8250.00	16500.00
178	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
179	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
180	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	4.00	2750.00	11000.00
181	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and and cleaning the area complete to the satisfaction.	H00400				
182	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	4.00	3300.00	13200.00
183	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
184	2" TF	H00402	Nos	2.00	3740.00	7480.00
185	1" TF	H00403	Nos	4.00	1072.50	4290.00
186	Excavation of Hard rock/surface	I00100				
187	Excavation of trench or pits, wherever hard rock presence is exceeding 1.5 m in any direction of the trench and excavation of trench or pits in Malba/Multiple layers of asphalt/ brick / PCC/RCC etc and removable only by pneumatic chisel / drill as per the specifications and direction of EIC. The rates are payable over and above the Laying rates as per relevant SOR Item No. A00101	I00101	Meter	10.00	256.00	2560.00
188	Flushing,Testing & Commissioning of MDPE line with all tools,Machines,Manpower are in contractor scope:Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
189	20 mm PE 100 MDPE Pipeline	K00101	Meter	10.00	212.00	2120.00
190	32 mm PE 100 MDPE Pipeline	K00102	Meter	20.00	248.00	4960.00
191	63 mm PE 100 MDPE Pipeline	K00103	Meter	20.00	325.00	6500.00
192	90 mm PE 100 MDPE Pipeline	K00104	Meter	10.00	343.00	3430.00
193	125 mm PE 100 MDPE Pipeline	K00105	Meter	10.00	500.00	5000.00
194	TOTAL VALUE (EXCLUDING GST)					50,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for
Patna GA (Annexure-ii)**

SCHEDULE OF RATES (Annexure-ii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / Molding - (without casing)/ Molding (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Molding without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					

SCHEDULE OF RATES (Annexure-ii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth upto 1.5 Meter	A00102	Nos	56.00	3115.00	174440.00
27	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	30.00	4615.00	138450.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	790.00	489.00	386310.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	700.00	567.00	396900.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipments, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H>=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					

SCHEDULE OF RATES (Annexure-ii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	10.00	644.00	6440.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.					
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	190.00	438.00	83220.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	190.00	1196.00	227240.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	10.00	500.00	5000.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	10.00	1182.50	11825.00
56	Tiles/ Paver/ Blocks/ Curb Stones, Red sand stone	A00306	Meter	200.00	447.00	89400.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	6.00	326.00	1956.00
58	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick leveling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labor, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
59	Type II : Inside size 600 mm x 600 mm	A00313	Each	2.00	31000.00	62000.00
60	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
61	32mm PE Valve	A00314	Nos	2.00	8430.00	16860.00
62	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
63	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
64	GI Sleeves /Concrete Sleeves					
65	2 1/2" NB, 1 FOOT Length	A00501	Nos	2.00	200.00	400.00
66	Fabrication & Installation of Markers	A00700				
67	RCC Route Markers					
68	Supply, fabrication, and installation of RCC route markers including application of approved color and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	20.00	473.00	9460.00
69	Warning Plate Markers					
70	Supply, fabrication, and installation of plate markers including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	80.00	489.50	39160.00
71	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
72	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per std. drawing.	A00801	Nos	10.00	3150.40	31504.00
73	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
74	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				
75	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labor, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labor, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
76	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
77	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
78	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
79	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
80	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
81	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colors to match the original, replacement of damages during drilling, restoring the area to its original condition.					

SCHEDULE OF RATES (Annexure-ii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
82	In case of multistorey buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201, B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
83	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Loctite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
84	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
85	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
86	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
87	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
88	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	2000.00	298.00	596000.00
89	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	150.00	368.00	55200.00
90	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	10.00	643.00	6430.00
91	1" Dia All floors (for Riser Installations & for Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	40.00	416.00	16640.00
92	Supply & laying/ Installation including fabrication of Contractor supplied MS piping system of all sizes & thickness including fabrication Installation of required compatible isolation ball valves, fittings, flanges, gaskets, valves, NRV, Strainer, couplings, etc. of all sizes, thickness & ANSI pressure rating including Pressure Gauge (PG) etc. as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out & complete the works at the site as per instruction of EIC. Flushing, Pneumatic testing, purging with nitrogen (including supply of Nitrogen as Inert gas by the contractor) and commissioning or make ready for commissioning as per specification and as per Instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by the contractor within specified schedule time. - 1 1/2" (1.5") Dia All Floors (For Commercial Connections) - (Payment for Welding will be made separately mentioned elsewhere in the SOR)	B00108	Meter	10.00	512.60	5126.00
93	Supply, laying, installation, and visual testing including fabrication of contractor-supplied carbon steel piping system of all sizes and thickness. This includes fabrication, installation, and visual testing of required compatible fittings, flanges, gaskets, valves, NRV, strainer, couplings, etc., of all sizes, thicknesses, and ANSI pressure ratings, including Pressure Gauge (PG), as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out and complete the works at the site as per the instruction of EIC. Flushing, pneumatic testing, purging with nitrogen (including the supply of nitrogen as an inert gas by the contractor), and commissioning or making ready for commissioning as per specifications and as per the instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned or covered explicitly above but otherwise required for satisfactory completion, safety, statutory requirements, or maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time. 2' Dia All Floors (For Commercial & Industrial Connections) - payment for welding will be made separately as mentioned elsewhere in the SOR.	B00109	Meter	20.00	669.00	13380.00
94	TPI Inspection of Internal Piping as per SOR B00108 and B00109 shall be done by the Contractor and payment shall be made separately as per below SOR Item.					
95	TPI Inspection of Internal Piping : Commercial and Industrial Customer	B00110	Nos	2.00	13600.00	27200.00
96	Carrying out Welding of MS/GI/CS Pipes as per latest applicable code & standard for above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00110	Inch-Dia	10.00	573.00	5730.00
97	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. Iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos., B00102, B00104 & B00106 (under SOR item No.- B00101)					
98	Cutting/Breaking and Restoration	B00200				
99	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
100	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00203	Inch	4.00	2998.00	11992.00
101	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
102	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and along with associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					

SCHEDULE OF RATES (Annexure-ii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
103	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
104	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	4.00	539.00	2156.00
105	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
106	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as as free issue Items)	B00601	Nos	700.00	557.00	389900.00
107	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	700.00	400.00	280000.00
108	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
109	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
110	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
111	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	280.00	302.00	84560.00
112	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	10.00	489.00	4890.00
113	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	140.00	300.00	42000.00
114	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. Incase of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
115	Registration of Domestic PNG Connections	C00100				
116	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	2.00	120.00	240.00
117	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	30.00	180.00	5400.00
118	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, in old riser to make the connection ready for conversion as per instruction and direction of EIC. In order to complete the old riser, payment shall be made as per the following SOR Items	E00100				
119	Tapping from already charged Riser in Multi-Storey Building upto Conversion: By 1/2" GI and/or 3/4" and/or MLC and/or Copper upto length less than or equal to 5 Mtr					
120	Multi-Storey Building of Ground+2 Floor	E00102	Nos	40.00	3200.00	128000.00
121	Multi-Storey Building of Ground+5 Floor	E00103	Nos	181.00	4200.00	760200.00
122	Multi-Storey Building of beyond Ground+5 Floor	E00104	Nos	130.00	5200.00	676000.00
123	Note: (1) Against Item E00100 to E00104 (length upto 5 Meter) Contractor has to do the tapping from already charged GI Riser in Multi-storey Building in order to complete all the works like installation of Meter, Meter-Regulator, Supply and installation of Isolation Valve (1/2" and/or 3/4"), Appliance Valve, Supply and Installation of Flexible Hose and Conversion of Kitchen Appliance complete in all respect.					
124	(2) In case length of tapping by 1/2"/3/4"/MLC/Copper Pipe against Item E00100 to E00104 is beyond 5 Mtr then separate payment shall be paid for length beyond 5 Mtr as per respective SOR Items given elsewhere.					
125	3) In case old Riser is not charged then contractor has to prepare Isometric Drawing, Testing and Commissioning of Riser for that payment shall be made against SOR Item E00111					
126	Domestic Conversion (Domestic Appliances)	E00109	Nos	2.00	500.00	1000.00
127	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	600.93	81.00	48675.00
128	Note:					
129	i) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR.					
130	Installation of GI Service Pipe (For Commercial/Industrial Connection and Installation of Service Regulator)	H00100				
131	Supply, loading, storing, unloading and laying of GI pipes, including supply of GI fittings/accessories of all sizes & thickness like Elbows, Tees, unions, sockets, reducers, GI plugs, sleeves etc., installation of GI line (alongwith installation of required accessories as mentioned above) of following sizes, including fabrication with supply of all materials, consumables, labour and other incidental works. Carrying out all temporary, ancillary, auxiliary works required to make the GI line ready for commissioning as per drawings specifications.					
132	Finalisation of optimum route with consent of customer, from transition fitting to cooking oven/ appliance.					
133	Making temporary but stable platforms/ scaffolding/ rope ladders and all other safety devices.					
134	Installation of GI Pipes, Fittings, Valves, warning plate including NPT threading, painting as specified (installation of meters & regulators forms a separate SOR item).					

SCHEDULE OF RATES (Annexure-ii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
135	Drillings of holes through walls (Brick, RCC), Granite, Marble, Glass Cutting with proper heavy duty hammer drill machine tools and tackle, using proper sealant /grout material colors to match the original replacement of damages during drilling, restoring the area to original condition.					
136	Supply & Fixing of approved clamps, Dowell Plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape/ lock tight, drilling of holes through tiles/ wood/ marble/ Granite etc. jointing of PE to above Ground service GI pipes, testing, purging with Nitrogen and commissioning of the complete installation as per specification.					
137	Painting of entire length of pipe along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification & direction of EIC. Restoring the wall surface to origin					
138	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
139	Handing over the completed works to Client for operation/ use, reconciliation of material area wise.					
140	Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule time.					
141	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required items (Only Meters and Regulators shall be provided as free issue) and all associated works. As per instruction and direction of EIC, Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration (Diaphragm Meter) Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00101	Nos	2.00	2286.00	4572.00
142	Supply and installation of Isolation Valves as per Technical Specification and as directed by EIC,(Approved make L&T/Audco or as mentioned in tender)	H00200				
143	Isolation Ball Valve 1 " max. 6 bar (g)(Threaded)	H00203	Nos	2.00	2750.00	5500.00
144	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
145	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
146	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	2.00	2750.00	5500.00
147	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and and cleaning the area complete to the satisfaction.	H00400				
148	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	2.00	3300.00	6600.00
149	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
150	1" TF	H00403	Nos	2.00	1072.00	2144.00
151	Flushing,Testing & Commissioning of MDPE line with all tools,Machines,Manpower are in contractor scope:Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
152	20 mm PE 100 MDPE Pipeline	K00101	Meter	400.00	212.00	84800.00
153	32 mm PE 100 MDPE Pipeline	K00102	Meter	200.00	248.00	49600.00
154	TOTAL VALUE (EXCLUDING GST)					50,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for
Ranchi GA (Annexure-iii)**

SCHEDULE OF RATES (Annexure-iii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Ranchi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / moling - (without casing)/ Moling (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Moling without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiseling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HOPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth upto 1.5 Meter	A00102	Nos	60.00	3115.00	186900.00
27	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	30.00	4615.00	138450.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	1600.00	489.00	782400.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	500.00	567.00	283500.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					

SCHEDULE OF RATES (Annexure-iii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Ranchi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipments, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H>=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	10.00	644.00	6440.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.					
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	20.00	438.00	8760.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	200.00	1196.00	239200.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	10.00	500.00	5000.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	10.00	1182.50	11825.00
56	Tiles/ Paver/ Blocks/ Curb Stones,Red sand stone	A00306	Meter	200.00	447.00	89400.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	6.00	326.00	1956.00
58	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick leveling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labor, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
59	Type II : Inside size 600 mm x 600 mm	A00308	Nos	2.00	31000.00	62000.00
60	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
61	32mm PE Valve	A00309	Nos	3.00	8430.00	25290.00
62	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
63	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
64	GI Sleeves /Concrete Sleeves					
65	2 1/2" NB, 1 FOOT Length	A00501	Nos	2.00	200.00	400.00
66	Note: The decision regarding the use of types of sleeves to be used at various locations shall be made by the Engineer-In-Charge (EIC) / Owner.					
67	Fabrication & Installation of Markers	A00700				
68	RCC Route Markers					
69	Supply, fabrication, and installation of RCC route markers including application of approved color and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	20.00	473.00	9460.00
70	Warning Plate Markers					
71	Supply, fabrication, and installation of plate markers including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	80.00	489.50	39160.00
72	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
73	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per std. drawing.	A00801	Nos	10.00	3150.40	31504.00
74	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
75	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				

SCHEDULE OF RATES (Annexure-iii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Ranchi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
76	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labor, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labor, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
77	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
78	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
79	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
80	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
81	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
82	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colors to match the original, replacement of damages during drilling, restoring the area to its original condition.					
83	In case of multistory buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201, B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
84	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Loctite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
85	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
86	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
87	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
88	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
89	1/2" All floors (including connectivity from TF to regulator) with supply of GI Pipes by Contractor.	B00102	Meter	10.00	416.00	4160.00
90	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	3800.00	298.00	1132400.00
91	3/4" All Floors (including Installation of Risers) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00104	Meter	4.00	523.00	2092.00
92	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	150.00	368.00	55200.00
93	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	10.00	643.00	6430.00
94	1" Dia All floors (for Riser Installations & for Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	40.00	416.00	16640.00
95	Supply & laying/ Installation including fabrication of Contractor supplied MS piping system of all sizes & thickness including fabrication Installation of required compatible isolation ball valves, fittings, flanges, gaskets, valves, NRV, Strainer, couplings, etc. of all sizes, thickness & ANSI pressure rating including Pressure Gauge (PG) etc. as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out & complete the works at the site as per instruction of EIC. Flushing, Pneumatic testing, purging with nitrogen (including supply of Nitrogen as Inert gas by the contractor) and commissioning or make ready for commissioning as per specification and as per Instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by the contractor within specified schedule time. - 1 1/2" (1.5") Dia All Floors (For Commercial Connections) - (Payment for Welding will be made separately mentioned elsewhere in the SOR)	B00108	Meter	10.00	512.60	5126.00
96	Supply, laying, installation, and visual testing including fabrication of contractor-supplied carbon steel piping system of all sizes and thickness. This includes fabrication, installation, and visual testing of required compatible fittings, flanges, gaskets, valves, NRV, strainer, couplings, etc., of all sizes, thicknesses, and ANSI pressure ratings, including Pressure Gauge (PG), as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out and complete the works at the site as per the instruction of EIC. Flushing, pneumatic testing, purging with nitrogen (including the supply of nitrogen as an inert gas by the contractor), and commissioning or making ready for commissioning as per specifications and as per the instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned or covered explicitly above but otherwise required for satisfactory completion, safety, statutory requirements, or maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time. 2' Dia All Floors (For Commercial & Industrial Connections) - payment for welding will be made separately as mentioned elsewhere in the SOR.	B00109	Meter	20.00	669.00	13380.00
97	TPI Inspection of Internal Piping as per SOR B00108 and B00109 shall be done by the Contractor and payment shall be made separately as per below SOR Item.					
98	TPI Inspection of Internal Piping : Commercial and Industrial Customer	B00110	Nos	2.00	13600.00	27200.00
99	Carrying out Welding of MS/GI/CS Pipes as per latest applicable code & standard for above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00110	Inch-Dia	10.00	573.00	5730.00
100	Carrying out NDT/Radiography of welded joints of CS/GI Pipes as per the latest applicable code & standard for the above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00111	Inch-Dia	2.00	191.40	382.80
101	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos, B00102, B00104 & B00106 (under SOR item No. B00101)					
102	Cutting/Breaking and Restoration	B00200				
103	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
104	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00203	Inch	4.00	2998.00	11992.00
105	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
106	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and along with associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					

SCHEDULE OF RATES (Annexure-iii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Ranchi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
107	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
108	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	4.00	539.00	2156.00
109	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
110	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as free issue Items)	B00601	Nos	140.00	557.00	77980.00
111	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting. Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	140.00	400.00	56000.00
112	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
113	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
114	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
115	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	280.00	302.00	84560.00
116	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	10.00	489.00	4890.00
117	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	140.00	300.00	42000.00
118	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. Incase of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
119	Registration of Domestic PNG Connections	C00100				
120	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	10.00	120.00	1200.00
121	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	30.00	180.00	5400.00
122	Providing the Services of Resources as per site requirement	D00100				
123	Providing the services of Plumber(Manday= 8 Working Hours)	D00101	Manday	10.00	1144.00	11440.00
124	Providing the services of Helper(Manday= 8 Working Hours)	D00102	Manday	10.00	929.50	9295.00
125	Providing the Services of Conversion Technician(Manday= 8 Working Hours)s)	D00105	Manday	10.00	1430.00	14300.00
126	Providing the Services of Grinder(Manday- 8 Working Hours)	D00106	Manday	2.00	1661.00	3322.00
127	Note for all above SOR Items Nos. A00100 to D00106 :- i) Quantities mentioned against all above SOR items are estimated & tentative and may vary up to any extent as per site condition and/or as per instruction of EIC. ii) If certain documents, drawings, datasheets, specifications etc. are not included in the bid, the same will be made available to the successful bidder. While formulating the bid, bidders are requested to quote such items based on practices followed by the similar nature of industries. However procurement & installation of such items will be done as per site requirement after due approval of EIC. iii) Quantities mentioned against all above SOR items are estimated & tentative and may required to be executed in Varanasi GA, in any ratio, as per site requirement and/or as per instruction of EIC. In this regard, decision of EIC shall be final and binding to the contractor. Hence, bidder is requested to familiarize themselves with both the GAs mentioned above while formulating their bid.					
128	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, in old riser to make the connection ready for conversion as per instruction and direction of EIC. In order to complete the old riser, payment shall be made as per the following SOR Items	E00100				
129	Tapping from already charged Riser in Multi-Storey Building upto Conversion: By 1/2" GI and/or 3/4" and/or MLC and/or Copper upto length less than or equal to 5 Mtr					
130	Multi-Storey Building of Ground+2 Floor	E00102	Nos	20.00	3200.00	64000.00
131	Multi-Storey Building of Ground+5 Floor	E00103	Nos	201.00	4200.00	844200.00
132	Multi-Storey Building of beyond Ground+5 Floor	E00104	Nos	70.00	5200.00	364000.00
133	Note: (1) Against Item E00100 to E00104 (length upto 5 Meter) Contractor has to do the tapping from already charged GI Riser in Multi-storey Building in order to complete all the works like installation of Meter, Meter-Regulator, Supply and installation of Isolation Valve (1/2" and/or 3/4"), Appliance Valve, Supply and Installation of Flexible Hose and Conversion of Kitchen Appliance complete in all respect.					
134	(2) In case length of tapping by 1/2"/3/4"/MLC/Copper Pipe against Item E00100 to E00104 is beyond 5 Mtr then separate payment shall be paid for length beyond 5 Mtr as per respective SOR Items given elsewhere.					
135	3) In case old Riser is not charged then contractor has to prepare Isometric Drawing, Testing and Commissioning of Riser for that payment shall be made against SOR Item E00111					
136	Domestic Conversion (Domestic Appliances)	E00109	Nos	2.00	500.00	1000.00
137	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	604.19	81.00	48939.20
138	Note:					
139	(i) Under SOR E00100 GI pipes shall be supplied by the Owner as Free Issue Material. All the fittings shall be in the scope of Contractor.					
140	ii) Technical specification of Anaconda shall be in accordance with applicable National / International Standard, PNGRB					
141	ii) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR. Testing, commissioning of any additional GI piping installed by the contractor shall be paid in accordance with SOR B00102 and B00103. Contractor has to do the testing and commissioning of entire GI connection in customer house before conversion.					
142	Installation of GI Service Pipe (For Commercial/Industrial Connection and Installation of Service Regulator)	H00100				
143	Supply, loading, storing, unloading and laying of GI pipes, including supply of GI fittings/accessories of all sizes & thickness like Elbows, Tees, unions, sockets, reducers, GI plugs, sleeves etc., installation of GI line (alongwith installation of required accessories as mentioned above) of following sizes, including fabrication with supply of all materials, consumables, labour and other incidental works. Carrying out all temporary, ancillary, auxiliary works required to make the GI line ready for commissioning as per drawings specifications.					
144	Finalisation of optimum route with consent of customer, from transition fitting to cooking oven/ appliance.					
145	Making temporary but stable platforms/ scaffolding/ rope ladders and all other safety devices.					
146	Installation of GI Pipes, Fittings, Valves, warning plate including NPT threading, painting as specified (installation of meters & regulators forms a separate SOR item).					
147	Drillings of holes through walls (Brick, RCC), Granite, Marble, Glass Cutting with proper heavy duty hammer drill machine tools and tackles, using proper sealant /grout materialized colors to match the original replacement of damages during drilling, restoring the area to original condition.					
148	Supply & Fixing of approved clamps, Dowell Plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape/ lock tight, drilling of holes through tiles/ wood/ marble/ Granite etc. jointing of PE to above Ground service GI pipes, testing, purging with Nitrogen and commissioning of the complete installation as per specification.					
149	Painting of entire length of pipe along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification & direction of EIC. Restoring the wall surface to origin					
150	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
151	Handing over the completed works to Client for operation/ use, reconciliation of material area wise.					

SCHEDULE OF RATES (Annexure-iii)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Ranchi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
152	Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule time.					
153	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required items (Only Meters and Regulators shall be provided as free issue) and all associated works. As per instruction and direction of EIC, Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration (Diaphragm Meter) Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00101	Nos	2.00	2286.00	4572.00
154	Supply and installation of Isolation Valves as per Technical Specification and as directed by EIC,(Approved make L&T/Audco or as mentioned in tender)	H00200				
155	Isolation Ball Valve 1 " max. 6 bar (g)(Threaded)	H00203	Nos	2.00	2750.00	5500.00
156	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
157	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
158	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	2.00	2750.00	5500.00
159	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and and cleaning the area complete to the satisfaction.	H00400				
160	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	2.00	3300.00	6600.00
161	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
162	1" TF	H00403	Nos	2.00	1072.00	2144.00
163	Excavation of Hard rock/surface	I00100				
164	Excavation of trench or pits, wherever hard rock presence is exceeding 1.5 m in any direction of the trench and excavation of trench or pits in Malba/Multiple layers of asphalt/ brick / PCC/RCC etc and removable only by pneumatic chisel / drill as per the specifications and direction of EIC. The rates are payable over and above the Laying rates as per relevant SOR Item No. A00101	I00101	Meter	4.00	256.00	1024.00
165	Additional Backfilling of Sand in excavated trench/Pit as per site requirement	J00100				
166	Filling of M-Sand/Soft soil as per the site requirement and as per the instructions of EIC (except the sand padding as mentioned SOR Item No. A00101)	J00101	Cum	4.00	800.00	3200.00
167	Flushing,Testing & Commissioning of MDPE line with all tools,Machines,Manpower are in contractor scope:Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
168	20 mm PE 100 MDPE Pipeline	K00101	Meter	400.00	212.00	84800.00
169	32 mm PE 100 MDPE Pipeline	K00102	Meter	200.00	248.00	49600.00
170	TOTAL VALUE (EXCLUDING GST)					50,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for
Jamshedpur GA (Annexure-iv)**

SCHEDULE OF RATES (Annexure-iv)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Jamshedpur GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / Molding - (without casing)/ Molding (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Molding without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth upto 1.5 Meter	A00102	Nos	60.00	3115.00	186900.00
27	20 mm PE 100 pipe Line Laying	A00103	Meter	600.00	489.00	293400.00
28	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00104	Meter	600.00	567.00	340200.00
29	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00103					
30	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
31	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
32	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					

SCHEDULE OF RATES (Annexure-iv)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Jamshedpur GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
33	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipments, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
34	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					
35	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
36	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
37	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
38	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
39	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
40	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
41	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H)=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
42	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
43	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
44	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
45	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
46	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
47	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
48	20/32 mm PE 100 pipe	A00201	Meter	601.00	644.00	387044.00
49	Civil Work/Cutting/Breaking and Restoration	A00300				
50	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.					
51	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	320.00	438.00	140160.00
52	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	320.00	1196.00	382720.00
53	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	40.00	500.00	20000.00
54	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	40.00	1182.50	47300.00
55	Tiles/ Paver/ Blocks/ Curb Stones,Red sand stone	A00306	Meter	100.00	447.00	44700.00
56	Brick Soling/ Stone Soling, etc	A00307	Meter	50.00	326.00	16300.00
57	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick leveling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labor, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
58	Type I : Inside size 1000 mm x 1000 mm	A00311	Each	2.00	47250.50	94501.00
59	Type II : Inside size 1500 mm x 1000 mm	A00312	Each	2.00	74813.20	149626.40
60	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
61	32mm PE Valve	A00313	Nos	4.00	8430.00	33720.00
62	Fabrication & Installation of Markers	A00700				
63	RCC Route Markers					
64	Supply, fabrication, and installation of RCC route markers including application of approved color and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	60.00	473.00	28380.00
65	Steel Pole Markers with Foundation					
66	Supply, fabrication, and installation of Steel Pole markers, including application of approved color and quality of primer and paint as per the standard drawings, along with all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete, cleaning, stench letter cutting of lettering, numbers, direction, etc. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00702	Nos	10.00	2631.20	26312.00
67	Warning Plate Markers					
68	Supply, fabrication, and installation of plate markers including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	200.00	489.50	97900.00
69	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
70	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				

SCHEDULE OF RATES (Annexure-iv)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Jamshedpur GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
71	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labor, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labor, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
72	Scope of work indicated in PIS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
73	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
74	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
75	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
76	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
77	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colors to match the original, replacement of damages during drilling, restoring the area to its original condition.					
78	In case of multistory buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201, B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
79	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Loctite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
80	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
81	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
82	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
83	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
84	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	3200.00	298.00	953600.00
85	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	200.00	368.00	73600.00
86	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. Iv) In the case of SOR Items B00103 & B00105 above (under SOR Item No. • B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as contractor scope of supply.					
87	Cutting/Breaking and Restoration	B00200				
88	In the case of a multistorey building where RCC slab/visor/sunshade/chhaja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
89	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00203	Inch	20.00	2998.00	59960.00
90	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
91	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and along with associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
92	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
93	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	400.00	539.00	215600.00
94	Supply, Installation, Testing & Commissioning of Multi Layer Composite (MLC) Pipes	B00500				
95	Supply and installation of MLC Pipe according to the latest ISO17484-1 standard and installation of Appliance Ball valves as per technical specifications along with associated accessories/fittings, including brass fittings at the outlet of the meter and at the entry of the appliance valve as per the satisfaction and instructions of EIC. The MLC Pipe and fittings shall be procured from Jindal /Uniflex Pipe/Any ISI approved make or from vendors who have previously supplied these items for a similar application in any PSU with prior approval from the Owner/consultant.					
96	MLC pipe shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The Contractor must provide all equipment, tools, tackles, and associated materials necessary to execute the work efficiently by cutting, cleaning, bending, fixing with clamps, etc. The work includes the supply of all tools, tackles, and consumables, including clamps for fixing the MLC pipe, and restoration of the work area to the customer's satisfaction.					
97	<i>NOTE::Approved vendor list for MLC pipes -Jindal/Uniflex Pipes/UNIPRO/Any ISI approved make.</i>					
98	16.0 mm OD	B00501	Meter	200.00	304.00	60800.00
99	Note: i) Supply of Appliance Ball Valves shall be paid as a separate SOR Item. ii) SOR item No. B00400 & B00500 shall be carried out including supply of materials, only after getting instruction / approval from EIC.					
100	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
101	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as free issue Items)	B00601	Nos	500.00	557.00	278500.00
102	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	500.00	400.00	200000.00
103	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
104	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
105	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
106	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	1000.00	302.00	302000.00
107	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	60.00	489.00	29340.00
108	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	700.00	300.00	210000.00

SCHEDULE OF RATES (Annexure-iv)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Jamshedpur GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
109	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. Incase of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
110	Registration of Domestic PNG Connections	C00100				
111	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	400.00	120.00	48000.00
112	Left Out Work in Old Riser	E00100				
113	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	600.45	81.00	48636.60
114	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
115	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
116	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	4.00	2750.00	11000.00
117	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and and cleaning the area complete to the satisfaction.	H00400				
118	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	4.00	3300.00	13200.00
119	Flushing, Testing & Commissioning of MDPE line with all tools, Machines, Manpower are in contractor scope: Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
120	20 mm PE 100 MDPE Pipeline	K00101	Meter	200.00	212.00	42400.00
121	32 mm PE 100 MDPE Pipeline	K00102	Meter	400.00	248.00	99200.00
122	63 mm PE 100 MDPE Pipeline	K00103	Meter	200.00	325.00	65000.00
123	TOTAL VALUE (EXCLUDING GST)					50,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for
Bhubaneswar GA (Annexure-v)**

SCHEDULE OF RATES (Annexure-v)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Bhubaneswar GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / Moling - (without casing)/ Moling (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Moling without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying Upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth Upto 1.5 Meter	A00102	Nos	120.00	3115.00	373800.00
27	20 mm PE 100 pipe Service Line Laying Upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	10.00	4615.00	46150.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	1000.00	489.00	489000.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	550.00	567.00	311850.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					

SCHEDULE OF RATES (Annexure-v)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Bhubaneswar GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipment's, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H>=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	50.00	644.00	32200.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.	A00301				
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	200.00	483.00	96600.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	200.00	1196.00	239200.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	10.00	500.00	5000.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	10.00	1182.00	11820.00
56	Tiles/ Paver/ Blocks/ Curb Stones, Red sand stone	A00306	Meter	10.00	447.00	4470.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	10.00	326.00	3260.00
58	Providing, hoisting, and placing of 75 mm thick precast reinforced cement concrete slab of M-20 grade over the pipeline as mechanical protection including the cost of required centring, shuttering, reinforcement complete as per tender drawing and direction of the EIC. Note: Size (Length x Width) of the precast slab will be decided as per site condition and as per instruction of EIC. Precast slab will be placed in multiple numbers and various locations as per site condition and as per instruction of EIC.	A00308	Cum	1.00	11026.00	11026.00
59	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick levelling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labour, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
60	Type I : Inside size 1000 mm x 1000 mm	A00311	Each	1.00	47250.00	47250.00
63	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
64	32mm PE Valve	A00314	Each	1.00	8430.00	8430.00
65	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
66	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
67	GI Sleeves /Concrete Sleeves					
68	2 1/2" NB, 1 FEET Length	A00501	Nos	1.00	280.00	280.00
69	4" NB, 1 FEET Length	A00502	Nos	1.00	501.00	501.00
70	2 1/2" NB, 3 FEET Length	A00503	Nos	1.00	552.00	552.00
71	4" NB 3 FEET Length	A00504	Nos	1.00	985.60	985.60
72	Concrete Sleeve (NPS 2 Class)					
73	4" NB, 3 FEET Length	A00506	Nos	1.00	278.00	278.00
74	6" NB, 3 FEET Length	A00507	Nos	1.00	447.00	447.00
75	Note: The decision regarding the use of types of sleeves to be used at various locations shall be made by the Engineer-In-Charge (EIC) / Owner.					
76	Fabrication & Installation of Markers	A00700				
77	RCC Route Markers					
78	Supply, fabrication, and installation of RCC route markers including application of approved colour and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	25.00	473.00	11825.00
79	Steel Pole Markers with Foundation					
80	Supply, fabrication, and installation of Steel Pole markers, including application of approved colour and quality of primer and paint as per the standard drawings, along with all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete, cleaning, stench letter cutting of lettering, numbers, direction, etc. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00702	Nos	1.00	2631.20	2631.20
81	Warning Plate Markers					

SCHEDULE OF RATES (Annexure-v)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Bhubaneswar GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
82	Supply, fabrication, and installation of plate markers including application of approved colour and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	120.00	489.50	58740.00
85	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
86	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per std. drawing.	A00801	Nos	10.00	3150.40	31504.00
87	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
88	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				
89	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labour, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labour, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
90	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
91	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
92	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
93	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
94	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
95	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colours to match the original, replacement of damages during drilling, restoring the area to its original condition.					
96	In case of multistorey buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201, B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
97	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Loctite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
98	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
99	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
100	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
101	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
102	1/2" All floors (including connectivity from TF to regulator) with supply of GI Pipes by Contractor.	B00102	Meter	8.00	416.00	3328.00
103	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	3616.00	298.00	1077568.00
104	3/4" All Floors (including Installation of Risers) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00104	Meter	8.00	523.00	4184.00
105	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	500.00	369.00	184500.00
106	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	8.00	643.00	5144.00
107	1" Dia All floors (for Riser Installations & for Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	500.00	416.00	208000.00
108	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. Iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos.-B00102, B00104 & B00106 (under SOR item No.- B00101)					
109	Cutting/Breaking and Restoration	B00200				
110	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
111	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00203	CUM	10.00	2998.00	29980.00
112	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
113	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and algorithm associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
114	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
115	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	10.00	539.00	5390.00
116	Supply, Installation, Testing & Commissioning of Multi Layer Composite (MLC) Pipes	B00500				
117	Supply and installation of MLC Pipe according to the latest ISO17484-1 standard and installation of Appliance Ball valves as per technical specifications along with associated accessories/fittings, including brass fittings at the outlet of the meter and at the entry of the appliance valve as per the satisfaction and instructions of EIC. The MLC Pipe and fittings shall be procured from Jindal /Uniflex Pipe/Any ISI approved make or from vendors who have previously supplied these items for a similar application in any PSU with prior approval from the Owner/consultant.					
118	MLC pipe shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The Contractor must provide all equipment, tools, tackles, and associated materials necessary to execute the work efficiently by cutting, cleaning, bending, fixing with clamps, etc. The work includes the supply of all tools, tackles, and consumables, including clamps for fixing the MLC pipe, and restoration of the work area to the customer's satisfaction.					
119	<i>NOTE::Approved vendor list for MLC pipes -Jindal/Uniflex Pipes/UNIPRO/Any ISI approved make.</i>					
120	16.0 mm OD	B00501	Meter	1500.00	304.00	456000.00
121	Note: i) Supply of Appliance Ball Valves shall be paid as a separate SOR Item. ii) SOR item No. B00400 & B00500 shall be carried out including supply of materials, only after getting instruction / approval from EIC.					
122	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				

SCHEDULE OF RATES (Annexure-v)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Bhubaneswar GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
123	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as free issue Items)	B00601	Nos	300.00	557.00	167100.00
124	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	300.00	400.00	120000.00
125	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
126	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
127	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
128	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	650.00	302.00	196300.00
129	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	20.00	489.00	9780.00
130	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	300.00	300.00	90000.00
131	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. In case of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
132	Registration of Domestic PNG Connections	C00100				
133	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	300.00	120.00	36000.00
134	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	150.00	180.00	27000.00
135	Providing the Services of Resources as per site requirement	D00100				
136	Providing the services of Plumber(Manday= 8 Working Hours)	D00101	Manday	5.00	1144.00	5720.00
137	Providing the services of Helper(Manday= 8 Working Hours)	D00102	Manday	5.00	929.50	4647.50
138	Providing the Services of Welder(Manday= 8 Working Hours)	D00103	Manday	5.00	2502.50	12512.50
139	Providing the Services of Electrician(Manday- 8 Working Hours)	D00104	Manday	5.00	1430.00	7150.00
140	Providing the Services of Conversion Technician(Manday= 8 Working Hours)s)	D00105	Manday	5.00	1430.00	7150.00
141	Providing the Services of Grinder(Manday- 8 Working Hours)	D00106	Manday	5.00	1661.00	8305.00
142	Note for all above SOR Items Nos. A00100 to D00106 :- i) Quantities mentioned against all above SOR items are estimated & tentative and may vary up to any extent as per site condition and/or as per instruction of EIC. ii) If certain documents, drawings, datasheets, specifications etc. are not included in the bid, the same will be made available to the successful bidder. While formulating the bid, bidders are requested to quote such items based on practices followed by the similar nature of industries. However procurement & installation of such items will be done as per site requirement after due approval of EIC. iii) Quantities mentioned against all above SOR items are estimated & tentative and may required to be executed in Varanasi GA, in any ratio, as per site requirement and/or as per instruction of EIC. In this regard, decision of EIC shall be final and binding to the contractor. Hence, bidder is requested to familiarize themselves with both the GAs mentioned above while formulating their bid.					
143	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, in old riser to make the connection ready for conversion as per instruction and direction of EIC. In order to complete the old riser, payment shall be made as per the following SOR Items	E00100				
144	Tapping from already charged Riser in Multi-Storey Building upto Conversion: By 1/2" GI and/or 3/4" and/or MLC and/or Copper upto length less than or equal to 5 Mtr					
146	Multi-Storey Building of Ground+2 Floor	E00102	NOS	50.00	3200.00	160000.00
147	Multi-Storey Building of Ground+5 Floor	E00103	NOS	25.00	4200.00	105000.00
148	Multi-Storey Building of beyond Ground+5 Floor	E00104	NOS	25.00	5200.00	130000.00
149	Note: (1) Against Item E00100 to E00104 (length upto 5 Meter) Contractor has to do the tapping from already charged GI Riser in Multi-storey Building in order to complete all the works like installation of Meter, Meter-Regulator, Supply and installation of Isolation Valve (1/2" and/or 3/4"), Appliance Valve, Supply and Installation of Flexible Hose and Conversion of Kitchen Appliance complete in all respect.					
150	(2) In case length of tapping by 1/2"/3/4"/MLC/Copper Pipe against Item E00100 to E00104 is beyond 5 Mtr then separate payment shall be paid for length beyond 5 Mtr as per respective SOR Items given elsewhere.					
151	3) In case old Riser is not charged then contractor has to prepare Isometric Drawing, Testing and Commissioning of Riser for that payment shall be made against SOR Item E00111					
152	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, etc. in old riser to make the connection ready for conversion as per instruction and direction of EIC.					
153	Domestic Regulator installation 100mBar to 21mBar	E00107	Nos	44.00	176.00	7744.00
154	Domestic Regulator installation 4 to 21 mbr	E00108	Nos	44.00	176.00	7744.00
155	Anaconda installation (Supply in contractor scope)	E00110	Nos	2.00	301.40	602.80
156	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	999.63	81.00	80970.40
157	Note:					
158	(i) Under SOR E00100 GI pipes shall be supplied by the Owner as Free Issue Material. All the fittings shall be in the scope of Contractor.					
159	ii) Technical specification of Anaconda shall be in accordance with applicable National /Interation Stadnard, PNGRB					
160	ii) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR. Testing, commissioning of any additional GI piping installed by the contractor shall be paid in accordance with SOR B00102 and B00103. Contractor has to do the testing and commissioning of entire GI connection in customer house before conversion.					
161	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
162	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
163	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	NOS	8.00	2750.00	22000.00
164	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and cleaning the area complete to the satisfaction.	H00400				
165	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	NOS	5.00	3300.00	16500.00
166	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
167	2" TF	H00402	NOS	1.00	3740.00	3740.00
168	1" TF	H00403	NOS	0.00	1072.50	0.00
169	Additional Backfilling of Sand in excavated trench/Pit as per site requirement	J00100				
170	Filling of M-Sand/Soft soil as per the site requirement and as per the instructions of EIC (except the sand padding as mentioned SOR Item No. A00101)	J00101	Cum	5.00	800.00	4000.00

SCHEDULE OF RATES (Annexure-v)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Bhubaneswar GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
171	Flushing, Testing & Commissioning of MDPE line with all tools, Machines, Manpower are in contractor scope: Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
172	20 mm PE 100 MDPE Pipeline	K00101	Meter	5.00	212.00	1060.00
173	32 mm PE 100 MDPE Pipeline	K00102	Meter	5.00	248.00	1240.00
174	63 mm PE 100 MDPE Pipeline	K00103	Meter	5.00	325.00	1625.00
175	90 mm PE 100 MDPE Pipeline	K00104	Meter	5.00	343.00	1715.00
176	125 mm PE 100 MDPE Pipeline	K00105	Meter	5.00	500.00	2500.00
177	TOTAL VALUE (EXCLUDING GST)					50,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for
Cuttack GA (Annexure-vi)**

SCHEDULE OF RATES (Annexure-vi)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Cuttack GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / Moling - (without casing)/ Moling (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Moling without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying Upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth Upto 1.5 Meter	A00102	Nos	150.00	3115.00	467250.00
27	20 mm PE 100 pipe Service Line Laying Upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	50.00	4615.00	230750.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	1000.00	489.00	489000.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	550.00	567.00	311850.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipment's, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H>=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					

SCHEDULE OF RATES (Annexure-vi)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Cuttack GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	12.00	644.00	7728.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.					
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	200.00	483.00	96600.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	200.00	1196.00	239200.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	10.00	500.00	5000.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	10.00	1182.00	11820.00
56	Tiles/ Paver/ Blocks/ Curb Stones, Red sand stone	A00306	Meter	10.00	447.00	4470.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	10.00	326.00	3260.00
58	Providing, hoisting, and placing of 75 mm thick precast reinforced cement concrete slab of M-20 grade over the pipeline as mechanical protection including the cost of required centring, shuttering, reinforcement complete as per tender drawing and direction of the EIC. Note: Size (Length x Width) of the precast slab will be decided as per site condition and as per instruction of EIC. Precast slab will be placed in multiple numbers and various locations as per site condition and as per instruction of EIC.	A00308	Cum	5.00	11026.00	55130.00
59	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick levelling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labour, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, C1 manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
60	Type II : inside size 600 mm x 600 mm	A00313	Each	2.00	31000.00	62000.00
61	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
62	32mm PE Valve	A00314	Each	2.00	8430.00	16860.00
63	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
64	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
65	GI Sleeves / Concrete Sleeves					
66	2 1/2" NB, 1 FOOT Length	A00501	Nos	1.00	280.00	280.00
67	4" NB, 1 FOOT Length	A00502	Nos	1.00	501.00	501.00
68	2 1/2" NB, 3 FEET Length	A00503	Nos	1.00	552.00	552.00
69	4" NB 3 FEET Length	A00504	Nos	1.00	985.60	985.60
70	Concrete Sleeve (NPS 2 Class)					
71	4" NB, 3 FEET Length	A00506	Nos	1.00	278.00	278.00
72	6" NB, 3 FEET Length	A00507	Nos	1.00	447.00	447.00
73	Note: The decision regarding the use of types of sleeves to be used at various locations shall be made by the Engineer-In-Charge (EIC) / Owner.					
74	Fabrication & Installation of Markers	A00700				
75	RCC Route Markers					
76	Supply, fabrication, and installation of RCC route markers including application of approved colour and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	40.00	473.00	18920.00
77	Steel Pole Markers with Foundation					
78	Supply, fabrication, and installation of Steel Pole markers, including application of approved colour and quality of primer and paint as per the standard drawings, along with all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete, cleaning, stench letter cutting of lettering, numbers, direction, etc. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00702	Nos	1.00	2631.20	2631.20
79	Warning Plate Markers					
80	Supply, fabrication, and installation of plate markers including application of approved colour and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	180.00	489.50	88110.00
81	Paver Block Tiles Markers					
82	Supply, fabrication, and installation of Paver Block Tiles markers of standard size as per industry practice along the route on Paver Block/Thee on foot Path/As per the Instruction of EIG including application of approved colour and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. Carrying out all associated works for fixing / grouting / anchoring the marker with the surface. These works shall be carried out as per installation methodology approved by EIC based on site requirement.	A00704	Nos	5.00	457.60	2288.00
83	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
84	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per std. drawing.	A00801	Nos	10.00	3150.40	31504.00
85	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
86	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				
87	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labour, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labour, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
88	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
89	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
90	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
91	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required.					
92	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
93	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colours to match the original, replacement of damages during drilling, restoring the area to its original condition.					
94	In case of multistorey buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201,B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
95	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Loctite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
96	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
97	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
98	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
99	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
100	1/2" All floors (including connectivity from TF to regulator) with supply of GI Pipes by Contractor.	B00102	Meter	10.00	416.00	4160.00
101	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	3800.00	298.00	1132400.00
102	3/4" All Floors (including Installation of Risers) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00104	Meter	4.00	523.00	2092.00
103	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	150.00	369.00	55350.00
104	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	10.00	643.00	6430.00
105	1" Dia All floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	40.00	416.00	16640.00
106	Supply & laying/ Installation including fabrication of Contractor supplied MS piping system of all sizes & thickness including fabrication Installation of required compatible isolation ball valves, fittings, flanges, gaskets, valves, NRV, Strainer, couplings, etc. of all sizes, thickness & ANSI pressure rating including Pressure Gauge (PG) etc. as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out & complete the works at the site as per instruction of EIC. Flushing, Pneumatic testing, purging with nitrogen (including supply of Nitrogen as Inert gas by the contractor) and commissioning or make ready for commissioning as per specification and as per Instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by the contractor within specified schedule time. - 1 1/2" (1.5") Dia All Floors (For Commercial Connections) - (Payment for Welding will be made separately mentioned elsewhere in the SOR)	B00108	Meter	50.00	512.60	25630.00

SCHEDULE OF RATES (Annexure-vi)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Cuttack GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
107	Supply, laying, installation, and visual testing including fabrication of contractor-supplied carbon steel piping system of all sizes and thickness. This includes fabrication, installation, and visual testing of required compatible fittings, flanges, gaskets, valves, NRV, strainer, couplings, etc., of all sizes, thicknesses, and ANSI pressure ratings, including Pressure Gauge (PG), as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out and complete the works at the site as per the instruction of EIC. Flushing, pneumatic testing, purging with nitrogen (including the supply of nitrogen as an inert gas by the contractor), and commissioning or making ready for commissioning as per specifications and as per the instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned or covered explicitly above but otherwise required for satisfactory completion, safety, statutory requirements, or maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.	B00109	Meter	50.00	669.90	33495.00
	2' Dia All Floors (For Commercial & Industrial Connections) - payment for welding will be made separately as mentioned elsewhere in the SOR.					
108	TPI Inspection of Internal Piping as per SOR B00108 and B00109 shall be done by the Contractor and payment shall be made separately as per below SOR Item.					
109	TPI Inspection of Internal Piping : Commercial and Industrial Customer	B00110	Nos	1.00	13600.00	13600.00
110	Carrying out Welding of MS/GI/CS Pipes as per latest applicable code & standard for above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00110	Inch-Dia	10.00	573.00	5730.00
111	Carrying out NDT/Radiography of welded joints of CS/GI Pipes as per the latest applicable code & standard for the above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00111	Inch-Dia	2.00	191.40	382.80
112	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos.-B00102, B00104 & B00106 (under SOR item No.- B00101)					
113	Cutting/Breaking and Restoration	B00200				
114	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
115	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00203	CUM	4.00	2998.00	11992.00
116	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
117	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and algorithm associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
118	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
119	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	5.00	539.00	2695.00
120	Supply, Installation, Testing & Commissioning of Multi Layer Composite (MLC) Pipes	B00500				
121	Supply and installation of MLC Pipe according to the latest ISO17484-1 standard and installation of Appliance Ball valves as per technical specifications along with associated accessories/fittings, including brass fittings at the outlet of the meter and at the entry of the appliance valve as per the satisfaction and instructions of EIC. The MLC Pipe and fittings shall be procured from Jindal /Uniflex Pipe/Any ISI approved make or from vendors who have previously supplied these items for a similar application in any PSU with prior approval from the Owner/consultant.					
122	MLC pipe shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The Contractor must provide all equipment, tools, tackles, and associated materials necessary to execute the work efficiently by cutting, cleaning, bending, fixing with clamps, etc. The work includes the supply of all tools, tackles, and consumables, including clamps for fixing the MLC pipe, and restoration of the work area to the customer's satisfaction.					
123	<i>NOTE::Approved vendor list for MLC pipes -Jindal/Uniflex Pipes/UNIPRO/Any ISI approved make.</i>					
124	16.0 mm OD	B00501	Meter	500.00	304.00	152000.00
125	Note: i) Supply of Appliance Ball Valves shall be paid as a separate SOR Item. ii) SOR item No. B00400 & B00500 shall be carried out including supply of materials, only after getting instruction / approval from EIC.					
126	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
127	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as as free issue Items)	B00601	Nos	250.00	557.00	139250.00
128	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	250.00	400.00	100000.00
129	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
130	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
131	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
132	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	550.00	302.00	166100.00
133	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	10.00	489.00	4890.00
134	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	250.00	300.00	75000.00
135	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at work site is included in above sub SOR items rate under SOR items A00100 & B00100. In case of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
136	Registration of Domestic PNG Connections	C00100				
137	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	250.00	120.00	30000.00
138	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	250.00	180.00	45000.00
139	Providing the Services of Resources as per site requirement	D00100				
140	Providing the services of Plumber(Manday= 8 Working Hours)	D00101	Manday	5.00	1144.00	5720.00
141	Providing the services of Helper(Manday= 8 Working Hours)	D00102	Manday	5.00	929.50	4647.50
142	Providing the Services of Welder(Manday= 8 Working Hours)	D00103	Manday	5.00	2502.50	12512.50
143	Providing the Services of Conversion Technician(Manday= 8 Working Hours)s)	D00105	Manday	5.00	1430.00	7150.00
144	Providing the Services of Grinder(Manday- 8 Working Hours)	D00106	Manday	2.00	1661.00	3322.00
145	Note for all above SOR Items Nos. A00100 to D00106 :- i) Quantities mentioned against all above SOR items are estimated & tentative and may vary up to any extent as per site condition and/or as per instruction of EIC. ii) If certain documents, drawings, datasheets, specifications etc. are not included in the bid, the same will be made available to the successful bidder. While formulating the bid, bidders are requested to quote such items based on practices followed by the similar nature of industries. However procurement & installation of such items will be done as per site requirement after due approval of EIC. iii) Quantities mentioned against all above SOR items are estimated & tentative and may required to be executed in Varanasi GA, in any ratio, as per site requirement and/or as per instruction of EIC. In this regard, decision of EIC shall be final and binding to the contractor. Hence, bidder is requested to familiarize themselves with both the GAs mentioned above while formulating their bid.					
146	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, in old riser to make the connection ready for conversion as per instruction and direction of EIC. In order to complete the old riser, payment shall be made as per the following SOR Items	E00100				
147	Tapping from already charged Riser in Multi-Storey Building upto Conversion: By 1/2" GI and/or 3/4" and/or MLC and/or Copper upto length less than or equal to 5 Mtr					
148	Multi-Storey Building of Ground+2 Floor	E00102	Nos	50.00	3200.00	160000.00
149	Multi-Storey Building of Ground+5 Floor	E00103	Nos	25.00	4200.00	105000.00
150	Multi-Storey Building of beyond Ground+5 Floor	E00104	Nos	25.00	5200.00	130000.00
151	Note: (1) Against Item E00100 to E00104 (length upto 5 Meter) Contractor has to do the tapping from already charged GI Riser in Multi-storey Building in order to complete all the works like installation of Meter, Meter-Regulator, Supply and installatin of Isolation Valve (1/2" and/or 3/4"), Appliance Valve, Supply and Installation of Flexible Hose and Conversion of Kitchen Appliance complete in all respect.					
152	(2) In case length of tapping by 1/2"/3"/MLC/Copper Pipe against Item E00100 to E00104 is beyond 5 Mtr then separate paymet shall be paid for length beyond 5 Mtr as per respective SOR Items given elsewhere.					
153	3) In case old Riser is not charged then contractor has to prepare Isometric Drawing, Testing and Commissioning of Riser for that payment shall be made against SOR Item E00111					
154	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, etc. in old riser to make the connection ready for conversion as per instruction and direction of EIC.					

SCHEDULE OF RATES (Annexure-vi)
Schedule of Rates (SOR) for Contract Award Value up to ₹50 Lakh for Cuttack GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
155	By 1/2" GI upto length less than or equal to 4 Mtr	E00105	Nos	10.00	1500.00	15000.00
156	NOTE: (1) In case length of tapping by 1/2" against Item E00105 is beyond 4 Mtr then separate paymnet shall be paid for length beyond 4 Mtr as per applicable SOR Items B00102 and B00103 given elsewhere.For supply, Installation of IV, AV, Meter Installation, Conversion payment shall be made against applicable SOR Items from E00106 to E00111, as per instruction and direction of EIC.					
157	Domestic Meter installation (GI.6)	E00106	Nos	10.00	557.70	5577.00
158	Domestic Regulator installation 100mBar to 21mBar	E00107	Nos	10.00	176.00	1760.00
159	Domestic Regulator installation 4 to 21 mbr	E00108	Nos	10.00	176.00	1760.00
160	Domestic Conversion (Domestic Appliances)	E00109	Nos	2.00	500.00	1000.00
161	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	607.19	81.00	49182.40
162	Note:					
163	(i) Under SOR E00101 and E00102 GI pipes shall be supplied by the Owner as Free Issue Material. All the fittings shall be in the scope of Contractor.					
164	ii)Technical specification of Anaconda shall be in accordance with applicable National /Interantion Stadnard, PNGRB					
165	ii) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR. Testing, commissioning of any additional GI piping installed by the contractor shall be paid in accordance with SOR B00102 and B00103. Contractor has to do the testing and commissioning of entire GI connection in cusotmer house before conversion.					
166	Installation of GI Service Pipe (For Commercial/Industrial Connection and Installaton of Service Regulator)	H00100				
167	Supply, loading, storing, unloading and laying of GI pipes, including supply of GI fittings/accessories of all sizes & thickness like Elbows, Tees, unions, sockets, reducers, GI plugs, sleeves etc., installation of GI line (alongwith installation of required accessories as mentioned above) of following sizes, including fabrication with supply of all materials, consumables, labour and other incidental works. Carrying out all temporary, ancillary, auxiliary works required to make the GI line ready for commissioning as per drawings specifications.					
168	Finalisation of optimum route with consent of customer, from transition fitting to cooking oven/ appliance.					
169	Making temporary but stable platforms/ scaffolding/ rope ladders and all other safety devices.					
170	Installation of GI Pipes, Fittings, Valves, warning plate including NPT threading, painting as specified (installation of meters & regulators forms a separate SOR item).					
171	Drillings of holes through walls (Brick, RCC), Granite, Marble, Glass Cutting with proper heavy duty hammer drill machine tools and tacklees, using proper sealent /grout materialied colors to match the original replacement of damages during drilling, restoring the area to original condition.					
172	Supply & Fixing of approved clamps, Dowel Plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape/ lock tight, drilling of holes through tiles/ wood/ marble/ Granite etc. jointing of PE to above Ground service GI pipes, testing, purging with Nitrogen and commissioning of the complete installation as per specification.					
173	Painting of entire length of pipe along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification & direction of EIC. Restoring the wall surface to origin					
174	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
175	Handing over the completed works to Client for operation/ use, reconciliation of material area wise.					
176	Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule time.					
177	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required items (Only Meters and Regulators shall be provided as free issue) and all associated works. As per instruction and direction of EIC, Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration (Diaphragm Meter) Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00101	Nos	2.00	2286.00	4572.00
178	Supply and installation of Isolation Valves as per Technical Specification and as directed by EIC.(Approved make L&T/Audco or as mentioned in tender)	H00200				
179	Isolation Ball Valve 2 " max. 6 bar (g)	H00201	Nos	1.00	16500.00	16500.00
180	Isolation Ball Valve 1.5 " max. 6 bar (g)	H00202	Nos	1.00	11000.00	11000.00
181	Isolation Ball Valve 1 " max. 6 bar (g)(Threaded)	H00203	Nos	1.00	2750.00	2750.00
182	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
183	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
184	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	2.00	2750.00	5500.00
185	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and and cleaning the area complete to the satisfaction.	H00400				
186	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	2.00	3300.00	6600.00
187	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
188	1" TF	H00403	Nos	2.00	1072.50	2145.00
189	Additional Backfilling of Sand in excavated trench/Pit as per site requirement	J00100				
190	Filling of M-Sand/Soft soil as per the site requirement and as per the instructions of EIC (except the sand padding as mentioned SOR Item No. A00101)	J00101	Cum	4.00	800.00	3200.00
191	Flushing,Testing & Commissioning of MDPE line with all tools,Machines,Manpower are in contractor scope:Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
192	20 mm PE 100 MDPE Pipeline	K00101	Meter	50.00	212.00	10600.00
193	32 mm PE 100 MDPE Pipeline	K00102	Meter	1000.00	248.00	248000.00
194	63 mm PE 100 MDPE Pipeline	K00103	Meter	50.00	325.00	16250.00
195	TOTAL VALUE (EXCLUDING GST)					50,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for
Varanasi GA (Annexure-A)**

SCHEDULE OF RATES (Annexure-A)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / Moling - (without casing)/ Moling (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Moling without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth upto 1.5 Meter	A00102	Nos	10.00	3115.00	31150.00
27	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	10.00	4615.00	46150.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	100.00	489.00	48900.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	1200.00	567.00	680400.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top , and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					

SCHEDULE OF RATES (Annexure-A)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipments, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H)≥300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	25.00	644.00	16100.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.	A00301				
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	15.00	438.00	6570.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	15.00	1196.00	17940.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	10.00	500.00	5000.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	10.00	1182.50	11825.00
56	Tiles/ Paver/ Blocks/ Curb Stones, Red sand stone	A00306	Meter	150.00	447.00	67050.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	5.00	326.00	1630.00
58	Providing, hoisting, and placing of 75 mm thick precast reinforced cement concrete slab of M-20 grade over the pipeline as mechanical protection including the cost of required centering, shuttering, reinforcement complete as per tender drawing and direction of the EIC. Note: Size (Length x Width) of the precast slab will be decided as per site condition and as per instruction of EIC. Precast slab will be placed in multiple numbers and various locations as per site condition and as per instruction of EIC.	A00308	Cum	2.00	11026.40	22052.80
59	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick leveling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labor, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.	A00309				
60	Type I : Inside size 1000 mm x 1000 mm	A00310	Each	1.00	47250.50	47250.50
61	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
62	32mm PE Valve	A00313	Each	1.00	8430.00	8430.00
63	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
64	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
65	GI Sleeves /Concrete Sleeves					
66	2 1/2" NB, 1 FOOT Length	A00501	Nos	10.00	280.00	2800.00
67	4" NB, 1 FOOT Length	A00502	Nos	5.00	501.00	2505.00
68	2 1/2" NB, 3 FEET Length	A00503	Nos	15.00	552.00	8280.00
69	4" NB 3 FEET Length	A00504	Nos	1.00	985.60	985.60
70	Concrete Sleeve (NPS 2 Class)					
71	4" NB, 3 FEET Length	A00506	Nos	5.00	278.00	1390.00
72	6" NB, 3 FEET Length	A00507	Nos	5.00	447.00	2235.00
73	Note: The decision regarding the use of types of sleeves to be used at various locations shall be made by the Engineer-In-Charge (EIC) / Owner.					
74	Fabrication & Installation of Markers	A00700				
75	RCC Route Markers					
76	Supply, fabrication, and installation of RCC route markers including application of approved color and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	20.00	473.00	9460.00
77	Steel Pole Markers with Foundation					
78	Supply, fabrication, and installation of Steel Pole markers, including application of approved color and quality of primer and paint as per the standard drawings, along with all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete, cleaning, stench letter cutting of lettering, numbers, direction, etc. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00702	Nos	1.00	2631.20	2631.20
79	Warning Plate Markers					
80	Supply, fabrication, and installation of plate markers including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	90.00	489.50	44055.00

SCHEDULE OF RATES (Annexure-A)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
81	Paver Block Tiles Markers					
82	Supply, fabrication, and installation of Paver Block Tiles markers of standard size as per industry practice along the route on Paver Block/Thee on foot Path/As per the Instruction of EIG including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. Carrying out all associated works for fixing / grouting / anchoring the marker with the surface. These works shall be carried out as per installation methodology approved by EIC based on site requirement.	A00704	Nos	2.00	457.60	915.20
83	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
84	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per standard drawing.	A00801	Nos	2.00	3150.40	6300.80
85	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
86	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				
87	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labor, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labor, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
88	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
89	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
90	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
91	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
92	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
93	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colors to match the original, replacement of damages during drilling, restoring the area to its original condition.					
94	In case of multistory buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201,B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
95	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Loctite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
96	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
97	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
98	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
99	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
100	1/2" All floors (including connectivity from TF to regulator) with supply of GI Pipes by Contractor.	B00102	Meter	15.00	416.00	6240.00
101	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	2200.00	298.00	655600.00
102	3/4" All Floors (including Installation of Risers) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00104	Meter	9.00	523.00	4707.00
103	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	300.00	369.00	110700.00
104	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	5.00	643.00	3215.00
105	1" Dia All floors (for Riser Installations & for Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	5.00	416.00	2080.00
106	Supply & laying/ Installation including fabrication of Contractor supplied MS piping system of all sizes & thickness including fabrication Installation of required compatible isolation ball valves, fittings, flanges, gaskets, valves, NRV, Strainer, couplings, etc. of all sizes, thickness & ANSI pressure rating including Pressure Gauge (PG) etc. as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out & complete the works at the site as per instruction of EIC. Flushing, Pneumatic testing, purging with nitrogen (including supply of Nitrogen as Inert gas by the contractor) and commissioning or make ready for commissioning as per specification and as per Instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by the contractor within specified schedule time. - 1 1/2" (1.5") Dia All Floors (For Commercial Connections) - (Payment for Welding will be made separately mentioned elsewhere in the SOR)	B00108	Meter	5.00	512.60	2563.00
107	Supply, laying, installation, and visual testing including fabrication of contractor-supplied carbon steel piping system of all sizes and thickness. This includes fabrication, installation, and visual testing of required compatible fittings, flanges, gaskets, valves, NRV, strainer, couplings, etc., of all sizes, thicknesses, and ANSI pressure ratings, including Pressure Gauge (PG), as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out and complete the works at the site as per the instruction of EIC. Flushing, pneumatic testing, purging with nitrogen (including the supply of nitrogen as an inert gas by the contractor), and commissioning or making ready for commissioning as per specifications and as per the instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned or covered explicitly above but otherwise required for satisfactory completion, safety, statutory requirements, or maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time. 2" Dia All Floors (For Commercial & Industrial Connections) - payment for welding will be made separately as mentioned elsewhere in the SOR.	B00109	Meter	5.00	669.90	3349.50
108	TPI Inspection of Internal Piping as per SOR B00108 and B00109 shall be done by the Contractor and payment shall be made separately as per below SOR Item.					
109	TPI Inspection of Internal Piping : Commercial and Industrial Customer	B00110	Nos	1.00	13600.00	13600.00
110	Carrying out Welding of MS/GI/CS Pipes as per latest applicable code & standard for above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00111	Inch-Dia	10.00	573.00	5730.00
111	Carrying out NDT/Radiography of welded joints of CS/GI Pipes as per the latest applicable code & standard for the above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00112	Inch-Dia	10.00	191.40	1914.00
112	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TF) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item given elsewhere. iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. • B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos,-B00102, B00104 & B00106 (under SOR item No.-B00101)					

SCHEDULE OF RATES (Annexure-A)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
113	Cutting/Breaking and Restoration	B00200				
114	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
115	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00201	Cum	1.00	2998.00	2998.00
116	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
117	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and along with associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
118	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
119	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	5.00	539.00	2695.00
120	Supply, Installation, Testing & Commissioning of Multi Layer Composite (MLC) Pipes	B00500				
121	Supply and installation of MLC Pipe according to the latest ISO17484-1 standard and installation of Appliance Ball valves as per technical specifications along with associated accessories/fittings, including brass fittings at the outlet of the meter and at the entry of the appliance valve as per the satisfaction and instructions of EIC. The MLC Pipe and fittings shall be procured from Jindal /Uniflex Pipe/Any ISI approved make or from vendors who have previously supplied these items for a similar application in any PSU with prior approval from the Owner/consultant.					
122	MLC pipe shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The Contractor must provide all equipment, tools, tackles, and associated materials necessary to execute the work efficiently by cutting, cleaning, bending, fixing with clamps, etc. The work includes the supply of all tools, tackles, and consumables, including clamps for fixing the MLC pipe, and restoration of the work area to the customer's satisfaction.					
123	<i>NOTE::Approved vendor list for MLC pipes -Jindal/Uniflex Pipes/UNIPRO/Any ISI approved make.</i>					
124	16.0 mm OD	B00501	Meter	25.00	304.00	7600.00
125	Note: i) Supply of Appliance Ball Valves shall be paid as a separate SOR Item. ii) SOR item No. B00400 & B00500 shall be carried out including supply of materials, only after getting instruction / approval from EIC.					
126	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
127	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as as free issue Items)	B00601	Nos	200.00	557.00	111400.00
128	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	200.00	400.00	80000.00
129	Note: Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
130	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
131	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
132	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	300.00	302.00	90600.00
133	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	28.00	489.00	13692.00
134	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	150.00	300.00	45000.00
135	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. Incase of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
136	Registration of Domestic PNG Connections	C00100				
137	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	100.00	120.00	12000.00
138	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	50.00	180.00	9000.00
139	Providing the Services of Resources as per site requirement	D00100				
140	Providing the services of Plumber(Manday= 8 Working Hours)	D00101	Manday	1.00	1144.00	1144.00
141	Providing the services of Helper(Manday= 8 Working Hours)	D00102	Manday	1.00	929.50	929.50
142	Providing the Services of Welder(Manday= 8 Working Hours)	D00103	Manday	1.00	2502.50	2502.50
143	Providing the Services of Electrician(Manday- 8 Working Hours)	D00104	Manday	1.00	1430.00	1430.00
144	Providing the Services of Conversion Technician(Manday= 8 Working Hours)s)	D00105	Manday	1.00	1430.00	1430.00
145	Providing the Services of Grinder(Manday- 8 Working Hours)	D00106	Manday	1.00	1661.00	1661.00
146	Note for all above SOR Items Nos. A00100 to D00106 :- i) Quantities mentioned against all above SOR items are estimated & tentative and may vary up to any extent as per site condition and/or as per instruction of EIC. ii) If certain documents, drawings, datasheets, specifications etc. are not included in the bid, the same will be made available to the successful bidder. While formulating the bid, bidders are requested to quote such items based on practices followed by the similar nature of industries. However procurement & installation of such items will be done as per site requirement after due approval of EIC. iii) Quantities mentioned against all above SOR items are estimated & tentative and may required to be executed in Varanasi GA, in any ratio, as per site requirement and/or as per instruction of EIC. In this regard, decision of EIC shall be final and binding to the contractor. Hence, bidder is requested to familiarize themselves with both the GAs mentioned above while formulating their bid.					
147	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, etc. in old riser to make the connection ready for conversion as per instruction and direction of EIC.					
148	By 1/2" GI upto length less than or equal to 4 Mtr	E00105	Nos	25.00	1500.00	37500.00
149	NOTE: (1) In case length of tapping by 1/2" against Item E00105 is beyond 4 Mtr then separate payment shall be paid for length beyond 4 Mtr as per applicable SOR Items B00102 and B00103 given elsewhere. For supply, Installation of IV, AV, Meter Installation, Conversion in against Leftout Work the payment shall be made against applicable SOR Items from E00106 to E00111, as per instruction and direction of EIC.					
150	Domestic Meter installation (G1.6)	E00106	Nos	25.00	557.00	13925.00
151	Domestic Regulator installation 100mBar to 21mBar	E00107	Nos	10.00	176.00	1760.00
152	Domestic Regulator installation 4 to 21 mbr	E00108	Nos	10.00	176.00	1760.00
153	Domestic Conversion (Domestic Appliances)	E00109	Nos	50.00	500.00	25000.00
154	Anaconda installation (Supply in contractor scope)	E00110	Nos	25.00	301.40	7535.00
155	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	251.25	81.00	20351.40
156	Note:					
157	i) Technical specification of Anaconda shall be in accordance with applicable National /Interantion Stadnard, PNGRB					

SCHEDULE OF RATES (Annexure-A)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Varanasi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
158	ii) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR E00111. Testing, commissioning of any additional GI piping installed by the contractor shall be paid in accordance with SOR B00102 and B00103. Contractor has to do the testing and commissioning of entire GI connection in cusotmer house before conversion.					
159	Installation of GI Service Pipe (For Commercial/Industrial Connection and Installaton of Service Regulator)	H00100				
160	Supply, loading, storing, unloading and laying of GI pipes, including supply of GI fittings/accessories of all sizes & thickness like Elbows, Tees, unions, sockets, reducers, GI plugs, sleeves etc., installation of GI line (alongwith installation of required accessories as mentioned above) of following sizes, including fabrication with supply of all materials, consumables, labour and other incidental works. Carrying out all temporary, ancillary, auxiliary works required to make the GI line ready for commissioning as per drawings specifications.					
161	Finalisation of optimum route with consent of customer, from transition fitting to cooking oven/ appliance.					
162	Making temporay but stable platforms/ scaffolding/ rope ladders and all other safety devices.					
163	Installation of GI Pipes, Fittings, Valves, warning plate including NPT threading, painting as specified (installation of meters & regulators forms a separate SOR item).					
164	Drillings of holes through walls (Brick, RCC), Granite, Marble, Glass Cutting with proper heavy duty hammer drill machine tools and tacklees, using proper sealent /grout materiald colors to match the original replacement of damages during drilling, restoring the area to original condition.					
165	Supply & Fixing of approved clamps, Dowell Plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape/ lock tight, drilling of holes through tiles/ wood/ marble/ Granite etc. jointing of PE to above Ground service GI pipes, testing, purging with Nitrogen and commissioning of the complete installation as per specification.					
166	Painting of entire length of pipe along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification & direction of EIC. Restoring the wall surface to origin					
167	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
168	Handing over the completed works to Client for operation/ use, reconciliation of material area wise.					
169	Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule time.					
170	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required items (Only Meters and Regulators shall be provided as free issue) and all associated works. As per instruction and direction of EIC, Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration (Diaphragm Meter) Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00101	Nos	1.00	6600.00	6600.00
171	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required (Only Meters and Regulators shall be provided as free issue) and all associated works. (RPD Meter) Including supply, installation of #150 Flange of size 3"/2"/1.5"/1" (2 set with meter and 2 set with regulator), Stud-Nut, Gaskets, Elbow, L-Clamp, Grouting, Reducer, U-Clamp with rubber, and 01 Pressure Guage (0-4.2 Kg/Cm2) of reputed make and to the satisfaction of EIC. Works include installation of Free issued Strainer, NRV in all respects. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00102	Nos	1.00	30800.00	30800.00
172	Supply and installation of Isolation Valves as per Technical Specification and as directed by EIC.(Approved make L&T/Audco or as mentioned in tender)	H00200				
173	Isolation Ball Valve 2 " max. 6 bar (g)	H00201	Nos	1.00	16500.00	16500.00
174	Isolation Ball Valve 1.5 " max. 6 bar (g)	H00202	Nos	1.00	11000.00	11000.00
175	Isolation Ball Valve 1 " max. 6 bar (g)(Threaded)	H00203	Nos	1.00	2750.00	2750.00
176	Isolation Ball Valve 1 " max. 6 bar (g)(Flanged)	H00204	Nos	1.00	8250.00	8250.00
177	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
178	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
179	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	2.00	2750.00	5500.00
180	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and and cleaning the area complete to the satisfaction.	H00400				
181	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	2.00	3300.00	6600.00
182	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
183	2" TF	H00402	Nos	1.00	3740.00	3740.00
184	1" TF	H00403	Nos	2.00	1072.50	2145.00
185	Excavation of Hard rock/surface	I00100				
186	Excavation of trench or pits, wherever hard rock presence is exceeding 1.5 m in any direction of the trench and excavation of trench or pits in Malba/Multiple layers of asphalt/ brick / PCC/RCC etc and removable only by pneumatic chisel / drill as per the specifications and direction of EIC. The rates are payable over and above the Laying rates as per relevant SOR Item No. A00101	I00101	Meter	5.00	256.00	1280.00
187	Flushing,Testing & Commissioning of MDPE line with all tools,Machines,Manpower are in contractor scope:Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
188	20 mm PE 100 MDPE Pipeline	K00101	Meter	6.00	212.00	1272.00
189	32 mm PE 100 MDPE Pipeline	K00102	Meter	10.00	248.00	2480.00
190	63 mm PE 100 MDPE Pipeline	K00103	Meter	10.00	325.00	3250.00
191	90 mm PE 100 MDPE Pipeline	K00104	Meter	5.00	343.00	1715.00
192	125 mm PE 100 MDPE Pipeline	K00105	Meter	5.00	500.00	2500.00
193	TOTAL VALUE (EXCLUDING GST)					25,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for
Patna GA (Annexure-B)**

SCHEDULE OF RATES (Annexure-B)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / moling - (without casing)/ Moling (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Moling without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiseling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HOPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					

SCHEDULE OF RATES (Annexure-B)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth upto 1.5 Meter	A00102	Nos	28.00	3115.00	87220.00
27	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	15.00	4615.00	69225.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	395.00	489.00	193155.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	350.00	567.00	198450.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipments, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All files/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H>=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					

SCHEDULE OF RATES (Annexure-B)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	5.00	644.00	3220.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.	A00301				
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	95.00	438.00	41610.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	96.00	1196.00	114816.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	5.00	500.00	2500.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	5.00	1182.50	5912.50
56	Tiles/ Paver/ Blocks/ Curb Stones, Red sand stone	A00306	Meter	100.00	447.00	44700.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	3.00	326.00	978.00
58	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick leveling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labor, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
59	Type II : Inside size 600 mm x 600 mm	A00313	Each	1.00	31000.00	31000.00
60	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
61	32mm PE Valve	A00314	Nos	1.00	8430.00	8430.00
62	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
63	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
64	GI Sleeves /Concrete Sleeves					
65	2 1/2" NB, 1 FOOT Length	A00501	Nos	1.00	200.00	200.00
66	Fabrication & Installation of Markers	A00700				
67	RCC Route Markers					
68	Supply, fabrication, and installation of RCC route markers including application of approved color and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	10.00	473.00	4730.00
69	Warning Plate Markers					
70	Supply, fabrication, and installation of plate markers including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	40.00	489.50	19580.00
71	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
72	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per std. drawing.	A00801	Nos	5.00	3150.40	15752.00
73	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
74	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				
75	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labor, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labor, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
76	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
77	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					

SCHEDULE OF RATES (Annexure-B)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
78	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
79	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
80	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
81	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colors to match the original, replacement of damages during drilling, restoring the area to its original condition.					
82	In case of multistory buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201, B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
83	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Loctite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
84	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
85	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
86	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
87	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
88	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	1000.00	298.00	298000.00
89	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	75.00	368.00	27600.00
90	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	5.00	643.00	3215.00
91	1" Dia All floors (for Riser Installations & for Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	20.00	416.00	8320.00
92	Supply & laying/ Installation including fabrication of Contractor supplied MS piping system of all sizes & thickness including fabrication Installation of required compatible isolation ball valves, fittings, flanges, gaskets, valves, NRV, Strainer, couplings, etc. of all sizes, thickness & ANSI pressure rating including Pressure Gauge (PG) etc. as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out & complete the works at the site as per instruction of EIC. Flushing, Pneumatic testing, purging with nitrogen (including supply of Nitrogen as Inert gas by the contractor) and commissioning or make ready for commissioning as per specification and as per Instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by the contractor within specified schedule time. - 1 1/2" (1.5") Dia All Floors (For Commercial Connections) - (Payment for Welding will be made separately mentioned elsewhere in the SOR)	B00108	Meter	5.00	512.60	2563.00
93	Supply, laying, installation, and visual testing including fabrication of contractor-supplied carbon steel piping system of all sizes and thickness. This includes fabrication, installation, and visual testing of required compatible fittings, flanges, gaskets, valves, NRV, strainer, couplings, etc., of all sizes, thicknesses, and ANSI pressure ratings, including Pressure Gauge (PG), as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out and complete the works at the site as per the instruction of EIC. Flushing, pneumatic testing, purging with nitrogen (including the supply of nitrogen as an inert gas by the contractor), and commissioning or making ready for commissioning as per specifications and as per the instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned or covered explicitly above but otherwise required for satisfactory completion, safety, statutory requirements, or maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time. 2' Dia All Floors (For Commercial & Industrial Connections) - payment for welding will be made separately as mentioned elsewhere in the SOR.	B00109	Meter	10.00	669.00	6690.00
94	TPI Inspection of Internal Piping as per SOR B00108 and B00109 shall be done by the Contractor and payment shall be made separately as per below SOR Item.					
95	TPI Inspection of Internal Piping : Commercial and Industrial Customer	B00110	Nos	1.00	13600.00	13600.00
96	Carrying out Welding of MS/GI/CS Pipes as per latest applicable code & standard for above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00110	Inch-Dia	5.00	573.00	2865.00
97	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos. -B00102, B00104 & B00106 (under SOR item No. B00101)					
98	Cutting/Breaking and Restoration	B00200				

SCHEDULE OF RATES (Annexure-B)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
99	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
100	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00203	Inch	2.00	2998.00	5996.00
101	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
102	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and along with associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
103	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
104	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	2.00	539.00	1078.00
105	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
106	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as as free issue Items)	B00601	Nos	350.00	557.00	194950.00
107	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	350.00	400.00	140000.00
108	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
109	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
110	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
111	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	140.00	302.00	42280.00
112	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	5.00	489.00	2445.00
113	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	70.00	300.00	21000.00
114	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. In case of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
115	Registration of Domestic PNG Connections	C00100				
116	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	1.00	120.00	120.00
117	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	15.00	180.00	2700.00
118	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, in old riser to make the connection ready for conversion as per instruction and direction of EIC. In order to complete the old riser, payment shall be made as per the following SOR Items	E00100				
119	Tapping from already charged Riser in Multi-Storey Building upto Conversion: By 1/2" GI and/or 3/4" and/or MLC and/or Copper upto length less than or equal to 5 Mtr					
120	Multi-Storey Building of Ground+2 Floor	E00102		20.00	3200.00	64000.00
121	Multi-Storey Building of Ground+5 Floor	E00103		90.00	4200.00	378000.00
122	Multi-Storey Building of beyond Ground+5 Floor	E00104		65.00	5200.00	338000.00
123	Note: (1) Against Item E00100 to E00104 (length upto 5 Meter) Contractor has to do the tapping from already charged GI Riser in Multi-storey Building in order to complete all the works like installation of Meter, Meter-Regulator, Supply and installation of Isolation Valve (1/2" and/or 3/4"), Appliance Valve, Supply and Installation of Flexible Hose and Conversion of Kitchen Appliance complete in all respect.					
124	(2) In case length of tapping by 1/2"/3/4"/MLC/Copper Pipe against Item E00100 to E00104 is beyond 5 Mtr then separate payment shall be paid for length beyond 5 Mtr as per respective SOR Items given elsewhere.					
125	3) In case old Riser is not charged then contractor has to prepare Isometric Drawing, Testing and Commissioning of Riser for that payment shall be made against SOR Item E00111					
126	Domestic Conversion (Domestic Appliances)	E00109	Nos	1.00	500.00	500.00
127	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	311.62	81.00	25241.50
128	Note:					
129	i) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR.					

SCHEDULE OF RATES (Annexure-B)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Patna GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
130	Installation of GI Service Pipe (For Commercial/Industrial Connection and Installaton of Service Regulator)	H00100				
131	Supply, loading, storing, unloading and laying of GI pipes, including supply of GI fittings/accessories of all sizes & thickness like Elbows, Tees, unions, sockets, reducers, GI plugs, sleeves etc., installation of GI line (alongwith installation of required accessories as mentioned above) of following sizes, including fabrication with supply of all materials, consumables, labour and other incidental works. Carrying out all temporary, ancillary, auxiliary works required to make the GI line ready for commissioning as per drawings specifications.					
132	Finalisation of optimum route with consent of customer, from transition fitting to cooking oven/ appliance.					
133	Making temporay but stable platforms/ scaffolding/ rope ladders and all other safety devices.					
134	Installation of GI Pipes, Fittings, Valves, warning plate including NPT threading, painting as specified (installation of meters & regulators forms a separate SOR item).					
135	Drillings of holes through walls (Brick, RCC), Granite, Marble, Glass Cutting with proper heavy duty hammer drill machine tools and tackleles, using proper sealent /grout materialled colors to match the original replacement of damages during drilling, restoring the area to original condition.					
136	Supply & Fixing of approved clamps, Dowell Plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape/ lock tight, drilling of holes through tiles/ wood/ marble/ Granite etc. jointing of PE to above Ground service GI pipes, testing, purging with Nitrogen and commissioning of the complete installation as per specification.					
137	Painting of entire length of pipe along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification & direction of EIC. Restoring the wall surface to origin					
138	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
139	Handing over the completed works to Client for operation/ use, reconciliation of material area wise.					
140	Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule time.					
141	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required items (Only Meters and Regulators shall be provided as free issue) and all associated works. As per instruction and direction of EIC, Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration (Diaphragm Meter) Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00101	Nos	1.00	2286.00	2286.00
142	Supply and installation of Isolation Valves as per Technical Specification and as directed by EIC,(Approved make L&T/Audco or as mentioned in tender)	H00200				
143	Isolation Ball Valve 1 " max. 6 bar (g)(Threaded)	H00203	Nos	1.00	2750.00	2750.00
144	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
145	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
146	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	1.00	2750.00	2750.00
147	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and and cleaning the area complete to the satisfaction.	H00400				
148	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	1.00	3300.00	3300.00
149	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
150	1" TF	H00403	Nos	1.00	1072.00	1072.00
151	Flushing,Testing & Commissioning of MDPE line with all tools,Machines,Manpower are in contractor scope:Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
152	20 mm PE 100 MDPE Pipeline	K00101	Meter	200.00	212.00	42400.00
153	32 mm PE 100 MDPE Pipeline	K00102	Meter	100.00	248.00	24800.00
154	TOTAL VALUE (EXCLUDING GST)					25,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for
Ranchi GA (Annexure-C)**

SCHEDULE OF RATES (Annexure-C)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Ranchi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / moling - (without casing)/ Moling (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Moling without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiseling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HOPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth upto 1.5 Meter	A00102	Nos	30.00	3115.00	93450.00
27	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	15.00	4615.00	69225.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	800.00	489.00	391200.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	250.00	567.00	141750.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipments, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					

SCHEDULE OF RATES (Annexure-C)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Ranchi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H>=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	5.00	644.00	3220.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.					
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	10.00	438.00	4380.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	100.00	1196.00	119600.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	5.00	500.00	2500.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	5.00	1182.50	5912.50
56	Tiles/ Paver/ Blocks/ Curb Stones,Red sand stone	A00306	Meter	100.00	447.00	44700.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	3.00	326.00	978.00
58	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick leveling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labor, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
59	Type II : Inside size 600 mm x 600 mm	A00308	Nos	1.00	31000.00	31000.00
60	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
61	32mm PE Valve	A00309	Nos	2.00	8430.00	16860.00
62	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
63	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
64	GI Sleeves /Concrete Sleeves					
65	2 1/2" NB, 1 FOOT Length	A00501	Nos	1.00	200.00	200.00
66	Note: The decision regarding the use of types of sleeves to be used at various locations shall be made by the Engineer-In-Charge (EIC) / Owner.					
67	Fabrication & Installation of Markers	A00700				
68	RCC Route Markers					
69	Supply, fabrication, and installation of RCC route markers including application of approved color and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	10.00	473.00	4730.00
70	Warning Plate Markers					
71	Supply, fabrication, and installation of plate markers including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	40.00	489.50	19580.00
72	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
73	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per std. drawing.	A00801	Nos	5.00	3150.40	15752.00
74	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
75	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				
76	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labor, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labor, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
77	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
78	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
79	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
80	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
81	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
82	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colors to match the original, replacement of damages during drilling, restoring the area to its original condition.					
83	In case of multistory buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201,B00202, B00203 & B00204 and as per the instruction and direction of EIC.					

SCHEDULE OF RATES (Annexure-C)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Ranchi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
84	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Locitite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
85	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
86	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
87	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
88	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
89	1/2" All floors (including connectivity from TF to regulator) with supply of GI Pipes by Contractor.	B00102	Meter	5.00	416.00	2080.00
90	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	1950.00	298.00	581100.00
91	3/4" All Floors (including Installation of Risers) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00104	Meter	2.00	523.00	1046.00
92	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	75.00	368.00	27600.00
93	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	5.00	643.00	3215.00
94	1" Dia All floors (for Riser Installations & for Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	20.00	416.00	8320.00
95	Supply & laying/ Installation including fabrication of Contractor supplied MS piping system of all sizes & thickness including fabrication Installation of required compatible isolation ball valves, fittings, flanges, gaskets, valves, NRV, Strainer, couplings, etc. of all sizes, thickness & ANSI pressure rating including Pressure Gauge (PG) etc. as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out & complete the works at the site as per instruction of EIC. Flushing, Pneumatic testing, purging with nitrogen (including supply of Nitrogen as Inert gas by the contractor) and commissioning or make ready for commissioning as per specification and as per Instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by the contractor within specified schedule time. - 1 1/2" (1.5") Dia All Floors (For Commercial Connections) - (Payment for Welding will be made separately mentioned elsewhere in the SOR)	B00108	Meter	5.00	512.60	2563.00
96	Supply, laying, installation, and visual testing including fabrication of contractor-supplied carbon steel piping system of all sizes and thickness. This includes fabrication, installation, and visual testing of required compatible fittings, flanges, gaskets, valves, NRV, strainer, couplings, etc., of all sizes, thicknesses, and ANSI pressure ratings, including Pressure Gauge (PG), as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out and complete the works at the site as per the instruction of EIC. Flushing, pneumatic testing, purging with nitrogen (including the supply of nitrogen as an inert gas by the contractor), and commissioning or making ready for commissioning as per specifications and as per the instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned or covered explicitly above but otherwise required for satisfactory completion, safety, statutory requirements, or maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time. 2' Dia All Floors (For Commercial & Industrial Connections) - payment for welding will be made separately as mentioned elsewhere in the SOR.	B00109	Meter	10.00	669.00	6690.00
97	TPI Inspection of Internal Piping as per SOR B00108 and B00109 shall be done by the Contractor and payment shall be made separately as per below SOR Item.					
98	TPI Inspection of Internal Piping : Commercial and Industrial Customer	B00110	Nos	1.00	13600.00	13600.00
99	Carrying out Welding of MS/GI/CS Pipes as per latest applicable code & standard for above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00110	Inch-Dia	5.00	573.00	2865.00
100	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos.-B00102, B00104 & B00106 (under SOR item No.-B00101)					
101	Cutting/Breaking and Restoration	B00200				
102	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
103	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00203	Inch	2.00	2998.00	5996.00
104	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
105	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and along with associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
106	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
107	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	2.00	539.00	1078.00
108	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
109	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as as free issue Items)	B00601	Nos	70.00	557.00	38990.00
110	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	70.00	400.00	28000.00
111	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
112	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
113	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
114	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	140.00	302.00	42280.00
115	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	5.00	489.00	2445.00
116	Appliance Ball Valve 1/2 " max. 35 mlli Bar (g)	B00703	Nos	70.00	300.00	21000.00
117	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100. Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. In case of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
118	Registration of Domestic PNG Connections	C00100				
119	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	5.00	120.00	600.00

SCHEDULE OF RATES (Annexure-C)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Ranchi GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
120	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	15.00	180.00	2700.00
121	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, in old riser to make the connection ready for conversion as per instruction and direction of EIC. In order to complete the old riser, payment shall be made as per the following SOR Items	E00100				
122	Tapping from already charged Riser in Multi-Storey Building upto Conversion: By 1/2" GI and/or 3/4" and/or MLC and/or Copper upto length less than or equal to 5 Mtr					
123	Multi-Storey Building of Ground+2 Floor	E00102	Nos	10.00	3200.00	32000.00
124	Multi-Storey Building of Ground+5 Floor	E00103	Nos	100.00	4200.00	420000.00
125	Multi-Storey Building of beyond Ground+5 Floor	E00104	Nos	35.00	5200.00	182000.00
126	Note: (1) Against Item E00100 to E00104 (length upto 5 Meter) Contractor has to do the tapping from already charged GI Riser in Multi-storey Building in order to complete all the works like installation of Meter, Meter-Regulator, Supply and installation of Isolation Valve (1/2" and/or 3/4"), Appliance Valve, Supply and Installation of Flexible Hose and Conversion of Kitchen Appliance complete in all respect.					
127	(2) In case length of tapping by 1/2"/3/4"/MLC/Copper Pipe against Item E00100 to E00104 is beyond 5 Mtr then separate payment shall be paid for length beyond 5 Mtr as per respective SOR Items given elsewhere.					
128	3) In case old Riser is not charged then contractor has to prepare Isometric Drawing, Testing and Commissioning of Riser for that payment shall be made against SOR Item E00111					
129	Domestic Conversion (Domestic Appliances)	E00109	Nos	1.00	500.00	500.00
130	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	302.94	81.00	24538.50
131	Note:					
132	(i) Under SOR E00100 GI pipes shall be supplied by the Owner as Free Issue Material. All the fittings shall be in the scope of Contractor.					
133	ii) Technical specification of Anaconda shall be in accordance with applicable National / International Standard, PNGRB					
134	ii) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR. Testing, commissioning of any additional GI piping installed by the contractor shall be paid in accordance with SOR B00102 and B00103. Contractor has to do the testing and commissioning of entire GI connection in customer house before conversion.					
135	Installation of GI Service Pipe (For Commercial/Industrial Connection and Installation of Service Regulator)	H00100				
136	Supply, loading, storing, unloading and laying of GI pipes, including supply of GI fittings/accessories of all sizes & thickness like Elbows, Tees, unions, sockets, reducers, GI plugs, sleeves etc., installation of GI line (alongwith installation of required accessories as mentioned above) of following sizes, including fabrication with supply of all materials, consumables, labour and other incidental works. Carrying out all temporary, ancillary, auxiliary works required to make the GI line ready for commissioning as per drawings specifications.					
137	Finalisation of optimum route with consent of customer, from transition fitting to cooking oven/ appliance.					
138	Making temporary but stable platforms/ scaffolding/ rope ladders and all other safety devices.					
139	Installation of GI Pipes, Fittings, Valves, warning plate including NPT threading, painting as specified (installation of meters & regulators forms a separate SOR item).					
140	Drillings of holes through walls (Brick, RCC), Granite, Marble, Glass Cutting with proper heavy duty hammer drill machine tools and tackles, using proper sealant /grout material to match the original replacement of damages during drilling, restoring the area to original condition.					
141	Supply & Fixing of approved clamps, Dowell Plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape/ lock tight, drilling of holes through tiles/ wood/ marble/ Granite etc. jointing of PE to above Ground service GI pipes, testing, purging with Nitrogen and commissioning of the complete installation as per specification.					
142	Painting of entire length of pipe along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification & direction of EIC. Restoring the wall surface to origin					
143	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
144	Handing over the completed works to Client for operation/ use, reconciliation of material area wise.					
145	Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule time.					
146	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required items (Only Meters and Regulators shall be provided as free issue) and all associated works. As per instruction and direction of EIC, Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM ² shall be done for minimum 4 Hours duration (Diaphragm Meter) Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00101	Nos	2.00	2286.00	4572.00
147	Supply and installation of Isolation Valves as per Technical Specification and as directed by EIC.(Approved make L&T/Audco or as mentioned in tender)	H00200				
148	Isolation Ball Valve 1 " max. 6 bar (g)(Threaded)	H00203	Nos	1.00	2750.00	2750.00
149	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
150	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
151	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	1.00	2750.00	2750.00
152	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket/clamps as per drawing enclosed & as per specifications and and cleaning the area complete to the satisfaction.	H00400				
153	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	1.00	3300.00	3300.00
154	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
155	1" TF	H00403	Nos	1.00	1072.00	1072.00
156	Excavation of Hard rock/surface	I00100				
157	Excavation of trench or pits, wherever hard rock presence is exceeding 1.5 m in any direction of the trench and excavation of trench or pits in Malba/Multiple layers of asphalt/ brick / PCC/RCC etc and removable only by pneumatic chisel / drill as per the specifications and direction of EIC. The rates are payable over and above the Laying rates as per relevant SOR Item No. A00101	I00101	Meter	2.00	256.00	512.00
158	Additional Backfilling of Sand in excavated trench/Pit as per site requirement	J00100				
159	Filling of M-Sand/Soft soil as per the site requirement and as per the instructions of EIC (except the sand padding as mentioned SOR Item No. A00101)	J00101	Cum	2.00	800.00	1600.00
160	Flushing, Testing & Commissioning of MDPE line with all tools, Machines, Manpower are in contractor scope: Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
161	20 mm PE 100 MDPE Pipeline	K00101	Meter	200.00	212.00	42400.00
162	32 mm PE 100 MDPE Pipeline	K00102	Meter	100.00	248.00	24800.00
163	TOTAL VALUE (EXCLUDING GST)					25,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for
Jamshedpur GA (Annexure-D)**

SCHEDULE OF RATES (Annexure-D)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Jamshedpur GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / Molding - (without casing)/ Molding (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Molding without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth upto 1.5 Meter	A00102	Nos	30.00	3115.00	93450.00
27	20 mm PE 100 pipe Line Laying	A00103	Meter	300.00	489.00	146700.00
28	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00104	Meter	300.00	567.00	170100.00
29	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00103					
30	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
31	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
32	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					
33	Receipt, loading, unloading, storing, reloading, transportation, unloading, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipments, labor, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
34	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					

SCHEDULE OF RATES (Annexure-D)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Jamshedpur GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
35	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
36	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
37	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
38	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition. Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
39	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
40	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow color warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
41	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H)≥300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
42	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
43	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
44	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
45	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
46	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
47	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
48	20/32 mm PE 100 pipe	A00201	Meter	300.00	644.00	193200.00
49	Civil Work/Cutting/Breaking and Restoration	A00300				
50	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.	A00301				
51	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	160.00	438.00	70080.00
52	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	160.00	1196.00	191360.00
53	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	20.00	500.00	10000.00
54	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	20.00	1182.50	23650.00
55	Tiles/ Paver/ Blocks/ Curb Stones, Red sand stone	A00306	Meter	50.00	447.00	22350.00
56	Brick Soling/ Stone Soling, etc	A00307	Meter	25.00	326.00	8150.00
57	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick leveling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labor, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
58	Type I : Inside size 1000 mm x 1000 mm	A00311	Each	1.00	47250.50	47250.50
59	Type II : Inside size 1500 mm x 1000 mm	A00312	Each	1.00	74813.20	74813.20
60	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
61	32mm PE Valve	A00313	Nos	2.00	8430.00	16860.00
62	Fabrication & Installation of Markers	A00700				
63	RCC Route Markers					
64	Supply, fabrication, and installation of RCC route markers including application of approved color and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	30.00	473.00	14190.00
65	Steel Pole Markers with Foundation					
66	Supply, fabrication, and installation of Steel Pole markers, including application of approved color and quality of primer and paint as per the standard drawings, along with all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete, cleaning, stench letter cutting of lettering, numbers, direction, etc. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00702	Nos	5.00	2631.20	13156.00
67	Warning Plate Markers					
68	Supply, fabrication, and installation of plate markers including application of approved color and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	100.00	489.50	48950.00
69	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
70	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				
71	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labor, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labor, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
72	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
73	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
74	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
75	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
76	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
77	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colors to match the original, replacement of damages during drilling, restoring the area to its original condition.					
78	In case of multistory buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201, B00202, B00203 & B00204 and as per the instruction and direction of EIC.					

SCHEDULE OF RATES (Annexure-D)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Jamshedpur GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
79	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Locitite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
80	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
81	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
82	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
83	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
84	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	1600.00	298.00	476800.00
85	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	100.00	368.00	36800.00
86	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. Iv) In the case of SOR Items B00103 & B00105 above (under SOR Item No. • B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as contractor scope of supply.					
87	Cutting/Breaking and Restoration	B00200				
88	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
89	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00203	Inch	10.00	2998.00	29980.00
90	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
91	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and along with associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
92	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
93	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	200.00	539.00	107800.00
94	Supply, Installation, Testing & Commissioning of Multi Layer Composite (MLC) Pipes	B00500				
95	Supply and installation of MLC Pipe according to the latest ISO17484-1 standard and installation of Appliance Ball valves as per technical specifications along with associated accessories/fittings, including brass fittings at the outlet of the meter and at the entry of the appliance valve as per the satisfaction and instructions of EIC. The MLC Pipe and fittings shall be procured from Jindal/Uniflex Pipe/Any ISI approved make or from vendors who have previously supplied these items for a similar application in any PSU with prior approval from the Owner/consultant.					
96	MLC pipe shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The Contractor must provide all equipment, tools, tackles, and associated materials necessary to execute the work efficiently by cutting, cleaning, bending, fixing with clamps, etc. The work includes the supply of all tools, tackles, and consumables, including clamps for fixing the MLC pipe, and restoration of the work area to the customer's satisfaction.					
97	<i>NOTE::Approved vendor list for MLC pipes ~Jindal/Uniflex Pipes/UNIPRO/Any ISI approved make.</i>					
98	16.0 mm OD	B00501	Meter	100.00	304.00	30400.00
99	Note: i) Supply of Appliance Ball Valves shall be paid as a separate SOR Item. ii) SOR item No. B00400 & B00500 shall be carried out including supply of materials, only after getting instruction / approval from EIC.					
100	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
101	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as as free issue Items)	B00601	Nos	250.00	557.00	139250.00
102	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	250.00	400.00	100000.00
103	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
104	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
105	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
106	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	500.00	302.00	151000.00
107	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	30.00	489.00	14670.00
108	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	350.00	300.00	105000.00
109	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. Incase of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
110	Registration of Domestic PNG Connections	C00100				
111	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	200.00	120.00	24000.00
112	Left Out Work in Old Riser	E00100				
113	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	300.19	81.00	24315.30
114	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
115	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
116	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	2.00	2750.00	5500.00
117	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and cleaning the area complete to the satisfaction.	H00400				
118	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	2.00	3300.00	6600.00
119	Flushing, Testing & Commissioning of MDPE line with all tools, Machines, Manpower are in contractor scope: Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
120	20 mm PE 100 MDPE Pipeline	K00101	Meter	100.00	212.00	21200.00
121	32 mm PE 100 MDPE Pipeline	K00102	Meter	200.00	248.00	49600.00
122	63 mm PE 100 MDPE Pipeline	K00103	Meter	101.00	325.00	32825.00
123	TOTAL VALUE (EXCLUDING GST)					25,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for
Bhubaneswar GA (Annexure-E)**

SCHEDULE OF RATES (Annexure-E)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Bhubaneswar GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / Molding - (without casing)/ Molding (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Molding without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying Upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth Upto 1.5 Meter	A00102	Nos	60.00	3115.00	186900.00
27	20 mm PE 100 pipe Service Line Laying Upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	5.00	4615.00	23075.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	500.00	489.00	244500.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	250.00	567.00	141750.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top, and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipment's, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					

SCHEDULE OF RATES (Annexure-E)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Bhubaneswar GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H>=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	25.00	644.00	16100.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.	A00301				
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	100.00	483.00	48300.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	100.00	1196.00	119600.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	5.00	500.00	2500.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	5.00	1182.00	5910.00
56	Tiles/ Paver/ Blocks/ Curb Stones, Red sand stone	A00306	Meter	5.00	447.00	2235.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	5.00	326.00	1630.00
58	Providing, hoisting, and placing of 75 mm thick precast reinforced cement concrete slab of M-20 grade over the pipeline as mechanical protection including the cost of required centring, shuttering, reinforcement complete as per tender drawing and direction of the EIC. Note: Size (Length x Width) of the precast slab will be decided as per site condition and as per instruction of EIC. Precast slab will be placed in multiple numbers and various locations as per site condition and as per instruction of EIC.	A00308	Cum	1.00	11026.00	11026.00
59	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick levelling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labour, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
60	Type I : Inside size 1000 mm x 1000 mm	A00311	Each	1.00	47250.00	47250.00
61	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
62	32mm PE Valve	A00314	Each	1.00	8430.00	8430.00
63	Pipe Laying in any unprepared surface (Katcha surface) / Normal Surface / Hard surface (all types of hard rock) using open cut with casing Molding with Casing methodology.	A00400				
64	Laying of all PE pipe (PE 100 SDR11), including supply of HDPE casing pipe, Saddle, Couplers, End caps, etc. (As per particular job specification).					
65	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
66	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
67	GI Sleeves/Concrete Sleeves					
68	2 1/2" NB, 1 FEET Length	A00501	Nos	1.00	280.00	280.00
69	4" NB, 1 FEET Length	A00502	Nos	1.00	501.00	501.00
70	2 1/2" NB, 3 FEET Length	A00503	Nos	1.00	552.00	552.00
71	4" NB 3 FEET Length	A00504	Nos	1.00	985.60	985.60
72	Concrete Sleeve (NPS 2 Class)					
73	4" NB, 3 FEET Length	A00506	Nos	1.00	278.00	278.00
74	6" NB, 3 FEET Length	A00507	Nos	1.00	447.00	447.00
75	Note: The decision regarding the use of types of sleeves to be used at various locations shall be made by the Engineer-In-Charge (EIC) / Owner.					
76	Fabrication & Installation of Markers	A00700				
77	RCC Route Markers					
78	Supply, fabrication, and installation of RCC route markers including application of approved colour and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	15.00	473.00	7095.00
79	Steel Pole Markers with Foundation					
80	Supply, fabrication, and installation of Steel Pole markers, including application of approved colour and quality of primer and paint as per the standard drawings, along with all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete, cleaning, stench letter cutting of lettering, numbers, direction, etc. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00702	Nos	1.00	2631.20	2631.20
81	Warning Plate Markers					
82	Supply, fabrication, and installation of plate markers including application of approved colour and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	60.00	489.50	29370.00
83	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
84	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per std. drawing.	A00801	Nos	5.00	3150.40	15752.00
85	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
86	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				

SCHEDULE OF RATES (Annexure-E)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Bhubaneswar GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
87	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labour, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labour, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
88	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
89	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
90	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
91	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
92	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
93	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colours to match the original, replacement of damages during drilling, restoring the area to its original condition.					
94	In case of multistorey buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201,B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
95	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/Loctite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
96	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
97	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
98	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
99	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
100	1/2" All floors (including connectivity from TF to regulator) with supply of GI Pipes by Contractor.	B00102	Meter	5.00	416.00	2080.00
101	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	1800.00	298.00	536400.00
102	3/4" All Floors (including Installation of Risers) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00104	Meter	5.00	523.00	2615.00
103	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	250.00	369.00	92250.00
104	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	5.00	643.00	3215.00
105	1" Dia All floors (for Riser Installations & for Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	250.00	416.00	104000.00
106	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos.-B00102, B00104 & B00106 (under SOR item No.-B00101)					
107	Cutting/Breaking and Restoration	B00200				
108	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
109	Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying	B00203	CUM	5.00	2998.00	14990.00
110	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
111	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and algorithm associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
112	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
113	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	5.00	539.00	2695.00
114	Supply, Installation, Testing & Commissioning of Multi Layer Composite (MLC) Pipes	B00500				
115	Supply and installation of MLC Pipe according to the latest ISO17484-1 standard and installation of Appliance Ball valves as per technical specifications along with associated accessories/fittings, including brass fittings at the outlet of the meter and at the entry of the appliance valve as per the satisfaction and instructions of EIC. The MLC Pipe and fittings shall be procured from Jindal /Uniflex Pipe/Any ISI approved make or from vendors who have previously supplied these items for a similar application in any PSU with prior approval from the Owner/consultant.					
116	MLC pipe shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The Contractor must provide all equipment, tools, tackles, and associated materials necessary to execute the work efficiently by cutting, cleaning, bending, fixing with clamps, etc. The work includes the supply of all tools, tackles, and consumables, including clamps for fixing the MLC pipe, and restoration of the work area to the customer's satisfaction.					
117	NOTE::Approved vendor list for MLC pipes -Jindal/Uniflex Pipes/UNIPRO/Any ISI approved make.					
118	16.0 mm OD	B00501	Meter	750.00	304.00	228000.00
119	Note: i) Supply of Appliance Ball Valves shall be paid as a separate SOR Item. ii) SOR item No. B00400 & B00500 shall be carried out including supply of materials, only after getting instruction / approval from EIC.					
120	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
121	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as as free issue Items)	B00601	Nos	150.00	557.00	83550.00
122	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe,Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	150.00	400.00	60000.00
123	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
124	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
125	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					

SCHEDULE OF RATES (Annexure-E)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Bhubaneswar GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
126	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	330.00	302.00	99660.00
127	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	11.00	489.00	5379.00
128	Appliance Ball Valve 1/2 " max. 35 mili Bar (g)	B00703	Nos	150.00	300.00	45000.00
129	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. Incase of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
130	Registration of Domestic PNG Connections	C00100				
131	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	150.00	120.00	18000.00
132	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	80.00	180.00	14400.00
133	Providing the Services of Resources as per site requirement	D00100				
134	Providing the services of Plumber(Manday= 8 Working Hours)	D00101	Manday	4.00	1144.00	4576.00
135	Providing the services of Helper(Manday= 8 Working Hours)	D00102	Manday	4.00	929.50	3718.00
136	Providing the Services of Welder(Manday= 8 Working Hours)	D00103	Manday	4.00	2502.50	10010.00
137	Providing the Services of Electrician(Manday- 8 Working Hours)	D00104	Manday	4.00	1430.00	5720.00
138	Providing the Services of Conversion Technician(Manday= 8 Working Hours)s)	D00105	Manday	4.00	1430.00	5720.00
139	Providing the Services of Grinder(Manday- 8 Working Hours)	D00106	Manday	4.00	1661.00	6644.00
140	Note for all above SOR Items Nos. A00100 to D00106 :- i) Quantities mentioned against all above SOR items are estimated & tentative and may vary up to any extent as per site condition and/or as per instruction of EIC. ii) If certain documents, drawings, datasheets, specifications etc. are not included in the bid, the same will be made available to the successful bidder. While formulating the bid, bidders are requested to quote such items based on practices followed by the similar nature of industries. However procurement & installation of such items will be done as per site requirement after due approval of EIC. iii) Quantities mentioned against all above SOR items are estimated & tentative and may required to be executed in Varanasi GA, in any ratio, as per site requirement and/or as per instruction of EIC. In this regard, decision of EIC shall be final and binding to the contractor. Hence, bidder is requested to familiarize themselves with both the GAs mentioned above while formulating their bid.					
141	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, in old riser to make the connection ready for conversion as per instruction and direction of EIC. In order to complete the old riser, payment shall be made as per the following SOR Items	E00100				
142	Tapping from already charged Riser in Multi-Storey Building upto Conversion: By 1/2" GI and/or 3/4" and/or MLC and/or Copper upto length less than or equal to 5 Mtr					
143	Multi-Storey Building of Ground+2 Floor	E00102	NOS	25.00	3200.00	80000.00
144	Multi-Storey Building of Ground+5 Floor	E00103	NOS	10.00	4200.00	42000.00
145	Multi-Storey Building of beyond Ground+5 Floor	E00104	NOS	5.00	5200.00	26000.00
146	Note: (1) Against Item E00100 to E00104 (length upto 5 Meter) Contractor has to do the tapping from already charged GI Riser in Multi-storey Building in order to complete all the works like installation of Meter, Meter-Regulator, Supply and installatin of Isolation Valve (1/2" and/or 3/4"), Appliance Valve, Supply and Installation of Flexible Hose and Conversion of Kitchen Appliance complete in all respect.					
147	(2) In case length of tapping by 1/2"/3/4"/MLC/Copper Pipe against Item E00100 to E00104 is beyond 5 Mtr then separate paymnet shall be paid for length beyond 5 Mtr as per respective SOR Items given elsewhere.					
148	3) In case old Riser is not charged then contractor has to prepare Isometric Drawing, Testing and Commissioning of Riser for that payment shall be made agaist SOR Item E00111					
149	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, etc. in old riser to make the connection ready for conversion as per instruction and direction of EIC.					
150	Domestic Regulator installation 100mBar to 21mBar	E00107	Nos	25.00	176.00	4400.00
151	Domestic Regulator installation 4 to 21 mbr	E00108	Nos	25.00	176.00	4400.00
152	Anaconda installation (Supply in contractor scope)	E00110	Nos	2.00	301.40	602.80
153	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	501.82	81.00	40647.40
154	Note:					
155	(i) Under SOR E00100 GI pipes shall be supplied by the Owner as Free Issue Material. All the fittings shall be in the scope of Contractor.					
156	ii) Technical specification of Anaconda shall be in accordance with applicable National / Interantion Stadnard, PNGRB					
157	ii) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR. Testing, commissioning of any additional GI piping installed by the contractor shall be paid in accordance with SOR B00102 and B00103. Contractor has to do the testing and commissioning of entire GI connection in customer house before conversion.					
158	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
159	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
160	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	NOS	5.00	2750.00	13750.00
161	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and and cleaning the area complete to the satisfaction.	H00400				
162	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	NOS	2.00	3300.00	6600.00
163	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
164	2" TF	H00402	NOS	1.00	3740.00	3740.00
165	Additional Backfilling of Sand in excavated trench/Pit as per site requirement	J00100				
166	Filling of M-Sand/Soft soil as per the site requirement and as per the instructions of EIC (except the sand padding as mentioned SOR Item No. A00101)	J00101	Cum	5.00	800.00	4000.00
167	Flushing, Testing & Commissioning of MDPE line with all tools, Machines, Manpower are in contractor scope: Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
168	20 mm PE 100 MDPE Pipeline	K00101	Meter	5.00	212.00	1060.00
169	32 mm PE 100 MDPE Pipeline	K00102	Meter	5.00	248.00	1240.00
170	63 mm PE 100 MDPE Pipeline	K00103	Meter	5.00	325.00	1625.00
171	90 mm PE 100 MDPE Pipeline	K00104	Meter	5.00	343.00	1715.00
172	125 mm PE 100 MDPE Pipeline	K00105	Meter	5.00	500.00	2500.00
173	TOTAL VALUE (EXCLUDING GST)					25,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



**Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for
Cuttack GA (Annexure-F)**

SCHEDULE OF RATES (Annexure-F)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Cuttack GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
1	PE PIPELINE	A00100				
2	Pipe laying in any type of surface like unprepared surface (Katcha surface) / normal surface / hard surface (all types of hard rock) using open cut / Moling - (without casing)/ Moling (with Casing)/ Directional Drilling Technique (with and without Casing pipe) Methodology	A00101				
3	Receipt, loading, unloading, storing, reloading, transportation, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thickness like PE bends, saddles, couplers, end caps, tees (equal/reducing), reducers, CS/GI to PE fittings (i.e., transition fittings of sizes 20 mm to 32 mm), warning mat (300 mm width as per attached technical specification and QAP), etc. Handling, stringing/uncoiling, aligning of the PE line pipe on the pipeline right-of-use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification wherever required depending on site conditions, including execution of all associated works; storage of material in contractor's store in a safe manner, prefabrication/fabrication, access for prefabrication/fabrication area, all procured/supplied materials for construction, consumables, equipment, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from owner's designated store within GA, transportation, unloading, and stacking of free issue items at contractor's store.					
4	Carrying out all temporary, ancillary, and auxiliary works required to make the laid PE pipeline system complete and ready for commissioning as per drawings, specifications, and as per the direction of Engineer-In-Charge (EIC).					
5	Specifications, scope of work indicated in PJS and other provisions of the contract document and instructions of Engineer-in-charge, including but not limited to carrying out the following works					
6	Surveying of route and detours required at the time of execution including marking the same in topographical sheet, preparation of construction drawings showing survey details, and submit same to Owner for review/approval.					
7	Carrying out preliminary & final survey activities for crossings encountered in the pipeline route and preparation of drawings with crossing methodology, etc., wherever required, and submission to Owner/Engineer-in-charge for review/approval.					
8	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches wherever required from Owner/Engineer-in-charge and/or from concerned authority, making trial pits to determine the underground utilities/services, etc., restoration of the abandoned trial pits to original condition to the entire satisfaction of Owner/Engineer-in-charge and/or concerned authority.					
9	Stacking and installation of construction markers, clearing/grading of work area, fencing, grubbing, cutting of trees, etc. within work area and fulfilling all the requirements of various statutory/environment authorities to their entire satisfaction.					
10	Barricading the work area as per local authorities' guidelines/norms and to the entire satisfaction of Owner/Engineer-in-charge, installation of safety signs to the satisfaction of Owner/Engineer-in-charge and/or as per local authorities' guidelines/norms.					
11	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with the tender document and to the entire satisfaction of the owner/engineer-in-charge.					
12	Laying using open trench without casing/Moling without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling or otherwise cutting, as required and storing excavated soil and reusable materials at designated areas as directed by Engineer in charge and to a width to accommodate the pipeline as per the relevant standard specification. The minimum depth of the top of the pipeline shall be 1.0 m measured from the top of the pipeline to the top of the undisturbed surface of the soil or as per Specification/OISD-226 & PNGRB latest guidelines, whichever is higher. Dewatering of trenches/pits if required as per site conditions. Repairing of all damaged utilities, if any, and payment of any compensation (if claimed by owner/other utility agencies).					
13	Uncoiling / stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
14	Installation/lowering the pipeline in trench to required depth as per PJS, Technical Specification & drawings, supply & placement of HOPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawings, data sheets & technical specifications, padding around pipeline including supply of suitable padding material duly approved by EIC, backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed packed properly and no separate payment shall be admissible against this activity. Restoration shall be carried as per separate SOR item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
15	The scope of work against this item also includes Electro-fusion jointing of valves, fittings, saddle, etc., wherever required and as directed by the Engineer in-charge.					
16	The scope of work against laying of 20/32 mm pipe also includes works like making of PCC pedestal of grade (1:2.4) and size (8" depth x 6" length x 4" width), which may slightly vary in dimension and volumetric quantities of PCC and may increase up to 25% more as per site requirement, supply and installation of GI Sleeve (Heavy C-Class as per IS-1239), supply & filling of sand, and installation of TF (along with supply).					
17	Flushing, Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures, providing all tools and tackles, nitrogen, instruments, manpower, and other related accessories, and as per the instructions of the Engineer-in-Charge.					
18	Final clean-up of right-of-way or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas within GA, and backfilling of trench and compaction of the same to the satisfaction of Owner and/or as deemed by Engineer-in-charge.					
19	Maintaining the worthiness of the complete pipeline system along with associated facilities until handover to the OWNER/ETC and to carry out rectification/replacement works for any defects or failures reported by OWNER during defect liability period.					
20	Handing over the completed works to Owner for their operation/use, reconciliation of materials area-wise, and obtaining "no objection certificate" from Owner/PMC.					
21	Preparation and submission of daily progress reports, laying graphs/PE line cards on a daily basis, and getting them reviewed/inspected by the Owner/Owner representative/PMC.					
22	On completion of gas charging of pipelines. Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
23	In case the minimum required depth is not possible due to site conditions, necessary mitigation measures shall be required to be taken by the contractor in consultation with EIC as per PNGRB Guidelines. No additional payment shall be admissible against the same.					
24	Submission of all documents required for contract closure as mentioned in the contract document, as per guidelines of the Owner/PMC.					
25	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the scope of work and have to be completed by the Contractor within the specified time schedule at no extra cost to Owner. All the work shall be executed in accordance with the provisions of the contract and/or latest guidelines of the statutory authority, whichever is stringent.					
26	20 mm PE 100 pipe Service Line Laying Upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth Upto 1.5 Meter	A00102	Nos	65.00	3,115.00	2,02,475.00
27	20 mm PE 100 pipe Service Line Laying Upto 4 Meter (Online Ground Connectivity from existing Charged line) and depth more than 1.5 Meter	A00103	Nos	25.00	4,615.00	1,15,375.00
28	20 mm PE 100 pipe Line Laying	A00104	Meter	480.00	489.00	2,34,720.00
29	32 mm PE 100 pipe laying (Laying of 32mm shall accompany offline service line/GC with 20mm to the customers en route). Note: Flushing, Testing, commissioning of 32mm and 20mm shall be done together.	A00105	Meter	260.00	567.00	1,47,420.00
30	Note: i) The lengths of pipelines are tentative. It may increase or decrease as per site requirement or as per instruction of EIC. II) For restoration of asphalt or concrete roads, the item for construction of asphalt, concrete top, red stone waver, RCC, or JCC shall be paid separately as per the rates quoted for the same elsewhere in the SOR. III) The scope of work will start from tapping saddle/Tee on existing/laid PE pipe of various sizes of existing network to Transition Fitting (PE to GI). The tapping saddle/Tee, Transition fittings, and other fittings shall be included in the measurement under relevant SOR. IV) Bidders have to familiarize themselves with the entire locations/region/charge area within the GA and ascertain all types of eventuality/uncertainty before quoting their bid. V) In case quantity increases beyond 4 meter (against SOR item no A00102/A00103) payment towards additional length beyond 4 Mtr shall be paid as per SOR item no. A00104/A00105					
31	PE pipe laying of sizes 20 mm/32 mm inside private property i.e., multi-story buildings/apartments with no movement of heavy vehicles, surrounded by boundary wall where pipe top cover could not be achieved 600 mm.	A00200				
32	Minimum pipe top cover of 375 mm is required and the line pressure shall not exceed 110 mbar.					
33	Necessary mitigation measures such as RCC slab (150mm thick and 300mm width) at the top , and the RCC slab of the roof of the basement shall be treated as the bottom. There may be sand filling across three sides of the line pipe of 100mm each, which shall be required to be taken by the contractor in consultation with EIC as per the latest PNGRB Guidelines. No additional payment shall be admissible against the same.					

SCHEDULE OF RATES (Annexure-F)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Cuttack GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
34	Receipt, loading, unloading, storing, reloading, transportation, unloading, uncoiling, stringing, and laying of PE100, SDR11/17.6 line pipes of all sizes, including proper stacking, identification, and supply of accessories of all sizes and thicknesses like PE bends, saddle, couplers, endcaps, tee (equal/reducing), reducer, CS/GI to PE fittings (i.e. Transition Fittings of sizes 20 mm to 32 mm), Warning Mat (300 mm width as per attached Technical specification and QAP), etc. Handling, stringing, uncoiling, aligning of the PE line pipe on the pipeline Right-of-Use/route, laying/installation of PE line pipe along with required accessories as mentioned above as per specification whatever required depending on site condition including execution of all works. Storage of material in contractor's store, fabrication, access for construction, procurement, and supply of all materials, consumables, equipment's, labour, and other inputs. In the case of free issue items, the scope also includes receiving and loading from Owner's designated store, transportation, unloading, and stacking of free issue items at Contractor's store.					
35	Carrying out all temporary, ancillary, auxiliary works required to make the PE pipeline ready for commissioning as per drawing.					
36	Surveying of route and detours required at the time of execution, preparation of construction drawings showing survey details, and submit the same to Owner for review and approval.					
37	Preparation and getting approval of schedules, execution procedures, drawings/sketches wherever required, making trial pits to determine the underground utilities/services etc., restoration of the abandoned trial pits to original condition.					
38	Barricading the pipeline construction area prior to execution of the works as per drawing no. BR-CGD-STD-DWG-11 & BR-CGD-STD-DWG-10 enclosed with tender document and to the entire satisfaction of owner/engineer-in-charge.					
39	Laying using open trench without casing includes survey of underground utilities (through trial pits), execution of work as per specification including trenching to all depths by excavation in all types of soils including soft/rocky strata and different types of pavement/footpath/roads, etc., including rock breaking, chiselling, or otherwise cutting as required, and storing excavated soil, reusable materials at designated area as directed by Engineer In charge and to a width to accommodate the pipeline as per the relevant standard/specification, etc. [The minimum depth of the top of the pipeline shall be 1.0 m measured from top of the pipeline to the top of undisturbed surface of the soil or as per Specification/OISD-226 B PNGRB latest guidelines whichever is higher]. Dewatering of trenches/pits if required as per site condition, Repairing of all damaged utilities if any, and payment of any compensation (if claimed by owner/other utility agencies).					
40	Unrolling/stringing & aligning of PE pipes, clamping, jointing of the pipe ends/fittings/valves by qualified personnel using approved electro-fusion techniques as per specification.					
41	Installation/lowering the pipeline in trench to required depth, supply & placement of HDPE Yellow colour warning mat (300 mm width as per attached Technical specification and QAP) over the pipeline along the complete route as per standard drawing and backfilling to its original condition with excavated earth/borrowed select soil/sand duly approved by EIC & its compaction & crowning. At certain specific areas of ROU, trench shall be backfilled & compacted and shall be made ready for motorable. All tiles/slabs/curb stones etc. removed during excavation shall be placed properly and no separate payment shall be admissible against this activity. Restoration shall be carried out as per separate SOR Item mentioned elsewhere in the SOR or to be done by Owner/concerned authorities.					
42	The scope of work against laying of 20 mm/32 mm pipe also includes works like making of PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) XHeight (H)), (H>=300mm & will be as per site condition), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand, and installation of TF (along with supply).					
43	Pneumatic testing, purging with nitrogen, and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen instruments, manpower, and other related accessories and as per the instructions of the Engineer-in-charge.					
44	Final clean-up of right-of-use or area disturbed by contractor during their construction activities for laying of pipeline works and disposal of debris and surplus material to designated disposal areas, and backfilling of trench and compaction of the same as per satisfaction of Owner and/or as directed by Engineer-In-charge.					
45	Maintaining the completed pipelines and installations for any defects or failures during the defect liability period.					
46	Handing over the completed works to Owner for their operation/use, reconciliation of material area-wise, and obtaining "no objection certificate" from Owner/Consultant.					
47	On completion of gas charging of pipelines, Preparation and submission of As-built drawings, crossings details, termination, utility graphs, and deviation statements.					
48	Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner. All the work shall be executed in accordance with the provision of the contract.					
49	20/32 mm PE 100 pipe	A00201	Meter	7.00	644.00	4,508.00
50	Civil Work/Cutting/Breaking and Restoration	A00300				
51	Restoration of the roads, pavements, channels, footpaths, tiles, slabs, etc. to original condition including supply of the approved quality material required, as per local authorities' norms, obtaining NOC from landowners/third-party inspection agencies/Consultant designated by GAIL and to the satisfaction of Engineer-In-charge.					
52	Breaking/Cutting of Cement Concrete - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00302	Meter	100.00	483.00	48,300.00
53	Cement Concrete Restoration as per scope of work (Excluding Breaking/Cutting).	A00303	Meter	100.00	1,196.00	1,19,600.00
54	Breaking/Cutting of RCC Core - Making provision for PE Pipe laying as per site requirement and as per instruction of EIC.	A00304	Meter	5.00	500.00	2,500.00
55	RCC restoration as per scope of work (Excluding Breaking/Cutting).	A00305	Meter	5.00	1,182.00	5,910.00
56	Tiles/ Paver/ Blocks/ Curb Stones, Red sand stone	A00306	Meter	5.00	447.00	2,235.00
57	Brick Soling/ Stone Soling, etc	A00307	Meter	5.00	326.00	1,630.00
58	Providing, hoisting, and placing of 75 mm thick precast reinforced cement concrete slab of M-20 grade over the pipeline as mechanical protection including the cost of required centring, shuttering, reinforcement complete as per tender drawing and direction of the EIC. Note: Size (Length x Width) of the precast slab will be decided as per site condition and as per instruction of EIC. Precast slab will be placed in multiple numbers and various locations as per site condition and as per instruction of EIC.	A00308	Cum	5.00	11,026.00	55,130.00
59	Valve Pit Chamber (RCC) Constructing valve pit chamber in RCC of grade M-25 over 75 mm thick levelling course in 1:4:8 mix including 16 mm thick plastering with cement mortar 1:3 (1 cement : 5 coarse sand) and PCC pedestal for Valve support (if required) complete as per specification, drawings, and direction of EIC. Valve Pit Chamber shall be covered with 150 mm thick RCC top slab of M-25 grade with manhole cover (medium duty) along with frame as per IS 1726. Rate to include cost of all labour, tools, tackles, equipment, hire charges, supply of all materials such as minimum 45 grade cement, reinforcement, CI manhole cover, PVC coated rungs, inserts including excavation and backfilling, masonry works, plastering, etc., with all bye works and sundry works.					
60	Type II : inside size 600 mm x 600 mm	A00313	Each	1.00	31,000.00	31,000.00
61	SUPPLY, INSTALLATION AND COMMISSIONING OF VALVES INSIDE CHAMBER:					
62	32mm PE Valve	A00314	Each	1.00	8,430.00	8,430.00
63	Supply of GI/concrete Sleeves (wherever required as a special case as per instructions of the Engineer-in-charge).	A00500				
64	Supply, installation of sleeve, insertion of pipe, sealing the annulus area, firm fixing of sleeves with concrete mix. Breaking through any obstructions and their subsequent restoration, as per specifications and instructions of the Engineer-in-charge.					
65	GI Sleeves/Concrete Sleeves					
66	2 1/2" NB, 1 FOOT Length	A00501	Nos	1.00	280.00	280.00
67	4" NB, 1 FOOT Length	A00502	Nos	1.00	501.00	501.00
68	2 1/2" NB, 3 FEET Length	A00503	Nos	1.00	552.00	552.00
69	4" NB 3 FEET Length	A00504	Nos	1.00	985.60	985.60
70	Concrete Sleeve (NPS 2 Class)					
71	4" NB, 3 FEET Length	A00506	Nos	1.00	278.00	278.00
72	6" NB, 3 FEET Length	A00507	Nos	1.00	447.00	447.00
73	Note: The decision regarding the use of types of sleeves to be used at various locations shall be made by the Engineer-In-Charge (EIC) / Owner.					
74	Fabrication & Installation of Markers	A00700				
75	RCC Route Markers					
76	Supply, fabrication, and installation of RCC route markers including application of approved colour and quality of primer and paint as per the standard drawing, along the route including all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00701	Nos	20.00	473.00	9,460.00
77	Steel Pole Markers with Foundation					
78	Supply, fabrication, and installation of Steel Pole markers, including application of approved colour and quality of primer and paint as per the standard drawings, along with all associated civil works such as excavation and construction in all types of soils, construction of pedestals, and grouting with concrete, cleaning, stench letter cutting of lettering, numbers, direction, etc. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00702	Nos	1.00	2,631.20	2,631.20
79	Warning Plate Markers					

SCHEDULE OF RATES (Annexure-F)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Cuttack GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
80	Supply, fabrication, and installation of plate markers including application of approved colour and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. as per the standard drawings to be installed near the regulator. These works shall be carried out as per installation methodology approved by EIC based on site requirements.	A00703	Nos	90.00	489.50	44,055.00
81	Paver Block Tiles Markers					
82	Supply, fabrication, and installation of Paver Block Tiles markers of standard size as per industry practice along the route on Paver Block/Thee on foot Path/As per the Instruction of EIG including application of approved colour and quality of primer and paint, stencil letter cutting of lettering, numbers, direction, etc. Carrying out all associated works for fixing / grouting / anchoring the marker with the surface. These works shall be carried out as per installation methodology approved by EIC based on site requirement.	A00704	Nos	1.00	457.60	457.60
83	Crossing of Sewage Drains/Nala alongside independent houses where drains/Nalas are being encountered adjacent to houses.	A00800				
84	The scope of work includes supply of medium-duty GI casing pipes of 2.5 inches, along with padding with sandstone and civil works associated with the construction of cover slab as per std. drawing.	A00801	Nos	5.00	3,150.40	15,752.00
85	PNG Connection to Domestic/Commercial/Industrial Consumers	B00100				
86	Installation of GI Service Pipe / Carbon Steel (CS) Pipe	B00101				
87	Supply/Receipt, Loading, unloading, storing, reloading, transportation, unloading at work site, and laying of either Owner-supplied Powder-coated GI pipes or Contractor-supplied Powder-coated GI pipes & carbon steel pipes of all sizes & thicknesses, including supply of all associated compatible accessories of all sizes & thicknesses like Elbows, Tees, unions, sockets, reducers, GA plugs, sleeves, etc. Installation of GA line (along with installation of required accessories as mentioned above) of all sizes & thicknesses, including fabrication with supply of all materials, consumables, labour, and other incidental works. The scope of work also includes installation of Regulators (4/6 bar to 100/21 mbar and/or 100 mbar to 21 mbar) which shall be provided as free issue items, Installation of all sizes of isolation Valves (which are to be procured & supplied by contractor mentioned elsewhere as separate items in the SOR). Carrying out all temporary, ancillary, auxiliary works required to make the GI line complete and ready for commissioning as per drawings specifications. Handling, aligning, fabrication & installation of the GA Pipes in the work area along with required associated compatible accessories as mentioned above as per site condition and as per instruction of EIC. Execution of all associated works; Supply of all materials, consumables, equipment, labour, and other inputs; Storage of material in the contractor's store in a safe manner, pre-fabrication, access for construction/fabrication work area. In the case of free-issue items, the scope also includes receiving and loading from Owner's designated store within GA, transportation, unloading, and stacking of free-issue items at the Contractor's store in a safe condition.					
88	Scope of work indicated in PJS and other provisions of Contract document and instructions of Engineer-In-charge, including but not limited to carrying out the following works					
89	Preparation and getting approval of execution schedules, execution procedures, drawings/sketches from Owner/Engineer-in-charge and/or from concerned authority.					
90	Finalization of optimum route with consent of customer, from transition fitting to cooking oven/appliance.					
91	Making temporary but stable platforms/scaffolding/rope ladders and all other safety measures including safety belts wherever required,					
92	Installation of GI pipes, fittings, including NPT threading, painting as specified.					
93	Drilling of holes through walls (brick, RCC), granite, marble, tiles, cutting with proper heavy-duty hammer drill machine tools and tackles, using proper sealant/grout material and colours to match the original, replacement of damages during drilling, restoring the area to its original condition.					
94	In case of multistorey buildings where RCC slab/visor/sunshade/chhata restricts riser installation, then separate payment for cement concrete/RCC core-cutting with heavy-duty drill machine and their restoration shall be paid under SOR items B00201, B00202, B00203 & B00204 and as per the instruction and direction of EIC.					
95	Supply and fixing of approved clamps, dowel plugs with screws, grout material, suitable thread sealant (i.e., Teflon Tape/LocTite), drilling of holes through tiles/wood/marble/granite, etc., jointing of PE to aboveground service GI pipes, flushing, pneumatic testing, purging with nitrogen (including supply of nitrogen as inert gas by the contractor), and commissioning or making ready for commissioning of the complete system as per specification and as per instructions of EIC.					
96	Touch-up painting/painting of outer surface of GI pipe of all sizes along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification and direction of EIC. Restoring the wall surface to original condition to the entire satisfaction of EIC and obtaining NOC from end user/consumer/concerned authorities/authorized competent person of the society.					
97	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
98	Handing over the completed works to GAIL for operation/ use, reconciliation of material area wise and obtaining "no objection certificate" from GAIL/GAIL Representative at Site/ CPMC.					
99	Any other activity not mentioned/covered, explicitly above, but otherwise required for satisfactory completion/safety/statutory/maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time.					
100	1/2" All floors (including connectivity from TF to regulator) with supply of GI Pipes by Contractor.	B00102	Meter	5.00	416.00	2,080.00
101	1/2" All floors (including connectivity from TF to regulator) - with supply of GI Pipes by Owner on Free Issue Basis.	B00103	Meter	1,900.00	298.00	5,66,200.00
102	3/4" All Floors (including Installation of Risers) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00104	Meter	2.00	523.00	1,046.00
103	3/4 All Floors (Including Installation of Risers) with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00105	Meter	75.00	369.00	27,675.00
104	1" Dia All Floors (for Riser Installations & For Commercial Connections) - with supply of GI Pipes by Contractor (Rates are inclusive of installation by threading; however, in case of pipe joining by welding as per the direction of EIC, payment for welding, NDT will be made separately).	B00106	Meter	5.00	643.00	3,215.00
105	1" Dia All floors (for Riser Installations & for Commercial Connections) - with supply of GI Pipes by Owner on Free Issue Basis (Rates are inclusive of installation by threading, however in case of pipe joining by welding as per direction of EIC, payment for Welding, NDT will be made separately)	B00107	Meter	20.00	416.00	8,320.00
106	Supply & laying/ Installation including fabrication of Contractor supplied MS piping system of all sizes & thickness including fabrication Installation of required compatible isolation ball valves, fittings, flanges, gaskets, valves, NRV, Strainer, couplings, etc. of all sizes, thickness & ANSI pressure rating including Pressure Gauge (PG) etc. as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out & complete the works at the site as per instruction of EIC. Flushing, Pneumatic testing, purging with nitrogen (including supply of Nitrogen as Inert gas by the contractor) and commissioning or make ready for commissioning as per specification and as per Instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by the contractor within specified schedule time. - 1 1/2" (1.5") Dia All Floors (For Commercial Connections) - (Payment for Welding will be made separately mentioned elsewhere in the SOR)	B00108	Meter	25.00	512.60	12,815.00
107	Supply, laying, installation, and visual testing including fabrication of contractor-supplied carbon steel piping system of all sizes and thickness. This includes fabrication, installation, and visual testing of required compatible fittings, flanges, gaskets, valves, NRV, strainer, couplings, etc., of all sizes, thicknesses, and ANSI pressure ratings, including Pressure Gauge (PG), as per instruction of EIC. Supply of all types of manpower, machinery, materials, consumables, and other incidental works to carry out and complete the works at the site as per the instruction of EIC. Flushing, pneumatic testing, purging with nitrogen (including the supply of nitrogen as an inert gas by the contractor), and commissioning or making ready for commissioning as per specifications and as per the instruction of EIC. Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration. Any other activity not mentioned or covered explicitly above but otherwise required for satisfactory completion, safety, statutory requirements, or maintenance of works shall also be covered under the scope of work and has to be completed by the contractor within the specified schedule time. 2' Dia All Floors (For Commercial & Industrial Connections) - payment for welding will be made separately as mentioned elsewhere in the SOR.	B00109	Meter	25.00	669.90	16,747.50
108	TPI Inspection of Internal Piping as per SOR B00108 and B00109 shall be done by the Contractor and payment shall be made separately as per below SOR Item.					
109	TPI Inspection of Internal Piping : Commercial and Industrial Customer	B00110	Nos	1.00	13,600.00	13,600.00
110	Carrying out Welding of MS/GI/CS Pipes as per latest applicable code & standard for above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00110	Inch-Dia	5.00	573.00	2,865.00
111	Carrying out NDT/Radiography of welded joints of CS/GI Pipes as per the latest applicable code & standard for the above SOR items B00104 to B00109 as per site requirement and instruction of EIC	B00111	Inch-Dia	1.00	191.40	191.40

SCHEDULE OF RATES (Annexure-F)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Cuttack GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
112	Note to items under B00100:- i) Refer to the Particular Job Specification for the supply items. ii) The quantity measurement shall be from the outlet of the Transition Fitting (TP) up to the Meter. All Intermediate CA fittings & valves, GI fittings & valves (excluding Flexible Hose / Anaconda, meter, and regulator) shall be considered while measuring the length of CS/GI Pipes. iii) Supply of isolation Ball valves shall be paid as a separate SOR Item. iv) In the case of SOR Items B00103, B00105 & B00107 above (under SOR Item No. B00101), the owner shall supply Plain or Powder Coated GI Pipes (as free Issue). The remaining scope of supplies of fittings, etc., including all associated works, shall be as per item nos., B00102, B00104 & B00106 (under SOR item No. B00101)					
113	Cutting/Breaking and Restoration	B00200				
114	In the case of a multistorey building where RCC slab/visor/sunshade/chhajja restricts riser installation, then separate payment for core-cutting with a heavy-duty drill machine shall be made under the below SOR items and as per the instructions and direction of EIC.					
115	<u>Breaking/Cutting of RCC Core - Making provision for GI Pipe Laying</u>	B00203	CUM	2.00	2,998.00	5,996.00
116	Supply, Installation, Testing & Commissioning of Copper Service Pipes	B00400				
117	Supply and installation of copper tubing and installation of Appliance Ball valves as per Technical specification and algorithm associated accessories/fittings including brass fittings at the outlet of the meter and at the entry of appliance valve as per satisfaction and instruction of EIC. The copper tube and fittings shall be procured from approved vendors who have supplied these items for similar application earlier and with prior approved of Owner / PMC.					
118	Copper tubing shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The contractor is responsible for providing all equipment, tools, tackles, and associated materials necessary to efficiently execute the work by cutting, cleaning, applying flux, soldering, and lacquering. This work includes the supply of all tools, tackles, and consumables, including clamps for fixing the tubes, and the restoration of the work area to the customer's satisfaction.					
119	12.0 mm OD x 0.6 mm wall thickness	B00401	Meter	5.00	539.00	2,695.00
120	Supply, Installation, Testing & Commissioning of Multi Layer Composite (MLC) Pipes	B00500				
121	Supply and installation of MLC Pipe according to the latest ISO17484-1 standard and installation of Appliance Ball valves as per technical specifications along with associated accessories/fittings, including brass fittings at the outlet of the meter and at the entry of the appliance valve as per the satisfaction and instructions of EIC. The MLC Pipe and fittings shall be procured from Jindal/ Uniflex Pipe/Any ISI approved make or from vendors who have previously supplied these items for a similar application in any PSU with prior approval from the Owner/consultant.					
122	MLC pipe shall be installed from the downstream of the meter up to the isolation/appliance valve before the customer's appliance as required and to the satisfaction of the EIC. The Contractor must provide all equipment, tools, tackles, and associated materials necessary to execute the work efficiently by cutting, cleaning, bending, fixing with clamps, etc. The work includes the supply of all tools, tackles, and consumables, including clamps for fixing the MLC pipe, and restoration of the work area to the customer's satisfaction.					
123	<i>NOTE::Approved vendor list for MLC pipes -Jindal/Uniflex Pipes/UNIPRO/Any ISI approved make.</i>					
124	16.0 mm OD	B00501	Meter	250.00	304.00	76,000.00
125	Note: i) Supply of Appliance Ball Valves shall be paid as a separate SOR Item. ii) SOR item No. B00400 & B00500 shall be carried out including supply of materials, only after getting instruction / approval from EIC.					
126	Installation of Regulator, Meter, Flexible Hose & Conversion of Domestic Appliance::	B00600				
127	Installation & fixing of Meters, Regulators (100 m bar to 21 m bar wherever required) with associated inlet connections/ fittings, valves, approved meter brackets and other supports by proper scaffolding/ grouting, Restoration of the work area to its original condition to the entire satisfaction of EIC. (Meter and Regulator will be provided as as free issue Items)	B00601	Nos	125.00	557.00	69,625.00
128	Conversion of Domestic Appliances Carrying out the complete works starts from outlet of meters which includes installation of GI pipe, Appliance valve etc & other supports by proper grouting, Restoring the area to original complete as per specification. The work also includes installation and supply of Steel reinforced Flexible Hose as per IS 9573 (with Type as per latest PNGRB guidelines) (Gas tube from end of Isolation Valve upto burner/stove) and conversion of all the burners of the LPG stove (one stove per household) including supply of all types of burner nozzles/jets and associated controls etc.	B00602	Nos	125.00	400.00	50,000.00
129	Complete works as per specification for carrying out cleaning and performing minor maintenance, greasing etc. of appliance, testing/ showing performance to the customer, signing of Joint Meter Records (JMR) and issue of guideline / instructing to customer regarding operation & safety norms during use as per specifications. The issued instruction & guideline should be the entire satisfaction of customer.					
130	Supply of Valves for Carrying out connection (For Domestic Connections)	B00700				
131	Supply of Isolation & Appliance Ball Valves as per Technical Specification and as directed by EIC					
132	Isolation Ball Valve 1/2 " max. 6 bar (g)	B00701	Nos	285.00	302.00	86,070.00
133	Isolation Ball Valve 3/4 " max. 6 bar (g)	B00702	Nos	5.00	489.00	2,445.00
134	Appliance Ball Valve 1/2 " max. 35 mli Bar (g)	B00703	Nos	125.00	300.00	37,500.00
135	Note:- Services of Safety Officer must be provided by the contractor during execution of Works as mentioned in various sub SOR items under SOR items A00100 & B00100 . Safety Officer will report to EIC and liable to follow his instruction time to time during their deputation at work site. The cost of deputation of Safety Officer at works site is included in above sub SOR items rate under SOR items A00100 & B00100. Incase of non deployment of Safety Officer during execution of works at site and/or as per instruction of EIC, penalty will be levied to contractor as per rate/ amount mentioned in Annexure-10 to SCC enclosed with the tender document and the same will be deducted from their RA Bill.					
136	Registration of Domestic PNG Connections	C00100				
137	Assistance in carrying out the work of Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: 1) Enrolment & Registration of Domestic PNG Customers as per the given target. 2) Collection of filled up form and documents 3) Registration document uploading on SAHAJ.	C00101	Nos	125.00	120.00	15,000.00
138	Assistance in carrying out the work of Collection of Cheque/Demand Draft of Security Deposit amount for Domestic PNG registration as per directions/instructions of the Marketing In charge of CLIENT / Authorized representative including but not limited to following: All other activities as may be required to complete the work in all respect is defined in the Scope of work to be read along with the Special Conditions of Contract and as per instructions of MIC. Carrying out the marketing activities for Domestic PNG connection as detailed in Scope of work, complete in all respects, as per directions/instructions of the Marketing In Charge including but not limited to the following: Distribution of leaflets & FAQ, Installation of banners, to be provided by client, at prime location, Awareness cum Registration Camp, Audio / Visual Presentations, Organizing Road Shows, etc.	C00102	Nos	125.00	180.00	22,500.00
139	Providing the Services of Resources as per site requirement	D00100				
140	Providing the services of Plumber(Manday= 8 Working Hours)	D00101	Manday	5.00	1,144.00	5,720.00
141	Providing the services of Helper(Manday= 8 Working Hours)	D00102	Manday	5.00	929.50	4,647.50
142	Providing the Services of Welder(Manday= 8 Working Hours)	D00103	Manday	5.00	2,502.50	12,512.50
143	Providing the Services of Electrician(Manday- 8 Working Hours)	D00104	Manday	5.00	1,430.00	7,150.00
144	Providing the Services of Conversion Technician(Manday= 8 Working Hours)s)	D00105	Manday	5.00	1,430.00	7,150.00
145	Providing the Services of Grinder(Manday- 8 Working Hours)	D00106	Manday	1.00	1,661.00	1,661.00
146	Note for all above SOR Items Nos. A00100 to D00106 :- i) Quantities mentioned against all above SOR items are estimated & tentative and may vary up to any extent as per site condition and/or as per instruction of EIC. ii) If certain documents, drawings, datasheets, specifications etc. are not included in the bid, the same will be made available to the successful bidder. While formulating the bid, bidders are requested to quote such items based on practices followed by the similar nature of industries. However procurement & installation of such items will be done as per site requirement after due approval of EIC. iii) Quantities mentioned against all above SOR items are estimated & tentative and may required to be executed in Varanasi GA, in any ratio, as per site requirement and/or as per instruction of EIC. In this regard, decision of EIC shall be final and binding to the contractor. Hence, bidder is requested to familiarize themselves with both the GAs mentioned above while formulating their bid.					
147	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, in old riser to make the connection ready for conversion as per instruction and direction of EIC. In order to complete the old riser, payment shall be made as per the following SOR Items	E00100				
148	Tapping from already charged Riser in Multi-Storey Building upto Conversion: By 1/2" GI and/or 3/4" and/or MLC and/or Copper upto length less than or equal to 5 Mtr					
149	Multi-Storey Building of Ground+2 Floor	E00102	Nos	25.00	3,200.00	80,000.00
150	Multi-Storey Building of Ground+5 Floor	E00103	Nos	12.00	4,200.00	50,400.00
151	Multi-Storey Building of beyond Ground+5 Floor	E00104	Nos	12.00	5,200.00	62,400.00

SCHEDULE OF RATES (Annexure-F)
Schedule of Rates (SOR) for Contract Award Value up to ₹25 Lakh for Cuttack GA

SL NO	ITEM DESCRIPTION	ITEM CODE	UOM	QTY	RATE	AMOUNT
152	Note: (1) Against Item E00100 to E00104 (length upto 5 Meter) Contractor has to do the tapping from already charged GI Riser in Multi-storey Building in order to complete all the works like installation of Meter, Meter-Regulator, Supply and installation of Isolation Valve (1/2" and/or 3/4"), Appliance Valve, Supply and Installation of Flexible Hose and Conversion of Kitchen Appliance complete in all respect.					
153	(2) In case length of tapping by 1/2"/3/4"/MLC/Copper Pipe against Item E00100 to E00104 is beyond 5 Mtr then separate payment shall be paid for length beyond 5 Mtr as per respective SOR Items given elsewhere.					
154	3) In case old Riser is not charged then contractor has to prepare Isometric Drawing, Testing and Commissioning of Riser for that payment shall be made against SOR Item E00111					
155	Left Out Work in Old Riser: Contractor has to carry out pending activities like testing, tapping, meter installation, Anaconda, leakage arrest, regulator installation, etc. in old riser to make the connection ready for conversion as per instruction and direction of EIC.					
156	By 1/2" GI upto length less than or equal to 4 Mtr	E00105	Nos	5.00	1,500.00	7,500.00
157	NOTE: (1) In case length of tapping by 1/2" against Item E00105 is beyond 4 Mtr then separate payment shall be paid for length beyond 4 Mtr as per applicable SOR Items B00102 and B00103 given elsewhere. For supply, Installation of IV, AV, Meter Installation, Conversion payment shall be made against applicable SOR Items from E00106 to E00111, as per instruction and direction of EIC.					
158	Domestic Meter installation (GI.6)	E00106	Nos	5.00	557.70	2,788.50
159	Domestic Regulator installation 100mBar to 21mBar	E00107	Nos	5.00	176.00	880.00
160	Domestic Regulator installation 4 to 21 mbr	E00108	Nos	5.00	176.00	880.00
161	Domestic Conversion (Domestic Appliances)	E00109	Nos	1.00	500.00	500.00
162	Testing of GI Piping already installed in customer premises. Preparation of Isometric Drawing, testing and commissioning of 1/2", 3/4" GI Piping	E00111	Meter	305.05	81.00	24,708.70
163	Note:					
164	(i) Under SOR E00100 GI pipes shall be supplied by the Owner as Free Issue Material. All the fittings shall be in the scope of Contractor.					
165	ii) Technical specification of Anaconda shall be in accordance with applicable National /International Standard, PNGRB					
166	ii) Under this SOR E00111, in customer premises where GI piping already installed shall be tested and Isometric drawing shall be prepared and commissioned by the contractor. Payment shall be made for such old GI pipe under this SOR. Testing, commissioning of any additional GI piping installed by the contractor shall be paid in accordance with SOR B00102 and B00103. Contractor has to do the testing and commissioning of entire GI connection in customer house before conversion.					
167	Installation of GI Service Pipe (For Commercial/Industrial Connection and Installation of Service Regulator)	H00100				
168	Supply, loading, storing, unloading and laying of GI pipes, including supply of GI fittings/accessories of all sizes & thickness like Elbows, Tees, unions, sockets, reducers, GI plugs, sleeves etc., installation of GI line (alongwith installation of required accessories as mentioned above) of following sizes, including fabrication with supply of all materials, consumables, labour and other incidental works. Carrying out all temporary, ancillary, auxiliary works required to make the GI line ready for commissioning as per drawings specifications.					
169	Finalisation of optimum route with consent of customer, from transition fitting to cooking oven/ appliance.					
170	Making temporary but stable platforms/ scaffolding/ rope ladders and all other safety devices.					
171	Installation of GI Pipes, Fittings, Valves, warning plate including NPT threading, painting as specified (installation of meters & regulators forms a separate SOR item).					
172	Drillings of holes through walls (Brick, RCC), Granite, Marble, Glass Cutting with proper heavy duty hammer drill machine tools and tackles, using proper sealant /grout material to match the original replacement of damages during drilling, restoring the area to original condition.					
173	Supply & Fixing of approved clamps, Dowell Plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape/ lock tight, drilling of holes through tiles/ wood/ marble/ Granite etc. jointing of PE to above Ground service GI pipes, testing, purging with Nitrogen and commissioning of the complete installation as per specification.					
174	Painting of entire length of pipe along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specification & direction of EIC. Restoring the wall surface to origin					
175	All above activities to be carried out as per specification to the complete satisfaction of consumer & as desired by Engineer-in-charge.					
176	Handing over the completed works to Client for operation/ use, reconciliation of material area wise.					
177	Any other activity not mentioned/ covered, explicitly above, but otherwise required for satisfactory completion/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule time.					
178	Installation of Commercial/Industrial Regulators and Meters of various sizes and capacities and Flexible Hoses including conversion of burners. The scope of work includes supply of all items required items (Only Meters and Regulators shall be provided as free issue) and all associated works. As per instruction and direction of EIC, Dye Penetrant Testing (DPT) and Pressure Testing at Minimum 6.2 Kg/CM2 shall be done for minimum 4 Hours duration (Diaphragm Meter) Payment for welding, if applicable, will be made separately as mentioned elsewhere in the SOR.	H00101	Nos	1.00	2,286.00	2,286.00
179	Supply and installation of Isolation Valves as per Technical Specification and as directed by EIC.(Approved make L&T/Audco or as mentioned in tender)	H00200				
180	Isolation Ball Valve 2 " max. 6 bar (g)	H00201	Nos	1.00	16,500.00	16,500.00
181	Isolation Ball Valve 1.5 " max. 6 bar (g)	H00202	Nos	1.00	11,000.00	11,000.00
182	Isolation Ball Valve 1 " max. 6 bar (g)(Threaded)	H00203	Nos	1.00	2,750.00	2,750.00
183	Installation of Service Regulator / Field Regulator: Installation & Fixing of regulator with associated inlet and outlet	H00300				
184	The scope also includes works like making of PCC pedestal of grade (1:2:4) and size (8"X6"X4"), supply and installation of GI Sleeve (Heavy (C-Class) as per IS-1239), filling of sand and installation of TF (along with supply).					
185	Service Regulator installation - (4/6 bar to 100 mbar)	H00301	Nos	1.00	2,750.00	2,750.00
186	Regulator Boxes: Supply including painting of approved make regulator boxes and installing them firmly by grouting using approved bracket /clamps as per drawing enclosed & as per specifications and cleaning the area complete to the satisfaction.	H00400				
187	Service Regulator Boxes: Supply and installation of Service Regulators Boxes as per drawing attached and as per directions of EIC.	H00401	Nos	1.00	3,300.00	3,300.00
188	Supply and Installation of Transition Fittings for Commercial/Industrial connections					
189	1" TF	H00403	Nos	1.00	1,072.50	1,072.50
190	Additional Backfilling of Sand in excavated trench/Pit as per site requirement	J00100				
191	Filling of M-Sand/Soft soil as per the site requirement and as per the instructions of EIC (except the sand padding as mentioned SOR Item No. A00101)	J00101	Cum	2.00	800.00	1,600.00
192	Flushing, Testing & Commissioning of MDPE line with all tools, Machines, Manpower are in contractor scope: Pneumatic testing, purging with nitrogen and commissioning as per specification and approved procedures providing all tools and tackles, nitrogen, instruments, manpower and other related accessories and as per the instructions of the Engineer-in-charge. (Lines already laid)-Note*	K00100				
193	20 mm PE 100 MDPE Pipeline	K00101	Meter	25.00	212.00	5,300.00
194	32 mm PE 100 MDPE Pipeline	K00102	Meter	400.00	248.00	99,200.00
195	63 mm PE 100 MDPE Pipeline	K00103	Meter	25.00	325.00	8,125.00
196	TOTAL VALUE (EXCLUDING GST)					25,00,000.00



**HIRING OF CONTRACTORS FOR GAIL'S CGD PROJECT AT SIX GA'S
THROUGH WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**



GAIL (India) Limited

**(A Government of India Undertaking)
A Maharatna Company**

EOI No: GAIL/CGD/06 GA/LMC/2026/01

**DETAILED NOTICE FOR HIRING OF CONTRACTORS
FOR GAIL'S CGD PROJECT AT SIX GA'S THROUGH
WALK-IN METHOD SELECTION PROCESS FOR
DPNG CONNECTION / LMC WORKS**

**Address: M/s GAIL INDIA LIMITED, Plot No. B, 35-36, Block B,
Sector 1, Noida, Uttar Pradesh 201301.**

VOLUME – II OF II



Appointed PMC for Contract Award Process on behalf of GAIL (India) Limited

**BRIDGE AND ROOF COMPANY (INDIA) LIMITED
(A Govt. of India Enterprise)**

***Corporate office:*
KANKARIA CENTER (4TH & 5TH FLOOR), 2/1 RUSSEL STREET,
KOLKATA – 700071, WEST BENGAL (INDIA)**

***Head Office and Works:*
427/1, GRAND TRUNK ROAD, HOWRAH - 711101.**

~~GAIL - Internet~~
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TECHNICAL SPECIFICATION

FOR

LAYING OF PE MAIN PIPELINES

AND SERVICE PIPELINES



BRIDGE AND ROOF CO. (INDIA) LTD.

(A Govt. of India Enterprise)

4th & 5th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

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TECHNICAL SPECIFICATION

1.0 GENERAL INFORMATION

1.1 INTRODUCTION

1.2

M/s GAIL (India) Limited has been set up to provide CNG (Compressed Natural Gas) as fuel to commercial & private vehicles through filling stations and PNG (Piped Natural Gas) to Industrial, household and commercial sector in 06 GAs.

1.2 NATURE OF CONTRACT

The contractor shall be paid on a Schedule of Rates basis. He shall execute the work and perform his obligations under the contract, and Owner shall pay the contractor for measured quantity of each item of work actually carried out under the contract. Payment shall be at the rate for the work set out in the agreed Schedule of Rates.

2.0 SCOPE OF WORK

- 2.1 Generally the following shall constitute the Contractor's scope of work :
Plan and prepare a schedule for execution and work implementation as per QA/QC plans to be issued by Client / Consultant. Contractor has to submit the Construction/ Execution procedures before commencement of work.
- 2.2 Assist in obtaining permissions from land owning agencies for road cutting for laying of pipelines. Liaisoning with concerned authorities during execution of the job.
- 2.3 Prior to start of Construction activities , Contractor shall carry out area and crossings survey and prepare drawings for proposed gas pipe line laying and submit to Owner / Consultant for approval.
- 2.4 Receipt of free issue items from clients designated stores, loading, transportation, unloading at Contractor's stores near project sites.
- 2.5 Proper storing, stacking, identification, providing security, and insurance, during storage, laying and upto handing over of pipelines.
- 2.6 Making trial pits to determine the underground utilities /services such as existing pipelines, Cables (Electrical/Communication), Conduits, U/G drainage, Sewers, tunnels, Subways foundations etc, and deciding optimum routes and depths for laying the pipelines based on the route plans provided in the tender.

- 2.7 Obtaining the approval for optimum route and ROU from the concerned authority and EIC. Grading the ROU as per requirement for proper movement of workmen, equipment and QA/QC personnel.
- 2.8 Wherever required the grass/ turfing, pavement, linings, drains roads and other such 'pucca' area shall be locally removed to facilitate trenching and pipe laying works. The same is to be reinstated as original.
- 2.9 Supply & Installation of Safety/ Warning Signs, barricading of the entire route to be trenched. Pits to be similarly barricaded along the warning sign.
- 2.10 To make trenches with stable slopes but restricting minimum disturbance to above ground/underground services/ installation as per specifications and approved route plans; keep the trenches free from water and soil till placement of pipes;
- 2.11 Uncoiling/ stringing the PE pipes of required sizes (i.e. 20, 32 & 63) pipes into trenches as per specification.
- 2.12 Joining the pipe ends with fittings and valves by approved electro fusion techniques as per specification.
- 2.13 Installation of pipe fittings/installation like elbow, tee, reducers, tapping saddles, joints, connectors, transition fittings, valves, sleeves etc. including construction of supports, valves pits, inspection chambers etc. as per specification.
- 2.14 Laying pipeline using trench less technology methods with or without casing pipes as per specification and as directed by EIC.
- 2.15 Supply & Laying of HDPE duct as casing pipe wherever applicable, along with PE Pipe.
- 2.16 Supply of good quality GI sleeves, MS enamel coated sleeves, concrete casing pipes, sand and other material, fittings to be supplied by the Contractor as per provisions of tender.
- 2.17 Back filling and compaction by jumping jack compactor using approved 'good' soil or using excavated earth or borrow earth as per requirement and specification and replacement of tiles, slabs removed during the excavation. Cleaning all unserviceable material, debris, excess earth near trenches etc to designated disposal area.
- 2.18 Carrying out pneumatic testing and purging as per specifications and approved procedures; providing all tools, tackles, instruments, manpower and other related accessories for carrying out the testing of pipes.
- 2.19 Nitrogen purging (including supply), commissioning & gas charging of tested pipeline as per approved procedure.
- 2.20 Restoration of existing ground features such as grass/ turfing, paving, roads, drains, concrete, floral beds, fencing, tiles, flooring masonry etc. to original

condition and to match with adjoining conditions- functionally and aesthetically upto the entire satisfaction of Client / Consultant any other third party agency designated by Client and local authorities, failing which, it will be done at the risk and cost of the contractor. Obtaining satisfactory completion certificates for the restoration work done from the concerned authorities.

- 2.21 Installing of permanent site markers, warning signs, valve chamber etc.
- 2.22 Returning surplus material to Clients stores, reconciliation of free issue material/ consumables if supplied by Client and obtaining 'no objection certificates' from Client / Consultant.
- 2.23 Handing over the completed works to Client for their operation / use purposes.
- 2.24 Maintaining the completed pipelines/installation for any defect, failures during defect liability period.
- 2.25 Preparation and submission of As-built drawings, details of crossings, utility graphs, measurement sheets and deviation statements on completion / commissioning of work by way of drawing, sketches and tables.
- 2.26 Any other activity not mentioned/ covered explicitly above, but otherwise required for satisfactory completion/ operation/ safety/ statutory/ maintenance of the works shall also be covered under the Scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Client.

3.0 MATERIAL, LABOUR, PLANT AND EQUIPMENT

3.1 Owner's Scope of Supply (Free Issue Item)

Owner's scope of supply shall be as per PJS clause no 4.1.

In order to speed up the project Free Issue Materials shall be issued to the Contractor from the designated store(s) of Client. Contractor shall be responsible for lifting the free issue materials from Owner's storage point(s) and transporting the same to work site(s) at his own cost.

3.2 Supplied by the Contractor

Contractor will supply all size HDPE casing pipe, GI pipes (as per SOR), fittings and PE fittings other materials as per SOR & scope of supply necessary to complete the laying of gas main pipelines and service pipelines.

The contractor is to procure all bought out items from approved vendors and accordingly keep Client / Consultant informed. The inspection of bought out items would be carried out by Client / Consultant / Third Party Inspection or as instruction by EIC.

In general PE pipe shall be of the following lengths indicated.

20mm/32mm	100 to 300 Mtrs. coils
63 mm	100 Mtrs. Coils
90 mm	50 Mtrs Coils
125 mm	50 Mtrs. Coils
180 mm	12 Mtrs. Coils

The Contractor shall provide the skilled labour, tools, material and equipment necessary for the proper execution of the Work. This will include but not be limited to list of specialized items included in the enclosure furnished herewith.

3.2.1 Equipment & Machinery

All vehicular type machinery shall be in good working order and shall not cause spillage of oil or grease. To avoid damage to paved surfaces the Contractor will provide pads of timber or thick rubber under the hydraulic feet or outriggers of machinery.

In addition to above, the contractor must have dedicated bar coded electro- fusion (Automatically readable) machine with power generator (at any point of time minimum 2 nos.), Pipe Cutters (like circular guillotine), End Scrapers, Pipe Straightened, approved Top loading clamp for fusing saddle tapping tee, clamps of all sizes for Electro-fusion fittings, re-rounding tools and test ends

etc. for pipes of following diameters 125mm, 90mm, 63mm, 32mm & 20mm for this project. Contractor has to arrange his own all equipments for trenchless crossings such as HDD, Moling & rock cutting equipment, HDPE fusion equipment at the site whenever required.

Contractor must also have to arrange his own equipment for restoration work like water tanker and jumping jack compactor for compaction of backfilled trenches and roller and other required equipment/ machinery for asphaltting/ road works.

In case there is non availability of approved equipments, tools and tackles during the work at site, suitable penalties, as per special terms and condition of the contract, will be levied and deducted from the running bills.

3.2.2

Imported Backfill and Material

The Contractor shall be responsible to arrange the supply of approved soft soil / Coarse Sand free from any impurities like clay, mica and soft flaky pieces as per the instruction of EIC/Owner.

For supply of sand in trench for rocky terrain ,no separate charges are payable and is included in SOR item for excavation of hard rock/Morrum. Also supply of sand in valve chambers ,Normal chambers & Built up surface ,if required ,as per the instruction of EIC,is not separately payable.

In case specified trench depths are not achieved & if directed by Engineer-in- charge Contractor to provide concrete casing pipes/ slabs or cement concrete, without any cost implication to Owner.

3.2.3

Other Materials

The Contractor shall supply the following items where required.

- All materials required for form work, trench support, temporary trench crossings.
- All sign boards, barricades, tin sheets, lights and protective equipment.
- Permanent markers as shown in the drawings enclosed in the tender.
- Material required for installation of valve chambers.
- GI ,Half Round concrete sleeves
- All minor items not expressly mentioned in the Contract but which are necessary for the satisfactory completion and performance of the Work under this Contract.

3.2.4

Manpower

The contractor shall provide the skilled labour, tools, materials, and equipment necessary for the proper execution.

3.2.5 Acquisition, Receipt, & Storage Of Materials

In case of material supplied by owner than the contractor shall collect all materials from Client store between working hours following all documentation procedures laid down and as directed by EIC. The contractor shall at the time of receipt of material physically examine all materials and notify the EIC immediately of any damage . Any damage not recorded at the time of inspection done by contractor will be deemed not to have existed at the time of receipt of material. Cost of repair, rectification, replacement will be borne by the contractor. Any defective material found during the time of installation will noted and forwarded to stores for replacement immediately with P.O reference and only with written approval of EIC. The contractor shall ensure that no defective material shall be returned to store at the time of closure of contract. The contractor shall maintain permanent locked store preferably near site in so that all the material are stored in such a manner so as to prevent and damage to the materials from scratching , gouging , indentation , excessive heat or by contact with any sharp objects and chemicals.

The contractor shall maintain log book at their respective stores stating issue and availability of free issue material as a given day. Further the contractor is required to undertake and submit an inventory of materials every month to Owners/Owners Representative (mandatory) .

4.0 PROGRESS OF WORK

The Contractor shall proceed with the Work under the Contract with due expedition and without delay.

The EIC may direct in what order and at what time the various stages or parts of the work under the Contract shall be performed.

Contractor has to regularly submit daily progress reports, weekly progress reports, graphs with utilities, testing reports, material consumption and inventory reports, deviation statements etc.

5.0 APPROVALS

Contractor has to assist in getting permissions, obtain statutory approval/ clearances for laying of pipelines. However, Client will pay the departmental charges and Bank Guarantees for getting the clearances. It is the contractor's responsibility to inform and co-ordinate the concerned local authorities and also other utility agencies before commencement of work at site. To ensure smooth execution of the work on a day to day basis, the contractor has to liaison with respective authorities and obtains necessary approvals.

6.0 REFERENCE SPECIFICATION, CODES AND STANDARDS

The contractor shall carry out the work in accordance with the requirement of latest relevant applicable standards, this specification, Client's Engineering Standards; relevant Oil India Safety Directorate (OISD) norms,

Latest PNGRB Guidelines, ASME B31.8 – Gas Transmission and Distribution Piping Systems; Australian Standard 3723 – Installation and Maintenance of Plastics Pipe Systems for Gas; and the American Gas Association Document – Purging Principles and Practice. ISO: 4437/ IS:14885 for underground polyethylene pipes and Client's approved procedures

Should the contractor find any discrepancy, ambiguity or conflict in or between any of the Standards and the contract documents, then this should be promptly referred to the Engineer-in-Charge (EIC) for his decision, which shall be considered binding on the contractor.

7.0

SAFETY

The Contractor shall conform to the requirements outlined elsewhere in the tender document. In addition, the Contractor shall observe safe working practices in the storage and handling of cleaning fluids, flammable fluids, etc, and ensure smoking or naked flames are not permitted in the vicinity when these materials are being used.

Trench walls shall be battered with sufficient slope in order to minimize a trench collapse. Where there is a danger of an earth slide or collapse, the trench shall remain open for the minimum time possible with proper barricading. The Contractor is to ensure that no person enters a trench, which is of a depth of 1.5 meters or greater, unless the trench has adequate shoring or the sides are battered to such an extent as to prevent a trench collapse

The Contractor shall also protect all work sites with warning signs, barricades and night lighting. The Contractor shall inspect all fenced excavations daily, and maintain them in good order.

The trenches/ pits shall not be kept open in night times. However in case the same is essential the same shall be properly barricaded with proper lighting arrangements & manned.

The Contractor shall provide all safety equipments like helmets, boots, etc. to the labour which are necessary for safe working practice.

Any accident causing injury to any person or damage to property or equipment shall be reported to the EIC.

Where the EIC determines that the work is being performed by the Contractor in an unsafe manner, he may suspend the Work until corrective action is taken by the Contractor.

For further details refer Attached HSE technical specification.

8.0 ROUTE SURVEY

8.1 Plans detailing the size, operating pressure and approximate location of the proposed mains, connections and associated regulator installations will be issued to the contractor at the start of the works.

8.2 The final alignment of mains will be worked out at site in consultations with the site engineers after route survey and trial pits, at his cost, have been carried out. Any change in routing from the issued drawings due to site constraint will be notified to EIC & his specific written approval shall be obtained before carrying out the job.

8.3 Service Lines

8.3.1 A survey will be conducted jointly by Consultant/ third party inspection and the contractor at each premises or housing colony to be supplied. The survey record will note customer details, the potential gas supply points and proposed regulator positions and estimates of material quantities. The contractor's representatives will make a sketch of the agreed pipe routes if necessary.

8.3.2 The contractor will be responsible for contacting the customer and making the necessary arrangements for access, and appointments to carry out the work. Contractor shall maintain job card and complaint books at site. Client will not be responsible for any time lost due to broken appointments or disputes with customers.

9.0 ORGANIZATION OF WORK

9.1 All construction work will be carried out as per direction of EIC, and this will be the primary point of contact between the contractor and Client on site. All work will be issued and sanctioned through the EIC and site control exercised by Site Engineer Client / Consultant. The contractor shall ensure that technical quality standards are maintained, that construction is carried out cost effectively and that a good customer and public image of Client is maintained.

9.2 Contractor shall designate RCM who will be the single point coordinator to interact with EIC/Consultant/TPIA and authorized to attend review meetings, receive materials, authorized to sign documents, claims and receive payments etc. . Contractor shall submit the organization chart stating that in charge of projects, store, QA/QC and take approval from the owner.

9.3 The contractor will appoint his own supervisors of minimum number instructed by EIC. These personnel will be responsible to the SE for monitoring construction standards and for ensuring that all detailed technical requirements are met on each and every job which is undertaken. The contractor's supervisor(s) will have day to day liaison with the SE, and will provide the SE with technical reports and audits, and other management information as is required on work progress and construction quality standards.

9.4 The contractor's supervisor shall have mobile telephones or pagers to ensure that they can be contacted at all times. The contractor will also nominate one person who can be contacted if necessary out of hours, for the duration of the works. The contractor's supervisor will have access to transport at all times to allow them to visit sites and attend meetings with Consultant / Client as is required. The normal day to day issue of work instructions, communication between Consultant /Client and the contractor's supervisor and the SE. No deviation from the approved technical specification / issued construction drawings shall be undertaken without written approval of EIC.

9.5 Contractor shall maintain a Project site office, Material store with following facilities:

- Telephone, Mobile phones, Fax machine, printers/Scanning/Xerox machines, Computer with e-mail facility
- 1 No. four wheeler with driver for suit survey , meetings etc, with Owner/Owners representative. Also it shall be well equipped with tools and tackles for attending any emergency complaints and ongoing execution work.

On award of the contract , The contractor shall establish and submit documentary evidence for above Which will be verified by owner before of the work order .Any delay and non-compliance of above may result into the termination of contract

10.0 STRUCTURES, SERVICES AND OTHER PROPERTY

10.1 Location of Underground Utilities

The contractor shall locate all buried utility pipes, underground cables, water mains and other obstructions intersecting or adjacent to the Works, and shall make available the necessary labour to expose and record the depth of cover over all obstructions in advance of excavation. This shall be done far enough in advance of excavation to facilitate gradual change in grade or position found necessary to clear any obstructions.

In addition, the contractor shall excavate trial pits as necessary to determine the pipe route. The number of trial pits will be agreed with the EIC in advance of any excavation. In any event, trial pits shall be made at intervals of a maximum of 30 meters. Restoration of the abandoned trial pits and trenches shall be the contractor's responsibility. No payments shall be made for such type of jobs. It is contractor's responsibility to interact with other utility agencies regarding their existing utilities and finalize the route along with these agencies and Owner/ Owner's representative.

There will be no additional payments in respect of abandoned trenches incurred because of insufficient or inadequate trial pits, or any associated lost time or delays.

10.2 **Protection of Structures and Utilities**

The Contractor shall at his own cost, support and protect all buildings, walls, fences or other structures and all utilities e.g. Electrical cables, Telephone Cables, Water pipelines, Sewer pipelines etc., and property which may, unless so protected, be damaged as a result of the execution of the works. He shall also comply with the requirements in the specification relating to protective measures applicable to particular operations or kind of work. Special care shall be taken while laying Pipelines near the trees.

10.3 **Interference with Traffic, Street Drainage and General Public**

The Work shall be executed in such a manner as to cause a minimum of inconvenience to persons requiring to use public or private roads, lanes, thoroughfares, walkways, rights-of use or passages through which the Works are to be executed. The trench shall be back filled, compacted, leveled and extra earth shall be removed immediately after laying of pipeline to avoid public inconvenience. Closure of roads, etc, shall not be permitted without the approval of the EIC.

The Contractor shall comply with all local Authorities requirements to traffic, and keep roads open to traffic, and maintain access to and within any private property.

Wherever the pipe route crosses driveways, access tracks or entrances to private properties, the Contractor shall give the owner, occupier or relevant authority at least 24 hours prior notice of intended commencement of excavation and shall be restricted to pass through.

The Contractor shall not, in any circumstance, use a private driveway, access track or entrance without the prior approval of the EIC.

The Contractor shall provide suitable access where necessary in the form of temporary bridges, culverts, flumes, etc, of a size and type approved by the EIC.

The Contractor shall comply with all relevant road laws. Where limits and/or speed limits have been placed in the vicinity of the Works, the Contractor shall provide for the necessary movement of plant and equipment in accordance with the requirements of the relevant authority.

The Contractor shall not obstruct any drainage pipes or channels in any road but shall deviate them where necessary and use all proper measures to provide for the free passage of water.

The Contractor shall deliver the completed works after proper cleaning of the site.

The contractor shall conduct his operations at all times, with a view to minimizing as far as practicable noise from plant and other objectionable nuisance (e.g. oil leakage).

11.0 TRENCHING

The schematic diagram with the detail of trench is enclosed as Annexure.

The Contractor shall perform the excavation works so as to enable the pipe to be laid in conformity with the levels, depths, slopes, curves, dimensions and instructions shown on the Drawings, Specifications or as otherwise directed by the EIC.

Contractor shall excavate and maintain the pipeline trench on staked centerline as per approved alignment sheets taking into account the horizontal curves of the pipelines.

While trenching care shall be taken to ensure that all underground structures and utilities are disturbed to the minimum. Suitable crossing shall be provided and maintained over the ROU wherever necessary to permit general public, property owners or his tenants to cross or move stock or equipment from side of the trench or another.

Trenching shall be made with sufficient slopes on sides in order to minimize collapsing of the trench. On slopes wherever there is danger of landslides, the pipeline trench shall be maintained open only for the time strictly necessary. Client may require excavation by hand tools, local rerouting and limiting the period of executing of the works. Before trench cuts through water table, proper drainage shall be ensured, both near the ditch and ROU in order to guarantee the soil stability.

The Contractor shall ensure that trench bottom is maintained in the square form as far as possible, with equipment, so as to avoid/ minimize the hand grading at the bottom of the trench. The Contractor shall do all such handwork in the trench as required to free the bottom of trench from loose rock, pebbles and to trim protruding roots from the bottom and sidewalls of the trench.

11.1 Depth of Trench

The minimum depth of cover shall be measured from top of pipe to the top of undisturbed surface of the soil or top of the graded working strip or top of road or top of rail, whichever is lower.

The depth of the trench will be such as to provided minimum cover as stipulated below :

* Refer PJS clause No. 17.0 SPECIAL POINTS PERTAINING TO SPECIFICATION.

The minimum depth as mentioned above may be greater than as may be required by Government/ Public authorities under jurisdictions. The Contractor shall perform such work without extra compensation, according to the requirement of concerned authorities.

In cases of Drain/ Culvert crossing through open cut where excavation cut is more than 1.5m, the extra excavation shall be paid in quantity basis. The rate shall include backfilling as specified. No separate payment is chargeable for extra excavation and includes backfilling as well.

In case the depth could not be achieved due to practical problems and the same is demonstrated, EIC after examining thoroughly and considering the codes and standards may allow the contractor to provide suitable protection by way of concrete casing pipes or slabs without extra cost to Client.

11.2 **Width of Trench**

The width of the trench shall be wide enough to provide bedding around the pipe and to prevent damage to the pipe inside the trench. Unless otherwise directed by the EIC and where ground conditions permit, the minimum distance from the inside edge of the trench wall to the outside of the pipe shall be as per drawing enclosed herewith.

11.3 **Trench Base**

The trench bottom shall be cut or trimmed to provide a uniform bedding for the pipe, and shall be free of stones, metal, wood, vegetation, clods of earth or other debris before placement of the pipe.

Hard rock is defined as trench material with a single piece dimension exceeding 1.5 m in length which cannot be removed other than by the use of pneumatic chisel/drill or sledge hammer and chisel.

Excavation through soil mixed with boulders that have been used for a road base will not be considered as hard rock for the purposes of payment.

1.4 **Clearances**

Unless otherwise approved, the following clearances shall be maintained between the external wall of the gas pipe and the external surface of other underground assets in the vicinity of the Works.

- 150-300 mm where the gas pipe crosses other assets, other than electric cables, whereupon the clearance shall be 300 mm.
- 300mm where the gas pipe is on a similar alignment to the other assets. Where

the above clearances cannot be achieved, or in other special circumstances, the EIC may approve/specify protection with concrete/MS coated pipe, etc. The protective material shall be supplied and installed by the Contractor at his cost.

11.5 **Under Ground Interferences**

The Contractor shall locate and expose manually all underground facilities if any during trenching. Safety barriers, if required shall be erected to prevent any damages or accident. On locations where pipeline is laid under the existing facilities and near the approaches to the crossing, the trench shall be gradually deepened to avoid sharp bends.

All sewers, drains, ditches and other natural waterways encountered while trenching shall be maintained open and functional by providing proper temporary installations if required. Suitable dewatering pumps shall be deployed to dewater, if required.

Whenever it is permitted by Authorities and/ or Client to open cut paved road crossing, or where line is routed within the road pavement, the Contractor shall remove the paving in accordance with the restrictions and requirements of the authorities having jurisdiction thereof as directed by Client. After laying the pipeline, backfilling shall be immediately performed and all the areas connected with the works shall be temporarily restored.

In case of damage to any of above referred structures/ utilities the contractor shall be responsible for repairs/ replacement at his own cost, which shall be carried out to satisfaction of concerned authorities, resident and Consultant/ Client.

11.6

Others

Throughout the period of execution of such work, the Contractor shall provide and use warning signs, traffic lights or lanterns, barricades, fencing, watchman etc. as required by the local authorities having jurisdiction and/ or Client.

For all roads, paths, walkways etc. that are open-cut, the Contractor shall provided temporary diversions properly constructed to allow the passage of normal traffic with the minimum of inconvenience and interruptions.

The paving shall be restored to its original condition after the pipeline is installed.

The Contractor shall excavate to additional depth at all the points where the contour of the earth may require extra depth, or where as deep trench is required at the approaches to crossings of roadways, railroads, rivers, streams, drainage ditches without any extra cost implication to Client.

The Contractor shall excavate all such aforesaid depths as may be required at no extra cost of Client.

The trench shall be cut to a grade that will provide a firm, uniform and continuous support for the pipe.

The Contractor shall take conducive measures to ensure the protection of underground utilities as per the instructions of Client or relevant authorities.

Where the pipeline crosses underground utilities/ structures, Contractor shall first manually excavate to a depth and in a such a manner that the utilities/ structures are located, then proceed with the conventional methods.

The locations, where the pipeline has to be laid more or less parallel to an existing pipeline cable and/ or other utilities in the Right-of-way the Contractor shall maintain proper distances and perform the work to the satisfaction of Client and other utility agencies. In such locations, the Contractor shall perform work in such a way that even under the worst weather and flooding conditions, the existing pipeline/ utilities remain stable and shall neither become undermined nor have the tendency to slide towards the trench.

11.7 **Bedding**

The contractor shall ensure that the pipe when placed in the trench is supported and surrounded by a bed of screened excavated soil, which shall be stone free and have a maximum grit size of 5mm in order to ensure no damage occurs to the pipe.

However in case of rocky soil, the bedding shall be done with approved/ good quality packing sand, subject to the approval of the EIC, the size distribution of the sand/ shall be the same as per soil. The packing sand shall be placed to a minimum thickness of 150mm around the pipe in case of rocky terrain.

Unless directed by the EIC the quantity of bedding & surrounding sand shall confirm to specifications. There shall be no void space in packing sand around the pipe.

12.0 **LAYING**

Laying of PE pipelines shall commence only after ensuring proper dimensions and clean surface of the trench. The trench bottom shall be free from the presence of cuts, stones, roots, debris, stakes, rock projections upto 150mm below underside of pipe and any other material which could lead of perforation/ tearing of the pipe wall. After ensuring above the PE pipe coil shall be uncoiled smoothly through proper equipment's/ care inside the trench ensuring no damage to pipe coil during laying. The Contractor must ensure that pipe caps are provided before lowering of pipeline. The trench after this can be released for back filling leaving adequate lengths open at the ends, for jointing.

Where given specific approval by the EIC a pipe may pass through an open drain or nallah. Where this is permitted the pipe shall be installed inside a concrete or steel sleeve for protection. The sleeve material shall be procured and laid by the Contractor. In general the GI Sleeve and MS sleeves material specification shall be confirming to IS 1239 (Heavy Duty) specification of reputed make. The payment for the length of pipe in the sleeve will be made as per SOR. All other work necessary to break through the walls of the obstruction, and to seal the annulus between the pipe and the sleeve and the sleeve and the wall, shall be deemed to be included in the rates.

Open ends of pipe placed in the trench shall be securely capped or plugged to prevent the ingress of water or other matter. The Contractor is to ensure that

nothing enters the inside of the pipe during the laying process as this could cause a future blockage or regulator malfunction due to dust, etc.

Service lines shall be installed in accordance with the drawing enclosed. Note that the service pipe rises out of the ground at the customer's premises within a GI sleeve pipe. The vertical portion of the sleeve shall be fixed to the wall of the premises in a secure manner. A bending tool shall be used to bend the GI sleeve pipe so that it has the appropriate curvature and is free of kinks. The bending of the sleeve, its fitting and clamping, and the installation of the transition fitting excluding service-isolating valve, is all included in the service connection rate. A rate is included in the SOR for the provision of sleeves for PE laying. Any installation without inspection and approval may lead to penalties as Special condition of contract

A bending tool shall be used to bend the GI sleeve pipe so that it has the appropriate curvature and is free of Kinks. The installation of the GI sleeve for service lines shall be done by sealing the annulus, firm fixing of the GI sleeves with concrete mix, breaking through any obstructions & their subsequent restoration to the satisfaction of the EIC.

The contractor shall supply the GI sleeves (Heavy duty OF IS:1239 reputed make) respectively for domestic & commercial / Industrial installation. The vertical portion of the sleeves shall be fixed to the wall of the premises in a secure manner. The service line shall be installed in accordance with drawing enclosed. The material test certificates / inspection reports shall be inspected by TPIA/PMC before installation.

Valves shall be installed at locations shown on the Design Plan or as directed by the EIC and joined with PE pipes by electro-fusion techniques. The valves shall be supported on a bed of fine fill of grit size not greater than 5mm to achieve equivalent support as the incoming and outgoing pipe work.

Laying graphs with details of depth, length, offsets from fixed references, other utility crossings, fittings, size of casing pipe used for the pipeline shall be prepared on daily basis and submitted to Site Engineers of the Owner for approval. These details will be further incorporated into As-Built Drawings.

14.0

JOINTING OF POLYETHYLENE PIPE

The procedure for jointing of PE pipe and fittings is enclosed. Only Bar coded electro- fusion machine (Automatically Readable) that can read the bar code of the fittings automatically shall be used for jointing of PE pipe / fittings.

Manual feeding electro-fusion machines are not acceptable for jointing purpose.

The Contractor has to submit the certificate of calibration of Fusion machine at the time of start of work and at fixed intervals as per the instruction of owner. Contractor shall ensure that the machine are always available at site, no stoppage of work due to the non availability of machines.

The contractor shall flush the Pipeline with air to remove dust, water, mud etc. before fusing the joints.

Before jointing, the Contractor shall place packing sand under the pipes on both sides of the joint to keep the pipes in line and at the correct alignment during the jointing process. Alignment clamps with the correct size shells should be used to align the pipe during the electro-fusion cycle.

The Contractor shall ensure that polyethylene pipe is only cut with an approved PE pipe cutting tool. Before fusion is attempted he shall remove the oxidized surface of the pipe to be inserted into the electro-fusion coupling. The tool must remove a layer of 0.1 mm to 0.4 mm from the outer surface of the polyethylene pipe. **It may also be noted that no fusion will be allowed without clamping device and only the approved cutting tools (Hack Saw shall not be allowed for cutting the Pipe) shall be used.**

The contractor has to supply all the consumables required for carrying fusion of the joints (like cloth/ paper napkin, acetone etc.).

If, upon inspection, the EIC determines a joint is defective, Contractor shall remove the joint by an approved method. The cost of this work shall be borne by the Contractor.

For electro-fusion jointing, the contractor must bring own tools, tackles and equipments.

Contractor shall arrange generator for power supply for fusion machine. Taking power connection from electric poles ,connections without written permission from concerned authorities or residential premises is strictly not permitted.

Only, Approved Jointers shall carry out fusion of all joints. Contractors shall provide the list of jointers to be used on the job and make arrangements for qualification Testing of the jointers in presence of Owner / Owner's representative . All approved Jointers shall bear Identity cards signed by Owner/Owner's representative..

Taking power connection from electric poles , connection without written permission from the concerned authorities or residential premises is strictly prohibited

15.0

BACKFILLING

Backfilling shall be done after ensuring that appurtenance have been properly fitted and the pipe is following the ditch profile at the required depth that will provide the required cover and has a bed which is free of extraneous material and which allows the pipe to rest smoothly and evenly. Dewatering shall be carried out prior to backfilling. No backfilling shall be allowed if the trench is not completely dewatered. Prior to backfilling it should be ensured that the post padding where required of compacted thickness 150mm is put over and around the pipe immediately after lowering.

Backfilling shall be carried out immediately after the post padding where required has been completed in the trench, inspected and approved by Client / Consultant so as to provide a natural anchorage for the pipe, avoiding,

sliding down of trench sides and pipe moment in the trench. If immediate backfilling is not possible, a padding of at least 200mm of earth, free of rock and hard lumps shall be placed over and around the pipe and coating.

The backfill material shall contain no extraneous material and/ or hard lumps of soil, which could damage the pipe and/ or coating or leave voids in the backfilled trench. In case, it is required and directed by EIC, screening of the backfill material shall be carried out with specified equipment before backfilling the trench.

The surplus material shall be neatly crowned directly over the trench and the adjacent excavated areas on both sides of the trench to such a height which will, in Client/ Consultant opinion of provide adequately for future settlement of the trench backfill during the maintenance period and thereafter. The down shall be high enough to prevent the formation of the depression in the soil when backfill has settled into its permanent position should depression occur after backfill, Contractor shall be responsible for remedial work at no extra cost to Company. Surplus material, including rock, left from this operation shall be disposed off to the satisfaction of land owner or authority having jurisdiction at no extra cost to Client.

Where small pieces of rock, gravel, lumps of hard soil or like materials are encountered at the time of trench excavation, sufficient earth or select backfill materials shall be placed around and over the pipe to form a protective cushion extending at least to a height of 150mm above the top of the pipe. Select backfill materials for padding that are acceptable shall be screened soil, containing no gravel. All these works shall be carried out by Contractor at no extra cost to Client. Loose rock may be returned to the trench after the required selected backfill material has been placed, provided the rock placed in the ditch will not interfere with the use of the land by landowner, or tenant.

In case where hard rock is encountered or as desired by EIC sand padding is to be provided upto height of 150mm around the pipe.

When the trench has been dug through drive ways or roads, all backfilling shall be executed with suitable material in layers as approved by Consultant / Client and shall be thoroughly compacted. Special compaction methods as specified may be adopted. All costs incurred there upon shall be borne by the Contractor.

Trenches excavated in dikes which are the properties of railways or which are parts of main roads shall be graded and backfilled in their original profile and condition. If necessary, new and/ or special backfill materials shall be supplied and worked-up to.

PE Warning Grid/Mat 1mm thick and 300mm wide will be placed on distribution main and on service lines inside premises, after backfill of the trench upto a height of 300mm on the top of the carrier pipes. The warning grid is to be unrolled centrally over the pipe section and thereafter further backfilling will commence.

Backfilling activity shall include proper compaction by jumping jack compactor and watering in layers of 150mm above the warning mat. Proper crowning of not more than 150mm shall be done. All the excavated material required to be used during the Restoration process shall be stacked and kept separately and properly. Wherever Road cutting/ Tiles removal/ PCC cutting has been done during excavation for laying, the area shall be back filled and compacted immediately so that no inconvenience is caused to the general public.

Electro-fusion of joints is to be undertaken immediately after lowering and the activity shall not be kept pending for lack of Electro-fusion jointing. The backfilling shall be considered complete only after the joint is completed.

Debris and other surplus material shall be removed immediately after the back filling.

The contractor shall not be entitled for 30% payment on laying & backfilling till the above activities are completed.

16.0

MOLING:

The Moling shall be carried out as per the requirement specified by Client / Consultant and approved procedures. The contractor has to carry out thorough survey of the under ground utilities before going for the Moling, to avoid the damage to the other utilities.

No extra payment will be made for any trial/ abandoned pits made during the survey. The supply of all equipment, power required for carrying out moling work, is in contractor's scope. The type of moling to be carried out i.e., Manual/ Machine with or without casing shall be at the discretion of Consultant / Client. A prior approval is to be taken before starting the Moling.

For manual Moling the contractor shall ensure that the size of the hole shall not be more than 20% of the size of the casing / carrier pipe whichever is applicable. After completion of Manual Moling the hole shall be properly compacted / filled with soil by watering and by approved procedures, the pits shall be backfilled, compacted & restored . The rate for such crossing work by using casing pipe & carrier pipe or only carrier pipe shall be payable as per Schedule of Rates.
No separate payment shall be made for pulling the carrier pipe.

The rates for Moling, as indicated in SOR, are payable as per the size of the casing/ carrier pipe and are inclusive of excavation of pits, backfilling, compaction, restoration, jointing and insertion of carrier pie.

Any damages occurred to other utilities during the Moling operation shall be immediately notified and rectified by the contractor without any cost implication to Client.

The length of the Hole (excluding the sizes of the pits on both ends) shall be considered for the measurement of Moling length. However, intermediate pits will consider in the moling length.

17.0

BORING/RAMMING/DIRECTIONAL DRILLING

One of the above techniques is required to be carried out by the Contractor where conventional trenching/Moling is not possible viz. railways, major waterways, highways, roads etc. Details of such crossings shall be obtained by the Contractor, and construction drawings shall be prepared by the Contractor in consultation with Consultant / Client. Execution of the work shall be based on the Consultant / Clients approved drawings. The contractor has to do the thorough survey of the under ground utilities before commencement of BORING/ RAMMING/ DIRECTIONAL DRILLING to avoid the damage to the other utilities. No extra payment will be made for any trail/ abandoned pits made during the survey. The supply of all equipments is in Contractors scope. Work to be carried out in accordance with API - 1102.

Once the work is allotted, **Any delay in mobilizing / non – availability of HDD machines as per site requirement and conditions shall result in levying of penalties on daily basis as per SCC.**

The type of HDD to be carried out i.e. conventional (with or without casing) shall be at the discretion of Client/ Consultant . And prior approval is to be taken before starting the HDD.

The rates for HDD, as indicated in SOR, are payable as per the size of the carrier pipe and are inclusive of excavation of pits, backfilling, compaction, jointing and insertion of carrier pipe and restoration of pits. For HDD with casing pipe no separate payment shall be made for pulling of the carrier pipe, the rate quoted by the Contractor shall be inclusive of pulling carrier pipe.

Any damages occurred to other utilities during the HDD operation shall be immediately notified and rectified by the Contractor without any cost implications to Client.

The length of the HOLE (excluding the sizes of the pits on both ends) shall be considered of HDD length.

18.0

CASING PIPE

The tentative sizes of the HDPE casing pipe for Moling/ HDD shall be as follows:-

Size of PE pipe	Size of HDPE pipe
20 mm	75mm
32 mm	75 mm
63 mm	125 mm
90mm	180mm
125mm	250mm

19.0**RESTORATION**

Wherever the restoration is required, the roads, footpaths (including roads and footpaths inside colonies) shall be restored to original condition, and the same shall be done as per concerned local authorities norms and to the satisfaction of the concerned local Authority. To retard curing of the installed concrete, wet sack cloth is to be placed on the finished surface and kept damp for a period of 36 hours.

Where slabs and blocks are to be restored, the level of the compacted sub- base is to be adjusted according to the slab/block thickness. The slabs or blocks should be laid on moist bedding material, which should be graded sand, mortar or mortar mix. The slabs or blocks should be tapped into position to ensure they do not rock after laying.

The restored slabs or blocks should match the surrounding surface levels. Joint widths should match the existing conditions, and be filled with a dry or wet mix of mortar.

The sketch for restoration of Road, Footpath, Channel is enclosed herewith and is indicative. However, the restoration shall be done in accordance with the norms of concerned land owning agencies.

Turf shall be replaced in highly developed grassed area. In lesser-developed grassed areas topsoil should be replaced during the restoration process.

Where permanent surface restorations cannot be completed immediately, the Contractor shall provide and maintain a suitable temporary running surface for vehicular traffic and pedestrians. The Contractor will be responsible for the maintenance of all restoration carried out, for the duration of the Contract guarantee period.

The Contractor is to ensure the restoration work is properly supervised, and that the material used is suitable for the purpose and properly compacted. Where the required standards are not achieved the Contractor will be required to replace the defective restoration work.

Note that Payment for pipe laying will only be authorized on initial-satisfactory restoration, and where the sites has been cleared of all surplus materials, etc.

Contractor has to obtain the clearance certificate from the concerned local authorities after completion of the restoration work. The restoration specification specified in the tender is only a typical specification and the contractor has to carry out restoration as per latest version of the (PWD/ IRC) specification to its original condition and also to the entire satisfaction of land owner (Private/Public).

The expenditure incurred towards testing of the material used for restoration as per applicable standards, shall be born by the contractor.

20.0 TESTING

Pressure testing will be carried out with compressed air. Compressed air will be provided by Contractor for testing purposes and is to be included in the rates.

For main pipelines work the Contractor shall perform progressive pressure testing to avoid having to find leaks in long lengths of pipe. The test pressure shall be 6.0 bar(g), and there shall be no unaccountable pressure loss during the test period.

Test procedure with sketches showing the pipeline to be tested, vent points, gauge location, and inlet pressure print is to prepared & got approved by EIC.

For main line the test duration shall be 24 hrs . With these tests the pressure should be allowed to stabilize for a period of 30 minutes after pressurization. The holding period may then commence and continue for 24 hours. Measuring instruments shall have been calibrated and their accuracy and sensitivity confirmed. For testing of Network, calibrated pressure gauges of suitable range shall be supplied by the contractor. The pressure gauges shall be calibrated from time to time as desired by Engineer-in-Charge. All testing shall be witnessed and approved by the EIC or his delegated representative. Tie-in joints may be tested at working pressure following commissioning.

For service lines in some cases testing will be carried out independently of the testing of the mains for which the test duration may be reduced to 4 hrs. The service testing in this case will be performed after the service installation is complete but before the service tee has been tapped. Also in some cases the tapping of the service tee will be delayed pending the completion and purging of the main pipelines.

21.0 PURGING

Purging shall be carried out in accordance with the principles defined in the American Gas Association publication 'Purging Principles and Practice'.

Nitrogen required for purging will also be provided by the Contractor. Nitrogen shall be supplied in labeled, tested and certified cylinders, and completed with all necessary regulators, hoses and connections, which will be in good condition and working order.

In addition the Contractor shall submit and get approved a Purging Plan before commencing any purging work. The Plan shall include, but not be limited to, the provision of the following materials and equipment: Personal safety equipment, Fire extinguisher, Purging adapter, Purge stack with flame trap and gas sampling point, Gas sampling equipment (may be gas leak detector), squash-off tool, Polyethylene connecting pipe work.

The Plan shall also include the purging process along with detail on the sequence of events. The process is to also specifically mention the need to lay a wet cloth over the PE main and in contact with the ground, to disperse static electricity during the purging work.

A purge stack with flame trap shall be used when purging services. Care shall be taken to ensure that the purge outlet is so located that vent gas cannot drift into buildings.

22.0 VALVE PIT

The valve pit shall be constructed in accordance with enclosed drawing & payment shall be as per relevant SOR item.

The construction of valve chambers shall be taken up immediately after installation of valve pit.

22.1 Workmanship

The excavation work shall be done at a location given by Engineer-in-Charge. All care shall be taken not to damage existing facilities and surface of construction shall be restored to its original state.

Sandbags to be placed below pipeline without disturbing the layed pipe. Gunny bags and Sand should be of approved quality.

Precast RC slab shall be placed as indicated in the drawing issued to the contractor. PCC to be placed below the pipe as indicated. Once PCC is set sand is to be filled and properly rammed so that pipe and precast concrete blocks are firmly placed.

Valve will be supplied without the operating stem. Contractor has to supply the operating stem with a handle for the valves of the different sizes. The Contractor has to take prior approval for design and material specification of the stem for installation. Approved quality sand is to be placed in between area.

Surrounding area to be properly cleared and PCC to be placed around the location where precast slab with CI Manhole cover is placed. The RC precast slab to be laid in level and finished smooth.

23.0 PERMANENT MARKERS

23.1 Permanent Marker (As per typical Drawings Placed at Tender) shall be installed on the ROU at regular intervals as per the instructions of the EIC immediately after laying of the pipeline. The installation of the type of the Permanent Marker shall be decided by the EIC depending on the site condition. The Markers shall be painted before installation as per the approved procedure. The supply of the paint and painting as per the specification is in contractor's scope. Separate payment for installation of the markers shall be paid to the Contractor as per the respective Item in SOR .

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- 23.2 The artwork shown in the drawing is typical for all the markers. The contractor must take prior approval for the artwork from EIC before installation of Markers. The artwork must have Client's logo and specify the location of the pipeline from the marker.

Guidelines :

- The installation of these markers shall be such that in between two pole markers two RCC markers are installed with spacing of 50 Mtrs on either side. However , Pole markers shall be installed at all the tapping / Branching points in the mainline.
- Interval between any two RCC markers for mainline (125mm to 63mm) shall not be more than 50 m .
- Pole marker or RCC marker shall be installed near to valve chambers on mainline & inside the pockets respectively for indication.
- Pole marker with foundation shall be installed after two RCC marker as per drawings.
- The entry and exit pits for laying of pipeline by HDD/ Moiling for road crossings shall be marked by pole markers or RCC markers depending upon the site condition .
- In addition to the above , pole markers with foundation (As per drawings) shall be installed outside societies / Areas as per the instruction of the site in charge.
- For the distribution network 32 mm & 20 mm pipe , plate markers shall be installed as per the site condition and direction of the site in charge.

24.0 ASSISTANCE IN COMMISSIONING

Contractor shall provide the required personnel, Vehicles, labour, supervision, tools, equipment, instruments and technical assistance for performance tests and commissioning activities as per requirement of Client/Consultant.

25.0 STANDARD OF WORK

- 25.1 All work carried out under this contract shall be to standards, codes of practice, construction procedures and other technical requirements as defined in the technical specifications.
- 25.2 The manpower deployed on the respective work shall be adequately trained & shall have necessary skills to executive / supervise the work. However, the assessment on the qualification of the personal shall be at the discretion of EIC.

- 25.3 Fusion operators and other skilled personnel shall be approved by Client / Consultant and identification cards duly signed by EIC shall be issued to them. Only those personnel who are approved by EIC shall be allowed to execute the critical activities like joining of PE Pipes.

26.0 RECORDING (AS-BUILT DRAWINGS)

The Contractor will be required to submit computerized as-built drawings duly certified by EIC in A0/ A1 sheet form at 1:200 scale with six sets of prints plus soft copy. The as-built drawing shall be submitted on area wise as specified. The bill of materials used for the particular area shall be specified on the drawings. The Contractor shall use the area and crossing survey drawings prepared by them as reference. On-site sketches, picking up key reference points, shall be made during the installation of services. The lengths, depths of installed pipe work, changes in direction, major fittings, etc, shall be recorded together with appropriate references to other services crossed and in the proximity of the gas pipe .

Distance of pipeline from permanent property /structure should be provided at least every 20 meters. If there is any change in alignment/orientation and offset distance etc. of the pipeline in between the above said 20 meters, the same shall be clearly mentioned in the as laid. Gas objects (off valve, tees, elbows, couplers , T.F, etc shall be shown as block objects (which from a single node to connect) with respect owners symbol and legend. The as laid drawing shall be as per the legends provided by EIC. Details & offset distances from other utilities present should be given in as laid drawing. If there is any change in the depth of pipeline , the same shall be clearly marked with details in the as laid drawings. The details of additional protection provided must be mentioned.

Details of the PE stop off valve and other fittings used should be shown with adequate information and orientation. Technical deviation (if any) should be provided with reference to the buildings and permanent structure around , and the same should be cited clearly with all relevant details. Complete details of nallah crossings should be shown in a separate sketch .

Name of roads , major landmarks and buildings should be mentioned appropriately for reference.

Proper Chainage shall be mentioned on all the drawings to be referred with continuation reference.

Direction of gas flow should be indicated in each drawing.

Land based features shown on the drawing shall match the exact distance as they were on real ground with respect to scale ratio (1:200)

The details shall be prepared in standard format using Map Info/AUTOCAD Map and submitted in CD ROM. Contractor shall also make the item wise material consumption report for the respective areas in a soft copy and to be submitted along with the as-built drawings.

27.0

Civil Works

The contractor has to supply the adequate materials and skilled manpower for the completion of all the civil works . The contractors shall also insure that the work carried out as per the detail mentioned in the schedule of rates .

Special care should be taken at the time of labours working in depths/lifting of the skids by hydras/ cranes considering all the safety guidelines.

The contractors has to ensure that sample of all the material shall be inspected and approved by EIC before carrying out installation or erection work. The contractor has to submit the test certificates for all the materials to be used at the site . the construction shall be carried out strictly as per the drawings provided by the Client. The party shall ensure extra / Surplus / malba shall be immediately removed from the site after completion of the job. Separate payment shall be made as per the SOR.

TECHNICAL SPECIFICATION

FOR

INSTALLATION OF ABOVE GROUND GI /CU

PIPING

FOR

DOMESTIC, COMMERCIAL AND INDUSTRIAL

CONSUMERS



BRIDGE AND ROOF CO. (INDIA) LTD.
(A Govt. of India Enterprise)
4th & 5th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

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1.0 GENERAL INFORMATION

1.1 INTRODUCTION

The main intent of the specification is Supply and installation of above ground GI pipes, fittings, valves, meters and regulators, from the outlet of 'PE/GI transition fitting' up to the DOMESTIC consumers 'Appliance / stove/ oven valve' as per the Distribution Schedule.

The scope for commercial consumer includes installation of above ground GI pipes and associated fittings, valves, regulator up to and including meter. However, the piping may have to be carried out up to appliance valve, in case of some commercial customers.

In case of large commercials and industries completely assembled metering skids would be supplied to the contractor who would be required to install and provide inlet & outlet connection.

This technical specification defines the basic guidelines to develop an acceptable design and suitable construction methodology for carrying out different activities listed out in the schedule of rates of this tender.

Compliance with these specifications and / or approval of any of the Contractor's documents shall in no case relieve the Contractor of his contractual obligations.

2.0 SCOPE OF WORK

Generally the following shall constitute the contractor's scope of work:

- 2.1 Plan and prepare a detailed execution schedule and procedure for implementation based on QA / QC formats plans issued by Client / Consultant .
- 2.2 Contractor has to submit the Construction/Execution procedures before commencement of work to owner / owner's representative for approval.
- 2.3 Selection of route and marking on walls / floors between 'transition fitting' to 'cooking oven / stove / appliance' making openings and making provisions for fixing clamps. Making temporary but stable platforms / scaffolding / rope ladder etc., required for installation of pipes /fittings at all heights /multi storied flats and locations. Providing safety equipment to workers / plumbers.
- 2.4 Receipt of regulators, domestic meters, as a free issue items from Owner's Stores, loading, transportation, unloading at project site. Proper storing, stacking, identification, providing security and insurance during and before installation and commissioning of pipelines. Obtaining the approvals for optimum route and permission for work from the concerned authority and EIC.
- 2.5 Contractor shall procure all material, except free issue material from the outlet of PE/GI transition fitting up to the Domestic/Commercial customers "Appliance/Stove/Oven valve for satisfactory completion to the owner/Owner's representative.

- 2.6 Installation of GI pipes of ½", ¾", 1" dia. between transition fittings (installed by PE contractor) and customer's kitchen which would include NPT threading of pipes, and jointing of fittings such as elbows, tees, connectors, regulators, meters, isolation valves etc., as per laid procedures and specification including supply of GI fittings & Teflon tapes for sealing of joints. Painting of GI Pipes & fittings as per specification.
- 2.7 Installation of Copper pipes of ½" (12 mm) OD from the downstream of Meter upto the isolation valve prior to the customer's appliance, including the installation of isolation valves, brass fitting at the downstream of meters and at the entry of isolation valves with application of lacquer paint etc. to the satisfaction of EIC.
- 2.8 Supply & Installation of clamps for fixing pipes, isolation valve, appliance valve, box for regulator, Sleeves wherever required, painting of steel pipes & fittings. Providing consumables grout material, repair / restoration of walls / floors / holes including the materials required for conversions along with tools and tackles etc., complete as per specification.
- 2.9 Conversion of all types of LPG kitchen appliances to NG based appliances inclusive of supply of nozzles. Signing of Joint Meter Records (JMRs).
- 2.10 To demonstrate to the customer regarding use, safety and maintenance related aspects of NG based appliances and installations.
- 2.11 Testing & Commissioning of installations including purging as per specification and handing over the installation of Client / customer to the entire satisfaction of Client / Consultant .
- 2.12 Dismantling of scaffolding / temporary structures and cleaning of site.
- 2.13 Restoration of walls, flooring and other damages while executing the above ground installation .
- 2.14 Preparation and submission of above ground installation card for each house / commercial establishment indicating the list of materials used, reasons of not providing connections, testing pressure and date etc.. Deviation statements, if any, on completion / commissioning of work.
- 2.15 Any other activity not mentioned / covered explicitly above, but otherwise required for satisfactory completion / operation / safety / statutory/ maintenance of the works shall also be covered under the Scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Client.
- 2.16 Following activities are also in contractor scope
- Receive customer's request and complaints logged
 - Carry out joint technical feasibility survey for request received.
 - Attend and resolve customer complaint

3.0 MATERIAL, LABOUR, PLANT AND EQUIPMENT

3.1 Owner's Scope of Supply (Free Issue Item)

In order to speed up the project Free Issue Materials shall be issued to the Contractor from the designated store(s) of Client. Contractor shall be responsible for lifting the free issue materials from Owner's storage point(s) and transporting the same to work site(s) at his own cost.

3.2 Supplied by the Contractor

The contractor has to supply all GI pipes, GI Fittings, flexible hose, suraksha hose, Valves, Fittings, Clamps, Cu pipes, GI Pipes, Appliance Valves 1/2" and isolation Valves 1/2" , 3/4", sleeves, etc. and other materials required for said works.

The contractor shall provide the labour, tools (such as Hammer Drill, Piston Drill, Pipe cutters, Dies for threading, Pipe wrenches, spanners, all types of clamps, Plant and equipment necessary for the proper execution of the work. This will include but not be limited to list of specialized tools & tackles enclosed herewith. Contractor shall submit the specification of all the material to be supplied by him to EIC for approval and get the material checked & approved by him before commencement of execution.

The contractor is to be procure all bought out items from approved vendors and accordingly keep Client / Consultant informed. The inspection of bought out items would be carried out by Client / Consultant / Third Party Inspection or as instruction by EIC.

3.2.1 Plant and Equipment

All vehicular type machinery shall be in good working order and shall not cause spillage of oil or grease. To avoid damage to paved surfaces the contractor will provide pads of timber or thick rubber under the hydraulic feet or outriggers of machinery.

3.2.2 Sealant, grout

The contractor shall be responsible to arrange the supply of any consumable sealant or ready mix grout material required for execution of work. The sealant / grout supplied by the contractor shall be compatible with the area to be restored / rectified. No separate payment for the supply of sealant and grout shall be made to the contractor.

3.2.3 Clamps, Rawal Plugs, Screws, Nozzles etc.

The Clamps, Rawal Plugs, Screws, Nozzles, etc shall be approved lot wise by EIC prior to installation. Re-drilling of existing appliance nozzles is strictly not permitted.

The indicative sketch of the Brackets for Meter and GI Pipe Clamps is enclosed herewith.

3.2.4 Consumable Items

Special consumables such as Teflon Tapes, Solder wire, Flux, lacquer, thinner, shall be supplied by the contractor and are included for within the rates.

These consumables shall be of reputed companies and required grades / class and duly approved by EIC.

3.2.5. Other Materials

The contractor shall supply the following items where required. All materials required for formwork, NPT threading, testing etc. All signs, barricades, lights and protective equipment. All material required for working at higher floor levels (i.e., scaffolding, Ladder, safety belts etc.).

Special consumable such as grease for maintenance of domestic appliances and all paints or painting of G.I pipes, clamps, sleeves, brackets for meters, consumables such as Teflon Tapes, Petrol, diesel, fuels and oils required are to be supplied by the contractor and are included for within the rates.

All minor items not expressly mentioned in the contract but which are necessary for the satisfactory completion and performance of the work under this contract.

4. Acquisition, Receipt, & Storage Of Materials

In case of materials supplied by owner, then the contractor shall collect all materials from Client store between working hours following all documentation procedures laid down and as directed by EIC. The contractor shall at the time of receipt of material physically examine all materials and notify the EIC immediately of any damage. Any damage not recorded at the time of inspection done by contractor will be deemed not to have existed at the time of receipt of material. Cost of repair, rectification, replacement will be borne by the contractor. Any defective material found during the time of installation will be noted and forwarded to stores for replacement immediately with P.O reference and only with written approval of EIC. The contractor shall ensure that no defective materials shall be returned to store at the time of closure of contract.

The contractor shall maintain permanent locked store preferably near site in so that all the material are stored in such a manner so as to prevent and damage to the materials from scratching, gouging, indentation, excessive heat or by contact with any sharp objects and chemicals.

The contractor shall maintain log book at their respective stores stating issue and availability of free issue material as a given day. Further the contractor is required to undertake and submit an inventory of materials every month to Owners/Owners Representative (mandatory).

5.0 ISSUE OF WORK INSTRUCTIONS

- 5.1** The contractor will be required to carry out GI installation in the areas where PE laying is under progress. However, testing of GI installation shall be done in conjunction with laying of PE Service Lines to respective premises. A general scheme of distribution to domestic consumer is indicated in the sketch enclosed herewith, for reference. It may vary in case of individual and multistoried flats. A general scheme of distribution to small commercial consumers is indicated in the sketch enclosed herewith for reference.
- 5.2** All skilled personnel like plumbers, conversion technicians shall be approved and certified by EIC. Those who are certified and possess the identify cards duly signed by EIC shall only be authorized to take up respective jobs. The contractor has to arrange the identify cards. **In case it is found that contractor personnel other than authorized are carrying out these works, applicable penalty will be levied to the contractor as per contract.**
- 5.3** The rates to be quoted by contractor shall be inclusive of all preparatory / bye works, platforms, materials, labour, skills, supervision, tools, taxes, duties, levies, salaries, wages, overheads, profits, escalations, fluctuations in exchange rates and no change in the rates shall be admissible during tenancy of the contract.
- 5.4** The schedule of items of SOR have been described in brief and shall be held to be complete in all respect including safety requirements as per clause 9.0, tests, inspection, QA/ QC works, enabling and sundry works. The payment shall be made against completed and measured works only. No extra works whatsoever shall be considered in execution of these items.
- 5.5** A general scheme of distribution to domestic consumer is indicated in enclosed drawing. It may vary in case of individual and multistoried flats.

6.0 PROGRESS OF WORK

- 6.1** The contractor shall proceed with the work under the contract with due expedition and without delay.
- 6.2** The EIC may direct in what order and at what time the various stages or parts of the work under the contract shall be performed.
- 6.3** Weekly progress reports shall be submitted in the formats approved by Consultant/ Client., indicating broadly the laying, testing, RFC, conversions and extra piping.
- 6.4** Material consumption statement to be submitted at least once a month.

7.0 WORKSHEETS

- 7.1** The quantities and other details will be checked by Consultant/ Client's site engineer and the same shall be incorporated in measurement cards, signed & dated as certified on site. The cards will then be approved by the EIC.

- 7.2 Measurement sheets shall be prepared based on the measurement cards and checked and certified by the site engineers for billing purpose.
- 7.3 If measurement sheets submitted are illegible, incomplete or incorrectly booked, they will be returned to the contractor.

7.0 PERMISSIONS / APPROVALS

Contractor shall be responsible for obtaining approval from authorities like ADA / LDA and any other concerned authority, if required for completion of the work. Contractor must take the prior appointment from the resident for carrying out the work.

8.0 REFERENCE SPECIFICATION, CODES AND STANDARDS

The contractor shall carry out the work in accordance with this specification, Client's Engineering Standards: ASME B31.8 - Gas Transmission and distribution piping systems; Australian standard 3723 - Installation and Maintenance of Plastics Pipe Systems for Gas; Oil India Safety Directorate Norms (OISD), Latest PNGRB guidelines and the American Gas Association Document -Purging Principles and Practice.

Should the contractor find any discrepancy, ambiguity or conflict in or between any of the Standards and the contract documents, then this should be promptly referred to the Engineer - in- charge(EIC) for his decision, which shall be considered binding on the contractor.

9.0 SAFETY

The contractor shall take care of all safety norms applicable for such works at site. Contractor shall provide all safety appliances e.g., safety helmets, gloves, safety belts, ladders, staging, shoes, goggles etc.

All necessary care shall be taken while working at heights and workmen with proper skills and work permits only shall be deployed. Proper barricading and warning signs shall be installed. Adequate care shall be taken while taking supports from balconies, chajjas / protection parapets and like structures to be sure of strength and adequacy of the same.

No night working shall be permitted, without proper lighting and prior approval of EIC.

10.0 RIGHT-OF-USE SURVEY AND MARKING

The route of the pipeline to be installed shall be decided with consent of the consumer and SE / EIC. Contractor must ensure that the persons/ workers/ supervisors/workers at site shall have proper identity cards prior to entering the premises of the consumer.

No temporary or permanent deposit of any kind of material resulting from the work shall be permitted in the approach and any other position which might hinder the passage and / or natural water drainage or any area where there is objection from consumer

The contractor shall obtain necessary permissions from landowners and tenants and shall be responsible for all damages caused by the construction and use of such approaches, pavements, gardens, rooms, walls, roof etc., at no extra cost to Client.

A survey will be conducted jointly by Client /Consultant and the contractor at each premises or housing colony to be supplied. The survey record will note customer details, the potential gas supply points and proposed meter positions and estimates of material quantities. The contractor's representatives will make a sketch of the agreed pipe routes, if necessary.

The contractor will be responsible for contacting the customer and making the necessary arrangements for access, and appointments to carry out the work. Client will not be responsible for any time lost due to broken appointments or disputes with customers.

The contractor shall confine its operations within limits of the Right-in-use. The contractor shall restore any damage to property outside ROU, attributable to him.

The contractor shall also carry out all necessary preparatory work if needed to permit the passage of men and equipment. Lights, curbs, signs shall be provided wherever and / or required by the Consultant/ Client necessary to protect the public.

11.0 PROTECTION OF STRUCTURES AND UTILITIES

The contractor shall at his own cost, support and protect all buildings, walls, fences or other structures and all utilities and property which may, unless so protected, be damaged as a result of the execution of the works. He shall also comply with the requirements in the specification relating to protective measures applicable to particular operations or kind of work.

While painting contractor must take care of the consumer premises while carrying out the job/ such as spillage on floor, walls, ceilings, sun shades etc. if the same does occur, the contractor is to immediately make good to original.

12.0 G.I ABOVE GROUND SERVICE PIPE

The GI service pipe installation work includes all work necessary to connect from the PE / GI transition fitting on the down-stream of the PE service, to the customer's appliance, including the installation of appliance valve and isolation valves, except, Suraksha hose, Meters, Regulator for which separate rate shall be paid as per SOR Item of this document. The contractor shall be required to provide all equipment, tools and materials necessary to execute the work in an efficient and effective manner. Amongst other things he will be required to provide ladders, scaffolding pipe, dies, tripods, vices, fittings and teflon tape, drills for concrete and other masonry, drills for timber and laminated surfaces inside customer's property, bending tools, clamps, sleeves to facilitate the pipe passing through floors and walls, paint for pipe marking etc. GI pipes, fittings, valves and regulator shall be provided by Client.

All GI risers on the outside of buildings shall be fully supported to carry the weight of piping. Risers shall be supported by a flanged foot, or similar device, capable of supporting the total weight of the riser. The riser shall rise in a vertical line from its point of support to its highest point with a minimum of changes in direction. The threading of GI pipe shall be NPT and conforming to ASME / ANSI B1. 20.1.

Contractor has to supply different types / sizes of approved clamps (Mild Steel) for fixing GI pipes suiting to the site conditions and the same shall be painted before fixing, as per the painting specifications. Every fresh lot of the clamps, brackets, regulators boxes and other consumables shall be approved by the EIC prior to start of installation. All riser and lateral pipe shall be clamped to the building at intervals not exceeding two meters.

All riser and lateral pipe shall be clamped to the building at intervals not exceeding 1.5 meter. Maximum distance between clamps shall be 1.0-1.5m when pipe goes to the straight, if any tee or fittings lies in between the pipe then clamp shall be placed 150 mm far away from center line of fittings at every sides. However, the same may be changed as per site conditions/as directed by EIC. Minimum gap between pipe and wall shall be 25 mm. The joints/fittings of the GI installations shall be painted only after carrying out testing of the installation. Where pipe passes through a balcony floor, the floor surface shall be made slightly elevated around the service pipe or its surrounding sleeve to prevent the accumulation of water at that point. Where a short piece of sleeve is used around the gas pipe, the sleeve should be embedded in the concrete with a mix of mortar and the void between the pipe and sleeve filled with a suitable sealant. The sealant should be beveled such as to prevent an accumulation of water. Supply of clamps for all sizes of the GI pipes are in contractor's scope. Contractor has to take prior approval for design of clamps, paintings etc.

Pipe shall preferably enter a building aboveground and remain in a ventilated location. The location for entry shall be such that it can be routed to the usage points by the shortest practicable route.

The rates are to be paid in bands as shown in SOR e.g., the ground floor to 2nd floor band covers pipe work laid from the ground floor level to ceiling level on the 2nd floor. Payment will be in incremental stages. e.g., if a pipe is laid from the ground floor to the 9th floor of a building, the length of pipe laid up to the 2nd floor will be paid in the first band, The length of pipe laid between 3rd and 5th floor will be paid in second band and the length of pipe from the 6th floor and above will be paid for in the third band. However, it may be noted that all the piping done inside the premises shall be considered as ground floor piping, the payment for such work shall be as per first band. The Pipe installation includes all fittings, Flexible hoses, clamps, Regulators etc.

The contractor shall ensure that gas supply shall not be provided to the customer in any concealed piping.

13.0 COPPER ABOVE GROUND SERVICES PIPE

The Copper service pipe installation work includes all work necessary to connect from the downstream of Meter upto the isolation valve and flexible hose prior to the customers appliance, including the installation of valves, including application of lacquer paint etc. The contractor shall be required to provide all equipment, tools

and material necessary to execute the work in an efficient and effective manner. Amongst other things he will be required to provide ladders, scaffolding pipe, drills for concrete and other masonry, drills for timber and laminated surfaces inside customers property, bending tools, clamps, sleeves to facilitate the pipe passing through floors and walls, etc. Copper pipes, fittings, valves and regulator shall be provided by Client.

During installation the COPPER pipe is to be cut to proper length with a tube cutter, the burrs removed with a file, cleaning of outside surface of pipe & inside surface of fitting, applying flux to the tube and fitting around the outer / inner ends, inserting the tube in to the fitting, applying heat to the assembled joints using conventional Blow torch to melt Solder wire and lacquering.

Lacquer is to be applied to the copper tubes by mixing lacquer with thinner in approved proportions and applied by dipping method or with brush. It should be applied only once at a time and drying time of minimum one hr. is to be given.

Contractor has to supply different types / sizes of approved clamps for fixing COPPER pipes suiting to the site conditions and the same shall be painted, if required, before fixing, as per the painting specifications.

Contractor has to take prior approval of EIC for quality of the clamps, solder, flux, lacquer, thinner etc. The approval shall be taken for every fresh lot of clamps from EIC before installation at site.

All riser and lateral pipe shall be clamped to the building at intervals not exceeding one meter.

Where pipe passes through a balcony floor, the floor surface shall be made slightly elevated around the service pipe or its surrounding sleeve to prevent the accumulation of water at that point. Where a short piece of sleeve is used around the gas pipe, the sleeve should be embedded in the concrete with a mix of mortar and the void between the pipe and sleeve filled with a suitable sealant. The sealant should be beveled such as to prevent an accumulation of water. Supply of clamps for all sizes of the COPPER pipes is in contractor's scope. Contractor has to take prior approval for design of clamps, painting etc.

Pipe shall preferably enter a building aboveground and remain in a ventilated location. The location for entry shall be such that it can be routed to the usage points by the shortest practicable route.

The rates, mentioned in SOR are applicable from ground floor to 2nd floor. However, it may be noted that all the piping done inside the premises shall be considered as ground floor piping, the payment for such work shall be as per the SOR.

After installation of the entire piping system, final painting shall be done to the satisfaction of EIC.

All copper piping shall be clamped to the building at intervals not exceeding 500mm. These solder wire shall be of reputed company, lead free as per BS 29453: 1994 (Soft solder alloys) and supplied in coils. The details specification attached in tender. Solder for use with Cu tube & fittings generally melt within the temperature range of 1800C to 2500C. The contractor has to furnish the certificate of confirmation of standards before start of work.

14.0 TESTING OF GI INSTALLATION

- 14.1 The installation from PE/ GI transition fitting up to regulator shall be tested at the [pressure of 6.0 bar (g)].
- 14.2 The testing of GI riser pipe up to regulator shall be done with the isolation valve in open condition and open end plugged.
- 14.3 The GI pipe shall be painted with one coat prior to installation in riser, however the ends / joints shall be painted only after carrying out testing of the installation.
- 14.4 The GI installation from regulator outlet to appliance valve (except meter) shall be tested at a pressure of 2.0 bar (g) for a hold period of 4 hours and all the joints shall be checked with soap solution.
- 14.5 The meter shall be removed while carrying out the testing and joints of the meter shall be tested on line with soap solution after completion of the work. Proper test ends shall be made along with gauges and got approved by EIC. For the installation to be tested by manometer or diaphragm gauge the meter shall not be dismantled/removed and testing shall be carried out at 100 m bar with holding period of 15 min with no pressure drop.
- 14.6 The calibrated pressure gauges of suitable range shall be supplied by the contractor for testing.
- 14.7 The pressure gauges shall be calibrated from time-to-time as desired by Engineer In- charge but positively once in every six months.
- 14.8 Valves supplied by Clients, shall not be used for testing purpose
- 14.9 The details of testing shall be properly recorded in the measurement cards

15.0 INSPECTION

Any defect noticed during the various stages of inspection shall be rectified by the contractor to the entire satisfaction of Engineer-in-Charge before proceeding further. Irrespective of the inspection, repair and approval at intermediate stages of work, contractor shall be responsible for making good any defects found during final inspection/ guarantee period/ defect liability period as defined in general condition of contract.

16.0 PURGING & COMMISSIONING

Payment for the tapping of live mains and GI piping prior to the actual purge is included in normal laying & testing. The connection may involve the fitting of a temporary bypass, disconnection etc.

Purging shall be carried in accordance with the principles defined in the American Gas Association Publication "Purging Principles and Practice".

In addition the contractor shall submit and have approved Purging Plan before commencing any purging work. The plan shall include, but not be limited to the provision of the following materials and equipment: personal safety equipment, fire extinguisher, Purging adapter, Purge stack with flame trap and gas sampling point, Gas sampling equipment (may be gas leak detector), squash-off tool, Polyethylene connecting pipe work etc.

The plan shall also include the purging process along with detail on the sequence of events. The process is to also specially mention the need to lay a wet cloth over the GI pipe and in contact with the ground, to disperse static electricity during the purging work.

A purging stack with flame trap shall be used when purging services. Care shall be taken to ensure that the purge outlet is so located that vent gas cannot drift into buildings.

The purging work should be performed as follows,

- Ensure the method of purging is such that no pockets of air are left in any part of the customer's piping.
- Ensure that all appliance connections are gas tight, all appliance gas valves are turned off and there are no open ends.
- Where possible, select an appliance with an open burner at which to commence the purge i.e., a hotplate burner.
- Ensure the area is well ventilated, and free from ignition sources.
- Ensure branches that do not have an appliance connected are fitted with a plug or cap.
- Turn on one burner control valve until the presence of gas is detected. A change in the audible tone and smell is a good indication that gas is at the burner. Let the gas flow for a few seconds longer, then turn off and allow sufficient time for any accumulated gas to disperse.
- Turn on one gas control valve again and keep a continuous flame at the burner until the gas is alight and the flame is stable.
- Continue to purge until gas is available at other appliances.

17.0 INSTALLATION OF METERS

The work in this section includes :

- 17.1 Installation of domestic and non-domestic /small commercial meters with associated inlet and outlet connections (GI/Brass fitting), on the wall with approved meter brackets and angles.
- 17.2 Supply of approved meter brackets and angle brackets, properly painted with one coat of Zinc primer and two coats of synthetic enamel paint of approved make. A sketch of the brackets is enclosed herewith. It is required that one sample of each type of bracket is got approved beforehand.

- 17.3 Firmly securing the meters on the wall with good quality supply of proper rowel plugs, screws etc. In case the rowel plugs are not holding than wooden blocks or other fixing arrangements like cement etc. to be used for proper grouting.
- 17.4 The same rates of respective SOR Item will apply irrespective of whether the meter is situated inside or outside the property. Where a bank of meters is constructed the rate shall be for each complete meter installed.
- 17.5 The above activities along with restoration of the area to original shall be carried out to the complete satisfaction of consumer and EIC.
- 17.6 The meter installation will be preferred in open/ventilated space so as to prevent Gas accumulation and easy dispensation of Gas to atmosphere in case of any smell/ leakage of Gas. The meter installation will not be provided in any fixed enclosures, cabinets (below or above the slab) or confined space in the customer premises.
- 17.7 The contractor shall ensure that GI installation and rubber hose shall not be exposed to direct heat of Gas burners. The installation should have minimum clearance of about 1m from electric [point mains and switches. Minimum distance between appliance valve and Gas Burners shall be 0.3 meters. The isolation valve shall be installed after entering the customer premises /kitchen but before the meter installation.

18.0 PAINTING OF GI PIPES

The entire length of the pipeline along with fittings and clamps are to be painted after proper surface preparation and painting as follows.

- One coat of Primer application (Appropriate Zinc based primer)
- Two coats of synthetic enamel paint – canary yellow of minimum of 30microns per coat of reputed make like Asian, Berger, Nerolac.

All painting materials including primers and thinners brought to site by contractor for application shall be procured directly from manufacturers/ dealers as per specifications and shall be accompanied by manufacturer's test certificates. Paint formulations without certificates are not acceptable.

Engineer-in-Charge at his discretion, may call for tests for paint formulations. Contractor shall arrange to have such tests performed including batch wise test of wet paints for physical & chemical analysis. All costs there shall be borne by the contractor.

The painting work shall be subject to inspection and certification by Engineer-in- Charge at all times.

After installation of the entire piping system, final touching shall be done to the satisfaction of EIC.

19.0 BOX FOR REGULATOR

Boxes will be supplied and installed outside for regulators after due approval of the sample. The boxes will be installed as per requirement and as per instructions of Client.

The box brackets are to tightly secured to the wall with good quality proper Rowel plugs, screws etc. Wooden blocks to be used in case rowel plugs, do not hold properly.

All the boxes shall be thoroughly cleaned, painted with approved colour code.

As the boxes are installed outside it is to be ensured that they are painted properly to avoid rusting / weathering.

A sketch of regulator box is enclosed herewith.

20.0 CONVERSION OF DOMESTIC APPLIANCES

The work in this section includes,

The changing of nozzles and associated controls in accordance with manufactures instructions for both domestic and imported burners/ovens/grills/hotplate.

The changing of old appliance connection hoses and nozzles and re-greasing taps as necessary.

The contractor has to supply all types of nozzles / jets required for all types of appliances including imported burners, Grills, Ovens, Cleaning and performing minor maintenance of appliances

Testing for gas escapes and the soundness and performance of the appliance.

Instructing the customer in the safe use of natural gas and for fixing of safety and conversion labels.

Contractor must attend the complaints regarding appliances till the total area is handed over to Client's operation and maintenance.

All consumables (Nozzles, greases etc.) are in contractor's scope. Changing or repairing of any items damaged during conversion.

It may be noted that the rates will apply to all appliance found in both domestic and commercial premises. The contractor will be required under the Rates to provide both Pin gauges and standard sized nozzles.

21.0 RESTORATION

Contractor has to restore the area where ever he has carried out drilling, clamping etc. to its original condition to the satisfaction of the consumer and to ensure no passage to the premises and seepage. If the work was carried out in Govt. Flats (PWD), contractor has to restore the area according to CPWD specifications. For government flats the contractor has to obtain a clearance certificate from the concerned authorities maintaining the flats, after completion of the work.

Where slabs and brick work are to be reinstated, the level of the compacted sub- base is to be adjusted according to the slab / block thickness. The slabs or brick work should be laid on moist bedding material, which should be graded sand, mortar or mortar mix. The slabs or brick work should be tapped into position.

The restored slabs or brick work should match the surrounding surface levels. Joint widths should match the existing conditions, and be filled with a dry or wet mix of mortar.

Wherever any items of the consumer is damaged / broken during working, the same will be made good or replaced to the total satisfaction of the consumer.

The contractor will be responsible for the maintenance of all restoration carried out, for the duration of the contract guarantee period.

The contractor is to ensure the restoration work is properly supervised, and that the material used is suitable for the purpose and proper. Where the required standards are not achieved the contractor will be required to replace the defective reinstatement work.

Note that Payment for GI /Copper piping will only be authorized on satisfactory restoration, and where the sites has been cleared of all surplus materials etc.,

22.0 SUBMISSION OF FINAL RECORDS

Contractor shall submit the following documents in three sets each:

- a) Total list of houses & commercial establishments in the area allotted to him giving details of connections provided & reasons where connection could not be given / completed.
- b) The details recorded in measurement cards of every domestic house.
- c) Details of houses where extra piping done along with materials used.
- d) Total material consumption report.
- e) Material reconciliation with respect to the materials issued.
- f) Test reports & test certificates of gauges etc.
- g) Any other documents / records required.

TECHNICAL SPECIFICATION FOR HDPE PIPES



BRIDGE AND ROOF CO. (INDIA) LTD.
(A Govt. of India Enterprise)
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Contents of TS No. BR/TS/001

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1.0 **INTENT OF SPECIFICATION**

The intent of this specification is to establish minimum requirements to manufacture and supply of HDPE Pipes used for casing purpose of carrier pipe, supplying natural gas.

2.0 **SCOPE OF WORK**

2.1 The scope of the tendered will include manufacture/ supply, inspection/ testing/ marking/ packaging/ handling and despatch of HDPE Pipes of ratings and grades as indicated in the Material Requisition & Schedule of Rates, as per IS:4984 (Specification for HDPE Pipes for water supply).

2.2 All codes and standards for manufacture, testing, inspection etc. shall be of latest edition.

2.3 Purchaser reserves the right to delete or order additional quantities during execution of order, based on unit rates and other terms & conditions in the original order.

3.0 **INSTRUCTION OF TENDERER**

3.1 Length of the Pipes and their supply will be as per following :-

- DN 50 – In each coils of 100 mtrs. Length
- DN 75 – Each pipe of 12 mtrs. length minimum
- DN 90 – Each pipe of 12 mtrs. length minimum
- DN 110 – Each pipe of 12 mtrs. length minimum
- DN 250 – Each pipe of 12 mtrs. length minimum
- DN 315 – Each pipe of 12 mtrs. length minimum

3.2 Protection

- i) The ends shall be protected by proper end caps to prevent from shocks and ingress of the foreign body.
- ii) Coils shall be covered by black PVC/ PE Film to prevent exposure to direct sun light.

3.3 The successful bidder shall submit following for approval of Purchaser/ Consultant after placement of order

- a) The Quality Assurance Plan (QAP & Sampling Plan)
- b) Material test report as per clause 5 of IS:4984.

- c) Performance Requirements (clause 8 of IS:4984)
- d) Type Test (clause 9.1 of IS:4984).

3.4 The bidder shall submit following documents at the time of bidding,

- a) BIS Certification
- b) List of current orders in hand for similar items with full details such as specification, name of purchaser etc.
- c) Details of the largest supply executed
- d) Name and address of proposed test laboratories alongwith their credentials/ past records for carrying out all required tests.

TECHNICAL SPECIFICATION
FOR
MEDIUM DENSITY
POLYETHYLENE FITTINGS
AND
ELECTRO-FUSION

FOR

NATURAL GAS DISTRIBUTION



BRIDGE AND ROOF CO. (INDIA) LTD.
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C O N T E N T S

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1.0 SCOPE AND FIELD OF APPLICATION

This specification elaborates the requirements for Electrofusion fittings in the nominal size range 16 to 125 mm made from PE compound used with PE pipes for supply of natural gas and to be used at operating temperature not more than 40°C.

The material grades to be used are PE 100. The fittings shall be yellow or black in colour.

Electro Fusion Fitting Jointing

- 1.1 For Electro Fusion fitting jointing an electrical resistance element is incorporated in the socket of fitting which when connected to an appropriate power supply, melts and fuses the materials of the pipe and fitting together.
- 1.2 The effectiveness of this technique depends on attention to the preparation of the jointing surfaces, in particular the removal of the oxidized surface of the pipe over the socket depth and ensuring the jointing surface are clean. If ovality causes gap between concentrically located pipe and the fitting to exceed 1% of the pipe OD after re-rounding to ensure correct welding. If the gap still exceeds 1% of the pipe OD after re-rounding then a check should be made of the pipe OD dimensions to determine if it meets specification.
- 1.3 The maximum gap between eccentrically located pipe and fitting i.e. pipe touching fitting at one point must not exceed 2% of the pipe OD.
- 1.4 Sometimes coiled pipes may be too oval to fit into couplers, or the end of the pipe may make the alignment of the ends impossible. In such circumstances the use of a mechanical pipe straightener or rounding tool is necessary.

2. EQUIPMENT

- 2.1 The control box input supply is to be from a nominal 240V generator, which is normally of approximately 5kVA capacity. The Nominal output of the generator is to be 240V + 15%, -10% between no load and full load .

Control box are to include safety devices to prevent excessive voltages being present at the control box output. The safety devices shall operate in less than 0.5 s

Note that extension leads are not to be used on the control box outlet connections.

Warning : Control boxes are not intrinsically safe and must therefore not be taken to trench.

A mechanical pipe surface preparation tool is to be used before fusion is attempted. The tool is capable of removing the oxidized surface of the pipe in excess of the insertion depth. The tool is to remove a layer of surface material 0.2-0.4 mm thick from outer surface of the pipe preferably in a continuous strip of swarf over that length and round of the pipe.

Pipe clamps for restraining, aligning and re-rounding the pipes in the fusion process are to be used.

Pipe cutters with saw and saw guide

Protection against adverse weather conditions.

2.2 **Electro Fusion Jointing Method / Procedure**

Preparation

- Ensure there is sufficient space permit access to the jointing area . In a trench a minimum clearance of 150 mm is required.
- Check that the pipe ends to be jointed are cut square to the axis of the pipe and any burrs removed.
- Wipe pipe ends clean lint free material to remove traces of dirt or mud
- Mark the area over which the oxidized pipe surface is to be removed I.e. by placing the socket of the bagged fitting along side the pipe end. Trace a line round the circumference at the appropriate distance from the end of the pipe using a felt tip pen or similar.

Note that the fitting should not to be removed from the packaging at this stage.

- Connect the electro fusion control box input leads to the generator

- Check that the reset stop button, if fitted on the control box is in the correct mode.
- Check that reset stop button if fitted on the control box is in the correct mode
- Using the pipe end preparation tool, remove the entire surface of the pipe uniformly, preferably in continuous swarf over the area identified. i.e. in excess of insertion depth.
- A mechanical scraper could be used however there is a considerable risk that the end preparation will not be adequate with the use of such a tool.

Note that the prepared pipe surface should not be touched by hand.

- Remove the fitting from its packing and clean the scrapped area of the pipe surface and the bore of the fitting with a disposable wipe impregnated with Iso-propanol / Acetone. Ensure the prepared surfaces are completely dry before proceeding

Note that while Iso-propanol is a suitable cleaner , its use is subject to local health and safety regulation.

Check that the pipe clamps are of the correct size for the pipes to be jointed .

Insert the pipe ends into the fitting so that they are in contact with centre stop

Using the pipe clamps, secure the pipes so that they cannot move during the fusion cycle. Check that the pipes ends and the fitting are correctly aligned.

Connect the control box and check that they have been fully inserted.

If required by the control box enter the fusion jointing time into the control box timer. The jointing time is indicated on the fitting. Check the correct time as shown on the control box display.

Note 1: Automatic control box are available which obviate the need to enter the fusion time

Note 2: Gloves and goggles should be worn during the fusion process

Note 3: If the fusion cycle terminates before completion of the countdown , check for faults as indicated by the control box warning lights and check that there is adequate fuel in the generator. DO NOT attempt a second fusion cycle within one hour / cooling of joint at Ambient temperature of the first attempt.

2.3 **Records:** Records of appropriate servicing and calibration shall be kept.

2.4 **Training:** It is necessary that operators , inspection and supervisory personnel acquire the skills of Electro-fusion fitting .The necessary training should be carried out by qualified instructor with the objective of enabling participants to

- Understand the principles of electro-fusion fitting jointing
- Identify pipe and appropriate fitting markings
- Carry out pre jointing machine and equipment checks
- Make satisfactory Electro-fusion joints from pipes and fittings of different sizes
- Inspect for and identify joints of acceptable

Note that some form of assessment and certification should be associated with the training . The certificate should detail the pipe and fitting size range and the equipment used. A register of successful participants should be kept.

2.5 **Electro-Fusion Saddle Jointing**

For Electro Fusion fitting jointing an electrical resistance element is incorporated in the socket of fitting which when connected to a n appropriate power supply, melts and fuses the materials of the pipe and fitting together.

The effectiveness of this technique depends on attention to the preparation of the jointing surfaces, in particular the removal of the oxidized surface of the pipe over the socket depth and ensuring the jointing surface are clean.

Method of holding the tapping tee saddle during the fusion cycle are used namely top loading and under clamping space around the pipe. In a trench a minimum clearance of 150 mm is required.

2.6 **Electro-Fusion Saddle Jointing Method / Procedure.**

Preparation

Expose the pipe onto which the tapping tee is to be assembled , ensuring there is sufficient clear s pace around the pipe . In a trench a minimum clearance of 150mm is required.

Clean the pipe over the general area on which the saddle is to be assembled using clean , disposable lint free material .

Without removing the fitting from its packaging , place over the required position on the main . Mark the pipe surface all around and clear of the saddle base area using a felt tip pen or similar.

Remove the surface of the pipe to a depth of 0.2 to 0.4mm over the full area marked using a suitable tool, remove the swarf.

Connect the electro fusion control box input leads to the generator .
Check that the reset stop button, if fitted on the control box is in the correct mode.

Check that reset stop button if fitted on the control box is in the correct mode.

Remove the fitting from its packing and clean the scrapped area of the pipe surface and the bore of the fitting with a disposable wipe impregnated with Iso-propanol / Acetone. Ensure the prepared surfaces are completely dry before proceeding

Note that while Iso-propanol is a suitable cleaner , its use is subject to local health and safety regulation.

Position the fitting base onto the prepared pipes urface , and bring the lower saddle into position then gradually and evenly tighten the nuts until the upper saddle makes firm contact with scrapped pipe.

Check that there is sufficient fuel for the generator to complete the joint .
Start the generator and check that it is functioning correctly

Switch on the control box if applicable

Connect the control box output leads to the fitting terminals and check that have they have been fully inserted.

If required by the control box enter the fusion jointing time into the control box timer. The jointing time is indicated on the fitting . Check the correct time as shown on the control box display.

Note 1 : Automatic control box are available which obviate the need to enter the fusion time

Note 2 : Gloves and goggles should be worn during the fusion process

Press the start button on the control box and check that the heating cycle is proceeding as indicated on the display.

On completion of the heating cycle , the melt indicators where incorporated should have risen . If there is no apparent move in the melt indicators a new saddle joint should be made. Cut the tee of the faulty joints from its base.

If a satisfactory joint has been made , the joint is to be left in the clamps for the cooling time specified on the fitting label or any the automatic control box

Note 3 : If the fusion cycle terminates before completion of the countdown, check for faults as indicated by the control box warning lights and check that there is adequate fuel in the

The connection of the service pipe to the fitting outlet should be carried out in accordance with the procedure of the appropriate section of this item

Do Not attempt to tap the main with the integral cutter for at least 10 minutes after the completion of cooling cycle .

Records

Records of appropriate and calibration of electro fusion machines and joint shall be kept.

Trainings

AS PER 2.4

Note that some form of assessment and certification should be associated with the training. The certificate should detail the pipe and fitting size range and the equipment used. A register of successful participants should be kept.

2.7 STOPPING THE GAS FLOW

In the operation of a distribution system there is a periodic need to stop the gas flow for either routine or emergency maintenance. The flow may be stopped through the use of installed fitting such as valves. Where installed fittings are not available or the use of such would cause significant supply disruption, then one of the following methods may be employed.

2.8 SQUEEZE - OFF

- a. To control the gas flow a special tool may be used to squeeze the pipe walls together. Hydraulic jacks are used to supply the necessary force to compress the pipe walls for sizes 90 mm and above.
- b. As will be seen the squeeze-off equipment comprises two bars to apply pressure to outside of the pipe. The bars are brought together either manually or hydraulically, squeezing the pipe material together until a seal is formed where the upper and lower walls meet.
- c. The hydraulic machines should have a spring return for the jack and locking to prevent accidental release of pressure during operation. All squeeze – off machines should be fitted with check plate or stops to avoid over compression of the pipe.
- d. Where the pipe walls are compressed the polyethylene pipe will be severely deformed in the regions of maximum compression. The pipe will eventually regain its original shape after squeezing but there will be reduction in some pressure bearing properties.
- e. A complete stop may not always be obtainable because of wrinkling of the inside of the pipe. If a complete stop is required than a second squeeze can be used, with an intermediate vent to remove the gas which passes the first squeeze from say the trench of three pipe diameters area. A second squeeze

- off procedure should be a minimum of three pipe diameters and right angles to the squeeze.
- f. While not essential it would be good practice to fit a reinforcing stainless steel band / do not squeeze again adhesive tape around the pipe upon the completion of squeezing operation.

2.9 BENDING – BACK

Bending back of the pipe may be performed where the pipe has been severely damaged and stopping the gas flow is imperative. Its application is of a temporary nature and will provide a relief until a permanent repair can be effected. The section of pipe, which has been bent back, will to be replaced because of the damage caused by the severeness of the band back operation. The need of any bend back operation is most likely to occur as a consequence of damage caused to a PE service pipe.

While it is not the prime function of a saddle tee, controlling the flow in the service may be achieved by opening up an installed saddle tee and winding down the internal tapping tool to shut off the flow to the service pipe.

3. SYMBOLS & DEFINITIONS

3.1 Symbols for Electro fusion Fittings

3.1.1 Symbol for Electro Fusion Socket Fittings

The dimensions and main symbols used in this part of ISO 8085 are shown in figure 1, where

D1 is the mean inside diameter in the fusion zone comprising the mean inside diameter measured in a plane parallel to the plane of the mouth at a distance of $L3 + 0.5 L2$ from the plane at the mouth.

D2 is the minimum bore comprising the minimum diameter of the flow channel through the body of the fitting.

L1 is the depth of penetration of the pipe or of the male end of a spigot fittings.

L_2 is the nominal length of the fusion zone corresponding to the heated length.

L_3 is the nominal unheated entrance length of the fitting comprising the distance between the mouth of the fittings and the near end of the fusion zone.

3.1.2. Symbol for Electro Fusion Tapping Tees

The main symbols used for tapping tees are shown in Figure 2, where. **h** is the height of the service pipe and comprising the distance between the axis of the main pipe and the axis of the service pipe.

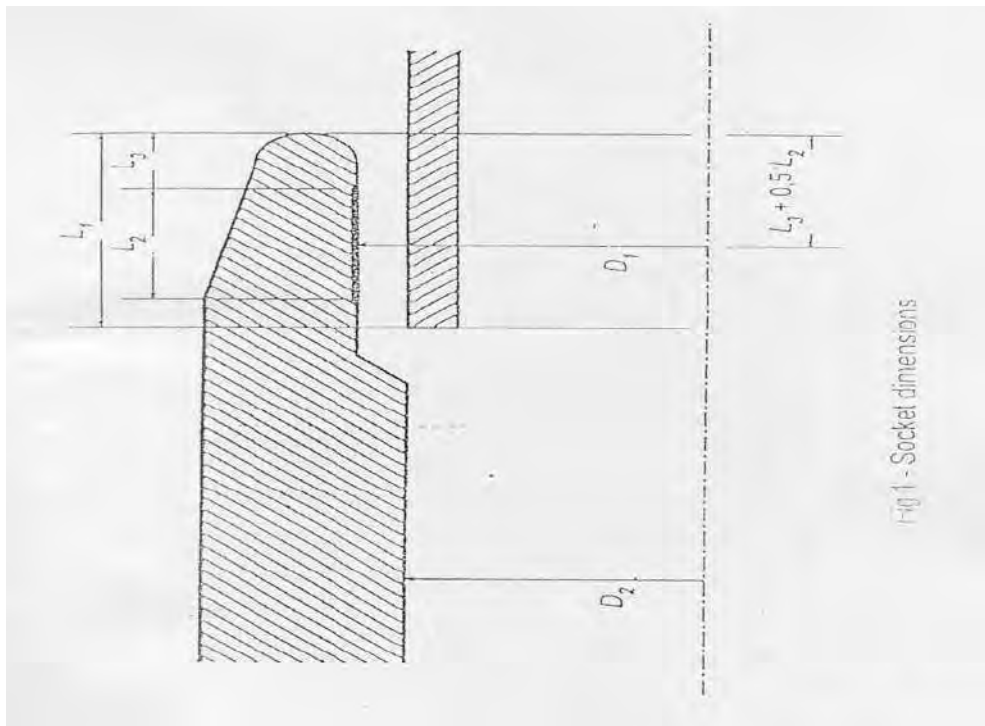
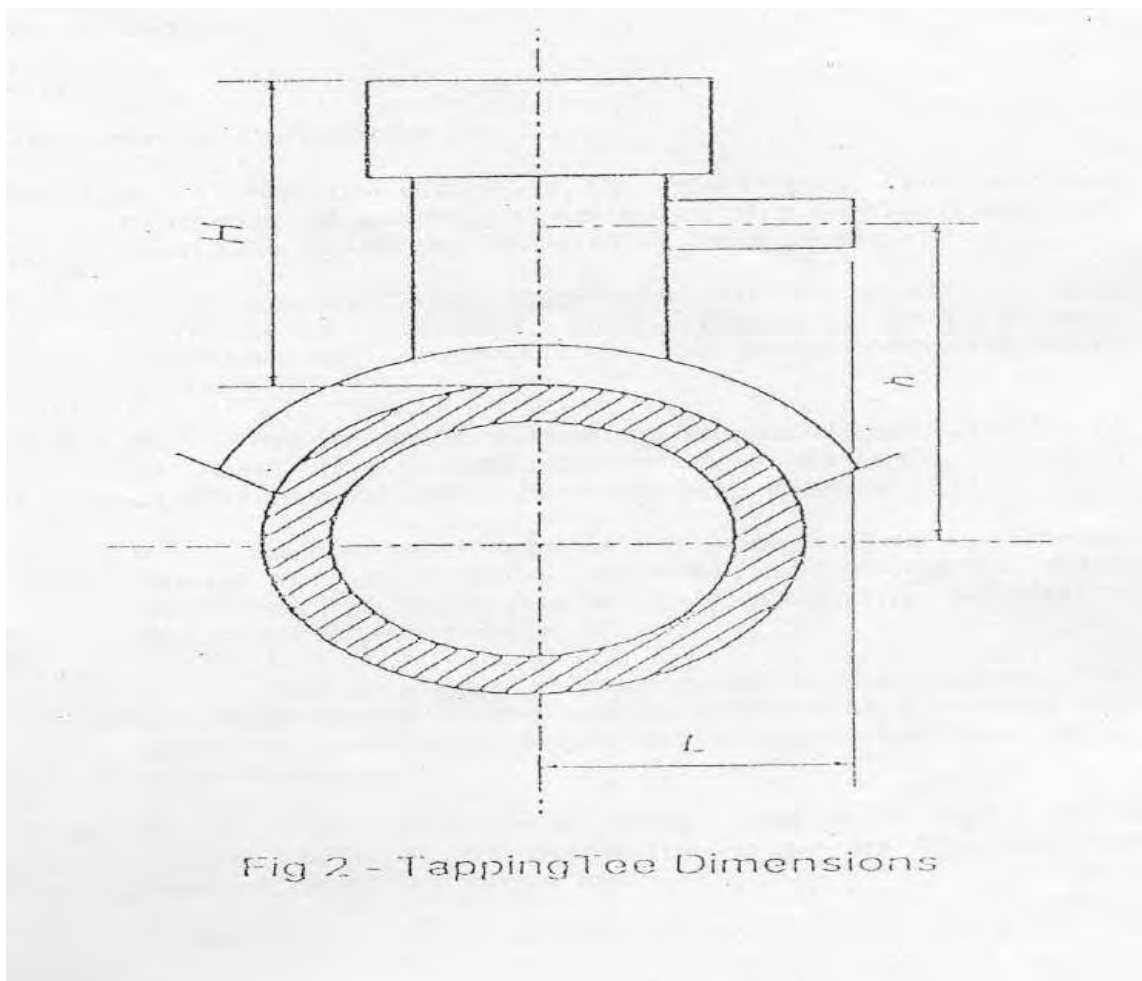


Fig 1 - Socket dimensions



L is the width of the tapping tee and comprising the distance between the axis of the main pipe and the plane of the mouth of the service pipe.

H is the height of the saddle which comprises the distance from the top of the main to the top of the tapping tee or saddle.

3.2 Definitions

3.2.1. Geometrical Definitions

3.2.1.1 Nominal diameter , DN, of a fitting:

The nominal diameter of a fitting is taken as the nominal outside diameter of the corresponding pipe series

3.2.1.2 Nominal wall thickness, en, of a fitting:

The nominal wall thickness of the fittings is taken as the nominal wall thickness of the corresponding pipe series.

3.2.1.3 Mean inside diameter

The arithmetic mean of at least two inside diameter measured at right angles to each other in transverse planes.

3.2.1.4 Out of roundness of the socket

The maximum inside diameter minus the minimum inside diameter of the socket, measured in the same plane, parallel to the plane of the mouth.

3.2.1.5 Maximum out of roundness of the socket:

The greatest value of the out of roundness between the plane of the mouth and a plane separated from it by a distance L1.

3.2.1.6 SDR value for a fitting:

The SDR value for a fittings is taken as being the same as that for the corresponding pipe series.

Where, $SDR = dn/en$

3.2.1.7 Wall thickness, E of a fitting:

The wall thickness of a fittings at any point of the body of the fitting which could be submitted to a stress induced by the pressure of the gas in the piping system.

3.2.2 Material Definition

3.2.2.1 Virgin Material:

Materials in form such as granules or powder that has not been subjected to use or processing other than that required for its manufacturer and to which no re-processable or recyclable materials have been added.

3.2.2.2 Own Reprocessable Material

Material prepared from rejected unused pipes, fittings or valves, including trimmings from the production of pipes, fittings or valve, that will be reprocessed in a manufacturer's plant after having been previously processed by the same manufacturer by a process such as in jecton moulding or extrusion.

3.2.2.3 Compound:

A homogenous mix of base polymer (PE) and additives, i.e. antioxidants, pigments, UV-stabilisers and others, at a dosage level necessary for the processing and of compon ents of this standards. The additives shall not have a negative influence on the performance with respect to feasibility. All additives shall be uniformly dispersed.

3.2.3 Definition related to material characterstics

3.2.3.1 Lower Confidence Limit (LCL):

A quantity with the unit in mega Pascals (MPs), which can be considered as a property of the material representing the 97.5% lower confidence limit of the predicted long-term hydrostatic strength at a temperature 20° C for 50 years in water.

3.2.3.2 Overall Service (Design) Coefficient (C):

An over all coefficient with a value larger than 1.0 which takes into consideration service conditions as well properties of the components of a piping system other than those represented in Icl. For gas applications, C can have any value equal to or greater than 2.0.

3.2.3.3 Minimum Required Strength (MRS):

The value of the Icl rounded down to the next lower value of the R 10 series when the Icl is less than 10 Mpa, or to the next lower value of the R 20 series when the Icl is greater than or equal to 10 Mpa.

Note: R10 and R 20 series are the Renard number series according the ISO 3 and ISO 497

3.2.3.4 Melt Mass Flow Rate:

A value relating to the viscosity of the molten material at a specified temperature and rate of shear.

3.2.4 Definitions Related To Service Conditions:

3.2.4.1 Gaseous Fuel:

Any fuel which is in the gaseous state at a temperature of + 15° C and a pressure of 1 bar.

3.2.4.2 Maximum Operating Pressure (MOP)

The maximum effective pressure of the gas in the piping system, expressed in bar, which is allowed in continuous use. It takes into account the physical and the mechanic characteristics of the components of a piping system.

Note : It is given by the equation :
$$MOP = \frac{20 * MRS}{C*(SDR-1)}$$

3.2.5 Definition on Design of Electrofusion Fittings:

3.2.5.1 Electro Fusion Socket Fittings:

A polyethylene (PE) fittings which contains one or more i ntegral heating elements, that are capable of transforming electrical energy into head to realise a fusion joint with a spigot – end or a pipe.

3.2.5.2 Electro Fussion Saddle Fittings:

A polyethylene (PE) fitting (top loading or wrap around) which contains one or more in tegral heating elements, that are capable of transforming electrical energy into head to realise a fusion joint onto a pipe.

3.2.5.3 TappingTee:

An Electrofusion saddle fitting which contains an integral cutter, to cut through the pipe wall. The cutter remains in the body of the saddle after installation.

3.2.5.4 Branch Saddle:

An Electrofusion saddle fitting which requires an ancillary cutting tool for drilling a hole in the adjoining main pipe.

3.2.5.5 URegulation:

Control of the energy supplied during the fusion process of an Electrofusion fitting, by means of the voltage parameter.

3.2.5.6 I Regulation:

Control of the energy supplied, during the fusion process of an electrofusion fitting by means of the current parameter.

4. **DESIGNATION**

4.1 Fittings shall be designed according to the grade of material, nominal diameter and Standard Dimension Ratio (SDR).

4.2 **Grade of Material:**

4.2.1. Fittings shall be classified according to the grade of material as given in following table:

Table–1

Material	M.R.S. Mpa	1 cl (20° C, 50 Yrs 97.5%) Mpa	Maximum Allowable Operating Pressure
PE 80	8.0	$8.00 \leq 1 \text{ cl} \leq 9.99$	5.5 Bar
PE 100	10.0	$10.00 \leq 1 \text{ cl} \leq 11.19$	7.0 Bar

4.3 **Nominal Diameter**

The Nominal Diameter for fittings covered in this standard are 16, 20, 25, 32, 40, 63, 75, 90, 110, 125 mm.

4.4 **Material**

4.4.1 Polyethylene Compound:

The Polyethylene compound used in the manufacture of fitting shall be a cadmium free compound. It shall be free from visible water, shall comply with the requirements as specified in Table – 2.

Table-2 : Characteristics of PE Compound

Characteristics	Units	Requirements	Test Parameters	Test Method
Conventional Density	Kg/m ³	≥ 930 (base polymer)	23 °C	ISO 1183 - ISO 1872/1
Melt Mass-flow Rate	g/10 min	± 20% of value nominated by compound producer	190 °C condition 18	ISO 1133
Thermal Stability	Minutes	> 20	200 °C (2)	ISO TR 10837
Volatile Content at Extrusion	mg/kg	≤ 350		ISO 4437 Annex. A
Water Content (3)	mg/kg	≤ 300		ASTM D 4019
Carbon Black Content	% (m/m)	2,0 ≤.....≤ 2,5		ISO 6964
Carbon Black Dispersion (4)	Grade	≤ 3		ISO DIS 11420
Pigment Dispersion (5)	Grade	≤ 3		ISO DIS 13949
Resistance to Gas Constituents	h	≥ 20	80 °C 2 Mpa	ISO 4437 Annex. B
Resistance to rapid crack propagation (RCP) (6)	Mpa	The critical pressure in the FS test shall be greater than or equal to the value of the MOP of the system multiplied by 1:5	0°C	ISO DIS 13478
Full Scale (FS) test : d ≥ 250mm				
Or		The critical pressure in the S4 test shall be equal to or greater than the value of the MOP of the system divided by 2,4 (8)	0°C	ISO DIS 13477
S4 Test : in principle according to all diameters (7)	Mpa			
Resistance to slow crack growth en > 5mm	h	165	80 °C, 8,0 bar (f) (9) 80 °C, 9,2 bar (f) (10)	ISO DIS 13479

- 1) Non black compound shall conform to the weathering requirements to ISO 4437
- 2) Test may be carried out at 210°C providing that there is a clear correlation to the results at 200°C, in case of dispute the reference temperature shall be 200°C

- 3) Only applicable if the compound does not conform to the requirement for volatile content. In case of dispute the requirements for water content shall apply
- 4) Carbon black dispersion for black compounds only.
- 5) Pigment dispersion method for non-black compounds only.
- 6) Only applicable for fittings which incorporate extruded pipe elements.
- 7) Shall be performed on pipe with a wall thickness of ≥ 15 mm.
- 8) This factor 2.4 is still under study and may be subject to change. If the requirement is not met, then retesting by using the Full Scale (FS) test shall be performed
- 9) Test parameter for PE 80.
- 10) Test parameter for PE 100.

5.0 **DESIGN**

- Fittings shall be designed for system operation at the pressures given in Table – I
- Fittings shall be free from cracks, voids, blisters, distortion, dent or other defects.
- Fittings shall be capable of being fusion jointed to pipes using control boxes. The fittings shall exhibit the strengths and fusion compatibility with, pipes of respective sizes.
- Each fitting shall be bar coated and shall have a permanent fusion indicator.
- Heating coil design shall be such that it should not be damaged during assembly leading to short circuit of heating coil.

5.1 **Electrofusion Socket Fittings**

Electrofusion Socket Fittings shall incorporate a method of controlling pipe penetration within each socket. The inner cold zone of each socket shall not be less than $(0.1 d + 5)$ mm for sizes upto 125 mm & $0.1 d$ for sizes greater than 125 mm.

5.2 **Tapping Tees**

Tapping tees shall be capable of installation by a force between 1 kN and 1.5 kN applied from above and on the centre line of the tapping tees stack. The tapping tees shall provide a means of cutting through the pressurised main pipe and allowing the gas flow into the outlet pipe.

5.3 **Transition Pieces**

To make connection between steel pipe and PE pipe specially fabricated transition pieces consisting of steel and PE pipes should conform to the requirements mentioned herein.

5.3.1 PE Pipe:

The PE pipe with one end plain should conform to the specification (IS:14885/ SDR 11)

5.3.2 Steel Pipe:

Black ERW steel pipe should conform to the specifications as laid in API STD 5L (latest revision)

5.3.2.1 Pipe END

One end of the pipe should be bevelled for welding angle of bevel should be $30^{\circ} + 5^{\circ}$.

5.3.3 Jointing between steel and PE pipes:

Steel and PE pipes should be so jointed in the factory so as to have a monolithic joint which is leak free and should be mechanically as strong or stronger than the PE Pipe.

5.4 **Transition Fittings (PE Pipes to threaded G.I. Fitting):**

Transition fitting for jointing of PE Pipes confirming to specification IS:14855/ SDR 11 to threaded G.I. tubing confirming to specification. The PE end of the transition fitting shall be jointed with PE Pipe with the electrofusion method.

6.0 **ELECTRICAL CHARACTERISTICS**

For each size and type of fitting, the manufacturer shall declare the nominal resistance of the heating element and specify the production tolerances.

The manufacturer s hall demonstrate that satisfactory joint can be made using the extremes of these tolerances.

All fittings shall have mechanically shrouded male electrical terminals. The fittings terminals connections shall be suitable for use with voltage less than or equal to 48 volts. Considerations should be given to the design of the shroud with respect to impact damage. When hollow terminal pins are used, the hole at the top of the pin shall be less than 1 mm diameter. The terminal pin material shall be corrosion resistant and the surface finish shall be N7.

Fittings incorporation two electrofusion sockets shall have both sockets fused in a single operation.

The heating elements shall be suitable designed to prevent short circuiting or local overheating/ under heating during the fusion operation. Protective coating applied to the heating element shall not have a detrimental effect on the joint.

The heating element wire shall not be disturbed during assembly.

7.0 DIMENSIONS

7.1 Measuring Temperature

Fittings shall not be measured within 24 hrs. of manufacturer to allow for normalization. The fittings shall be measured at an ambient temperature of $23 \pm 2^{\circ}\text{C}$, after a conditioning period of 5 Hrs.

Methods of measurements shall provided the appropriate degree of accuracy, and the reference conditions specified in this clause 6 apply in case of disputes in dimensional measurement.

7.2 Dimensional Stability

7.2.1 Couplers (Including all form of socket fittings):

All coupler dimensions shall conform to their specified value when the fitting has been stored for a period of 12 months at a temperature of $30 \pm 2^{\circ}\text{C}$.

7.2.2 Tapping Tees and Branch Saddles:

All tapping tee and branch saddle dimensions shall conform to their specified agreed values when the fitting has been stored for a period of 12 month at a temperature of $30 \pm 2^{\circ}\text{C}$.

TABLE 3 : SOCKET DIMENSIONS

Pipe Size d mm	Limits for average diameter d on each fitting measured over apparent fusion length L mm		Apparent fusion length L mm	Penetration depth L mm
	Maximum	Minimum	Minimum	Maximum
16	16.6	16.4	15	41
20	20.6	20.4	16	41
25	25.6	25.4	18	41
32	32.9	32.5	18	41
40	41.0	40.6	18	49
50	51.1	50.7	20	55
55	56.1	55.7	21	63
63	64.1	63.7	23	63
75	76.3	75.9	25	70
90	91.5	91.1	28	79
110	111.3	111.1	32	82
125	126.7	126.2	35	87
140	141.7	141.2	38	92
160	162.1	161.4	42	98
180	182.1	181.5	46	105

Notes:

1. The apparent fusion length, L, is the length of the integral heating elements, from the first regular section of the element to the end of the regular section, on one side of the fitting. This dimension to be measured from outside edge to outside edge of wire.
2. Any protrusions into the bore of the fitting (e.g. centralization ribs) shall not prevent easy assembly in the field.
3. The overall length of a straight coupler is equal to twice the quoted maximum penetration depth L.

TABLE 4: OVERALL LENGTH OF REDUCERS

Major Diameter mm	Maximum Length mm
25	90
32	90
63	120
90	180
125	215
180	280
200	245
225	260
250	280
280	300
315	320

TABLE 5: BRANCH SADDLE ASSEMBLY OUTLET LENGTH

Off-take Size mm	Shut-off method	Dimension from flange face to crown of main		Dimension from pipe end to crown of main	
		Class B fitting mm	Class B fitting mm	Class B fitting mm	Class B fitting mm
63	Valve	-	-	-	-
63	Squeeze	-	260*	-	-
90	Valve	-	-	400	-
90	Squeeze	400	180**	-	-
125	Valve	-	-	550	-
125	Squeeze	360	180***	-	-
180	Valve	-	-	750	-
180	Squeeze	360	180+	-	-
250	Valve	-	-	-	-
250	Squeeze	360	180++	-	-
* Flange size DN 50 ** Flange size DN 100 *** Flange size DN 150 + Flange size DN 250 ++ Flange size DN 250					

8 PERFORMANCE REQUIREMENTS

8.1 Mechanical Characteristics

Fittings shall be tested using pipes, which conform to ISO 4437, Test samples shall be assembled in accordance with ISO DIS 11413, following the technical instruction of the manufacturer and using fusion equipment conforming ISO DIS 12176.2.

When tested in accordance with the test methods as specified in table – 6 using the indicated parameters, the fittings have mechanical characteristics confirming to the requirements given in Table 6.

TABLE 6: MECHANICAL PROPERTIES

Characteristics	Units	Requirements I	Test	Parameters	Test Method
Hydrostatic strength at 20°C	H	Failure time $\geq$ 100	End caps orientation conditioning time. Type of test circumferential (hoop) stress pipe PE 80, PE 100, Test temperature.	Type a) free 1 h 9 Mpa, 12.4 Mpa, 20°C	ISO DIS 9356
Hydrostatic strength at 80°C	H	Failure time $\geq$ 165	End caps orientation conditioning time. Type of test circumferential (hoop) stress pipe PE 80, PE 100, Test temperature.	Type a) free 12 h water-in-water 4.6 Mpa 5.5 Mpa 80°C	ISO DIS 9356
Hydrostatic strength at 80°C	H	Failure time $\geq$ 1000	End caps orientation conditioning time. Type of test circumferential (hoop) stress pipe PE 80, PE 100, Test temperature.	Type a) free 12 h water-in-water 4 Mpa, 5 Mpa, 80°C	ISO DIS 9356
Cohesive resistance	mm	Length of initiation of brittle fracture L/3	Test temperature choice of method	23°C	ISO 13954 (A) ISO 13955 (A) ISO 13956 (B)
Impact strength (B)		No failure No leakage	Test temperature Falling height Mass of the striker	20°C 23°C 5m 5kg	ISO DIS 13957

Characteristics	Units	Requirements I	Test	Parameters	Test Method
Pressure drop (B)	M ³ /h	0.5 mbar : dn ≤ 63 0.1 mbar : dn ² > 63	Air flow rate Test medium Test pressure	Indicated by the manufacturer Air source 25 mbar	PrEN 12117

(A) Electrofusion Socket Fittings

(B) Tapping Tees

For hydrostatic strength test at 80°C only brittle failure shall be taken into account. If ductile failure occurs before the required time, a lower stress shall be selected and the minimum test time will be obtained from the line through the stress/ time points given in Table – 7.

TABLE 7
Hydrostatic strength (80°C) – Stress/
Minimum Failure Time Correlation

PE-80		PE-100	
Stress Mpa	Minimum Failure Time h	Stress Mpa	Minimum Failures Time h
4.6	165	5.5	165
4.5	219	5.4	233
4.4	293	5.3	332
4.3	394	5.2	476
4.2	533	5.1	688
4.1	727	5.0	1000
4.0	100	-	-

8.2 Physical Characteristics

When tested in accordance with the test methods as specified in Table 8 using the indicated parameters, the fittings shall have physical characteristics conforming to the requirements given in Table 8.

TABLE 8 : Physical Characteristics of Fittings

Property	Units	Requirements	Test Parameters	Test Method
Thermal Stability	Minutes	> 20	200 °C (1)	ISO TR 10837

Property	Units	Requirements	Test Parameters	Test Method
Melt Mass-flow Rate (MFR)	g/10 min	$0.2 \leq \text{MFR} \leq 1.4$ and after processing maximum deviation of $\pm 20\%$ of the value measured on the batch compound	Condition 18	ISO 4440.1

- (1) Test may be carried out at 210 °C providing that there is a clear correlation to the results at 200 °C, in case of dispute the reference temperature shall be 200 °C.

8.3 Technical File

The manufacturer of the fittings shall make availability of a technical file (generally confidential) with all relevant data to prove the conformity of the fittings to this specification. It shall include all results of the type testing and shall conform to the specification relevant technical brochure (e.g. ISO 12093 for electro fusion fittings).

The technical description of the manufacturer shall include the following information:

1. Field of appliance (pipe and fitting temperature limits SDR's and out of roundness):
2. Assembly instructions:
3. Fusion instruction (fusion parameters with limits)
4. For saddles and tapping tee:
 - The means of attachment (tools and/ or under clamp).
 - The need to maintain the under clamp in position in order to ensure the performances of the assembly.

For electrofusion fitting, the format of the technical brochure shall conform to ISO DIS 12093.

In the event of modification of the fusion parameters, the manufacturer shall ensure that the joint conforms to this standard.

9. MARKING

Following information shall be embossed upto height of 0.15 mm onto the fitting and also in the form of bar code:

- a) The manufacturer's identity
- b) The size of the fitting in mm
- c) Material and Designation
- d) The date of manufacturer (code may be used)
- e) Fusion time in seconds
- f) Cooling time in minutes
- g) Fusion parameters in BAR code
- h) Lot Number.

The information may be printed on a label associated with the fitting.

10 . PACKING

The fittings shall be packaged in bulk or individually protected where necessary in order to prevent deterioration. Whenever possible, they shall be placed in airtight plastic bags in card board boxes or cartons.

The cartons and/or individual bags shall bear at least one label with the manufacturer's name, date of manufacturer, type and dimensions of the part, number of units in the box, and any special storage conditions and storage time limits.

Note:

All the fittings required shall be bar coded electrofusion fitting type. In case bidder is quoting for spigot fittings, the necessary electrofusion coupler for all non electrofusion ends shall be included in the complete package

The transition fittings shall also be bar coded electrofusion type for PE connection, NPT Female threading confirming to ANSI B 20.1 for G.I connection & butt welded for carbon steel end.

The carbon steel material of transition fittings shall be confirming to APL 5L x 42 and thickness shall be of 4.8 mm.

All the fittings shall be used for the network operating at 4.0 Bar(g) Pressure.

TECHNICAL SPECIFICATION FOR POLYETHYLENE PIPES



BRIDGE AND ROOF CO. (INDIA) LTD.
(A Govt. of India Enterprise)
4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

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1.0 **INTENT OF SPECIFICATION**

The intent of this specification is to establish minimum requirements to manufacture and supply of Polyethylene Pipes used for supply of natural gas.

2.0 **INSTRUCTION TO THE TENDERER**

2.1 The PE pipes are to be supplied as per IS:14885.

2.2 The length of the Pipes and their supply will be as per following :-

- 20mm OD – In each Coils of 100 mtrs. length
- 32mm OD – In each Coils of 100 mtrs. length
- 63mm OD – In each Coils of 100 mtrs. Length
- 90mm OD – In each Coils of 50 mtrs, Length
- 125mm OD – In each Coils of 12 mtrs. length

2.3 **PROTECTION**

- i) The ends shall be protected by proper end caps to prevent from shocks and ingress of the foreign body.
- ii) Coils shall be covered by black PVC/ PE Film to prevent exposure to direct sun light.

2.4 The successful bidder shall submit following for approval of Purchaser/ Consultant after placement of order

- a) The Quality Assurance Plan (QAP & Sampling Plan)
- b) Certified test result of PE Compound (clause 5 of IS:14885)
- c) Performance Requirements (clause 8 of IS:14885)
- d) Type Test (clause 9.1.2 of IS:14885).

2.5 The bidder shall submit following documents at the time of bidding,

- a) BIS/ ISO Certification if obtained already, or documentary evidence of applying for the same
- b) List of current orders in hand for similar items with full details such as specification, name of purchaser etc.
- c) Details of the largest supply executed
- d) Name and address of proposed test laboratories alongwith their credentials/ past records for carrying out all required tests.
- e) The names of standards/ codes being followed in manufacture and supply
- f) Any accreditation certificates obtained or applied for.

2.6 **MARKING**

The pipe shall be marked in continues length in addition to the requirement of the applicable code.

TECHNICAL SPECIFICATION
FOR
ISOLATION VALVES



BRIDGE AND ROOF CO. (INDIA) LTD.

(A Govt. of India Enterprise)

4th & 5th Floor, Kankaria Centre,
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West Bengal, India.

Item	:	PE BALL VALVE
Application	:	Natural Gas Distribution Services
Code	:	ASME B16.40 / EN 1555-4
Rating	:	PE100 SDR 11
Operating Pressure	:	6 bar (g)
Operating Temperature	:	0°C to 60°C
End Connection	:	PE materials (Spigot Type)
Stem Extension	:	Not Required
Valve Design	:	Full Bore
Ball position Indicator	:	Open/Close Limits required

INSPECTION / DOCUMENT

- i) Inspection shall be carried out as per client/consultant's approved Inspection Plan / QAP.
- ii) Third party inspection agency appointed by vendor on prior approval of owner shall carry out stage wise inspection during manufacturing / final inspection.
- iii) Vendor shall furnish all the material test certificates, proof of approval /licence from specified authority as per specified standard, if relevant, internal test / inspection reports as per owner Technical Specification and specified code for 100% material, at the time of final inspection of each supply lot of material.

PACKING Packing size to be mentioned to ensure uniformity in delivery condition of the material being procured. Bidder shall submit the packaging details during QAP and also compiled with at the time delivery

TECHNICAL SPECIFICATION
FOR
GI PIPES



BRIDGE AND ROOF CO. (INDIA) LTD.
(A Govt. of India Enterprise)

4Th & 5Th Floor, Kankaria Centre,
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West Bengal, India.

TECHNICAL SPECIFICATION FOR GI PIPES

Service	: Natural Gas
Working Pressure	: 4 bar (g)
Hydrostatic Test Pressure	: 6 bar (g)
Working Temperature	: 0°C to 50°C
Material Description	: IS:1239 (Part-I) Heavy Duty, Continuous Welded
Min. Tensile Strength	: 30 kgf/sq.mm
Min. Elongation	: 6%
Tolerance	: + Not limited, - 10%
Protective Coating	: Galvanised uniformly to protect from corrosion as per IS:4736/ ASTM A53 or by Electro Galvanising
Ends of Pipes	: Plain End
Inspection	: Inspection shall be carried out as per applicable code & approved QAP and 100% Pressure Testing shall be carried out at factory.

1.0 **GENERAL NOTES**

- 1.1 All pipes and the ir dimensions, tolerance, chemical composition, physical properties, heat treatment, hydrotest and other testing and marking shall conform to the codes and standards.
- 1.2 Material test certificates (physical property chemical composition & heat treatment report) shall also be furnished for the pipes supplied.
- 1.3 All pipes shall be supplied with length between 5 to 7 mtr but average length of pipes supplied shall not be less than 6 meter. Overall length tolerance shall be (–) zero and (+) one length to complete the ordered quantity.
- 1.3 Pipes shall be galvanised uniformly to protect from corrosion as per IS:4736 / ASTM A53 or by electro galvanising.

2.0 **MARKING AND DESPATCH**

- 2.1 All pipes shall be marked in accordance with the IS 1239 codes, standards and specifications.
- 2.2 Paint or ink for marking shall not contain any harmful metal or metallic salts, such as zinc lead or copper which causes corrosive attack in heat.
- 2.3 Pipes shall be dry, clean and free from moisture, dirt and loose foreign materials of any kind.
- 2.4 Pipes shall be protected from rust, corrosion and mechanical damage during transportation, shipment and storage.
- 2.5 Both ends of the pipe shall be protected with the following material.

Plain End	:	Plastic Cap
Bevel End	:	Wood, Metal or Plastic Cover
Threaded End	:	Metal or Plastic Threaded Cap

TECHNICAL SPECIFICATION
FOR
COPPER TUBES



BRIDGE AND ROOF CO. (INDIA) LTD.
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STANDARD TECHNICAL SPECIFICATION FOR SEAMLESS ROUND COPPER TUBES

SPECIFICATION NO.: BR/TS/006



BRIDGE AND ROOF CO. (INDIA) LTD.
4th & 5th Floor, Kankaria Centre,
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AMENDMENT STATUS

Sl. No.	Clause / Paragraph / Annexure / Exhibit / Drawing Amended	Page No.	Rev.	Date	BY		Verified	
					Name	Sig.	Name	Sig.

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1.0 SCOPE

This specification covers the requirements for Seamless Round Copper Tubes. Specific requirement of Copper Tubes shall be 12 mm OD X 0.6 mm WT, Half Hard, with Physical properties to ensure wrinkle free bend-ability. Unless modified by this specification, requirement of BS EN 1057:2006 shall prevail.

2.0 MATERIAL

The material used for the manufacture of Copper tube shall conform to BS EN 1057:2006, Grade Cu – DHP or CW024A or ASTM C 12200.

Each lot of copper tubes shall be tested in accordance with BS EN: 1057 to ensure the following properties.

a. Mechanical Properties:

- i. Ultimate Tensile Strength – 250 N/ sq.mm (min)
- ii. Elongation – 30% (min)
- iii. Hardness - 75 to 100 on HV scale.

b. Chemical Properties:

Copper Percentage including silver (Cu+Ag): Min 99.9%

Phosphorus Percentage (P): 0.015 to 0.040%

3.0 DIMENSIONAL TOLERANCES:

The mean Outside Diameter of the tube shall not vary from the specified outside diameter of 12 mm by more than ± 0.09 mm. And also wall thickness of the tube shall not vary by more than ± 0.06 mm of specified wall thickness of 0.6 mm.

Copper Tubes shall be supplied in cut lengths of 3.0m

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4.0 PROCESS OF MANUFACTURE:

The tubes shall be so lid drawn by the process of melting, extrusion and thereafter Bright annealing. The ends shall be cut clean & square with the axis of the tube in no case shall tubes be redrawn from old or used tubes.

5.0 INSPECTION AND TESTING:

Inspection shall be carried out as per design codes/standards, Technical Specification and Inspection Plan/ Vendor's detailed QAP duly approved by owner/owner's representative.

Even after third party inspection, Client reserves the right to select a sample of tube randomly from each manufacturing batch and have these independently tested. If the results of these tests fall out side the limits specified in Technical specification, then client reserves the rights to reject all production supplied from the batch.

a. FREEDOM FROM DEFECT TEST

The tubes shall be free from internal & external fins, flaws, skin defects, blow holes etc. or other irregularities which might restrict the free flow of fluid and shall be so designed that resistance to the flow of fluid through the tubes is minimized.

All the tubes shall be subject to one the following tests:

- i) **Eddy Current Test:** Tubes shall be Eddy Current tested as per Annex. C of BS EN 1057 and ASTM E243. Eddy Current testing is a computer aided test, wherein the tube passes through a probe & an electro- magnetic field is created around the peripheral of the tube to detect any flaw or blow hole which may not be visible to the naked eye. The manufacturer must have in-house Eddy Current testing facilities to supply to IGL. IGL reserves the right to witness the Eddy Current facility at the manufacturer's factory premises
- ii) **Hydrostatic Test:** Hydrostatic test shall be carried out minimum 35 bar pressure for a period of 10 second as per BS EN 1057.
- iii) **Pneumatic Test:** The tube under test shall be connected to pressurized air. Air pressure of 4 bar shall be maintained in the tube. The tube shall be completely immersed in water for a minimum period of 10 sec. and inspected for the issue of bubbles from the tube. Tube shall be rejected in case of occurrence of bubble, otherwise accepted.

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b. CARBON CONTENT TEST

Copper tubes to be tested for carbon content test to ensure a carbon level to avoid the formation of carbon film during installation. Max. Carbon level shall be permitted as per Table-6 of BS EN 1057. Test shall be carried out as per reference method described in EN 723.

Sampling frequency shall be at least one sample per 5 Km of tube length. However, for small order quantities/ each batch of production, atleast one sample shall be drawn.

c. CARBON FILM TEST

The detection and assessment of carbon film shall be carried out as per Annex. B of BS EN 1057. Sampling for this test shall be same as that for 5.0 (b) of this specification.

6.0 RETEST:

In case a sample fails to meet the test requirements of this specification, the whole batch of production represented by the sample shall be kept aside for further test.

Four times the number of samples as sampling criteria defined in 5.0 (b) shall be taken from that batch for the specific test, for which the earlier sample failed, for further testing. If any of these samples fail to meet the test requirements, whole batch shall be rejected. And if, all the samples pass the test, that batch of production shall be accepted.

7.0 MARKING:

Each tube shall be permanently marked every meter with Client's Logo, manufacturer's name, size (OD x WT) and specification (BS EN 1057) of the tube.

Each packing containing tubes shall carry the following, stamped or written in indelible ink.

- a) Manufacturer's name or trade mark ,
- b) Designation of tubes (OD x wall thk)
- c) Lot number.

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d) No. of the standard (EN 1057)

8.0 PACKAGING:

Packing size shall be ensured for uniformity in delivery conditions of the material being procured. Packing size shall be approved by owner / owner's representative before packing the material. The vendor shall submit the packaging details during QAP and also comply with at the time of delivery.

9.0 DOCUMENTATION:

- (i) Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per Technical Specification, at the time of final inspection of each supply lot of material.
- (ii) Vendor shall prepare and submit the detail drawings of required Copper Tubes and QAP for approval by Client/ consultant before starting production.
- (iii) For any control test or examination required under the supervision of TPIA/owner/owner's representative, latter shall be informed in writing one (1) week in advance by vendor about inspection date & place along with production schedule.

 BRIDGE AND ROOF CO.(I) LTD			QAP Copper Tubes			QAP NO. BR/QAP/001			
						Sheet 1			
						Prepared : _____ Checked: _____			
						Approved : _____			
Sr. No.	INSPECTION AND TESTING	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA AND CERTIFICATE	FORMAT OF RECORD	INSPECTION			
						Vendor	TPIA	PMC/Client	REMARKS
1	Metallic materials (Chemical & Physical Requirements- Composition, Tensile & Hardness)	As per Sampling Plan in TS	As per BS EN 1057:2007	Clause 2.0 (a) & (b) of Technical Specification	Material Test certificate type 3.1	P	W	R	
2	Freedom From Defects Test One of the following three tests shall be performed :								
2.1	Eddy Current Test	100%	As per BS EN 1057:2007 and Technical Specification	As per BS EN 1057:2007 and Technical Specification	INSPECTION TEST REPORT	P	W	R	
2.2	Hydrostatic Test	100%	As per BS EN 1057:2007 and Technical Specification	As per BS EN 1057:2007 and Technical Specification	INSPECTION TEST REPORT	P	W	R	
2.3	Pneumatic Test	100%	As per BS EN 1057:2007 and Technical Specification	As per BS EN 1057:2007 and Technical Specification	INSPECTION TEST REPORT	P	W	R	
3	Surface Quality Test One of the following two tests shall be performed :								
3.1	Carbon Content Test	As per Sampling Plan in TS	As per BS EN 1057:2007 and Technical Specification	As per BS EN 1057:2007 and Technical Specification	INSPECTION TEST REPORT	P	W	R	
3.2	Carbon Film Test	As per Sampling Plan in TS	As per BS EN 1057:2007 and Technical Specification	As per BS EN 1057:2007 and Technical Specification	INSPECTION TEST REPORT	P	W	R	
4	Visual	1%	--	As per BS EN 1057:2007 and Technical Specification	--	P	W	R	
5	Dimensional	1%	--	As per BS EN 1057:2007 and Technical Specification	--	P	W	R	
6	Marking	100%	As per Technical Specification		INSPECTION TEST REPORT	P	W	R	
7	Packaging		As per Technical Specification		INSPECTION TEST REPORT	P	R	R	
8	Final Documentation		Document pertaining to all tests specified in this QAP	Document pertaining to all tests specified in this QAP	EN 10204 3.1 Certificate	P	H	H	

LEGENDS: R - REVIEW, W - Witness, H-Hold, P - Perform, TPIA - Third Party Agency
(Owner / Owner's Representative)

Note:-

- The Above Testing and acceptance criteria are minimum requirements, however, manufacturer shall ensure that the product shall also comply to the additional requirements as per TS and Design Standard.
- The supplier shall submit their own details ITP prepared on the basis of above/ Technical specification for approval of Owner/Owner's representative.
- Owner/Owner representative shall review/approve all the documents related to ITP/Quality manuals/Drawings etc. submitted by supplier.
- Owner / Owner's representative including TPIA will have to right to inspect any activity of manufacturing at any time Contractor shall in coordination with SupplierSub vendor issue detailed Production and Inspection schedule indicating the dates and the location to facilitate Owner/ Owner's representative and TPIA to organize Inspection.
- All reference Codes/ Standards, Documents. P.O. Copies shall be arranged by vendor / Supplier for reference of TPIA/PMC /CLIENT at the time of Inspection
- At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note & MTC.

TECHNICAL SPECIFICATION
FOR
GI FITTINGS



BRIDGE AND ROOF CO. (INDIA) LTD.
4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
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			EDITION : 0

STANDARD TECHNICAL SPECIFICATION FOR GI FITTINGS

SPECIFICATION NO.: BR/TS/007

PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :

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AMENDMENT STATUS

Sl. No.	Clause / Paragraph / Annexure / Exhibit / Drawing Amended	Page No.	Rev.	Date	BY		Verified	
					Name	Sig.	Name	Sig.

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1.0 SCOPE

This specification covers the requirements for Malleable Cast Iron Fittings. Unless modified by this specification, requirements of IS 1879 – latest edition shall be valid.

2.0 MATERIAL

The material used for the manufacturing of GI fittings shall conform to IS 14329 – 1995 with latest amendments Grade BM 300. Relevant test certificates conforming to all the test agreements of IS 14329 shall be provided with fittings.

3.0 DIMENSIONS AND DIMENSIONAL TOLERANCES

1. Dimensions of various types of fittings shall be as specified in sections 2 to 10 of IS 1879 – 1987 with latest amendments, as applicable.
2. Wall thickness of fittings and tolerances on them shall be as given in Table 1.2 of IS 1879 – 1987 with latest amendments,
3. In case of reducing fittings, the dimensions at each outlet shall be those appropriate to the nominal size of the outlet.
4. All GI fittings shall be of reinforced type. Reinforcement shall be provided as per Table 1.2 of IS: 1879.

4.0 WEIGHT

Weights of various types of fittings shall be as specified in sections 2 to 10 of IS 1879 – 1987 with latest amendments, as applicable.

5.0 THREADS

1. Threads shall be NPT type and conforming to ASME B1.20.1.
2. Outlets of fittings shall be threaded to dimensions & the tolerances as specified in ASME B1.20.1.
3. All internal & external threads shall be tapered.
4. For checking conformity of threads gauging practice in accordance with ASME B1.20.1 shall be followed.
5. Chamfering: The outlet of fittings shall have chamfer.

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6.0 FREEDOM FROM DEFECTS

On visual examination, the outside & inside surfaces of fittings shall be smooth & free from any defects such as cracks, injurious flaws, fine sand depth etc.

7.0 GALVANIZING

- i. Fittings shall be galvanized to meet the requirement of IS: 4759 – 1996 with latest amendments.
- ii. Zinc conforming to any grade specified in IS: 13229-1991 with latest amendments shall be used for the purpose of galvanizing.
- iii. Galvanizing bath: The molten metal in the galvanizing bath shall contain not less than 98.5% by mass of zinc.
- iv. Coating requirements: Mass of coating shall be 610 - 700 g/m².
- v. Freedom from defect: The zinc coating shall be uniform adhered, reasonably smooth & free from such imperfections as flux, ash bare patches, black spots, pimples, lumpiness runs, rust stains, bulky white deposits & blisters.
- vi. **Sampling plan and testing for Galvanization:**
 - a. All materials of the same type in coating bath having uniform coating characteristics shall be grouped together to continue a lot. Each lot shall be tested separately for the various requirements of the specification. The number of units to be selected from each lot for this purpose shall be given in Table 2 of IS 4759 – latest edition.
 - b. The sample selected according to Column 1 & 2 of Table 2, IS: 4759 – latest edition shall be tested for visual requirements as per Clause 6.2 of IS:4759 – latest edition
 - c. The sample found conforming to above requirements shall then be tested for mass of zinc coating in accordance with Clause 9.2 of IS: 4759 – latest edition.
- vii. Criteria for conformity: As per Clause 8.3 of IS: 4759-latest edition.
- viii. Test procedure shall be as per Clause 9 of IS: 4759-latest edition.

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8.0 PRESSURE TEST

Vendor shall carry out pneumatic pressure test as per Clause 12.1b of IS:1879 – 1987 with latest amendments on each & every fittings. Vendor has to submit the Internal Quality control certificate for the same.

9.0 COMPRESSION TEST

This test shall be conducted to judge the malleability of the pipe fittings & shall be carried out as per Clause 13 of IS:1879 – 1987 with latest amendments.

10.0 SAMPLING

Owner Representative of Third Party Inspection Agency appointed by Owner shall witness the tests as per Appendix-B of IS 1879 – 1987 with latest amendments. However, vendor to perform 100% inspection of visual, dimensional & pressure test. Vendor shall furnish Internal test certificates at the time of final inspection to the Owner.

11.0 MARKING

- Each fitting shall be embossed with Client's logo, manufacturer's name or trademark and the size designation to the extent possible depending upon available space. Detailed marking arrangement shall be submitted by vendor for approval.
- Each packing containing fittings shall carry the following embossed, stamped or written by indelible ink.
- Manufacturer's name or trade mark.
- Designation of fittings.
- Lot number.
- Each fitting conforming to this standard shall also be marked with BIS standard mark.

12.0 PACKAGING

Packing size is to be mentioned to ensure uniformity in delivery conditions of the material being procured. Packing size shall be approved by owner / owner's representative before packing the material. The vendor shall submit the packaging details during QAP and also complied with at the time of delivery.

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13.0 INSPECTION / DOCUMENTS

1. Inspection shall be carried out as per Owner Technical Specification/ referred codes.
2. Owner Representative/ Consultant or Third Party Inspection Agency appointed by Owner shall carry out inspection during manufacturing / final inspection.
3. Vendor shall furnish all the material test certificates, proof of approval / licence from specified authority as per specified standard, if relevant, internal test / Inspection reports as per Technical Specification & specified code for 100% material, at the time of final inspection of each supply lot of material.
4. Even after third party inspection, Owner reserves the rights to select a sample of fittings randomly from each manufacturing batch & have these independently tested. Should the results of these tests fall outside the limits specified in Owner technical specification, then Owner reserves the rights to reject all production supplied from the batch.

			QAP GI FITTINGS			QAP NO. BR/QAP/002 Sheet 1 Prepared : Checked: Approved :			
Sr. No.	INSPECTION AND TESTING	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA AND CERTIFICATE	FORMAT OF RECORD	INSPECTION			
						Vendor	TPIA	client/PMC	REMARKS
1	Materials (Chemical Properties)	IS:14329	IS:14329	IS:14329	Material Test certificate	P	R	R	
2	Materials (Mechanical Properties)	IS:14329	IS:14329	IS:14329	Material Test certificate	P	R	R	
3	Galvanizing								
3a	Visual inspection (Free from defects)	As per IS 4759-1996	As per IS 4759-1996	As per IS 4759-1996	INSPECTION TEST REPORT	P	W	R	
3b	Mass of Zinc Coating	As per IS 4759-1996	As per IS 4759-1996	As per IS 4759-1996	INSPECTION TEST REPORT	P	W	R	
4	Pneumatic Pressure Test	As per TS	As per IS 1879-1987	As per IS 1879-1987	INSPECTION TEST REPORT	P	W	R	
5	Compression Test	As per TS	As per IS 1879-1987	As per IS 1879-1987	INSPECTION TEST REPORT	P	W	R	
6	Weight of the Fittings	As per TS	As per IS 1879-1987	As per IS 1879-1987	INSPECTION TEST REPORT	P	W	R	
7	Dimension tolerances (Min. length of engagement. OD. Wall thk.)	1%	As per IS 1879-1987	As per IS 1879-1987	INSPECTION TEST REPORT	P	W	R	
8	Marking	1%	As per IS 1879-1987	As per IS 1879-1987	INSPECTION TEST REPORT	P	W	R	
9	Final Documentation		Document pertaining to all tests specified in this QAP	Document pertaining to all tests specified in this QAP		P	H	R	

LEGENDS: R - REVIEW, W - Witness, H-Hold, P - Perform, TPIA - Third Party Agency
 (Owner / Owner's Representative)

- The Above Testing and acceptance criteria are minimum requirements, however, manufacturer shall ensure that the product shall also comply to the additional requirements as per TS.
- The supplier shall submit their own details ITP prepared on the basis of above/ Technical specification for approval of Owner/Owner's representative.
- Owner/Owner representative shall review/approve all the documents related to ITP/Quality manuals/Drawings etc. submitted by supplier.
- Owner / Owner's representative including TPIA will have to right to inspect any activity of manufacturing at any time
- All reference Codes/ Standards, Documents. P.O. Copies shall be arranged by vendor / Supplier for reference of TPIA/PMC /Client at the time of Inspection
- At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note & MTC.

TECHNICAL SPECIFICATION FOR COPPER FITTINGS



BRIDGE AND ROOF CO. (INDIA) LTD.
4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

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8.0	MARKING
9.0	INSPECTION / DOCUMENTS
10.0	DRAWINGS

1.0 SCOPE

This specification covers the requirements for Copper Capillary fittings (End feed). Unless modified by this specification requirement European EN 1254 Part-I shall be valid.

2.0 MATERIAL

- i) The material used for the manufacturer of Copper Capillary Fittings shall confirm to BS EN 1254 - 1: latest Half hard
- ii) Material used for the solder should conform to BS 219 & BS EN 29453 or equivalent and should be lead free.

3.0 DIMENSIONAL TOLERANCES

Dimensions tolerances of various types of copper capillary fittings (End feed) shall be as per BS 864 Part-2 (latest) & EN 1254 (Open tolerances on dimensions shall be +/-0.1 mm).

The tolerances as specified in EN 1254 in nominal diameter are as follows (Ref Table 2).

Nominal Diameter	Tolerance on the mean diameter with respect to the nominal diameter		Resulting Difference	Diametrical
D	Outside Dia of male end (mm)	Inside Dia of Socket (mm)	Max. (mm)	Min. (mm)
12 mm	+ .0.04 - .0.05	+ 0.15 - 0.06	0.20	0.02

The minimum wall thickness of a fitting shall be in accordance as given below (Ref. Table 5 of EN 1254).

Nominal Dia mm D	Minimum wall thickness (mm)
	Wrought Coppers
12	0.6

End connection of the Fitting must be capable of end feeding. Internal solder ring type fitting is not acceptable

4.0 CARBON IN BORE

The internal surface of copper capillary fittings for soldering or brazing shall not contain any detrimental film nor present a carbon level high enough to allow the formation of such a film during installation. The maximum total carbon level on internal surfaces shall not exceed 1.0 mg/dm² when tested in accordance with the specification.

5.0 CHEMICAL PROPERTIES

Each heat no. of the copper fitting will be tested for chemical properties to conform to non-arsenical copper DHP grade C 106 as per BS EN 1057 & BS 2871 to have the following chemical composition :

Copper Percentage : Min 99.9%

Phosphorus Percentage : 0.015 to 0.040%

6.0 FREEDOM FROM DEFECTS

The fittings shall be free from internal fins, blow holes, skin defects etc. or other irregularities which might restrict the free flow of fluid, and shall be designed that resistance to the flow of fluid through the fittings is minimized.

7.0 PRESSURE TEST

All fittings shall be leak tested at the option of BGL at a pressure of 1 bar (g) for a period of 2 minutes and no leakage is permitted during this period. Manufacturer's Test Certificate is necessary with supply.

STRESS CORROSION RESISTANCE TEST

A Stress Corrosion Resistance is to be carried out as per method defined in ISO 6957 using test solution of pH 9.5 but without pickling

8.0 MARKING

Each tube shall be embossed with manufacturers name or trade mark BS 864 or EN 1254. Each packing containing fittings shall carry the following stamped or written in indelible ink.

- a) Manufacturers name or trade mark
- b) Designation of tubes
- c) BS Symbol mentioning as 864 or EN 1254 to be used.

9.0 INSPECTION / DOCUMENTS

- i) Inspect shall be carried out as per Client's Technical Specification and Inspection Plan / QAP.
- ii) Client representative or third party inspection agency appointed by Client shall carry out stage wise inspection during manufacturing / final inspection.
- iii) Vendor shall furnish all the material test certificates, proof of approval / license from specified authority as per specified standard, if relevant, internal test / inspection reports as per Client.

Technical Specification and specified code for 100% material, at the time of final inspection of each supply lot of material.

- iv) Even after third party inspection, Client reserves the right to Select a sample of tube randomly from each manufacturing batch and have these independently tested. Should the results of these tests fall outside the limits specified in Client Technical specification, then Client reserves the rights to reject all production supplied from the batch.
- v) Vendor shall prepare and submit the detail drawing of required copper fittings for approval by Client Before starting production
- vi) For any control test the date and place of inspection shall be provided by the vendor in writing to the Owner /Owner representative along with Production Schedule.

STANDARD SPECIFICATION
FOR
BRASS FITTINGS



BRIDGE AND ROOF CO. (INDIA) LTD.
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BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
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TITLE	BRASS FITTINGS	BR/TS/009	REVISION : A
			EDITION : 1

STANDARD TECHNICAL SPECIFICATION FOR BRASS FITTINGS

SPECIFICATION NO.: BR/TS/009

PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :

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			EDITION : 1

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					Name	Sig.	Name	Sig.

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1.0 SCOPE

This specification covers the requirements for Brass Capillary fittings (End feed fittings). Unless modified by this specification, requirement of EN 1254 Part 1 shall be valid.

2.0 MATERIAL

- The material used for the manufacturer of Brass Capillary Fittings shall conform to IS 319 Grade-2 or CW 602N as per EN12164.
- Material used for the solder should conform to BS EN 2 9453 and should be lead free. Solder material shall be generally melting within the temperature range 180 ° C to 250 ° C.
- Threading on the Brass fittings shall be done as per NPT (ASME 1.20.1).

3.0 DIMENSIONS

- Dimensions tolerances of various types of brass capillary fittings (End feed fittings) shall be as per EN 1254 Part 1. The tolerances at the end shall be as per EN 1254 Part I in nominal diameter which are as follows (Ref. table 2)

Diameter	Tolerance on the mean diameter with respect to the nominal diameter		Resulting Diametrical difference	
	Outside Dia of male end (mm)	Inside Dia of socket (mm)	Max (mm)	Min (mm)
12 mm	+0.04 -0.05	+ 0.15 +0.06	0.20 0.0	

The minimum wall thickness of a fitting shall be in accordance as given below (Ref table 5 of EN 1254 Part 1)

Nominal Dia mm, D

Minimum wall thickness (mm) Brass

12

1.1

- Minimum length of engagement shall be as per table-3 of BS EN 1254-1.
- Minimum bore area of fittings shall be corresponding to minimum bore as per table-4 of BSEN 1254-1

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IV. Tube abutment shall be shown in the drawing submitted for approval as per guidelines of BS EN 1254- 1.

4.0 END CONNECTION

End connection of the fitting must be capable of end feeding to the NPT x 12 mm. Integral solder ring type fitting is not acceptable.

5.0 CHEMICAL PROPERTIES

Chemical composition & mechanical properties of Brass shall be as mentioned in IS:319 Grade-2/ CuZn36Pb2As or CW602N as per EN12164. The material shall be Dezincification-resistant.

6.0 CARBON IN BORE

The internal surface of brass capillary fittings for soldering or brazing shall not contain any detrimental film nor present a carbon level high enough to allow the formation of such a film during installation. The maximum total carbon level on internal surfaces shall not exceed 1.0mg/dm². The test shall be carried out as per clause no. 5.4 and Annexure- A of EN 1254 -1.

7.0 RESISTANCE TO DEZINCIFICATION

The fittings shall be manufactured from alloys containing more than 10% Zinc. Accordingly resistance to dezincification test shall be carried out as per Cl. 5.5 of EN 1254 -1. The acceptance criteria shall be as per Clause 4.5.3.

8.0 STRESS CORROSION RESISTANCE TEST

A stress corrosion resistance is to be carried out on fittings as per method defined in ISO 6957 using test solution of pH 9.5 but without pickling.

9.0 FREEDOM FROM DEFECT

The fittings shall be free from internal fins, blow holes, skin defects etc. or other irregularities which might restrict the free flow of fluid, and shall be designed that resistance to the flow of fluid through the fittings is minimized.

10.0 HYDROSTATIC PRESSURE TEST

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All fittings shall be leak tightness tested at 1.5x25 bars for a period of 15 minutes and no leakage is permitted. This test shall be performed on each size of the fittings.

11.0 PNEUMATIC PRESSURE TEST

All fittings shall be leak tested at 6 bars for a period of 10 seconds and no leakage is permitted.

12.0 MARKING

Each fittings shall be embossed with client's logo, manufacturers name and trade mark EN 1 254 Part – I and designation of fittings. Each packing containing fittings shall carry the following stamped or written in indelible ink.

- a) Manufacturer's name or trade mark.
- b) Designation of fittings.
- c) Month and year of manufacturing

13.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Bidder shall submit the packaging details during QAP and also comply with at the time of delivery.

14.0 INSPECTION / DOCUMENTS

- (i) Inspection shall be carried out as per design codes/standards, Technical Specification and Inspection Plan/ Vendor's detailed QAP duly approved by owner/owner's representative.
- (ii) Client's representative or third party inspection agency appointed by client/ vendor shall carry out random inspection during manufacturing/ final inspection.
- (iii) Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per Technical Specification, at the time of final inspection of each supply lot of material.
- (iv) Even after third party inspection, Client reserves the right to select a sample of

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tube randomly from each manufacturing batch and have these independently tested. If the results of these tests fall outside the limits specified in Technical specification, then client reserves the rights to reject all production supplied from the batch.

- (v) Vendor shall prepare and submit the detail drawings of required brass fittings and QAP for approval by Client/ consultant before starting production.
- (vi) For any control test or examination required under the supervision of TPIA/owner/owner's representative, latter shall be in formed in writing one (1) week in advance by vender about inspection date & place along with production schedule.

 BRIDGE AND ROOF CO.(I) LTD			QAP BRASS FITTINGS			QAP NO. BR/QAP/003			
Sheet 1									
Prepared : Checked:									
Approved :									
Sr. No.	INSPECTION AND TESTING	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA AND CERTIFICATE	FORMAT OF RECORD	INSPECTION			
						Vendor	TPIA	PMC/Client	REMARKS
1	Raw Material Testing:								
1.1	Metallic materials (Chemical / Physical Requirement)	One sample in each heat	As per EN12164 for Gr. CW602N/ IS:319 Gr. 2)	As per EN12164 for Gr. CW602N/ IS:319 Gr. 2)	Material Test certificate type 3.1	P	R	R	
2	Leak tightness under Internal Hydrostatic Pressure Test	1%	BS EN 1254-1	BS EN 1254-1	INSPECTION TEST REPORT	P	W	R	
3	Gas Tightness Test (Pneumatic test)	1%	BS EN 1254-1	BS EN 1254-1	INSPECTION TEST REPORT	P	W	R	
4	Carbon in Bore	1%	BS EN 1254-1	BS EN 1254-1	INSPECTION TEST REPORT	P	W	R	
5	Dezincification Resistance Test	1%	BS EN 1254-1	BS EN 1254-1	INSPECTION TEST REPORT	P	W	R	
6	Stress Corrosion Resistance Test	1%	BS EN 1254-1	BS EN 1254-1	INSPECTION TEST REPORT	P	W	R	
8	Visual inspection (Free from defects)	10%	BS EN 1254-1	BS EN 1254-1	INSPECTION TEST REPORT	P	W	R	
9	Dimension tolerances (Min. length of engagement. OD. Wall thk.)	10%	As per Approved Drawing/ BS EN 1254-1	As per Approved Drawing/ BS EN 1254-1	INSPECTION TEST REPORT	P	W	R	
10	Marking	10%	BS EN 1254-1	BS EN 1254-1	INSPECTION TEST REPORT	P	W	R	
11	Final Documentation		Document pertaining to all tests specified in this QAP	Document pertaining to all tests specified in this QAP	EN 10204 3.1 CERTIFICATES	P	H	H	
LEGENDS: R - REVIEW, W - Witness, H-Hold, P - Perform, TPIA - Third Party Agency (Owner / Owner's Representative) Note:- - The Above Testing and acceptance criteria are minimum requirements, however, manufacturer shall ensure that the product shall also comply to the additional requirements as per TS. - The supplier shall submit their own details ITP prepared on the basis of above/ Technical specification for approval of Owner/Owner's representative. - Owner/Owner representative shall review/approve all the documents related to ITP/Quality manuals/Drawings etc. submitted by supplier. - Contractor shall in coordination with Supplier/Sub vendor issue detailed Production and Inspection schedule indicating the dates and the location to facilitate Owner/Owner's representative and TPIA to organize Inspection. - Owner / Owner's representative including TPIA will have to right to inspect any activity of manufacturing at any time - All reference Codes/ Standrds, Documents. P.O. Copies shall be arranged by vendor / Supplier for reference of TPIA/PMC /CLIENT at the time of Inspection - At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note & MTC.									

TECHNICAL SPECIFICATION
FOR
ISOLATION & APPLIANCE BALL VALVES



BRIDGE AND ROOF CO. (INDIA) LTD.
4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

Contents of TS No. BR/TS/010

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1.0 **INTENT OF SPECIFICATION**

The intent of this specification is to establish minimum requirements to manufacture and supply of Isolation & Appliance Ball Valves used for supply of natural gas.

2.0 **SCOPE OF WORK**

2.1 The scope of the tenderer will include manufacture/ supply, inspection/ testing/ marking/ packaging/ handling and despatch of Isolation & Appliance Ball Valves, as indicated in the Material Requisition & Schedule of Rates, meeting all the requirements as laid down in ASME B16.33 and should be approved by any certified agency for Gas application.

2.2 All codes and standards for manufacture, testing, inspection etc. shall be of latest edition.

3.0 **MATERIAL SPECIFICATION**

3.1 Metallic parts of Valves shall be manufactured as per material specified in respective datasheets.

3.2 Lubricants and Sealants. Lubricants and/or sealants shall be resistant to the action of fuel gases such as natural, manufactured, and LP gases. The valve manufacturer is responsible for the selection of lubricants and sealants, and for the determination of their suitability for the service conditions specified in the scope of this Standard.

3.3 Seating and Stem Seal Materials. The valve manufacturer is responsible for selection of seating and stem seal materials and for determination of their suitability for the service conditions specified in the scope of this Standard.

3.4 Air Aging Tests. Elastomer parts that are exposed to fuel gas shall be made from materials that, following 70-hr air aging in accordance with ASTM D573 at 212°F (100°C), meet elongation, tensile, and hardness property requirements as per ASME B16.33.

3.5 Elastomeric components' material shall qualify swell test and compression set tests as per requirement of ASME B16.33.

4.0 **DESIGN AND CONSTRUCTION**

4.1 DESIGN QUALIFICATION: Manufacturer shall qualify the design of the valves as per clauses mentioned below. Relevant documents for establishment of design qualification shall be submitted along with bid.

4.1.1 Each basic valve design shall be qualified and demonstrated as suitable for the service by testing randomly selected production valves of each size, type, and pressure shell material.

4.1.2 Following tests shall be carried out for design qualification as per ASME B 16.33

- a) Gas tightness
- b) Temperature resistance

- c) Structural tests viz. Strength test, Twist test, Bend Test, Tensile Test, Turning Torque test
- d) Flow Capacity

- 4.2 Production Testing
Each Valve shall be tested to a test pressure of 1.5 times the pressure rating of the valve according to test method of gas tightness. No leakage is permitted during production testing.
- 4.3 Valve ends shall be as specified in respective datasheets.

5.0 **Inspection and Testing**

- 5.1 Each valve shall be tested for leakage as specified in cl. 4.2 above. Test certificate shall be provided for production testing.
- 5.2 Test certificates for physical and chemical properties of all the components of valves shall be provided as per agreed QA/QC requirements.
- 5.3 Test certificates of all the tests conducted for design qualification as per ASME B16.33 shall be submitted for review.
- 5.4 Type of inspection documents as per EN 10204 shall be as defined in respective QAP/ Datasheet.

6.0 **Packing and Marking**

- 6.1 Valves shall be marked as mentioned below.
- 6.1.1 The manufacturer's name or trademark and, where space permits, the designation "B16.33." The B16.33 mark is the manufacturer's acknowledgement that the valve was manufactured in conformance with ASME B16.33.
- 6.1.2 Pressure Rating.
- 6.1.3. Open and close indication. when a 1/4 turn valve is in the open or closed position (if flat head, longitudinal axis of the head shall be perpendicular to the longitudinal axis of the valve when valve is in the closed position)
- 6.2 Each Valve shall be packed in individual card board boxes so as to avoid wear and tear during transport.
- 6.3 For threaded end valves, end caps shall be provided.

Data Sheet - Isolation Ball Valve		
S.NO	Description	Details
1	Process Data	
1.01	Fluid	Natural Gas
2	Operating Condition	
2.01	Pressure	4 Bar (g)
2.02	Temperature (°C)	0-48
3	Design Condition	
3.01	Pressure	-
3.02	Temperature (°C)	-29 to 65
4	Valve Data	
4.01	Size	1/2" and 3/4"
4.02	Type	Isolation Ball Valve of Full Bore with NPT Female (Confirming to ANSI B1.20.1) as an inlet with operating Knob and locking arrangement with provision for sealing wire and lead seal (without Key).metallic operating Knob for full open/close at 90° position.
4.03	Rating	125#
4.04	End Connections	NPT Female (Confirming to ANSI B1.20.1)
4.05	Body Material	Total Body Including the Nozzle shall be of forged Brass (ASTM B 283, Alloy UNSC37700) with Nickel/ Chrome plated.
4.06	Ball Material	Hard Chrome/ Nickel Plated, ASTM B 283
4.07	Stem	ASTM B283
4.08	Seat	Teflon
4.12	Extension Stem	Not required
4.13	Operator	Butterfly Arrangement
5	Painting	
5.01	Surface Preparation	Not Required
5.02	primer	Not Required
5.03	finish	Not Required
5.04	insulation	Not Required
6	Test	
	Production Test	-
6.01	Production Test Pressure	1.5 times of design class pressure
6.02	Test Medium	As per ASME B16.33
6.05	Test duration	15 seconds
Note	1. Lever type handle not acceptable.	
	2. Minimum Nickel/ Chrome Plated on the ball & body of Isolation ball valve shall be 25 micron	
	3. The above specified tests in TS/ Data sheet are minimum however, the other remaining/ specified test shall be done as per ASME B.16.33	

Data Sheet - Appliance Ball Valve		
S.NO	Description	Details
1	Process Data	
1.01	Fluid	Natural Gas
2	Operating Condition	
2.01	Pressure	4 Bar (g)
2.02	Temperature (°C)	0-48
3	Design Condition	
3.01	Pressure	-
3.02	Temperature (°C)	-29 to 65
4	Valve Data	
4.01	Size	1/2"
4.02	Type	Appliance Ball Valve of Full Bore with ½" NPT (Confirming to ANSI B1.20.1) Female as an inlet and the outlet shall be having Ni/ Cr plated brass or steel a nozzle (Serrated to suit ¼" rubber tubing/ hose connection) and the material is required for Domestic Natural Gas Service with a metallic operating Knob for full open/close at 90° position.
4.03	Rating	125#
4.04	End Connections	Female as an inlet and the outlet shall be having Ni/ Cr plated brass or steel as nozzle
4.05	Body Material	Total Body Including the Nozzle shall be of forged Brass (ASTM B 283, Alloy UNSC37700) with Nickel/ Chrome plated.
4.06	Ball Material	Hard Chrome/ Nickel Plated, ASTM B 283
4.07	Stem	ASTM B283
4.08	Seat	Teflon
4.12	Extension Stem	Not required
4.13	Operator	Knob Arrangement.
5	Painting	
5.01	Surface Preparation	Not Required
5.02	primer	Not Required
5.03	finish	Not Required
5.04	insulation	Not Required
6	Test	
	Production Test	-
6.01	Production Test Pressure	1.5 times of design class pressure
6.02	Test Medium	As per ASME B16.33
6.05	Test duration	15 seconds
Note	1. Minimum Nickel/ Chrome Plated on the ball & body of Isolation ball valve shall be 25 micron	
	2. The above specified tests in TS/ Data sheet are minimum however, the other remaining/ specified test shall be done as per ASME B.16.33	

 BRIDGE AND ROOF CO.(I) LTD			QAP ISOLATION AND APPLIANCE BALL VALVES			QAP NO. BR/QAP/004		
						Sheet 1		
						Prepared : Checked:		
						Approved :		
Sr. No.	INSPECTION AND TESTING	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA AND CERTIFICATE	FORMAT OF RECORD	INSPECTION		
						Vendor	TPIA	REMARKS
1	Raw Material Testing:							
1.1	Metallic materials (Chemical / Physical Requirement)	One in each heat	As per ASTM B 283 (ALLOY UNS C37700)	As per ASTM B 283 (ALLOY UNS C37700)	Material Test certificate	P	R	EN10204-3.1 certificate
1.2	Seat & Stem Seal Material	One in each heat	As per TS/ B16.33	As per TS/ B16.33	Material Test certificate	P	R	EN10204-3.1 certificate
2	Final Product:							
2.1	Gas Tightness Test	1%	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	W	
	Twist (Torque) Test	1%	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	W	
	Bending Test	1%	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	W	
	Tensile Test	One in each heat	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	W	
	Turning Torque Test	1%	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	W	
2.2	Temperature Resistance test	1%	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	W	
2.3	Flow Capacity Test	1%	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	W	
2.4	Production pressure test	100%	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	RW	
2.5	Visual inspection (Free from defects)	100%	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	RW	
2.6	Dimension tolerances (Min. length of engagement. OD. Wall thk.)	100%	As per Approved Drawing	As per Approved Drawing	INSPECTION TEST REPORT	P	RW	
2.7	Marking	100%	ASME B 16.33	ASME B 16.33	INSPECTION TEST REPORT	P	RW	
3	Final Documentation		Document pertaining to all tests specified in this QAP	Document pertaining to all tests specified in this QAP	EN 10204 3.1 CERTIFICATES for raw material	P	H	
LEGENDS: R - REVIEW, W - Witness, RW - Random Witness (Minimum 0.5% of lot size) H-Hold, P - Perform, TPIA - Third Party Agency, CA- Control Authority (Owner / Owner's Representative) Note:- - The Above Testing and acceptance criteria are minimum requirements, however, manufacturer shall ensure that the product shall also comply to the additional requirements as per TS. - The supplier shall submit their own details ITP prepared on the basis of above/ Technical specification for approval of Owner/Owner's representative. - Owner/Owner representative shall review/approve all the documents related to ITP/Quality manuals/Drawings etc. submitted by supplier. - Contractor shall in coordination with Supplier/Sub vendor issue detailed Production and Inspection schedule indicating the dates and the location to facilitate Owner/Owner's representative and TPIA to organize Inspection. - Special manufacturing procedures have to the specially approved or only previously approved procedures have to be used. - Owner / Owner's representative including TPIA will have to right to inspect any activity of manufacturing at any time - All reference Codes/ Standards, Documents. P.O. Copies shall be arranged by vendor / Supplier for reference of TPIA/PMC /GAIL(I)at the time of Inspection - At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note & MTC.								

BRIDGE AND ROOF CO.(I) LTD	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR WARNING MATS	
TECHNICAL SPECIFICATION NO. : BR/TS/011		REV-1	Page 1 of 4



TECHNICAL SPECIFICATION FOR WARNING MATS

SPECIFICATION NO. : BR/TS/011, Rev-1

BRIDGE AND ROOF CO.(I) LTD	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR WARNING MATS	
TECHNICAL SPECIFICATION NO. : BR/TS/011		REV-1	Page 2 of 4

**SPECIFICATION FOR PE ANTI RODENT WARNING MATS
FOR PIPELINE**

Purpose	: For using as a warning sign for Underground Pipeline
Width	: D + 300 mm, D – Dia of Line Pipe
Thickness	: 1.0 mm thick
Material of the mat	: The material shall be of high density Polyethylene of virgin quality and non Biodegradable type. It shall have Non Hazardous, Non Toxic and Anti – Rodent properties.
Colour of the mat	: Golden Yellow with letters printed in RED of non-deletable type with high abrasion resistant.
Art Work	: A sample piece of 30mm wide and 200mm long of every batch shall be checked by immersing in 20% solution of Ammonium Sulphide for period of 2 weeks at a temperature of 15°C for colour intactness of the strip. Copy of Art work is enclosed at Page 4. The Art work shall be printed in English and local language alternatively at every 1 mtr distance.
Mechanical Properties of HDPE	
Tensile Strength	: Minimum 200 kg/cm ²
Elongation at Break	: Minimum 175%
Bundle Length	: 1.0 mm thick warning mat shall be supplied as 100 mtrs length in each bundle packed in PE Woven sack material.
Tests	: Minimum following test has to be done with each batch of warning mat ➤ Tensile Strength test ➤ Elongation test ➤ Impact Strength test ➤ Color fastness test ➤ Heat Stability test ➤ Print Stability test

BRIDGE AND ROOF CO.(I) LTD	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR WARNING MATS	
TECHNICAL SPECIFICATION NO. : BR/TS/011		REV-1	Page 3 of 4

- Oxidation Induction test
- ESCR test
- Melt Flow Rate test
- Anti-Rodent Test.
- UV Stabilizer Test
- DSC Scan Test of Raw Material & Finish Goods.

Test Certificates : Vendor has to submit the all test certificates to Purchaser

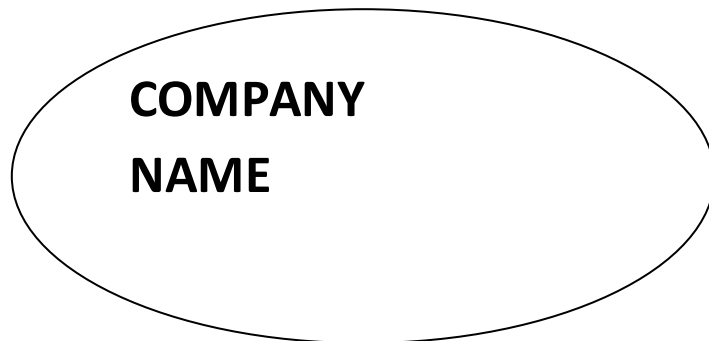
Inspection : The manufacturer has to submit the QAP before commencement of production. Inspection of the material will be done at vendor's works by Client / PMC Representative. Vendor has to submit all test reports before inspection call. Any test failed during the inspection for the offered lot, the total lot will be rejected.

Documentation : Vendor shall submit all test reports including document regarding Toxicology data & ROHS compliance, documentary evidence regarding Non-biocide product, value of Lethal Dosage (LD), value of % dermal toxicity, details of active ingredient in the product and final inspection reports along with the supply of materials.

BRIDGE AND ROOF CO.(I) LTD	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR WARNING MATS	 ब्री एण्ड आर B AND R Qualifying Nations Since 1920
TECHNICAL SPECIFICATION NO. : BR/TS/011		REV-1	Page 4 of 4

HIGH PRESSURE GAS PIPELINE BELOW

CLIENT NAME



**COMPANY
NAME**

IN EMERGENCY PLEASE CONTACT

PHONE NOS.

	CONTRACTOR	QUALITY ASSURANCE PLAN FOR WARNING MAT	PROJECT :
	ORDER NO. & DATE		PACKAGE NO.
	SUB-CONTRACTOR		PACKAGE NAME :
	ORDER NO. & DATE		ITEM : PE Anti-Rodent Warning Mat

Main Client	:	
Consultants	:	M/S BRIDGE AND ROOF CO.(I) LTD
Contractor	:	
Supplier Name & Address	:	
Supplier P.O. No.	:	
Job No.:	:	
Name of Project	:	
Item Description	:	PE Anti-Rodent Warning Mat.
Specification No.	:	BR/TS/011
Manufacturing Process	:	Extrusion of HDPE Film/ Sheet.
Size	:	D+300 MM Width for steel Pipelines, 300mm width for PE Pipelines, thickness 1mm Golden Yellow Color with Red Text Legend.
Color	:	
TPI Agency	:	Hired and deployed by Package Contractor as per Tender/ PO guidelines

Prepared by

Checked by

Approved by

QAP No.:	DATED:	REV 0
Page 1 of 5		



CONTRACTOR
ORDER NO. & DATE
SUB-CONTRACTOR
ORDER NO. & DATE

QUALITY ASSURANCE PLAN FOR WARNING MAT

PROJECT :

PACKAGE NO.

PACKAGE NAME :

ITEM : PE Anti-Rodent Warning Mat

Sr No	Name of Test Ref. to Test standards	Type of check / Method	Sampling model for manufacturer	Inspection by Mfr/ Lab.	Acceptance Norms / As per PTS BR/TS/011	Agency				Format of Record	Remarks (If any)
						Mfr.	TPIA	CONTR	PMC / CLIENT		
	Test on Warning Mat :										
1	Dimension & Tolerance: Width & Thickness	Measure ment	Three samples from each lot / batch/Batch	At Mfr's Works	Width : As per PO Thk. : Min. 1mm	P	W	R	R	Test Report	
2	Material Identification by chemical method.	Measure ment	One sample to be tested from each lot / batch.	Performed at any independent Lab.	Test sample shall be tested & to be confirmed HDPE by lab.	W	W	R	R	Test report of independent lab	
3	Color of Mat	Visual	Three sample to be tested from each lot / batch.	At Mfr's Works	Golden yellow color.	W	W	R	R	Test Report	
4	Text legend Printing on Mat	Visual	Three samples from each lot / batch.	At Mfr's Works	Red color. Non deletable and high abrasion resistant (Lamination over printing)	W	W	R	R	Test Report	
5	Tensile strength at break	Measure ment	Three samples to be tested from each lot / batch.	At Mfr's Works	Min 200 kg/cm ²	P	W	R	R	Test Report	
6	Elongation at break	Measure ment	Three sample to be tested from each lot / batch.	At Mfr's Works	Min 175 %	P	W	R	R	Test Report	

QAP No.:

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DATED:

REV
0

 बी एण्ड आर BAND R <i>Building Nation Since 1920</i>	CONTRACTOR	QUALITY ASSURANCE PLAN FORWARNING MAT	PROJECT :
	ORDER NO. & DATE		PACKAGE NO.
	SUB-CONTRACTOR		PACKAGE NAME :
	ORDER NO. & DATE		ITEM : PE Anti-Rodent Warning Mat

Sr No	Name of Test Ref. to Test standards	Type of check / Method	Sampling model for manufacturer	Inspection by Mfr/ Lab.	Acceptance Norms / As per PTS BR/TS/011	Agency				Forma t of Recor d	Rem arks (If any)
						Mfr.	TPIA	CONTR	PMC / CLIENT		
7	Impact Strength (500gm stricker weight at 1.2 Mtr. Height)	Measureme nt	Three sample to be tested from each lot / batch	At Mfr's Works	All test samples shall pass. If one fails out of the lot / batch, three more samples to be tested and no failure should occur.	P	W	R	R	Test Report	
8	Color fastness Test: After 15 days at 15°C in 20% Ammonium sulphite solution. (Type Test)	Review of TC	Refer Notes below	Testing at NABL accredited LAB	Satisfactory, while comparing the test specimen with production specimen of that batch in cool light with white background.	P	W*	R	R	Test report	
9	Performance of printing stability	Visual	Three samples from each lot / batch.	At Mfr's Works	Pass. Marking shall be easily legible. Non Deletable.	P	W	R	R	Test Report	
10	Oxidation Induction Test (Type Test)	Review of TC	Refer Notes below	Testing at NABL accredited LAB	Pass .Oxidation Induction test.	R	W*	R	R	Test certifica te	
11	ESCR Test (Type Test)	Review of TC	Refer Notes below	Testing at NABL accredited LAB	Pass. No crack found after test.	R	W*	R	R	Test certifica te	

QAP No.:	DATED:	REV 0
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 बी एण्ड आर BAND R <i>Building Nation Since 1920</i>	CONTRACTOR	QUALITY ASSURANCE PLAN FOR WARNING MAT	PROJECT :
	ORDER NO. & DATE		PACKAGE NO.
	SUB-CONTRACTOR		PACKAGE NAME :
	ORDER NO. & DATE		ITEM : PE Anti-Rodent Warning Mat

Sr No	Name of Test Ref. to Test standards	Type of check / Method	Sampling model	Inspection by Mfr/ Lab.	Acceptance Norms / As per PTS BR/TS/011	Agency				Format of Record	Remarks (If any)
						Mfr.	TPIA	CONTR	PMC / CLIENT		
12	Melt flow Rate (190°C, 2.16 kg load) (Type Test)	Measurement	Each lot / batch	Testing at NABL accredited LAB	0.2 – 2.5 Gms / 10 min	P	W*	R	R	Test certificate	
13	Heat Stability (at 80°C for 15 min.) (Type Test)	Measurement	Three samples from each lot / batch.	Testing at NABL accredited LAB	All test samples shall pass. There should be no visual or dimensional changes	P	W*	R	R	Test certificate	
14	Anti-Rodent Test - Non Toxic, Non Hazardous, Non Bio degradable (Type Test)	Review of TC	One sample from each lot / batch.	Testing at NABL accredited LAB	Pass. Anti-Rodent Test. Protection against rodent attack. Document/Certificate issued by supplier for Anti Rodent Master Batch as per PTS - Toxicology data, ROHS Compliance & Non- biocidal	P	W*	R	R	Test certificate	
15	UV stabilizer Test (Type Test)	Review of TC	One sample from each lot / batch.	Testing at NABL accredited LAB	UV content present	P	W*	R	R	Test certificate	

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 बी एण्ड आर B AND R <i>Building Nation Since 1920</i>	CONTRACTOR	QUALITY ASSRANCE PLAN FOR WARNING MAT	PROJECT :
	ORDER NO. & DATE		PACKAGE NO.
	SUB-CONTRACTOR		PACKAGE NAME :
	ORDER NO. & DATE		ITEM : PE Anti-Rodent Warning Mat

Sr No	Name of Test Ref. to Test standards	Type of check / Method	Sampling model for manufacturer	Inspection by Mfr/ Lab.	Acceptance Norms / As per PTS BR/TS/011	Agency				Format of Record	Remarks (If any)
						Mfr.	TPIA	CONTR	PMC / CLIENT		
16	DSC Scan with Melting Temperature Tm (Type Test)	Review of TC	One sample from each lot / batch.	Testing at NABL accredited LAB	Tm of Raw Material & corresponding finished product based on DSC Scan image results will have to	P	W*	R	R	T.C.	
17	Identification, Marking Art Work & Packing	Visual	Three sample from each lot / batch.	At Mfr's Works	Client Logo-followed by Client Name, Warning symbols with safety message and Telephone symbol with contact nos in English & local language at defined interval. Lot / batch no. to be printed at minimum 1 mtr interval for identification purpose. Printing shall be done as per approved layout. Roll length 100m minimum.	P	W	R	R	Test Report	

Abbreviations : P= Perform; W=Mandatory Witness; R=Review; T.C.=Test Certificate W*= First time witness and subsequent review for type tests.

Type Testing procedure: Manufacturer shall declare a given lot of Raw Material mix (PE compound, colorant, UV and Anti rodent) weight by assigning a specific lot Number. Manufacturer shall submit the documentation containing weight of individual components to prepare such mix. Manufacturer shall conduct the type testing once for such mix in a NABL lab for all type tests and get the same witnessed by TPIA. If lab does not allow TPI testing as a matter of their policy then such declaration from lab along with type testing results need to be submitted. Manufacturer shall maintain a log book of material consumption of such declared lot and need not carry out type testing until all the material in such lot is consumed. With every inspection waiver request, manufacturer shall provide the updated log book to use the same type test certificates. The updated log book shall be certified by TPIA at the time of final inspection. TPIA has to honor the previously certified log book by different TPI agency.

QAP No.:	DATED:	REV 0
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TECHNICAL SPECIFICATION
FOR
FLEXIBLE HOSE PIPE
(Anaconda)



BRIDGE AND ROOF CO. (INDIA) LTD.
4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	CORRUGATED FLEXIBLE METAL HOSE	DOCUMENT NO. BR/TS/012	Page 1 of 6
			REVISION : A
			EDITION : 1

STANDARD TECHNICAL SPECIFICATION FOR CORRUGATED FLEXIBLE METAL HOSE (ANACONDA)

SPECIFICATION NO.: **BR/TS/012**

PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	CORRUGATED FLEXIBLE METAL HOSE	DOCUMENT NO. BR/TS/012	Page 2 of 6
			REVISION : A
			EDITION : 1

AMENDMENT STATUS

Sl. No.	Clause / Paragraph / Annexure / Exhibit / Drawing Amended	Page No.	Rev.	Date	BY		Verified	
					Name	Sig.	Name	Sig.

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	CORRUGATED FLEXIBLE METAL HOSE	DOCUMENT NO. BR/TS/012	Page 3 of 6
			REVISION : A
			EDITION : 1

CONTENTS

Sl. No. DESCRIPTION

- 1.0 INTENT OF SPECIFICATION
- 2.0 SCOPE OF WORKS
- 3.0 TECHNICAL SPECIFICATIONS
- 4.0 TESTING, CLEANING & PACKAGING
- 5.0 MARKING
- 6.0 PACKAGING
- 7.0 INSPECTION / DOCUMENTS

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	CORRUGATED FLEXIBLE METAL HOSE	DOCUMENT NO. BR/TS/012	Page 4 of 6
			REVISION : A
			EDITION : 1

1.0 INTENT OF SPECIFICATION

The intent of this specification is to establish minimum requirements to manufacture and supply of corrugated flexible metal hose used for supply of domestic natural gas.

2.0 SCOPE OF WORKS

The scope of the tender will include manufacture/ supply, inspection, testing, marking, packaging handling and dispatch of corrugated flexible metal hose assembly, as indicated in the Material Requisition & Schedule of Rates, meeting all the requirements as laid down in manufacturing standard BS: 6501 Part 1(latest)/ ISO 10380.

All codes and standard for manufacture, testing, inspection etc. shall be of latest edition.

Owner/ Owner's Representative reserves the right to delete or order additional quantities during execution of order, based on unit rates and other terms & conditions in the original order.

3.0 TECHNICAL SPECIFICATIONS

Item	:	Corrugated Flexible metal Hose Assembly (Type-A flexibility) for Natural Gas Service
Applicable Code	:	BS: 6501 Part-I: (latest)/ ISO 10380 Specification for Corrugated Hose Assemblies
Nominal Size	:	DN 12
Total Length of Hose Assembly	:	350mm end to end
Movement Required	:	Static
Medium Flowing through Hose assembly	:	Natural gas (PNG)
Nominal Pressure/Design Pressure	:	0.25 bar (g) at 20°C
Temperature Range	:	0–65°C

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	CORRUGATED FLEXIBLE METAL HOSE	DOCUMENT NO. BR/TS/012	Page 5 of 6
			REVISION : A
			EDITION : 1

Cyclic Life : 30 Bends minimum when tested in accordance with
CI.14.2 Of BS: 6501 Part-I (latest)/ ISO 10380.

Static Bend Radius : 25mm

Type & Material of End Fitting : ¾" NPT SS316L Female Swivel Nut with Flat Seat
Nipple with Rubber Gasket / 'O' Ring (and second end
shall be SS Male ¾" NPT and threads shall be
conforming to ANSI B1.20.1 . Fittings shall be conforming
to SS316L.

Note: TIG welding shall be carried out for welding SS fittings to corrugated hose.

Material of rubber gasket : Polymer NBR / nitrile with thickness 3-4 mm

Material of Hose : SS316L, 0.3 mm thickness

Braiding : Not required

Product to be conveyed : Natural Gas

Heat Treatment Requirement : Parent sheet or the finished hose must undergo
annealing. The purpose of this is to relieve stress due to
cold working.

Surface Coating : No zinc plating is required on SS hose, SS fittings
& welded portion. At the welded portion suitable
anti rusting provision shall be made. .

4.0 TESTING, CLEANING & PACKAGING

Tests : Pneumatic Test at a pressure of 1.5 kg/cm²(g) & Type
testing as per CI.Nos. 14.1, 14.2, 14.5 & 14.6 of BS:
6501 Part-I (latest)/ ISO 10380

Cleaning & Packaging : As per CI.No. 17.0 of BS:6501 Part-I (latest)/ ISO 10380

Test Certificate : As per CI.No. 18.0 of BS:6501 Part-I (latest)/ ISO 10380

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	CORRUGATED FLEXIBLE METAL HOSE	DOCUMENT NO. BR/TS/012	Page 6 of 6
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5.0 MARKING

Each corrugated flexible metal hose and SS316 fittings shall be embossed with owner's logo, manufacturers name or trade mark BS: 6501 part I (latest)/ ISO 10380 and designation of fittings.

Each packing containing corrugated flexible metal hose shall carry the following stamped or written in indelible ink.

- Indication of the source of manufacture/Trade mark/Type
- Designation of fittings
- Maximum working pressure
- Nominal bore
- Month and year of manufacture

6.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Bidder shall submit the packaging details like numbering of pieces per package, along with QAP and also complied with at the time of delivery. One package will consist of one corrugated flexible metal hose assembly (metal hose + end fitting on both sides) & two gaskets for each end.

7.0 INSPECTION / DOCUMENTS

- a) Inspection shall be carried out as per design code/standard, Technical Specification and Inspection Plan/ Vendor's detailed QAP duly approved by Owner/Owner's representative.
- b) Owner representative or third party inspection agency appointed by owner shall carry out random inspection during manufacturing/ final inspection.
- c) Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per Technical Specification and specified code for 100% material, at the time of final inspection of each supply lot of material.
- d) Even after third party inspection, owner reserves the right to select a sample of flexible metal hose randomly from each manufacturing batch and have these independently tested. If the results of these tests fall outside the limits specified in Technical specification, then owner reserves the rights to reject all production supplied from the batch.
- e) For any control test or examination required under the supervision of TPIA/owner/owner's representative, latter shall be informed in writing one (1) week in advance by vender about inspection date & place along with production schedule.
- f) Vendor shall submit the dimensional drawing for Hose, end fittings and Rubber Gasket along with the technical bid.

			QAP FLEXIBLE HOSES (ANACONDA)			QAP NO. BR/QAP/006 Sheet 1 Prepared : Checked: Approved :			
Sr. No.	INSPECTION AND TESTING	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA AND CERTIFICATE	FORMAT OF RECORD	INSPECTION			
						Vendor	TPIA	PMC	REMARKS
1	Materials (Chemical Properties)	One sample each heat	Material code	Material code	Material Test certificate	P	R	R	
2	Materials (Mechanical Properties)	One sample each heat	Material code	Material code	Material Test certificate	P	R	R	
3	TIG welding (End fitting to hose)	100%	Approved WPS	ASME Section IX	Welding report	P	R	R	
4	Cyclic Test (Type test)	One sample each lot	As per ISO 10380	As per ISO 10380	INSPECTION TEST REPORT	P	W	R	
5	Pliable Test (Type Test)	One sample each lot	As per ISO 10380	As per ISO 10380	INSPECTION TEST REPORT	P	W	R	
6	Pneumatic test (Production test)	100%	As per Technical specification	As per Technical specification	INSPECTION TEST REPORT	P	W	R	
7	Leakage Test	1%	As per ISO:10380	As per ISO:10380	INSPECTION TEST REPORT	P	W	R	
8	Dimensional Check	1%	-	As per approved Drawing	INSPECTION TEST REPORT	P	W	R	
9	Marking	1%	As per TS	As per TS	INSPECTION TEST REPORT	P	W	R	
10	Final Documentation		Document pertaining to all tests specified in this QAP	Document pertaining to all tests specified in this QAP		P	H	R	
LEGENDS: R - REVIEW, W - Witness, H-Hold, P - Perform, TPIA - Third Party Agency (Owner / Owner's Representative) Note:- - The Above Testing and acceptance criteria are minimum requirements, however, manufacturer shall ensure that the product shall also comply to the additional requirements as per TS. - The supplier shall submit their own details ITP prepared on the basis of above/ Technical specification for approval of Owner/Owner's representative. - Owner/Owner representative shall review/approve all the documents related to ITP/Quality manuals/Drawings etc. submitted by supplier. - Owner / Owner's representative including TPIA will have to right to inspect any activity of manufacturing at any time - All reference Codes/ Standrds, Documents. P.O. Copies shall be arranged by vendor / Supplier for reference of TPIA/PMC /Client at the time of Inspection - At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note & MTC.									

TECHNICAL SPECIFICATION
FOR
FLUX



BRIDGE AND ROOF CO. (INDIA) LTD.
4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

TECHNICAL SPECIFICATION FOR FLUX

- I) Flux should be Non-Acidic, Lead Free as per ANSI / NSF 6 or equivalent to be approved by EIC.
- II) The Flux should be supplied in paste form packed in small tin container of 500 gms. & should have compatibility to use with solder wire (Lead free & as per BS 219 or equivalent).
- III) Certificate of confirmation with the specified standard & relevant material test certificate should be furnished by vendor.
- IV) Vendor should supply branded material.

SPECIFICATION FOR QUALITY ASSURANCE SYSTEMS REQUIREMENTS

SPECIFICATION NO. BR/QA/001



(PROCESS & PIPELINE DESIGN SECTION)

BRIDGE AND ROOF CO. (INDIA) LTD.

4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

BRIDGE AND ROOF CO.(I) LTD			STANDARD SPECIFICATION	
TITLE	QUALITY ASSURANCE SYSTEMS REQUIREMENTS	SPECIFICATION NO.		PAGE 1 OF 9
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CONTENTS				
Sl.No.	Description	Page No.		
1.0	INTRODUCTION	1		
2.0	DEFINITIONS	1 - 2		
3.0	CONTRACTORS SCOPE OF WORK	2-4		
4.0	QUALITY ASSURANCE REQUIREMENTS	4-7		
ATTACHMENTS				
TITLE		NUMBER		
FORMAT FOR QUALITY PLAN		FORMAT 00001		
FORMAT FOR OBSERVATION ON		FORMAT 00002		
PREPARED BY		CHECKED BY		APPROVED BY

BRIDGE AND ROOF CO.(I) LTD			STANDARD SPECIFICATION	
TITLE	QUALITY ASSURANCE SYSTEMS REQUIREMENTS	SPECIFICATION NO.	PAGE 2 OF 9	
		BR/QA/001	REVISION 0	
1.0INTRODUCTION This specification establishes the Quality Assurance Requirements to be met by the sub-contractors (including turnkey Contractors) and their sub-vendors. In case of any conflict between this specification and other provisions of the contract/ purchase order, the same shall be brought to the notice of PMC, at the stage of bidding and shall be resolved with PMC , prior to the placement of order. 2.0DEFINITION Bidder For the purpose of this specification, the word "Bidder" means the person(s) , firm, company or organisation who is under the process of being contracted by PMC / Owner for delivery of some products (including service). The word is considered synonymous to supplier, contractor or vendor. Correction Action taken to eliminate the detected non-conformity. Refers to repair, rework or adjustment and relates to the disposition of an existing non-conformity. Corrective Action Action taken to eliminate the causes of an existing non-conformity, defect or other undesirable situation in order to prevent recurrence. Preventive Action Action taken to eliminate the causes of a potential non-conformity, defect or other undesirable situation in order to prevent its recurrence. Process Set of inter-related resources and activities which transform inputs into outputs.				

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Special Process Processes requiring pre-qualification of their process capability.				
3.0 CONTRACTORS SCOPE OF WORK				
3.1 Prior to award of contract The bidder shall understand scope of work, drawings, specifications and standards etc., attached to the tender/ enquiry document, before he makes an offer. The bidder shall submit milestone charts having the time required for each milestone activity and linkages between different milestone activities alongwith overall time period required to complete the entire scope of work. The bidder shall develop and submit manpower and resource deployment chart. The bidder shall submit, alongwith the bid, a manual or equivalent document describing/ indicating/ addressing various control/ check points for the purpose of quality assurance and the responsibilities of various functions responsible for quality assurance.				
3.2 After the award of contract The bidder shall submit the schedule for submission of following documents in the kick-off meeting or within two weeks of the placement of order, whichever is earlier. • Detailed Bar Chart • Quality plan for all activities, required to be done by the bidder, to accomplish offered scope of work. • Inspection and test plans, covering various control aspects. • Job procedures as required by Consultant / Owner. • Procurement schedule for items to be supplied by contractor covering inspection of the same. Various documents submitted by the bidder shall be finalised in consultation with PMC. Here it shall be presumed that once a bidder has made an offer, he has understood the requirements given in this specification and agrees to				

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comply with them in totality unless otherwise categorically so indicated during pre-award stage through agreed deviation/ exception request. All Quality Assurance Plan (QAP) documents shall be reviewed by concerned functional groups of PMC and the bidder shall be required to incorporate all comments within the framework of this specification at this stage of the contract. It is also obligatory on the part of the bidder that obtains approval on every Quality Assurance Plan (QAP) documents, before he starts using a particular document for delivery of contracted scope of work. Participation of PMC / Owner in review/ approval of quality plan/ QAP documents does not absolve the contractor of his contractual obligations towards specified and intended use of the product (or service) provided/ to be provided by him under the contract.

3.3 During job execution

During job execution, the bidder shall fully comply with all quality document submitted and finalised/ agreed against the requirements of this specification. Approval of Consultant on all these documents shall be sought before start of work.

Bidder shall produce sufficient quality records on controlled/agreed forms such that requirements given in this specification are objectively/demonstrable.

Bidder shall facilitate Consultant / Owner during quality/ technical audits at his works/ sites.

Bidder shall discharge all responsibilities towards enforcement of this specification on all his sub-contractors for any part of the scope which is sub-contracted.

4.0 QUALITY ASSURANCE SYSTEM REQUIREMENTS

4.1 The bidder shall nominate an overall in-charge of the contract titled as "Project Manager" for the scope of work of agreed contract. The name of this person shall be duly intimated to Consultant including all subsequent changes, if any. Consultant shall correspond only with the project manager of the bidder on all matters of the project. The project manager of the bidder shall be responsible for co-ordination and management of activities with bidder's organisation and all sub-vendors appointed by the bidder.

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After award of work, the bidder may review augmentation of manpower and resources deployment chart (submitted earlier), detail it out , if so consented by Consultant / Owner and resubmit the same as "issued for effective implementation of the project".				
4.2	The bidder shall plan the contract scope of work on quality plan format such that no major variation is expected during delivery of contract scope of work. These quality plan shall be made on enclosed format complete in all respect. The quality plan shall be assumed to be detailing bidder's understanding and planning for the contract/ offered scope of work. The bidder shall plan the type of resources including various work methodology which he agrees to utilize for delivery of contract scope of work.			
4.3	The bidder is required to review the contract at all appropriate stages to evaluate his capabilities with respect to timely and quality completion of all activities pertaining to contracted scope of work and shall report for constraints, if any to Consultant / Owner.			
4.4	The design activities, if any performed during delivery of contract scope of work shall be so controlled that the outputs is reliable enough. It is expected that during development of design, the bidder shall take recourse to detailed checking, inter departmental reviews and documented verification methods.			
4.5	For all documents which the bidder is likely to utilize for delivery of contract scope of work, a system must exist which assures that latest/ required version(s) of the document(s) is available at all location/ point of use.			
4.6	In case the bidder decides to sub-contract any part/ full of the contract scope of work (without prejudice to main Contractual condition), the bidder shall : • Evaluate the technical and financial capabilities and past performance of the sub-contractor(s) and their products and/ or services before awarding them with the sub-contracted scope of work. Selection of a sub-contractor should meet PMC approval in documented form. • Requirement of this specification shall be enforced on sub-contracted agency also. The bidder shall choose sub-contractor based on their capability to meet requirements of this specification also.			

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Note: It may so happen that, in a given situation, a sub-contractor may not have a system meeting the requirements of this specification. In all such eventualities, bidder may lend his system to sub-contractor for the contract such that sub-contractor effectively meets the requirements of this specification. In all such cases PMC shall be duly informed.			
4.7	Bidder shall establish adequate methodology such that the materials supplied by the Owner/ Consultant shall be adequately preserved, handled and made use of for the purpose for which they are provided.		
4.8	All output delivered against contract scope of work shall be suitably identified in such a manner that either through identification or some other means, sufficient traceability is maintained which permits effective resolution of a ny problem reported in the outputs.		
4.9	Critical activities shall be identified and the bidder is required to have documented methodologies which he is going to utilize for carrying out such activities under the contract scope of work. Wherever it is difficult to fully inspect or verify the out put (special process), bidder shall pre -qualify, the performers and methodologies.		
4.10	All inspections carried out by the bidder's surveillance/ inspection staff shall be conformity to quality plans and/ or in spection and test plans. All inspection results shall be duly documented on controlled/ agreed forms such that results can be co-related to specific product,that was inspected/ tested.		
4.11	All inspection, measuring & test equipments (IMTEs) shall be duly calibrated as per National/ International standards/ codes and only calibrated and certified IMTEs shall be utilized for delivery of contract scope of work.		
4.12	All out puts/ products delivered against contract scope of work shall be duly marked such that their inspection status is clearly evident during all stages/ period of the contract.		
4.13	All non-conformities (NCs) found by the contractor's inspection/ surveillance staff shall be duly re corded,including their disposal action. The deficiencies observed during stage of the product,shall be recorded and resolved suitably. Effective corrective and preventive acti on shall be implemented by the bidder for all repetitive NCs,including deficiencies.		

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4.14	All deficiencies noticed by Consultant / Owner representative(s) shall be recorded on a controlled form (Format No. 00002). Such deficiencies shall be analysed by the bidder and effective and appropriate correction, corrective and preventive actions shall be implemented. Bidder shall intimate Consultant/ Owner of all such corrective and preventive action implemented by him.			
4.15	Bidder shall establish appropriate methodologies for safe and effective handling, storage, preservation of various materials/ inputs encountered during delivery of contract scope of work.			
4.16	Bidder shall prepare sufficient records for various processes carried out by him for delivery of contract scope of work such that requirements of this specification are objectively demonstrable. In case Consultant / Owner finds that enough objective evidence/ recording is not available for any particular process, bidder shall be obliged to make additional records so as to provide sufficient objective evidence. The decision of Consultant / Owner shall be final and binding on such issues.			
4.17	The bidder shall arrange internal quality audits at quarterly intervals, to independently assess the conformance by various performers to the requirements of this specification. The findings of such assessment shall be duly recorded and a copy shall be sent to Consultant / Owner for review.			
4.18	For all special processes, bidder shall deploy only qualified performers. Wherever Consultant / Owner observes any deficiency, the bidder shall arrange the adequate training to the performer(s) before any further delivery of work.			

BRIDGE AND ROOF CO.(I) LTD			STANDARD SPECIFICATION	
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OBSERVATION OF QUALITY ASPECTS**FORMAT - 00002**

Job No. and Description		No.		Date:	
Issued to : M/s					
Location of Work :					
Item of Work :					
Details of Observation(Deficiency)			Recommended Course of Action		
			Time Allowed for Correction :		
Issued by : _____					
Name of Signature of RCM, Consultant Site					
Corrective Action taken report by Contractor/ Vendor :					
Date:					
Name and Signature					
Distribution (before resolution) :					
Project Manager Owner	Chief Business Executive Consultant	Consultant Inspection	Resident Construction Manager, Consultant Site		
Verification of Resolution by Consultant :					
Date:					
Name of Signature					
Distribution (before resolution) :					
Project Manager Owner	Chief Business Executive Consultant	Consultant Inspection	Resident Construction Manager, Consultant Site		

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Note:

- 1) The bidder ensures that the filled up format conforms to minimum requirements on Quality Plan/ Quality Assurance, specified by Consultant on drawings/ standards/ specifications/ write-up.
- 2) The bidder confirms that document is issued for information/ approval of Owner/ Consultant for the project implementation

TECHNICAL SPECIFICATION OF STEEL REINFORCED RUBBER HOSE



BRIDGE AND ROOF CO. (INDIA) LTD.

(A Govt. of India Enterprise)

4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	STEEL REINFORCED RUBBER HOSE	DOCUMENT NO. BR/TS/014	Page 1 of 7
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			EDITION : 1

STANDARD TECHNICAL SPECIFICATION FOR STEEL REINFORCED RUBBER HOSE

SPECIFICATION NO.: BR/TS/014

PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	STEEL REINFORCED RUBBER HOSE	DOCUMENT NO. BR/TS/014	Page 2 of 7
			REVISION : A
			EDITION : 1

AMENDMENT STATUS

Sl. No.	Clause / Paragraph / Annexure / Exhibit / Drawing Amended	Page No.	Rev.	Date	BY		Verified	
					Name	Sig.	Name	Sig.

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	STEEL REINFORCED RUBBER HOSE	DOCUMENT NO. BR/TS/014	Page 3 of 7
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C O N T E N T S

SI No.	DESCRIPTION
1.0	SCOPE
2.0	MATERIAL
3.0	DIMENSIONS & TOLERANCES
4.0	FEATURES
5.0	MARKING
6.0	PACKAGING
7.0	INSPECTION / DOCUMENTS

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	STEEL REINFORCED RUBBER HOSE	DOCUMENT NO. BR/TS/014	Page 4 of 7
			REVISION : A
			EDITION : 1

1.0 SCOPE

This present document covers the technical specification for the procurement of steel reinforced rubber hose, Type 4 used in distribution systems. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which need to be fulfilled.

This specification covers the requirements for steel reinforced rubber hose unless modified by this specification, requirements of IS: 9573 shall be valid.

2.0 MATERIAL

- i. Lining: - It shall be nitrile – butadiene rubber (NBR) or chloroprene rubber (CR) compound. It shall be smooth in bore, uniform in thickness and free from air blisters, porosity and splits.
- ii. Reinforcement material :- It shall have wire reinforcement in braided form in between the lining & cover.
- iii. Cover :- It shall be manufactured out of synthetic rubber compound resistant to abrasion, weather and natural gas. The cover color shall be orange.
- iv. The whole shall be consolidated by wrapping or any other suitable method and uniformly vulcanized to give good adhesion between reinforcement plies and the rubber lining of the cover.

3.0 DIMENSIONS & TOLERANCES

- i. Bore size

Nominal size (mm)	Minimum base diameter (mm)	Minimum bend radius (mm)
8 mm	7.9	95

The Nominal bore size of the hose shall be accordance to table # 1 of IS 9573 : 1998 shall be as given above table. It shall be tested/ checked as method defined in IS 4143

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	STEEL REINFORCED RUBBER HOSE	DOCUMENT NO. BR/TS/014	Page 4 of 7
			REVISION : A
			EDITION : 1

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BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	STEEL REINFORCED RUBBER HOSE	DOCUMENT NO. BR/TS/014	Page 5 of 7
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- ii. The Minimum thickness of lining & cover shall be 2 mm & 1 mm respectively.
- iii. Length of hose shall be as defined in M.R. & the tolerances on length shall be permitted $\pm 1\%$.

4.0 FEATURES

4.1 Mechanical properties

Tensile strength (Lining & cover) at break - 10 MPa (minimum)

Elongation (Lining & cover) in at break (%) - 200 & 250 respectively (minimum)

4.2 Resistance of Lining to n-pentane

The n-pentane absorbed and the n-pentane extractable matter as determined Clause no. 5.4.3.2 of IS 9573: 1998 shall not exceed 10% & 5% respectively to the initial mass of lining.

4.3 Adhesion

The minimum adhesion between rubber lining & reinforcement, between layers of reinforcement and between reinforcement & cover shall be 2KN/m.

4.4 Low temperature flexibility

Flexible hose is conditioned at -40°C for at least 5 hrs. and then bent at 180° around a mandrel with a diameter 12 times the nominal bore diameter of the hose, no cracks or breaks shall be shown.

4.5 Flexibility of Hose

The hose shall be capable of being bent empty to the radius 95 mm without flattening and suffering structural damages.

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	STEEL REINFORCED RUBBER HOSE	DOCUMENT NO. BR/TS/014	Page 6 of 7
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4.6 Ozone resistance

It shall be carried out as per clause no. 5.5. of IS 9573: 1978

4.7 Hydrostatic test

All hoses shall be leak tightness tested at 2 Mpa for a period of 1 minutes and no leakage is permitted. This test shall be performed on each size of the hoses as per clause no. 5.5.5.1 of IS 9573: 1978.

4.8 Bursting pressure

It shall be carried out as per Clause 5.5.2 of IS 9573. The minimum burst pressure shall be 5 Mpa.

4.9 Grip strength test

The hose shall comply to the requirement of Clause no. 5.5.7 of IS 9573.

4.10 Burning behaviour

The burning test shall be carried out on hose as per clause no. 5.5.8 of IS 9573. The hose at least shall not burn till 45 second.

5.0 MARKING

Each hose shall be indelibly marked as follows:

- Manufacturer's name or trade mark., if any
- Nominal bore
- Batch no. / Lot no.
- Month and year of manufacturer
- Type of hose i.e Type 4
- BIS marking

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	STEEL REINFORCED RUBBER HOSE	DOCUMENT NO. BR/TS/014	Page 7 of 7
			REVISION : A
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6.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Bidder shall submit the packaging details during offer and also complied with at the time of delivery.

7.0 INSPECTION / DOCUMENTS

- i. Inspection shall be carried out as per design codes/standards, Technical Specification and Inspection Plan/ Vendor's detailed QAP duly approved by owner/owner's representative.
- ii. For all tests purposes, the minimum time between vulcanization & testing shall be 16 h.
- iii. Owner representative or third party inspection agency appointed by Owner shall carry out random inspection during manufacturing/ final inspection.
- iv. Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per Technical Specification, at the time of final inspection of each supply lot of material.
- v. Even after third party inspection, Owner reserves the right to select a sample of hose randomly from each manufacturing batch and have these independently tested. If the results of these tests fall outside the limits specified in Technical specification, then Owner reserves the rights to reject all production supplied from the batch.
- vi. Vendor shall prepare and submit the detail drawings of required steel reinforced rubber hose for approval by Owner before starting production.
- vii. For any control test or examination required under the supervision of TPIA/owner/owner's representative, latter shall be informed in writing one (1) week in advance by vender about inspection date & place along with production schedule.

 BRIDGE AND ROOF CO.(I) LTD			QAP STEEL REINFORCED RUBBER HOSES			QAP NO. BR/QAP/007			
						Sheet 1			
						Prepared : Checked:			
						Approved :			
Sr. No.	INSPECTION AND TESTING	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA AND CERTIFICATE	FORMAT OF RECORD	INSPECTION			
						Vendor	TPIA	PMC	REMARKS
1	Materials (Chemical Properties)	IS :9573	Manufacturer Std	IS :9573	Material Test certificate	P	R	R	
2	Dimensional check	IS : 9573	-	IS :9573	INSPECTION TEST REPORT	P	W	R	
3	Physical Properties (Tensile Strength and Elongation)	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
4	Accelerated aging test	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
5	Resistance of lining to N-Pentane	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
6	Adhesion	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
7	Low Temperature Flexibility	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
8	Flexibility	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
9	Ozone Resistance	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
10	Hydrostatic Test	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
11	Bursting Pressure Test	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
12	Grip Strength Test	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
13	Burning Behaviour test	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
14	Marking	IS : 9573	IS : 9573	IS : 9573	INSPECTION TEST REPORT	P	W	R	
15	Final Documentation		Document pertaining to all tests specified in this QAP	Document pertaining to all tests specified in this QAP		P	H	R	

LEGENDS: R - REVIEW, W - Witness, H-Hold, P - Perform, TPJA - Third Party Agency
 (Owner / Owner's Representative)
 Note:-

- The Above Testing and acceptance criteria are minimum requirements, however, manufacturer shall ensure that the product shall also comply to the additional requirements as per TS.
- The supplier shall submit their own details ITP prepared on the basis of above/ Technical specification for approval of Owner/Owner's representative.
- Owner/Owner representative shall review/approve all the documents related to ITP/Quality manuals/Drawings etc. submitted by supplier.
- Owner / Owner's representative including TPJA will have to right to inspect any activity of manufacturing at any time
- All reference Codes/ Standrds, Documents. P.O. Copies shall be arranged by vendor / Supplier for reference of TPJA/ /Client/PMC at the time of Inspection
- At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note & MTC.

SPECIFICATION FOR HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT

SPECIFICATION NO.: BR/HSE/001



BRIDGE AND ROOF CO. (INDIA) LTD.

4th & 5th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.

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C O N T E N T S

<u>SL. NO.</u>	<u>DESCRIPTION</u>
1.0	SCOPE
2.0	REFERENCES
3.0	REQUIREMENT OF HEALTH, SAFETY & ENVIRONMENT (HSE) MANAGEMENT SYSTEM TO BE COMPLETED BY BIDDERS.
4.0	DETAILS OF HSE MANAGEMENT SYSTEM BY CONTRACTOR
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PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :
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AMENDMENT STATUS

Sl. No.	Clause / Paragraph / Annexure / Exhibit / Drawing Amended	Page No.	Revision	Date	By (Name)	Verified (Name)

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1.0

SCOPE

This specification establishes the Healthy, Safety and Environment (HSE) management requirement to be complied with by the Contractors during construction.

This specification is not intended to replace the necessary professional judgement needed to design & implement an effective HSE system for construction activities and the contractor is expected to exceed requirements given in this specification.

Requirement stipulated in this specification shall supplement the requirement of HSE management given in relevant Act (S)/ legislations. General Condition of Contract (GCC) Special Condition of Contract (SCC) and Job Specifications. Where different documents stipulate different requirements, the most stringent shall be adopted.

2.0

REFERENCES

This document should be read in conjunction with following:

- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Building and other construction workers (regulation of employment and condition of service) Act, 1996
- Job Specifications
- Relevant IS Codes (refer Annexure-A)
- Reporting Formats (refer Annexure-B)
- Statutory requirements

3.0

REQUIREMENT OF HEALTH, SAFETY & ENVIRONMENT (HSE) MANAGEMENT SYSTEM TO BE COMPLETED BY BIDDERS.

3.1

Management Responsibility

3.1.1

The Contract should have a document HSE policy to cover commitment of the organization to ensure health, safety and environment aspects in their line of operations

3.1.2

The HSE management system of the Contractor shall cover HSE requirement including but not limited to what specified under clause 1.0 & 2.0 mentioned above

3.1.3

Contractor shall be fully responsible for planning and implementing HSE requirement to the satisfaction of the company. Contractor as a minimum requirement shall designate/deploy the following to co-ordinate the above:

No. Of workers deployed

Up to 250

- Designate one safety supervisor who will guide the workers from time to time, as well as impart training basic guidelines at least weekly once.

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Above 250 & upto 500 - Deploy one qualified and experienced safety Engineer / Officer who will guide the workers from time to time as well as impart basic guideline & training at least weekly once. He / She shall possess a recognized Degree in any branch of engineering or technology or architecture and had a post qualification construction experience of minimum two years or possess a recognized Diploma in any branch of engineering or technology or Graduate in Science stream and had a post qualification construction experience of minimum five years.

Above 500 (for every 500 or less) - One additional safety engineer/Officer whose function will be as mentioned above

Contractor shall indemnify and hold harmless OWNER / Consultant & their representative's from any and all liabilities arising out of non fulfillment of HSE requirements.

Above is the minimum requirement and the Contractor shall ensure physical presence of a safety personnel at each place where Hot work permit is required. No work shall be started at site until above safety personnel are physically present at site. The contractor shall submit a safety organogram clearly indicating the lines of responsibility and reporting system. He shall furnish Bio-Data/Resume/Curriculum Vitae of the safety personnel he intends to mobilize, at least 1 month before the intended mobilization, for Consultant/Owner's approval.

- 3.1.4 The Contractor shall ensure that the Health, Safety and Environment (HSE) requirements are clearly understood & faithfully implemented at all levels, at each and every site/ work place.
- 3.1.5 The Contractor shall promote and develop consciousness for Health, Safety and Environment among all personnel working for the Contractor. Regular awareness programs and fabrication shop/work site meeting shall be arranged on HSE activities to cover hazards involved in various operations during construction.
- 3.1.6 Arrange suitable first aid measures such as First Aid Box, trained personnel to give First Aid, Stand by Ambulance or Vehicle and install fire protection measures such as: adequate number of steel buckets with sand and water and adequate fire extinguishers to the satisfaction of OWNER / Consultant. In case the number of workers exceeds 500, the Contractor shall position an ambulance /vehicle on full time basis very close to the worksite.
- 3.1.7 The Contractor shall evolve a comprehensive planned and documented system for implementation and monitoring of the HSE requirements. This shall submitted to

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OWNER & Consultant for approval well in advance, prior to start of work. The monitoring for implementation shall be done by regular inspection and compliance to the observations thereof. The Contractor shall get similar HSE requirements implemented at his sub-contractor (s) work site/ Office. However, compliance of HSE requirement shall be the sole responsibility of the Contractor. Any review/ approval by OWNER/ Consultant shall not absolve the Contractor of his responsibility/ liability in relation to all HSE requirements.

3.1.8 Non-Conformance on HSE by the Contractor (including his Sub-contractors) as brought out during review / audit by Consultant / OWNER representative shall be resolved forthwith by Contractor. Compliance report shall be possibility submitted to Consultant / OWNER at the earliest.

3.1.9 The Contractor shall ensure participation of his Resident Engineer/Site-in-Charge in the Safety Committee/HSE Committee meetings arranged by OWNER / Consultant. The compliance of any observation shall be arranged urgently. Contractor shall assist OWNER / Consultant to achieve the targets set by them on HSE during the project implementation.

The contractor shall ensure that his staff members & workers (permanent as well casual) shall not be in a state of intoxication during working hours and shall abide by any law relating to consumption & possession of intoxicating drinks or drugs in force. Awareness about local laws on this issue shall form part of the Induction Training.

The contractor shall ensure that all personnel working for him comply with No-smoking requirements of the owner as notified from time to time. Cigarettes, lighters, auto ignition tools or appliances shall not be allowed inside the plant complex. Smoking shall be permitted only inside smoking booths expressly designated & authorized by the Owner / Consultant.

3.1.10 The Contractor shall adhere consistently to all provisions of HSE requirements. In case of non-compliance or continuous failure in implementation of any of HSE provisions; OWNER / Consultant may impose stoppage of work without any Cost & Time implication to Owner and/or impose a suitable penalty for non-compliance with a notice of suitable period, upto a cumulative limit of 1.0% (one percent) of Contract value with a ceiling of Rs. 10 lakhs.

0.2% (Zero decimal two percent) of the contract value for LSTK, EPC, EPCC or Package contracts with an overall ceiling of Rs. 1,00,00,000/- (Rupees one crore).

S. No.	Violation or HSE norms	Penalty Amount
1.	For not using personal protective equipment (Helmet, Shoes, Goggles, Gloves, Full body harness, Face shield, Boiler suit, etc.)	Rs. 250/- per day / item / person
2.	Working without Work Permit / Clearance	Rs.5,000/- per occasion

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S. No.	Violation or HSE norms	Penalty Amount
3.	Unsafe electrical practices (not installing ELCB, using poor joints of cables, using naked wire without top plug into socket, laying wire / cables on the roads, electrical jobs by incompetent person, etc.)	Rs.3,000/- per item per day.
4.	Working at height without full body harness, using non-standard / rejected scaffolding and not arranging fall protection arrangement as required like Safety Nets.	Rs.1,000/ per case per day.
5.	Unsafe handling of compressed gas cylinders (No trolley, jubilee clips double gauge regulator, improper storage / handling).	Rs. 100/- per item per day
6.	Use of domestic LPG for cutting purpose.	Rs.1,000/- per occasion
7.	No fencing / barricading of excavated areas.	Rs.1,000/- per occasion
8.	Not providing shoring / strutting / proper slope and not keeping the excavated earth at least 1.5 M away from excavated area.	Rs.5,000/- per occasion
9.	Non display of caution boards, list of hospitals, emergency services available at work locations.	Rs.500/- per occasion
10.	Traffic rules violations like over speeding of vehicles, rash driving, wrong parking, not using seat belts, vehicles not fitted with reverse warning alarms.	Rs.1,000/- per occasion
11.	Absence of Contractor's top most executive at site in the safety meetings whenever called by Consultant / Owner	Rs.1,000/- per occasion
12.	Failure to maintain safety records by Contractor Safety personnel.	Rs.1,000/- per month.
13.	Failure to conduct daily safety site inspection, HSE meeting and HSE audit at predefined frequencies.	Rs.1,000/- per occasion
14.	Failure to submit the monthly HSE report by 5 th of subsequent month to Engineer-in-Charge.	Rs. 1,000/- per occasion and Rs. 100/- per day for further delay.
15.	Poor House Keeping	Rs.1,000/- per occasion
16.	Failure to report & follow up accident (including Near Miss) reporting system.	Rs. 10,000/- per occasion

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S. No.	Violation or HSE norms	Penalty Amount
17.	Degradation of environment (not confining toxic spills oil / lubricants onto ground)	Rs.1,000/- per occasion
18.	Not medically examining the workers before allowing them to work at height, not providing ear muffs while allowing them to work in noise polluted areas, made them to work in air polluted areas without respiratory protective devices, etc.	Rs.1,000/- per occasion
19.	Violation of any other safety condition as per job HSE plan, work permit and HSE conditions of contract (using crowbar on cable trenches, improper welding booth, not keeping fire extinguisher ready at hot work site, unsafe rigging practices, non-availability of First-Aid box, etc.)	Rs.1,000/- per occasion
20.	Any violation not covered above.	To be decided by Consultant / Owner

This penalty shall be in addition to all other penalties specified else where in the contract. The decision of imposing stoppage of work, its extent & monetary penalty shall rest with Consultant/OWNER & binding on the Contractor.

3.1.11 All fatal accidents and other personnel accidents shall be investigated by a team of Contractor's senior personnel for root cause and recommend corrective and preventive actions. Findings shall be documented and suitable actions taken to avoid recurrences shall be communicated to OWNER / Consultant. OWNER / Consultant shall have the liberty to independently investigate such occurrences and Contractor shall extend all necessary help and co-operation in this regard. Consultant / Owner shall have the right to share the content of this report with the outside world.

3.2 House Keeping

3.2.1 Contractor shall ensure that a high degree of house keeping is maintained and shall ensure the followings:

- All surplus earth and debris are removed/disposed off from the working site to identified location (s).
- Unused/Surplus Cables Steel items and steel scrap lying scattered at different places within the working areas are removed to identified location (s).
- All wooden scrap, empty wooden cable drums and other combustible packing materials shall be removed from work place to identified location(s).

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- d. Roads shall be kept clear and materials like pipes, steel, sand, boulders, concrete chips and bricks, etc. shall not be allowed in the roads to obstruct free movement of men & machineries.
- e. Fabricated steel structurals, pipes & piping materials shall be stacked properly for erection.
- f. Water logging on roads shall not be allowed.
- g. No parking of trucks/ trolleys, cranes and trailers etc. shall be allowed on of roads, which may obstruct the traffic movements.
- h. Utmost care shall be taken to ensure over all cleanliness and proper up keep of the working areas.
- i. Trucks carrying sand, earth and pulverized materials etc. shall be covered while moving within the plant areas.
- j. The contractor shall ensure that the atmosphere in plant area and on roads is free from particulate matter like dust, sand, etc. by keeping the top surface wet for ease in breathing.
- k. At least two exits for any unit area shall be assured at all times.

3.3

Healthy, Safety and Environment

- a) The Contractor shall provide safe means of access to any working place including provision of suitable and sufficient scaffolding at various stages during all operations of the work for the safety of his workmen, and OWNER/ Consultant. Contractor shall ensure deployment of appropriate equipment and appliances for adequate safety and healthy of the workmen and protection of surrounding areas.

Contractor shall ensure identification of all Occupational Health, Safety & Environmental hazards in the type of work he is going to undertake and enlist mitigation measures. Contractor shall carry out Job Safety Analysis (JSA) specifically for high risk jobs like working at height & in confined space, deep excavations, radiography jobs, electrical installations, blasting operations, demolishing / dismantling activities, welding / gas cutting jobs and submit the findings to Consultant / Owner. The necessary HSE measures devised shall be in place prior to start of an activity by the contractor.
- b) The Contractor shall ensure that all their staff workers including their sub-Contractor (s) shall wear Safety Helmet and Safety shoes. Contractor shall also ensure use of safety belt, protective goggles, gloves etc. by the personnel as per jobs requirements. All these gadgets shall conform to relevant IS specification equivalent.

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The Contractor shall ensure that all their staff, workers and visitors including their sub-contractor(s) have been issued (records to be kept) & wear appropriate PPEs like nape strap type safety helmets preferably with head & sweat band with ¾" cotton chin strap (made of industrial HDPE), safety shoes with steel toe cap and antiskid sole, full body harness (CE marked and conforming to EN361), protective goggles, gloves, ear muffs, respiratory protective devices, etc. All these gadgets shall conform to applicable IS Specifications / CE or other applicable international standards.

Owner may issue a comprehensive color scheme for helmets to be used by various agencies. The Contractor shall follow the scheme issued by the owner. All Safety / Fire personnel shall preferably wear red colour helmet so that workmen can approach them for guidance during emergencies.

For shot blasting, the usage of protective face shield and helmets, gauntlet and protective clothing is mandatory.

For offshore jobs/contracts, contractor shall provide PPEs (new) to Consultant & Owner's personnel, at his (contractor's) cost. All personnel shall wear life jacket at all time.

An indicative list of HSE standards/codes is given under Appendix-A.

The contractor shall issue height permit for working at height after verifying and certifying the checkpoints as specified in the attached permit (Format No. HSE-6). He shall also undertake to ensure compliance to the conditions of the permit during the currency of the permit including adherence to personal protective equipments.

The permit shall be issued initially for one week or expected duration of an activity and extended further for the balance duration. This permit shall be applicable in areas where specific clearance from Owner's operation Deptt. / Safety Deptt. is not required. Consultant field Engineers / Safety Officers / Area Coordinators may verify and counter sign this permit (as an evidence of verification) during the execution of the job.

In case work is undertaken without taking sufficient precautions as given in the permit, Consultant Engineers may cancel the permit and stop the work till satisfactory compliance is arranged. Contractors are expected to maintain a register for issuance of permit and extensions thereof including preserving the used permits for verification during audits etc.

Contractor shall arrange (at his cost) and ensure use of Fall Arrester Systems by his workers. Fall arresters are to be used while climbing / descending tall structures. These arresters should lock automatically against the anchorage line, restricting free fall of the user. The device is to be provided with a double security opening system to ensure safe attachment or release of the user at

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any point of rope. In order to avoid shock, the system should be capable of keeping the person in vertical position in case of a fall.

Contractor shall ensure that Full body harnesses conforming EN361 and having authorized CC marking is used by all personnel while working at height. The lanyards and life lines should have enough tensile strength to take the load of the worker in case of a fall. One end of the lanyard shall be firmly tied with the harnesses and the other end with life line. The harness should be capable of keeping the workman vertical in case of a fall, enabling him to rescue himself.

Contractor shall provide Roof Top Walk Ladders for carrying out activities on sloping roofs in order to reduce the chances of slippages and falls.

- c) Contractor shall ensure that a proper Safety Net System shall be used at appropriate locations. The safety net shall be located not more than 30 feet (9.0 metres) below the working surface at site to arrest or to reduce the consequences of possible fall of persons working at different heights.
- d) Contractor shall ensure that flash back arrestors conforming to BS:6158 or equivalent are installed on all gas cylinders as well as at the torch end of the gas hose, while in use. All cylinders shall be mounted on trolleys and provided with a closing key. The burner and the hose placed downstream of pressure reducer shall be equipped with Flash Back Arrestor / Non Return Valve device. The hoses for acetylene and oxygen cylinders must be of different colours. Their connections to cylinders and burners shall be made with a safety collar. At end of work, the cylinders in use shall be closed and hoses depressurized. All welding machines shall have effective earthing. In order to help maintain good housekeeping, and to reduce fire hazard, live electrode bits shall be contained safely and shall not be thrown directly on the ground.
- e) The Contractor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health for driving of vehicles, handling and erections of materials and equipment's. All lifting equipments shall be tested certified for its capacity before use. Adequate and suitable lighting at every work place and approach there to shall be provided by the contractor before starting the actual work/ operation at night.

Contractor shall ensure installation of Safe Load Indicator (SLI) on all cranes (while in use) to minimize overloading risk. SLI shall have capability to continuously monitor and display the load on the hook, and automatically compare it with the rated crane capacity at the operating condition of the crane. The system shall also provide visual and audible warnings at set capacity levels to alert the operator in case of violations.

The contractor shall be responsible for safe operations of different equipments mobilized and used by him at the workplace like transport

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vehicles, engines, cranes, mobile ladders, scaffoldings, work tools, etc.

- f) Hazardous and/or toxic material such as solvent coating or thinners shall be stored in appropriate containers.
- g) All hazardous materials shall be labeled with the name of the materials, the hazards associated with its use and necessary precautions to be taken.

The work place shall be checked prior to start of activities to identify the location, type and condition of any asbestos materials which could be disturbed during the work. In case asbestos material is detected, usage of appropriate PPEs by all personnel shall be ensured and the matter shall be reported immediately to Consultant / Owner.

- h) Contractor shall ensure that during the performance of the work all hazards to the health of personnel have been identified assessed and eliminated.
- i) Chemical spills shall be contained & cleaned up immediately to prevent further contamination.
- j) All personnel exposed to physical agents such as ionizing or non-ionizing radiation ultraviolet rays or similar other physical agents shall be provided with adequate shielding or protection commensurate with type of exposure involved. For ionizing radiation, requirements of Bhabha Atomic Research Centre (BARC)/ Atomic Energy Regulatory Board (AERB) shall be followed.
- k) Where contract or exposure of hazardous materials could exceed limits or could otherwise have harmful affects, appropriate personal protective equipment's such as gloves, goggles, aprons, chemical resistant clothing and respirator shall be used.

- l) Contractor shall ensure the following facilities at work sites:

- I) A Crèche where 10 or more female workers are having children below the age of 6 years.

- II) Reasonable Canteen facilities are made available at appropriate location depending upon site conditions.

- m) Suitable facilities for toilet, drinking water, proper lighting shall be provided at site and labor camps, commensurate with applicable Laws/Legislation.
- n) Contractor shall ensure storage and utilization methodology of material that are not detrimental to the environment. Wherever required Contractor shall ensure that only the environment friendly material are selected.

Emphasize on recycling of waste materials such as metals, plastics, glass, paper, oil & solvents. The waste that can not be minimized, reused or

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recovered shall be stored and disposed of safely. In no way, toxic spills shall be allowed to percolate into the ground. The contractor shall not use the empty areas for dumping the wastes.

- o) All person deployed at site shall be knowledgeable of and comply with the environmental laws, rules & regulation relating to the hazardous materials substance and wastes. Contractor shall not dump, release or otherwise discharge or dispose off any such materials without the authorization of OWNER/ Consultant.

Suitable scaffoldings shall be provided to workmen for all works that cannot be safely done from the ground or from solid construction except such short period work that can be safely done using ladders. When a ladder is used, an extra workman shall be engaged for holding the ladder.

The contractor shall ensure that the scaffolds used during construction activities shall be strong enough to take the designed load. Owner / Consultant reserves the right to ask the contractor to submit certification and or design calculations from his Engineering regarding load carrying capacity of the scaffoldings.

All scaffolds shall be inspected by a Scaffolding Inspector of the contractor. He shall paste a GREEN tag on each scaffold found safe and a RED tag on each scaffold found unsafe. Scaffoldings with GREEN tag only shall be permitted to be used and RED ones shall immediately be removed from the site.

All electrical installations / connections shall be carried out as per the provisions of latest revision of following codes/standards, in addition to the requirements of Statutory Authorities and IE / applicable international rules & regulations:

- OISO SID 173 : Fire prevention & protection system for electrical installations
- SP 30 (BIS) : National Electric Code

All electrical installations shall be approved by the concerned statutory authorities.

- The contractor shall meet the following requirements:
 - i) Ensure that electrical systems and equipment including tools & tackles used during construction phase are properly selected, installed, used and maintained as per provisions of the latest revision of the Indian Electrical / applicable international regulations.
 - ii) Shall deploy qualified & licensed electricians for proper & safe installation and for regular inspection of construction power

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distribution system / points including their earthing. A copy of the license shall be submitted to Consultant / Owner for records. Availability of at least one competent licensed electrician shall be ensured at site round the clock to attend to the normal / emergency jobs.

- iii) All switchboards / welding machines shall be kept in well-ventilated & covered shed. The shed shall be elevated to avoid water logging. No flammable materials shall be used for constructing the shed. Also flammable materials shall not be stored in and around electrical equipment / switchboard. Adequate clearances and operational space shall be provided around the equipment.
- iv) Fire extinguishers and insulating mats shall be provided in all power distribution centers.
- v) Temporary electrical equipment shall not be employed in hazardous area without obtaining safety permit.
- vi) Proper house keeping shall be done around the electrical installations.
- vii) All temporary installations shall be tested before energising, to ensure proper earthing, bonding, suitability of protection system, adequacy of feeders/cables etc.
- viii) All welders shall use hand gloves irrespective of holder voltage.
- ix) Multilingual (Hindi, English and local language) caution boards, shock treatment charts and instruction plate containing location of isolation point for incoming supply, name & telephone No. of contact person in emergency shall be provided in substations and near all distribution boards / local panels.
- x) Operation of earth leakage device shall be checked regularly by temporarily connecting series test lamp (2 bulbs of equal rating connected in series) between phase and earth.
- xi) Regular inspection of all installations (at least once in a month)
- The following features shall also be ensured for all electrical installations during construction phase by the contractor:
 - i) Each installation shall have a main switch with a protective device, installed in an enclosure adjacent to the metering point. The operating height of the main switch shall not exceed 1.5 M. The main switch shall be connected to the point of supply by means of armoured cable.
 - ii) The outgoing feeders shall be double or triple pole switches with fuses / MCBs. Loads in a three phase circuit shall be balanced as far as

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possible and load on neutral should not exceed 20% of load in the phase.

- iii) The installation shall be adequately protected against overload, short circuit and earth leakage by the use of suitable protective devices. Fuses wherever used shall be HRC type. Use of rewirable fuses shall be strictly prohibited. The earth leakage device shall have an operating current not exceeding 30 mA.
- iv) All connections to the hand tools / welding receptacles shall be taken through proper switches, sockets and plugs.
- v) All single phase sockets shall be minimum 3 pin type only. All unused sockets shall be provided with socket caps.
- vi) Only 3 core (P+N+E) overall sheathed flexible cables with minimum conductor size of 1.5 mm² copper shall be used for all single phase hand tools.
- vii) Only metallic distribution boxes with double earthing shall be used at site. No wooden boxes shall be used.
- viii) All power cables shall be terminated with compression type cable glands. Tinned copper lugs shall be used for multistrand wires / cables.
- ix) Cables shall be free from any insulation damage.
- x) Minimum depth of cable trench shall be 750 mm for MV & control cables and 900 mm for HV cables. These cables shall be laid over a sand layer and covered with sand, brick & soil for ensuring mechanical protection. Cables shall not be laid in waterlogged area as far as practicable. Cable route markers shall be provided at every 25 M of buried trench route. When laid above ground, cables shall be properly cleated or supported on rigid poles of atleast 2 M high. Minimum head clearance of 6 meters shall be provided at road crossings.
- xi) Under ground road crossings for cables shall be avoided to the extent feasible. In any case no under ground power cable shall be allowed to cross the roads without pipe sleeve.
- xii) All cable joints shall be done with proper jointing kit. No taped / temporary joints shall be used.
- xiii) An independent earthing facility should preferably be established within the temporary installation premises. All appliances and

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equipment shall be adequately earthed. In case of armoured cables, the armour shall be bonded to the earthing system.

- xiv) All cables and wire rope used for earth connections shall be terminated through tinned copper lugs.
- xv) In case of local earthing, earth electrodes shall be buried near the supply point and earth continuity wire shall be connected to local earth plate for further distribution to various appliances. All insulated wires for earth connection shall have insulation of green colour.
- xvi) Separate core shall be provided for neutral. Earth / Structures shall not be used as a neutral in any case.
- xvii) ON/OFF position of all switches shall be clearly designated / painted for easy isolation in emergency.

The contractor shall identify all operations that can adversely affect the health of its workers and issue & implement mitigation measures.

For surface cleaning operations, sand blasting shall not be permitted even if not explicitly stated elsewhere in the contract.

To eliminate radiation hazard, Tungsten electrodes used for Gas Tungsten Arc Welding shall not contain Thorium.

Appropriate respiratory protective devices shall be used to protect workmen from inhalation of air borne contaminants like silica, asbestos, gases, fumes, etc.

Workmen shall be made aware of correct methods for lifting, carrying, pushing & pulling of heavy loads. Wherever possible, manual handling shall be replaced by mechanical lifting equipments.

For jobs like drilling / demolishing / dismantling where noise pollution exceeds the specified limit of 85 decibels, ear muffs shall be provided to the workers.

To avoid upper limb disorders and backaches, Display Screen Equipments' workplace stations shall be carefully designed & used with proper sitting postures. Power driven hand-held tools shall be maintained in good working condition to minimize their vibrating effects and personnel using these tools shall be taught how to operate them safely & how to maintain good circulation in hands.

The contractor shall arrange health check up for all the workers at the time of induction. Health check may have to be repeated if the nature of duty assigned to him is changed necessitating health check or doubt arises about his wellness. Consultant / Owner reserve the right to ask the contractor to submit test reports.

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Weather Protection

Contractor shall take appropriate measures to protect workers from severe storms, solar radiations, poisonous gases, dust, etc. by ensuring proper usage of PPEs like Sun glasses, Sun screen lotions, respirators, dust masks, etc. and rearranging / planning the construction activities to suit the weather conditions.

Communication

All persons deployed at the work site shall have access to effective means of communication so that any untoward incident can be reported immediately and assistance sought by them.

All health & safety information shall be communicated in a simple & clear language easily understood by the local workforce.

Unsuitable Land Conditions

Contractor shall take appropriate measures and necessary work permits / clearances if work is to be done in or around marshy areas, river crossings, mountains, monuments, etc.

Under Water Inspection

Contractor shall ensure that boats and other means used for transportation, surveying & investigation works shall be certified seaworthy by a recognized classification society. It shall be equipped with all life saving devices like life jackets, adequate fire protection arrangements and shall possess communication facilities like cellular phones, wireless, walkie-talkie. All divers used for seabed surveys, underwater inspections shall have required authorized license, suitable life saving kit. Number of hours of work by divers shall be limited as per regulations. Consultant / Owner shall have the right to inspect the boat and scrutinize documents in this regard.

TOOL BOX MEETING (TBM)

Contractor shall conduct daily TBM with workers prior to start of work and shall maintain proper record of the meeting. A suggested format is given below. The TBM is to be conducted by the immediate supervisor of the workers.

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TOOLBOX MEETING RECORDING SHEET

Date & Time		
Subject		
Presenter		
Hazards involved		
Precautions to be taken		
Worker's Name	Signature	Section
Remarks, if any		

The topics during TBM shall include

- Hazards related to work assigned on that day and precautions to be taken.
- Any forthcoming HSE hazards / events / instruction / orders, etc.

The above record can be kept in local language, which workers can read. These records shall be made available to Consultant / Owner whenever demanded.

TRAINING

Contractor shall ensure that all his personnel possess appropriate training to carry out the assigned job safely. The training should be imparted in a language understood by them and should specifically be trained about

- Potential hazards to which they may be exposed at their workplace
- Measures available for prevention and elimination of these hazards

The topics during training shall cover, at the minimum;

- Education about hazards and precautions required
- Emergency and evacuation plan
- HSE requirements
- Fire fighting and First-Aid
- Use of PPEs
- Local laws on intoxicating drinks, drugs, smoking in force

Records of the training shall be kept and submitted to Consultant / Owner whenever demanded.

For offshore and jetty jobs, contractor shall ensure that all personnel deployed have undergone a structured sea survival training including use of lifeboats, basket landing, use of radio communication etc. from an agency acceptable to Owner / Consultant.

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INSPECTION

The contractor shall carryout daily HSE inspection and record observations at a central location. These inspection records shall be freely accessible to Owner / Consultant representatives. The contractor shall also assist Owner / Consultant representatives during the HSE inspections conducted by them.

ADDITIONAL SAFETY REQUIREMENTS FOR WORKING INSIDE A RUNNING PLANT

As a minimum, the contractor shall ensure adherence to following safety requirements while working in or in the close vicinity of an operating plant :

- a) Contractor shall obtain permits for Hot work, Cold work, Excavation and Confined Space from Owner in the prescribed format.
- b) The contractor shall monitor, record and compile list of his workers entering the operational plant/unit each day and ensure & record their return after completing the job.
- c) Contractor's workers and staff members shall use designated entrances and proceed by designated routes to work areas only assigned to them. The workers shall not be allowed to enter units' area, tanks area, pump rooms, etc. without work authorization permit.
- d) Work activities shall be planned in such a way so as to minimize the disruption of other activities being carried out in an operational plant / unit and activities of other contractors.
- e) The contractor shall submit a list of all chemicals / toxic substances that are intended to be used at site and shall take prior approval of the Owner.
- f) Specific training on working in a hydrocarbon plant shall be imparted to the work force and mock drills shall be carried out for Rescue operations / First-Aid measures.
- g) Proper barricading / cordoning of the operational units / plants shall be done before starting the construction activities. No unauthorized person shall be allowed to trespass. The height and overall design of the barricading structure shall be finalized in consultation with the Owner and shall be got approved from the Owner.
- h) Care shall be taken to prevent hitting underground facilities such as electrical cables, hydrocarbon piping during execution of work.
- i) Barricading with water curtain shall be arranged in specific/critical areas where hydrocarbon vapors are likely to be present such as near horton spheres or tanks. Positioning of fire tenders (from owner) shall also be ensured during execution of critical activities.

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- j) Emergency evacuation plan shall be worked out and all workmen shall be apprised about evacuation routes. Mock drill operations may also be conducted.
- k) Flammable gas test shall be conducted prior to any hot work using appropriate measuring instruments. Sewers, drains, vents or any other gas escaping points shall be covered with flame retardant tarpaulin.
- l) Respiratory devices shall be kept handy while working in confined zones where there is a danger of inhalation of poisonous gases. Constant monitoring of presence of Gas / Hydrocarbon shall be done.
- m) Clearance shall be obtained from all parties before starting hot tapping, patchwork on live lines and work on corroded tank roof.
- n) Positive isolation of line/equipment by blinding for welding/cutting/grinding shall be done. Closing of valve will not be considered sufficient for isolation.
- o) Welding spatters shall be contained properly and in no case shall be allowed to fall on the ground containing oil. Similar care shall be taken during cutting operations.
- p) The vehicles, cranes, engines, etc. shall be fitted with spark arresters on the exhaust pipe and got it approved from Safety Department of the Owner.
- q) Plant air should not be used to clean any part of the body or clothing or use to blow off dirt on the floor.
- r) Gas detectors should be installed in gas leakage prone areas as per requirement of Owner's plant operation personnel.
- s) An experienced full time safety personnel shall be exclusively deployed to monitor safety aspects in running plants.

HSE PROMOTION

The contractor shall encourage his workforce to promote HSE efforts at workplace by way of organizing workshops / seminars / training programmes, celebrating HSE awareness weeks & National Safety Day, conducting quizzes & essay competitions, distributing pamphlets, posters & material on HSE, providing incentives for maintaining good HSE practices and granting bonus for completing the job without any lost time accident.

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4.0 **DETAILS OF HSE MANAGEMENT SYSTEM BY CONTRACTOR**

4.1 **On Award of Contract**

The Contractor shall prior to start of work submit his Health. Safety and Environment Manual of procedure and HSE Plans for approval by OWNER/Consultant. The Contractor shall participate in the pre-start meeting with OWNER/Consultant to finalize HSE plans including the following.

- Job procedure to be followed by Contractor for activities covering Handling of equipment's, Scaffolding, Electric Installation, describing the risks involved, actions to be taken and methodology for monitoring each.
- Organizations structure alongwith responsibility and authority records/ reports etc. on HSE activities.

4.2 **During job execution**

4.2.1 Implement approved Health, Safety and Environment management procedure including but not limited to as brought out under para 3.0. Contractor shall also ensure to:

- Arrange workmen compensation insurance, registration under ESI Act, third party liability insurance etc. as applicable.
- Arrange all HSE permits before start of activities (as applicable) like hot work, confined space, work at heights, storage of Chemicals/explosives materials and its use and implement all precautions mentioned therein
- Submit timely the completed check list on HSE activities, Monthly HSE report, accident report, investigation report, etc. as per OWNER/Consultant requirements. Compliance of instructions on HSE shall be done by Contractor and informed urgently to OWNER/Consultant.
- Ensure that resident Engineers/Site-In-Charge of the Contractor shall amend all the Safety Committee/HSE meeting arranged by OWNER/ Consultant only in case of his absence from site, a second senior most person shall be nominated by him in advance and communicated to OWNER/Consultant.
- Display at site office and work locations caution boards, list of hospitals for emergency services available.
- Provided posters, banners, for safe working to promote safety consciousness
- Carryout audits/inspection at sub Contractor work as per approved HSE documents & submit the reports for OWNER/Consultant review.

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- Assist in HSE audits by OWNER/ Consultant and submit
- compliance report. Generate & submit HSE records/ reports as per
- HSE Plan. Appraise OWNER/Consultant on HSE activities at site.

5.0 RECORDS

At the minimum, the contractor shall maintain/ submit HSE records in the following reporting formats:

- | | | |
|----|--|-------|
| 1. | Monthly HSE Checklist cum compliance report | HSE-1 |
| 2. | Accident / Incident Report | HSE-2 |
| 3. | Supplementary Accident / Incident Investigation report | HSE-3 |
| 4. | Near Miss Incident Report | HSE-4 |
| 5. | Monthly HSE Report | HSE-5 |
| 6. | Permit for working at height | HSE-6 |
| 7. | Permit for working in confined space | HSE-7 |
| 8. | Permit for radiation work | HSE-8 |
| 9. | Permit for demolishing / dismantling | HSE-9 |

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ANNEXURE-A**A. I.S. CODES ON HSE**

SP:53	Safety code for the use, Care and protection of hand operated tools.
IS: 818	Code of practice for safety and health requirements in electric and gas welding and cutting operations
IS: 1179	Eye and Face precautions during welding, equipment etc.
IS: 1860	Safety requirements for use, care and protection of abrasive grinding wheels.
IS: 1989(Part-I & II)	Leather safety boots and shoes
IS: 2925	Industrial Safety Helmets
IS: 3016	Code of practice for fire safety precautions in welding and cutting operations.
IS: 3043	Code of practice for earthing.
IS: 3764	Code of safety for excavation work
IS: 3786	Methods for computation of frequency and severity rates for industrial injuries and classification of industrial accidents.
IS: 3996	Safety Code of scaffolds and ladders.
IS: 4082	Recommendation on stacking and storage of construction materials and components at site.
IS: 4770	Rubber gloves for electrical purposes
IS: 5121	Safety code for piling and other deep foundations
IS: 5216 (Part-I)	Recommendations on Safety procedures and practices in electrical works
IS: 5557	Industrial and Safety rubber lined boots.
IS: 5983	Eye protectors
IS:6519	Selection, care and repair of Safety footwear
IS: 6994 (Part-I)	Industrial Safety Gloves (Leather & Cotton Gloves)
IS: 7293	Safety Code for working with construction Machinery

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IS: 8519	Guide for selection of industrial safety equipment for body protection
IS: 9167	Ear protectors
IS: 11006	Flash back arrestor (Flame arrestor)
IS:11016	General and safety requirements for machine tools and their operation
IS: 11057	Specification for Industrial safety nets
IS: 11226	Leather safety footwear having direct moulded rubber sole
IS: 11972	Code of practice for safety precaution to be taken when entering a sewerage system
IS: 13367	Code of practice-safe use of cranes
IS: 13416	Recommendations for preventive measures against hazards at working place

B. INTERNATIONAL STANDARDS ON HSE

Safety Glasses	:	ANSI Z 87.1, ANSI ZZ 87.1, AS 1337, BS 2092, BS 1542, BS 679, DIN 4646 / 58211
Safety Shoes	:	ANSI Z 41.1, AS 2210, EN 345
Hand Gloves	:	BS 1651
Ear Muffs	:	BS 6344, ANSI S 31.9
Hard Hat	:	ANSI Z 89.1 / 89.2, AS 1808, BS 5240, DIN 4840
Goggles	:	ANSI Z 87.1
Face Shield	:	ANSI Z 89.1
Breathing Apparatus	:	BS 4667, NIOSH
Welding & Cutting	:	ANSI Z 49.1
Safe handling of compressed Gases in cylinders	:	P-1 (Compressed Gas Association 1235 Jefferson Davis Highway, Arlington VA 22202 – USA)

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ANNEXURE-B**DETAILS OF FIRST AID BOX**

SL. NO	DESCRIPTION	QUANTITY
1.	Small size Roller Bandages, 1 inch wide (Finger Dressing small)	6 Pcs.
2.	Medium size Roller Bandages, 2 inch wide (Hand and Foot Dressing)	6 Pcs.
3.	Large size Roller Bandages, 4 inch wide (Body Dressing Large)	6 Pcs.
4.	Large size Burn Dressing (Burn Dressing Large)	4 Pkts.
5.	Cotton wool (20 gms packing)	4 Pkts.
6.	Antiseptic Solution Dettol (100 ml.) or Savlon	1 Bottle
7.	Mercurochrome Solution (100 ml.) 2% in water	1 Bottle
8.	Ammonia Solution (20 ml.)	1 Bottle
9.	A Pair of Scissors	1 Piece
10.	Adhesive Plaster (1.25 cm x 5 m)	1 Spool
11.	Eye pads in Separate Sealed Packet	4 Pcs.
12.	Tourniquet	1 No.
13.	Safety Pins	1 Dozen
14.	Tinc. Iodine / Betadin (100 ml.)	1 Bottles
15.	Ointment for burns (Burnol 20 gms.)	1 Bottole
16.	Polythene Wash cup for washing eyes	1 No.
17.	Potassium Permanganate (20 gms.)	1 Pkt.
18.	Tinc. Benzoine (100 ml.)	1 Bottole
19.	Triangular Bandages	2 Nos.
20.	Band Aid Dressing	5 Pcs.
21.	Iodex / Moov (25 gms.)	1 Bottole
22.	Tongue Depressor	1 No.
23.	Boric Acid Powder (20 gms.)	2 Pkt.
24.	Sodium Bicarbonate (20 gms.)	1 Pkt.
25.	Dressing Powder (Nebasulf) (10 gms.)	1 Bottole
26.	Medicinal Glass	1 No.
27.	Duster	1 No.
28.	Booklet (English & Local Language)	1 No. each
29.	Soap	1 No.
30.	Toothache Solution	1 No.
31.	Eye Ointment	1 Bottle
32.	Vicks (22 gms.)	1 Bottle
33.	Forceps	1 No.
34.	Cotton Buds (5 nos.)	1 Pkt.
35.	Note Book	1 No.
36.	Splints	4 Nos.
37.	Lock	1 Piece
38.	Life Saving/Emergency/Over-the Counter Drugs	As decided at site
	Box size : 14" x 12" x 4"	

Note : The medicines prescribed above are only indicative. Equivalent medicines can also be used.
A prescription, in this regard, shall be required from a qualified Physician.

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ANNEXURE – C**TYPE OF FIRES VIS-À-VIS FIRE EXTINGUISHERS**

Fire	Fire Extinguishers				
	Water	Foam	CO ₂	Dry Powder	Multi Purpose (ABC)
Originated from paper, clothes, wood	√	√	Can control minor surface fires	Can control minor surface fires	√
Inflammable liquids like alcohol, diesel, petrol, edible oils, bitumen	x	√	√	√	√
Originated from gases like LPG, CNG, H ₂	x	x	√	√	√
Electrical Fires	x	x	√	√	√

Legend : √ Can be used
 x Not to be used

Note : Fire extinguishing equipment must be checked atleast once a year and after every use by an authorized person. The equipment must have an inspection label on which the next inspection date is given. Type of extinguisher shall clearly be marked on it.

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ANNEXURE – D**Indicative List of Statutory Acts & Rules Relating to HSE**

- The Indian Explosives Act and Rules
- The Motor Vehicle Act and Central Motor Vehicle Rules
- The Factories Act and concerned Factory Rules
- The Petroleum Act and Petroleum Rules
- The Workmen Compensation Act
- The Gas Cylinder Rules and the Static & Mobile Pressure Vessels Rules.
- The Indian Electricity Act and Rules
- The Indian Boiler Act and Regulations
- The Water (Prevention & Control & Pollution) Act
- The Water (Prevention & Control of Pollution) Cess Act
- The Mines & Minerals (Regulation & Development) Act
- The Air (Prevention & Control of Pollution) Act
- The Atomic Energy Act
- The Radiation Protection Rules
- The Indian Fisheries Act
- The Indian Forest Act
- The Wild Life (Protection) Act
- The Environment (Protection) Act and Rules
- The Hazardous Wastes (Management & Handling) Rules
- The Manufacturing, Storage & import of Hazardous Chemicals Rules
- The Public Liability Act
- The Building and Other Construction Workers (Regulation of Employment and Condition of service) Act
- Other statutory acts Like EPF, ESIS, Minimum Wage Act.

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ANNEXURE – E**CONSTRUCTION HAZARDS, THEIR EFFECTS & PREVENTIVE MEASURES**

ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
(A) EXCAVATION Pit Excavation up to 3.0m	➤ Falling into pit	➤ Personal injury	➤ Provide guard rails/barricade with warning signal. ➤ Provide at least two entries/exits. ➤ Provide escape ladders.
	➤ Earth Collapse	➤ Suffocation / Breathlessness ➤ Buried	➤ Provide suitable size of shoring and strutting, if required. ➤ Keep soil heaps away from the edge equivalent to 1.5m or depth of pit whichever is more. ➤ Don't allow vehicles to operate too close to excavated areas. Maintain at least 2m distance from edge of cut. ➤ Maintain sufficient angle of repose. Provide slope not less than 1:1 and suitable bench of 0.5m width at every 1.5m depth of excavation in all soils except hard rock. ➤ Battering/benching the sides.
	➤ Contact with buried electric cables ➤ Gas/ Oil Pipelines	➤ Electrocution ➤ Explosion	➤ Obtain permission from competent authorities, prior to excavation, if required. ➤ Locate the position of buried utilities by referring to plant drawings. ➤ Start digging manually to locate the exact position of buried utilities and thereafter use

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			mechanical means.
Pit Excavation beyond 3.0m	➤ Same as above plus ➤ Flooding due to excessive rain/ underground water	➤ Can cause drowning situation	➤ Prevent ingress of water ➤ Provide ring buoys ➤ Identify and provide suitable size dewatering pump or well point system
	➤ Digging in the vicinity of existing Building/ Structure	➤ Building/ Structure may collapse ➤ Loss of health & wealth	➤ Obtain prior approval of excavation method from local authorities ➤ Use under-pining method ➤ Construct retaining wall side by side
	➤ Movement of vehicles / equipments close to the edge of cut.	➤ May cause cave-in or slides ➤ Persons may get buried	➤ Barricade the excavated area with proper lighting arrangements ➤ Maintain at least 2m distance from edge of cut and use stop block to prevent over-run. ➤ Strengthen shoring and strutting
Narrow deep excavations for pipelines, etc.	➤ Same as above plus ➤ Frequent cave-in or slides	➤ May cause severe injuries or prove fatal	➤ Battering/benching of sides ➤ Provide escape ladders
	➤ Flooding due to Hydrostatic testing	➤ May arise drowning situation	➤ Same as above plus ➤ Bail out accumulated water ➤ Maintain adequate ventilation
Rock excavation by blasting	➤ Improper handling of explosives	➤ May prove fatal	➤ Ensure proper storage, handling & carrying of explosives by trained personnel. ➤ Comply with the applicable explosive acts & rules.
	➤ Uncontrolled explosion	➤ May cause severe injuries or prove fatal	➤ Allow only authorized persons to perform blasting operations. ➤ Smoking and open

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			flames are to be strictly prohibited.
	➤ Scattering of stone pieces in atmosphere	➤ Can hurt people	➤ Use PPE like goggles, face mask, helmets etc.
Rock excavating by blasting (Contd)	➤ Entrapping of persons/ animals.	➤ May cause severe injuries or prove fatal	➤ Barricade the area with red flags and blow siren before blasting.
	➤ Misfire	➤ May explode suddenly	➤ Do not return to site for at least 20 minutes or unless announced safe by designated person.
Piling Work	➤ Failure of pile-driving equipment	➤ Can hurt people	➤ Inspect Piling rigs and pulley blocks before the beginning of each shift.
	➤ Noise pollution	➤ Can cause deafness and psychological imbalance	➤ Use personal protective equipments like ear plugs, muffs, etc.
	➤ Extruding rods / casing	➤ Can hurt people	➤ Barricade the area ➤ an install sign boards ➤ Provide first-aid
	➤ Working in the vicinity of 'Live-Electricity'	➤ Can cause electrocution / asphyxiation	➤ Keep sufficient distance from Live-Electricity as per IS code. ➤ Shut off the supply, if possible ➤ Provide artificial/rescue breathing to he injured.
(B) CONCRETING	➤ Air pollution by cement	➤ May affect Respiratory System	➤ Wear respirators or cover mouth and nose with wet cloth.
	➤ Handling of ingredients	➤ Hand s may get injured	➤ Use gloves and other PPE.
	➤ Protruding reinforcement rods.	➤ Feet may get injured	➤ Use Safety shoes. ➤ Provide platform above reinforcement for movement of workers.
	➤ Earthing of electrical mixers,	➤ Can cause electrocution / asphyxiation	➤ Ensure earthing of equipments and proper functioning of

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
	vibrators, etc. not done		electrical circuit before commencement of work.
	➤ Falling of materials from height	➤ Persons may get injured	➤ Use hard hats ➤ Remove surplus material immediately from work place ➤ Ensure lighting arrangements during night hours.
	➤ Continuous pouring by same gang	➤ Cause tiredness of workers and may lead to accident.	➤ Insist on shift pattern ➤ Provide adequate rest to workers between subsequent pours.
	➤ Revolving or concrete mixer/ vibrators	➤ Parts of body or clothes may get entrapped.	➤ Allow only mixers with hopper ➤ Provide safety cages around moving motors ➤ Ensure proper mechanical locking of vibrator
Super-structure	➤ Same as above plus ➤ Deflection in props or shuttering material	➤ Shuttering / props may collapse and prove fatal	➤ Avoid excessive stacking on shuttering material ➤ Check the design and strength of shuttering material before commencement of work ➤ Rectify immediately the deflection noted during concreting
	➤ Passage to work place	➤ Improperly tied and designed props / planks may collapse	➤ Ensure the stability and strength of passage before commencement of work ➤ Do not overload and under the passage.
(C) REINFORCEMENT	➤ Curtailment and binding of rods	➤ Persons may get injured	➤ Use PPE like gloves, shoes, helmets, etc. ➤ Avoid usage of shift tools
	➤ Carrying of rods for short distance/ at	➤ Workers may injure their hands and shoulders	➤ Provide suitable pads on shoulders and use safety

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
	heights		- gloves. ➤ Tie up rods in easily liftable bundles ➤ Ensure proper staging.
	➤ Checking of clear distance/ cover with hands	➤ Rods may cut or injure the finger	➤ Use measuring devices tape, measuring rods, etc.
	➤ Hitting projected rods and standing on cantilever rods	➤ Persons may get injured and fall down	➤ Use safety shoes and avoid standing unnecessarily on cantilever rods ➤ Avoid wearing loose clothes
	➤ Falling of material from height	➤ May prove fatal	➤ Use helmets ➤ Provide safety nets
	➤ Transportation of rods by trucks / trailers	➤ Protruded rods may hit the persons	➤ Use red flags/lights at the ends ➤ Do not protrude the rods in front of or by the side of driver's cabin. ➤ Do not extend the rods 1/3rd of deck length or 1.5 m which is less
(D) WELDING AND GAS CUTTING	➤ Welding radiates invisible ultraviolet and infrared rays	➤ Radiation can damage eyes and skin.	➤ Use specified shielding devices and other PPE of correct specifications ➤ Avoid throated tungsten electrodes for GTAW.
	➤ Improper placement of oxygen and acetylene cylinders	➤ Explosion may occur	➤ Move out any leaking cylinder ➤ Keep cylinder in vertical position ➤ Use trolley for transportation of cylinders and chain them ➤ Use flash back arrestors
	➤ Leakage / cuts in hoses	➤ May cause fire	➤ Purge regulators immediately and then turn off ➤ Never use grease or

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			oil on oxygen line connections and copper fittings on acetylene lines ➤ Inspect regularly gas carrying hoses ➤ Always use red hose for acetylene & other fuel gases and black for oxygen.
	➤ Opening-up of cylinder	➤ Cylinder may burst	➤ Always stand back from the regulator while opening the cylinder ➤ Turn valve slowly to avoid bursting ➤ Cover the lug terminals to prevent short circuiting.
	➤ Welding of tanks, container or pipes storing flammable liquids	➤ Explosion may occur	➤ Empty & purge them before welding ➤ Never attach the ground cable to tanks, container or pipe storing flammable liquids ➤ Never use LPG for gas cutting
(E) RADIOGRAPHY	➤ Ionizing Radiation	➤ Radiations may react with the skin and can cause cancer, skin irritation, dermatitis, etc.	➤ Ensure safety regulations as per BARC/AERB before commencement of job. ➤ Cordon off the area and install Radiation warning symbols ➤ Restrict the entry of unauthorized persons ➤ Wear appropriate PPE and film badges issued by BARC/AERB
	➤ Transportation and Storage of Radiography source	➤ Same as above	➤ Never touch or handle radiography source with hands ➤ Store radiography source inside a pit in an exclusive isolated

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			storage room with lock and key arrangement. The pit should be approved by BARC/AERB ➤ Radiography source should never be carried either in passenger bus or in a passenger compartment of trains. ➤ BARC/AERB have to be informed before source movement. ➤ Permission from Director General of Civil Aviation is required for booking radio isotopes with airlines.
	➤ Loss of Radio isotope	➤ Same as above	➤ Try to locate with the help of Survey Meter. ➤ Inform BARC/AERB(*) (*) Atomic Energy Regulatory Board (AERB), Bhabha Atomic Research Centre (BARC) Anushaktinagar, Mumbai – 400 094
(F) ELECTRICAL INSTALLATION AND USAGE	➤ Short circuiting	➤ Can cause Electrocution or Fire	➤ Use rubberized hand gloves and other PPE ➤ Don't lay wires under carpets, mats or door ways. ➤ Allow only licensed electricians to perform on electrical facilities ➤ Use one socket for one appliance ➤ Ensure usage of only fully insulated wires or cables ➤ Don't place bare wire ends in a socket

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			➤ Ensure earthing of machineries and equipments ➤ Do not use damaged cords and avoid temporary connections ➤ Use spark-proof/flame proof type field distribution boxes. ➤ Do not allow open/bare connections ➤ Provide all connections through ELCB ➤ Protect electrical cables / equipment's from water and naked flames ➤ Check all connections before energizing.
	➤ Overloading of Electrical System	➤ Bursting of system can occur which leads to fire	➤ Display voltage and current ratings prominently with 'Danger' signs. ➤ Ensure approved cable size, voltage grade and type. ➤ Switch off the electrical utilities when not in use. ➤ Do not allow unauthorized connections. ➤ Ensure proper grid wise distribution of Power.
	➤ Improper laying of overhead and underground transmission lines / cables	➤ Can cause electrocution and prove fatal	➤ Do not lay unarmored cable directly on ground, wall, roof of trees ➤ Maintain at least 3m distance from HT cables ➤ All temporary cables should be laid at least 750 mm below ground on 100 mm

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			fine sand overlying by brick soling ➤ Provide proper sleeves at crossings/ intersections ➤ Provide cable route markers indicating the type and depth of cables at intervals not exceeding 30m and at the diversions / termination.
(G) FIRE PREVENTION AND PROTECTION	➤ Small fires can become big ones and may spread to the surrounding areas	➤ Cause burn injuries and may prove fatal.	➤ In case a fire breaks out, press fire alarm system and shout "Fire, Fire" ➤ Keep buckets full of sand & water/fire extinguishing equipment near hazardous locations ➤ Confine smoking to 'Smoking Zones' only ➤ Train people for using specific type of fire equipments under different classes of fire ➤ Keep fire doors/ shutters, passages and exit doors unobstructed ➤ Maintain good house keeping and first-aid boxes (for detail refer Annex-2) ➤ Don't obstruct access to Fire extinguishers ➤ Do not use elevators for evacuation during fire ➤ Maintain lightening arrestors for elevated structures ➤ Stop all electrical motors with internal combustion. ➤ Move the vehicles from dangerous

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			- locations. ➤ Remove the load hanging from the crane booms. ➤ Remain out of the danger areas.
	➤ Improper selection of Fire Extinguisher	➤ It may not extinguish the fire	➤ Ensure usage of correct fire extinguisher meant for the specified fire (for details refer Appendix-C) ➤ Do not attempt to extinguish Oil and electric fires with water. Use foam cylinders/CO₂/sand or earth.
	➤ Improper storage of highly inflammable substances	➤ Same as above	➤ Maintain safe distance of flammable substances from source of ignition ➤ Restrict the distribution of flammable materials to only min. necessary amount ➤ Construct specifically designed fuel storage facilities ➤ Keep chemicals in cool and dry place away from hat. Ensure adequate ventilation ➤ Before welding operation, remove or shield the flammable material properly ➤ Store flammable materials in stable racks, correctly labeled preferably with catchments trays. ➤ Wipe off the spills immediately

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
	➤ Short circuiting of electrical system	➤ Same as above ➤ Can cause Electrocution	➤ Don't lay wires under carpets, mats or door ways ➤ Use one socket for one appliance ➤ Use only fully insulated wires or cables ➤ Do not allow open/bare connections ➤ Provide all connections through ELCB ➤ Ensure earthing of machineries and equipments
(H) VEHICULAR MOVEMENT	➤ Crossing the Speed Limits (Rash driving)	➤ Personal injury	➤ Obey speed limits and traffic rules strictly ➤ Always expect the unexpected and be a defensive drive ➤ Use sat belts/helmets ➤ Blow horn at intersections and during overtaking operations. ➤ Maintain the vehicle in good condition ➤ Do not overtake on curves, bridges and slopes
	➤ Adverse weather condition	➤ Same as above	➤ Read the road ahead and ride to the left ➤ Keep the wind screen and lights clean ➤ Do not turn at speed ➤ Recognize the hazard, understand the defense and act correctly in time.
	➤ Consuming alcohol before and during he	➤ Same as above	➤ Alcohol and driving do not mix well. Either choose

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
	driving operation		➤ alcohol or driving. ➤ If you have a choice between hitting a fixed object or an oncoming vehicle, hit the fixed object ➤ Quit the steering at once and become a passenger. Otherwise take sufficient rest and then drive. ➤ Do not force the driver to drive fast and round the clock ➤ Do not day dram while driving
	➤ Falling objects / Mechanical failure	➤ May prove fatal	➤ Ensure effective braking system, adequate visibility for the drives, reverse warning alarm. ➤ Proper maintenance of the vehicle as per manufacturer instructions
(I) PROOF TESTING (HYDROSTATIC/ PNEUMATIC TESTING)	➤ Bursting of piping ➤ Collapse of tanks ➤ Tanks flying off	➤ May cause injury and prove fatal	➤ Prepare test procedure & obtain CONSULTANT/ Owner's approval ➤ Provide separate gauge for pressurizing pump and piping/equipment ➤ Check the calibration status of all pressure gauges, dead weight testers and temperature recorders ➤ Take dial readings at suitable defined intervals and ensure most of them fall between 40-60% of the gauge scale range ➤ Provide safety relief valve (set at

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			pressure slightly higher than test pressure) while testing with air/nitrogen ➤ Ensure necessary precautions, stepwise increase in pressure, tightening of bolts/ nuts, grouting, etc. before and during testing ➤ Keep the vents open before opening any valve while draining out of water used for hydro testing of tanks ➤ Pneumatic testing involves the hazard of released energy stored in compressed gas. Specific care must therefore be taken to minimize the chance of brittle failure during a pneumatic leak test. Test temperature is important in this regard and must be considered when the designer chooses the material of construction ➤ A pressure relief device shall be provided, having a set pressure not higher than the test pressure plus the lesser of 345 KPa (50 psi) or 10% of the test pressure. The gas used as test fluid, if not air, shall be nonflammable and nontoxic.
(J) WORKING AT HEIGHTS	➤ Person can fall down	➤ May sustain severe injuries or	➤ Provide guard rails/barricade at the

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
		prove fatal	➤ work place ➤ Use PPE like safety belts, full body harness, life line, helmets, safety shoes, etc. ➤ Obtain a permit before starting the work at height above 3 meters ➤ Fall arrest systems like safety nets, etc. must be installed ➤ Provide adequate working space (min. 0.6 m) ➤ Tie/weld working platform with fixed support ➤ Use roof top walk ladder while working on a slopping roofs ➤ Avoid movement on beams
		➤ May hit the scrap / material stacked at the ground or in between	➤ Keep the work place neat and clean ➤ Remove the scrap immediately
	➤ Material can fall down	➤ May hit the workers working at lower levels and prove fatal.	➤ Same as above plus ➤ Do not throw or drop material or equipment from height ➤ All tools to be carried in a toolkit bags or on working uniform ➤ Remove scrap from the planks ➤ Ensure wearing of helmet by the workers at low level
(K) CONFINED SPACES	➤ Suffocation / drowning	➤ Unconsciousness, death	➤ Use respiratory devices, if required ➤ Avoid over crowding inside a confined space ➤ Provide Exhaust Fans for ventilation ➤ Do not wear loose clothes, neck ties,

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			etc. ➤ Fulfill conditions of the permit. ➤ Check for presence of hydrocarbons, O ₂ level ➤ Obtain work permit before entering a confined space ➤ Ensure that the connected piping of the equipment which is to be opened is pressure free, fluid has been drained, vents are open and piping is positively isolated by a blind flange
	➤ Presence of foul smell and toxic substances	➤ Inhalation can pose threat to life.	➤ Same as above plus ➤ Check for hydrocarbon and Aromatic compounds before entering a confined space ➤ Depute one person outside the confined space for continuous monitoring and for extending help in case of an emergency
	➤ Ignition / flame can cause fire	➤ Person may sustain burn injuries or explosion may occur	➤ Keep fire extinguishers at a hand distance ➤ Remove surplus material and scrap immediately ➤ Do not smoke inside a confined space ➤ Do not allow gas cylinders inside a confined space ➤ Use low voltage (24V) lamps for lighting ➤ Use tools with air motors or electric tools with max.

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			➤ voltage of 24V ➤ Remove all equipments at the end of the day
(L) HANDLING AND LIFTING EQUIPMENTS	➤ Failure of load lifting and moving equipments	➤ Can cause accident and prove fatal	➤ Avoid standing under the lifted load and within the operating radius of cranes ➤ Check periodically oil, brakes, gears, horns and tyre pressure of all moving machinery ➤ Check quality, size and condition of all chain pulley blocks, slings, U-clamps, D-shackles, wire ropes, etc. ➤ Allow crane to move only on hard, firm and leveled ground ➤ Allow lifting slings as short as possible and check gunny packings at the friction points ➤ Do not allow crane to tilt its boom while moving ➤ Install Safe Load Indicator ➤ Ensure certification by applicable authority.
	➤ Overloading of lifting equipments	➤ Can cause electrocution and fire	➤ Safe lifting capacity of derricks and winches written on them shall be got verified. ➤ The max safe working load shall be marked on all lifting equipments ➤ Check the weight of columns and other heavy items painted on them and accordingly decide about the crane

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			capacity, boom and angle of erection ➤ Allow only trained operators and riggers during crane operation
	➤ Overhead electrical wires	➤ Can cause electrocution and fire	➤ Do not allow boom or other parts of crane to come within 3 m reach of overhead HT cables ➤ Hook and load being lifted shall preferably remain in full visibility of crane operator.
(M) SCAFFOLDING, FORMWORK AND LADDERS	➤ Person can fall down	➤ Person may sustain severe injuries and prove fatal	➤ Provide guard rails for working at height ➤ Face ladder while climbing and use both hands ➤ Ladders shall extend about 1m above landing for easy access and tying up purpose ➤ Do not place ladders against movable objects and maintain base at ¼ unit of the working length of the ladder ➤ Suspended scaffolds shall not be less than 500 mm wide and tied properly with ropes ➤ No loose planks shall be allowed ➤ Use PPE, like helmets, safety shoes, etc.
	➤ Failure of scaffolding material	➤ Same as above	➤ Inspect visually all scaffolding materials for stability and anchoring with permanent structures. ➤ Design scaffolding

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
			for max. load carrying capacity ➤ Scaffolding planks shall not be less than 50x250 mm full thickness lumber or equivalent. These shall be cleared or secured and must extend over the end supports by at least 150mm and not more than 300 mm ➤ Don't overload the scaffolds ➤ Do not splice short ladders to make a longer one. Vertical ladders shall not exceed 6m.
	➤ Material can fall down	➤ Persons working at lower level gets injured.	➤ Remove excess material and scrap immediately ➤ Carry the tools in a tool-kit bag only ➤ Provide safety nets
(N) STRUCTURAL WORKS	➤ Personal negligence and danger of fall	➤ Can cause injury or casualty	➤ Do not take rest inside rooms built for welding machines or electrical distribution system ➤ Avoid walking on beams at height ➤ Wear helmet with chin strap and safety belts when working at height ➤ Use hand gloves and goggles during grinding operations ➤ Cover or mark the sharp and projected edges ➤ Do not stand within the operating radius of cranes
	➤ Lifting / slipping of	➤ Same as above	➤ Do not stand under the lifted load

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ACTIVITY	TYPE OF HAZARD	EFFECT OF HAZARD	PREVENTIVE MEASURES
	material		➤ Stack properly all the materials. Avoid slippage during handling ➤ Control longer pieces lifted up by cranes from both ends ➤ Remove loose materials from height ➤ Ensure tightening of all nuts and bolts
(O) PIPELINE WORKS	➤ Erection / lowering failure	➤ Can cause injury	➤ Do not stand under the lifted Load ➤ Do not allow any person to come within the radii of the side boom handling pipes ➤ Check the load carrying capacity of the lifting tools and tackles ➤ Use safe Load Indicators ➤ Use appropriate PPEs
	➤ Other	➤ Same as above	➤ Wear gum boots in marshy areas ➤ Allow only one person to perform signaling operations while lowering of pipes ➤ Provide night caps on pipes ➤ Provide end covers on pipes for stoppage of pigs while testing/cleaning operations.

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HSE CHECKLIST CUM COMPLIANCE REPORT (1/6)

Project: _____
 Date: _____
 Inspection By: _____
 Frequency : Fortnightly

Contractor : _____
 Owner : _____
 Report No. : _____
 Job No : _____

Note: write 'NA' wherever the item is not applicable

SL. NO.	ITEM	YES	NO	REMARKS	ACTION
1	HOUSEKEEPING				
a)	Waste containers provided and used				
b)	Sanitary facilities adequate and clean				
c)	Passageways and Walkways clear				
d)	General neatness of working areas				
e)	Others				
2	PERSONNEL PROTECTIVE EQUIPMENT				
a)	Goggles; Shields				
b)	Face protection				
c)	Hearing protection				
d)	Safety shoes				
e)	Hand protection				
f)	Respiratory Masks etc.				
g)	Safety Belts				
h)	Safety Helmet/Hard Hat				
i)	Others				
3	EXCAVATIONS/OPENINGS				
a)	Openings properly covered or barricaded				
b)	Excavations shored				
c)	Excavations barricaded				
d)	Overnight lighting provided				
e)	Others				
4	WELDING & GAS CUTTING				
a)	Gas cylinders chained upright				
b)	Cables and hoses not obstructing				
c)	Screens or shields used				
d)	Flammable materials protected				
e)	Fire extinguisher(s) accessible				
f)	Others				
5	SCAFFOLDING				
a)	Fully decked platforms				
b)	Guard and intermediate rails in place				

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SL. NO.	ITEM	YES	NO	REMARKS	ACTION
c)	Toe boards in place				
d)	Adequate shoring				
e)	Adequate access				
f)	Others				
6	LADDERS				
a)	Extension side rails 1m above				
b)	Top of landing				
c)	Properly secured				
d)	Angle + 70 from horizontal				
e)	Others				
7	HOISTS, CRANES AND DERRICKS				
a)	Condition of cables and sheaves OK				
b)	Condition of slings, chains, hooks and eyes OK				
c)	Inspection and maintenance logs maintained				
d)	Outriggers used				
e)	Signs/barricades provided				
f)	Signals observed and understood				
g)	Qualified operators				
h)	Others				
8	MACHINERY, TOOLS AND EQUIPMENT				
a)	Proper instruction				
b)	Safety devices				
c)	Proper cords				
d)	Inspection and maintenance				
e)	Others				
9	VEHICLE AND TRAFFIC				
a)	Rules and regulations observed				
b)	Inspection and maintenance				
c)	Licensed drivers				
d)	Others				
10	TEMPORARY FACILITIES				
a)	Emergency instructions posted				
b)	Fire extinguishers provided				
c)	Fire-aid equipment available				
d)	Secured against storm damage				
e)	General neatness				
f)	In accordance with electrical requirements				
g)	Others				
11	FIRE PREVENTION				
a)	Personnel instructed				
b)	Fire extinguishers checked				
c)	No smoking in Prohibited Areas				
d)	Hydrants Clear				

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e)	Others				
12	ELECTRICAL				
a)	Use of 3-core armoured cables				
b)	Usage of 'All insulated' or 'double insulated' electrical tools				
c)	All electrical connection are routed through ELCB				
d)	Natural Earthing at the source of power (main DB)				
e)	Continuity and tightness of earth conductor				
f)	Covering of junction boxes, panels and other energized wiring places				
g)	Ground fault circuit interrupters provided				
h)	Prevention of tripping hazards				
i)	Others				
13	HANDLING AND STORAGE OF MATERIALS				
a)	Properly stored or stacked				
b)	Passageways clear				
c)	Others				
14	FLAMMABLE GASES AND LIQUIDS				
a)	Containers clearly identified				
b)	Proper storage				
c)	Fire extinguishers nearby				
d)	Others				
15	WORKING AT HEIGHT				
a)	Erection plan and work permit obtained				
b)	Safety nets				
c)	Full body harness and lanyards; chute lines				
d)	Health Check record available for workers going up?				
e)	Others				
16	CONFINED SPACE				
a)	Work permit obtained				
b)	Test for toxic gas and sufficient availability of oxygen conducted				
c)	At least one person outside the confined space for monitoring deputed				
d)	Availability of sufficient means of entry, exit and ventilation				
e)	Fire extinguishers and first-aid facility ensured				
f)	Lighting provision made by using 24V lamps				
g)	Proper usage of PPEs ensured				
17	RADIOGRAPHY				
a)	Proper storage and handling of source as per BARC / AREB guidelines				
b)	Working permit obtained				
c)	Cordoning of the area done				

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SL. NO.	ITEM	YES	NO	REMARKS	ACTION
d)	Use of appropriate PPE's ensured				
e)	Proper training to workers/supervisors imparted				
f)	Minimum occupancy of workplace ensured				
18	HEALTH CHECKS				
a)	Workers medically examined and found to fit for working : i) At heights ii) In confined space.				
b)	Availability of First-aid facilities				
c)	Proper sanitation at site, office and labour camps				
d)	Arrangement of medical facilities				
e)	Measures for dealing with illness				
f)	Availability of Portable drinking water for workmen & staff				
g)	Provision of crèches for children				
h)	Stand by vehicle available for evacuation of injured.				
19	ENVIRONMENT				
a)	Chemical and other effluents properly disposed				
b)	Cleaning liquid of pipes disposed off properly				
c)	Seawater used for hydro-testing disposed off as per agreed procedure				
d)	Lubricant Waste/Engine oils properly disposed				
e)	Waste from Canteen, offices, sanitation etc. disposed properly				
f)	Disposal of surplus earth, stripping materials, oily rags and combustible materials done properly				
g)	Green belt protection				

Signature of Resident
Engineer with Seal

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TITLE	HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT	DOCUMENT NO. BR/HSE/001	
			REVISION : 0
			EDITION : 1

FORMAT NO. : HSE-2, REV. 0

ACCIDENT / INCIDENT REPORT**(To be submitted by Contractor after every Accident / Incident within 24 hours)**

Report No: _____

Date: _____

Name of Site:- _____

CONTRACTOR _____

Type of Accident / Incident : ☐ Fatal ☐ Other Lost Time ☐ Non Loss Time ☐ First-Aid case

NAME OF THE INJURED.....

AGE

FATHER'S NAME.....

SUB-CONTRACTOR M/S.....

DATE & TIME OF ACCIDENT.....

LOCATION

BRIEF DESCRIPTION OF ACCIDENT

CAUSE OF ACCIDENT

NATURE OF INJURY/DAMAGE

MEDICAL AID PROVIDED/ACTIONS TAKEN

INTIMATION TO LOCAL AUTHORITIES (IF APPLICABLE)

DATE:

SIGNATURE OF CONTRACTOR
WITH SEAL

To : OWNER.....

: RCM/SITE-IN-CHARGE, Consultant

1 COPY

3 COPIES

→ Divisional Head (Constn.) through RCM

→ Project Manager Consultant, through RCM

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT	DOCUMENT NO. BR/HSE/001	

FORMAT NO. : HSE-3, REV. 0

SUPPLEMENTARY ACCIDENT / INCIDENT INVESTIGATION REPORT

Supplementary to Report No: _____(Copy enclosed)

Project: _____
 Name of Work : _____
 Contractor: _____

Site: _____
 Date: _____
 Work Order / LOI No. : _____

NAME OF THE INJURED
 AGE :
 SUB-CONTRACTOR M/S.....
 DATE & TIME OF ACCIDENT / INCIDENT
 LOCATION.....

BRIEF DESCRIPTION & CAUSE OF A ACCIDENT/ INCIDENT

NATURAL OF INJURY/DAMAGE

COMMENTS FROM MEDICAL PRACTITIONER WHO ATTENDED THE VICTIM/INJURED

SUGGESTED IMPROVEMENT IN THE WORKING CONDITION IF ANY

LOSS OF MANHOURS AND IMPACT ON SITE WORKS

ANY OTHER COMMENT BY SAFETY OFFICER.

DATE:

SIGNATURE OF CONTRACTOR
WITH SEAL

To : OWNER.....
 : RCM/SITE-IN-CHARGE, Consultant

1 COPY
 3 COPIES

→ Divisional Head (Constn.) through RCM
 → Project Manager Consultant, through RCM

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT	DOCUMENT NO. BR/HSE/001	Page 50 of 59
			REVISION : 0
			EDITION : 1

FORMAT NO. : HSE-4, REV. 0

NEAR MISS INCIDENT – SUGGESTED PROFORMA

Name of Site : _____ Report No: _____
 Name of Work : _____ Date : _____
 Contractor : _____

INCIDENT REPORTED BY :

DATE & TIME OF INCIDENT :

LOCATION :

BRIEF DESCRIPTION OF INCIDENT

PROBABLE CAUSE OF INCIDENT

SUGGESTED CORRECTIVE ACTION

STEPS TAKEN TO AVOID RECURRENCE

YES

☐

NO

☐

DATE:

SIGNATURE OF CONTRACTOR
WITH SEAL

To : OWNER.....
 : RCM/SITE-IN-CHARGE, Consultant

1 COPY
 3 COPIES

→ Divisional Head (Constn.) through RCM
 → Project Manager Consultant, through RCM

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT	DOCUMENT NO. BR/HSE/001	Page 51 of 59
			REVISION : 0
			EDITION : 1

FORMAT NO. : HSE-5, REV. 0

MONTHLY HEALTH, SAFETY & ENVIRONMENT (HSE) REPORT**(To be submitted by each Contractor)**

Actual work start Date: _____

For the Month of: _____

Project: _____

Report No: _____

Name of the Contractor: _____

Status as on: _____

Name of Work: _____

Name of Safety officer: _____

ITEM		UPTO PREVIOUS MONTH	THIS MONTH	CUMU- LATIVE
a)	Average number of Staff & Workmen (average daily headcount, not man days)			
b)	Manhours Worked			
c)	Number of HSE meeting organized at site			
d)	Number of HSE awareness programmes conducted at site			
e)	Number of Lost Time Accidents (LTA)	Fatal		
		Other LTA		
f)	Number of Loss time Injuries (LTI)	Fatalities		
		Other LTI		
g)	Number of Loss Time Accidents			
h)	Number of First Aid Cases			
i)	Number of Near Miss Incidents			
j)	Man-days lost due to accidents			
k)	LTA Free Manhours i.e. Number of LTA free manhours from the Lst LTA			
l)	Compensation cases raised with Insurance			
m)	Compensation case resolved and paid to workmen			
n)	Whether workmen compensation policy taken	Y/N		
o)	Whether workmen compensation policy valid	Y/N		
p)	Whether workmen registered under ESI Act	Y/N		
Remark				

DATE:

Safety Officer /Resident Engineer
(Signature and Name)To : OWNER
: RCM/, Consultant (2 COPIES)

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT	DOCUMENT NO. BR/HSE/001	Page 52 of 59
			REVISION : 0
			EDITION : 1

FORMAT NO. : HSE-6, REV. 0

PERMIT FOR WORKING AT HEIGHT (ABOVE 2 METER)

Project Site : Sr. No.:
 Name of the work: Date:
 Name of Contractor : Nature of Work :
 Total No.of Workers: Exact location of work :
 Duration of work: from to

The following items have been checked and compliance shall be ensured during the currency of the permit:

Sl.	ITEM	DONE	NOT REQD.
1.	Equipment/Work Area inspected	☐	☐
2.	Considered hazard from other routine/non-routine operations and concerned person alerted	☐	☐
3.	ELCB provided	☐	☐
4.	Proper lighting provided	☐	☐
5.	Area cordoned off.	☐	☐
6.	Precautions against public traffic taken	☐	☐
7.	Sound Scaffolding provided	☐	☐
8.	Adequate protected Platform provided	☐	☐
9.	Acces and Exit to the area (Ladder properly fixed)	☐	☐
10.	Floor Openings covered	☐	☐
11.	Safety Net provided	☐	☐
12.	Heath check of personnel	☐	☐

- A. Following personal protective equipment are provided (mark) and used as relevant Safety helmet/Gloves/Goggles/Shoes/Face Shield/Life Line/Safety Belt/Safety Harness.
- B. This permit shall be available at the work site at all times.

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			REVISION : 0
			EDITION : 1

- C. Permit shall be issued for maximum one week only (Monday to Sunday).
- D. This permit shall be applicable in non-operational areas.
- E. After completion of the work, used permits shall be preserved for record purposes.
- F. Additional precautions, if any

Permission is granted to work (See overleaf) = Yes/No

Name of Contractor's Supervisor
(Initiator)

Name of Contractor's Safety Officer
(Issuing Authority)

GRANT OF PERMIT AND EXTENSIONS

[illegible]

Additional safety instructions, if any.

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TITLE	HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT	DOCUMENT NO. BR/HSE/001	Page 54 of 59
			REVISION : 0
			EDITION : 1

FORMAT NO. : HSE-7, REV. 0

CONFINED SPACE ENTRY PERMIT

Project Site : Sr. No.:
 Name of the work: Date:
 Name of Contractor : Nature of Work :
 Exact location of work :

Safety Requirements : POSITIVE ISOLATION OF THE VESSEL IS MANDATORY

(A) Has the equipment been ?					
Y	NR		Y	NR	
☐	☐	isolated from power / steam / air	☐	☐	water flushed &/or steamed
☐	☐	isolated from liquid or gases	☐	☐	Manways open & ventilated
☐	☐	depressurized &/or drained	☐	☐	cont. inset gas flow arranged
☐	☐	blanked / blinded / disconnected	☐	☐	adequately cooled
			☐	☐	radiation sources removed
			☐	☐	Proper lighting provided

(B) Expected Residual Hazards					
Y	NR		Y	NR	
☐	☐	lack of O ₂	☐	☐	combustible gas / liquid
☐	☐	corrosive chemicals	☐	☐	pyrophoric iron / scales
☐	☐	Heat / stream / frost	☐	☐	high humidity
☐	☐		☐	☐	
			☐	☐	H ₂ S / toxic gases
			☐	☐	electricity / static
			☐	☐	ionizing radiation

(C) Protective Measures					
Y	NR		Y	NR	
☐	☐	gloves	☐	☐	ear plug / muff
☐	☐	protective clothing	☐	☐	dust / gas / air line mask
☐	☐	Grounded air educator / blower / AC	☐	☐	attendant with SCBA / air mask
☐	☐	Fire fighting arrangements	☐	☐	safety harness & lifeline
☐	☐		☐	☐	
			☐	☐	goggles / face shield
			☐	☐	personal gas alarm
			☐	☐	rescue equipment / team
			☐	☐	communication equipment

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			REVISION : 0
			EDITION : 1

Authorization / Renewal (It is safe to enter the confirmed space)

Date	No. of Persons Allowed	Name of Persons allowed	Signature		Time		Signature e Workman
			Contractor's Supervisor	Contractor's Safety Officer	From	To	

Permit Closure :

- (A) Entry ☐ was closed ☐ stopped ☐ will continue on
- (B) ☐ Site left in a safe condition
☐ Housekeeping done
- (C) Multi lock ☐ removed ☐ key transferred
☐ Ensured all men have come out ☐ Manways barricaded

Remarks, if any :

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			EDITION : 1

FORMAT NO. : HSE-8, REV. 0

RADIATION WORK PERMIT

Project : Sr. No.:
 Name of the work : Date:
 Name of Contractor : Job No. :

Location of work :

Source Strength :

Cordoned distance (m) :

Name of Radiographing agency : Approved by Owner / Consultant

☐

The following items have been checked & compliance shall be ensured during currency of the permit :

S. No.	Item Description	Done
1.	Safety regulations as per BARC/AERB ensured while source in use/ in transit & during storage.	☐
2.	Area cordoned off.	☐
3.	Lighting arrangements for working during nights ensured.	☐
4.	Warning signs / flash lights installed.	☐
5.	Cold work permit taken (if applicable)	☐
6.	PPEs like film badges, dosimeters used.	☐

Additional precautions, if any _____

(Radiography Agency's BARC / AREB authorized Supervisor) (Contractor's Safety Officer)

Permission is granted.

Permit is valid from _____ AM/PM _____ Date to _____ AM/PM _____
 Date

(Signature of permit issuing authority)

Name : Designation : Date :

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			EDITION : 1

Permit renewal :

Permit extended upto		Additional precautions required, if any.	Sign of issuing authority with date
Date	Time		

Work completed / stopped / area cleared at _____ Hrs. of Date _____

(Sign of permit issuing authority)
Name :

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			REVISION : 0
			EDITION : 1

FORMAT NO. : HSE-9, REV. 0

RADIATION WORK PERMIT

Project : Sr. No.:

Name of the work : Date:

Name of Contractor : Job No. :

Name of Contractor :

Line No. / Equipment No. /Structure to be dismantled :

Location details of dismantling / demolition with sketch : (Clearly indicate the area)

The following items have been checked & compliance shall be ensured during currency of the permit :

S. No.	Item Description	Done	Not Applicable
1.	Services like power, gas supply, water, etc. disconnected.	☐	☐
2.	Dismantling / Demolishing method reviewed & approved.	☐	☐
3.	Usage of appropriate PPEs ensured.	☐	☐
4.	Precautions taken for neighboring structures	☐	☐
5.	First-Aid arrangements made	☐	☐
6.	Fire fighting arrangements ensured	☐	☐
7.	Precautions taken for blasting	☐	☐

(Contractor's Supervisor)

(Contractor's Safety Officer)

Permission is granted.

(Permit issuing authority)

Name :

Date :

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT	DOCUMENT NO. BR/HSE/001	Page 59 of 59
			REVISION : 0
			EDITION : 1

Completion Report :

Dismantling / Demolishing is completed on _____ Date at _____ Hrs.

Materials / debris transported to identified location ☐

Tagging completed (as applicable) ☐

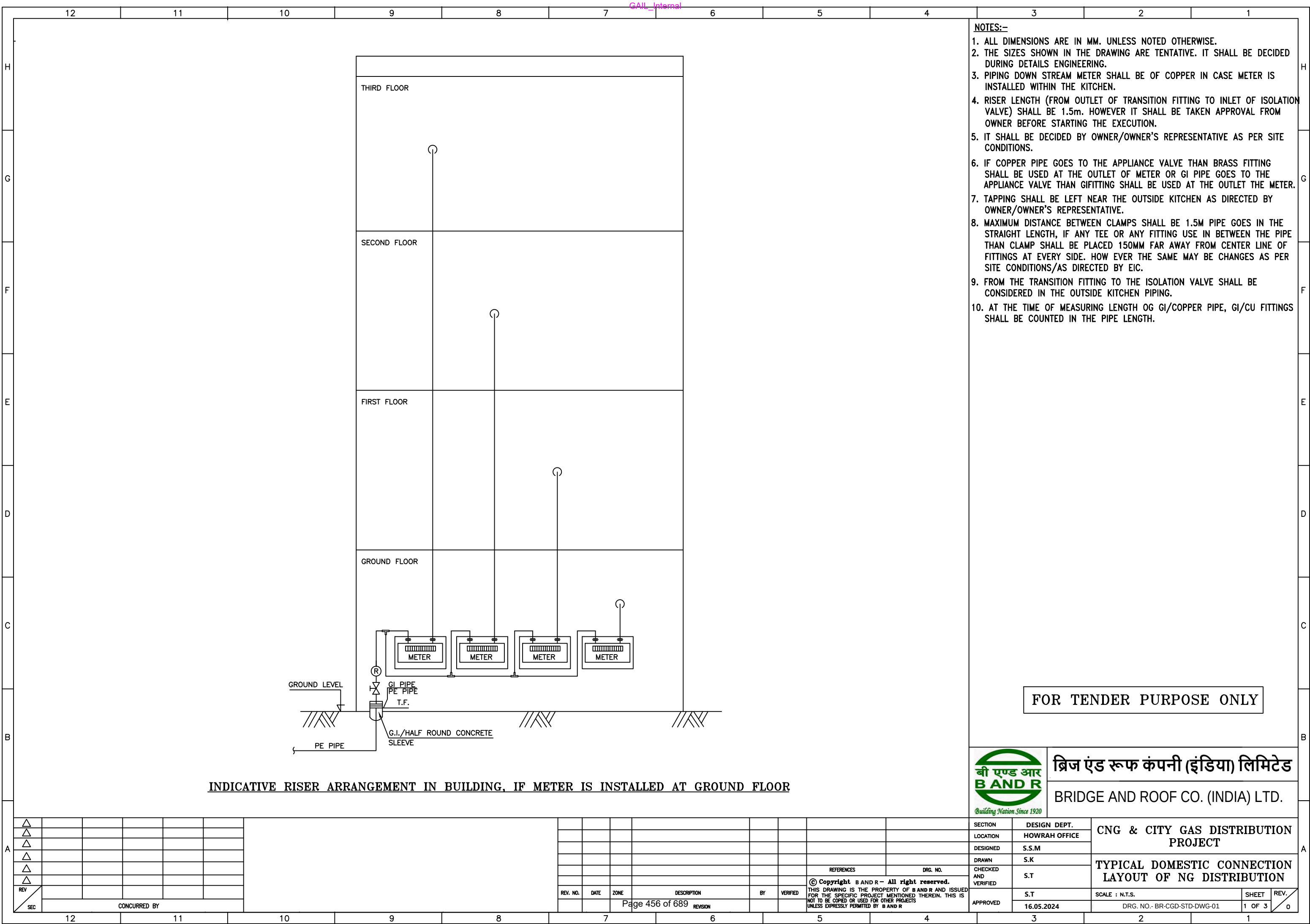
Services like power, gas supply, water, etc. restored ☐

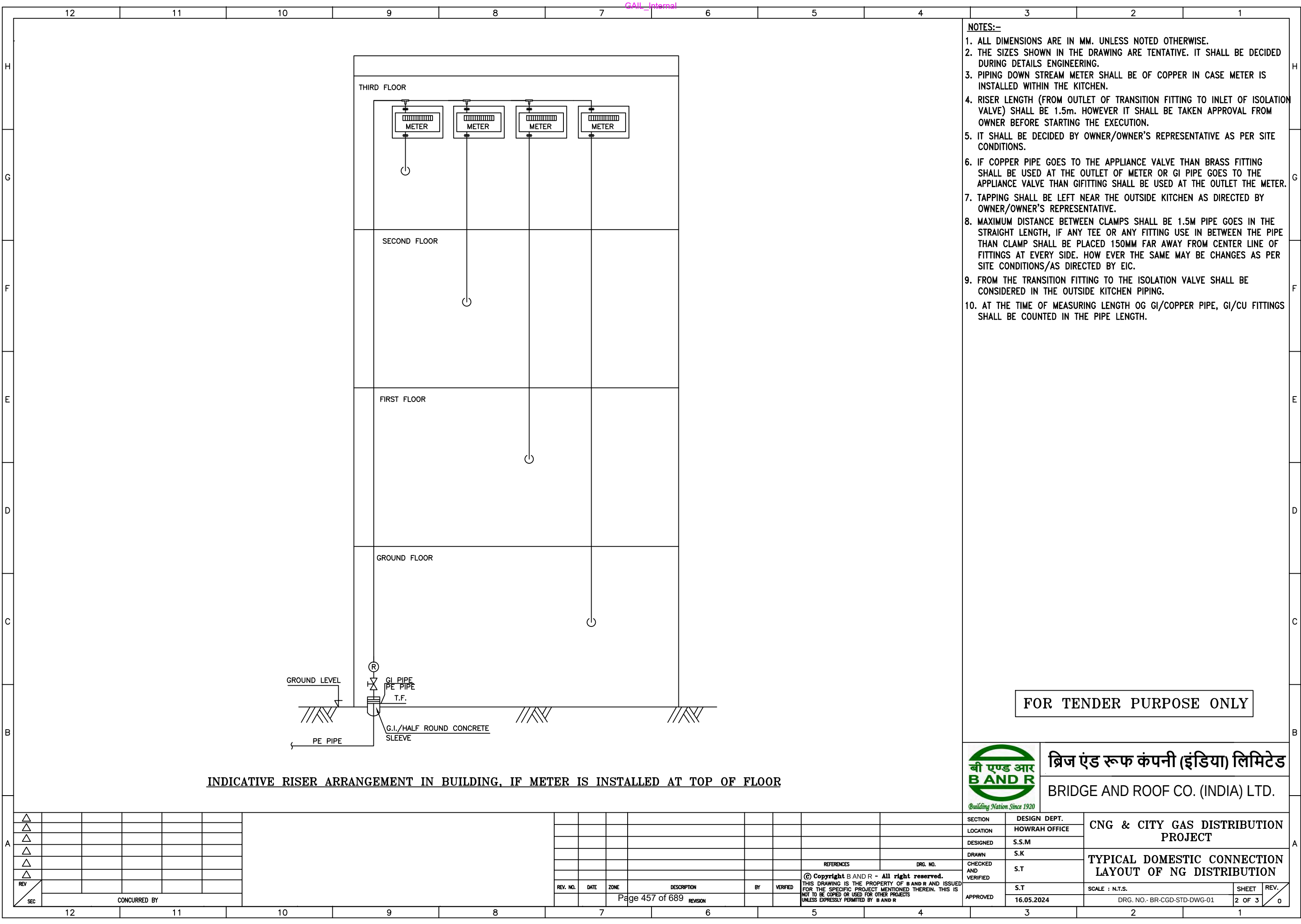
(Permit issuing authority)

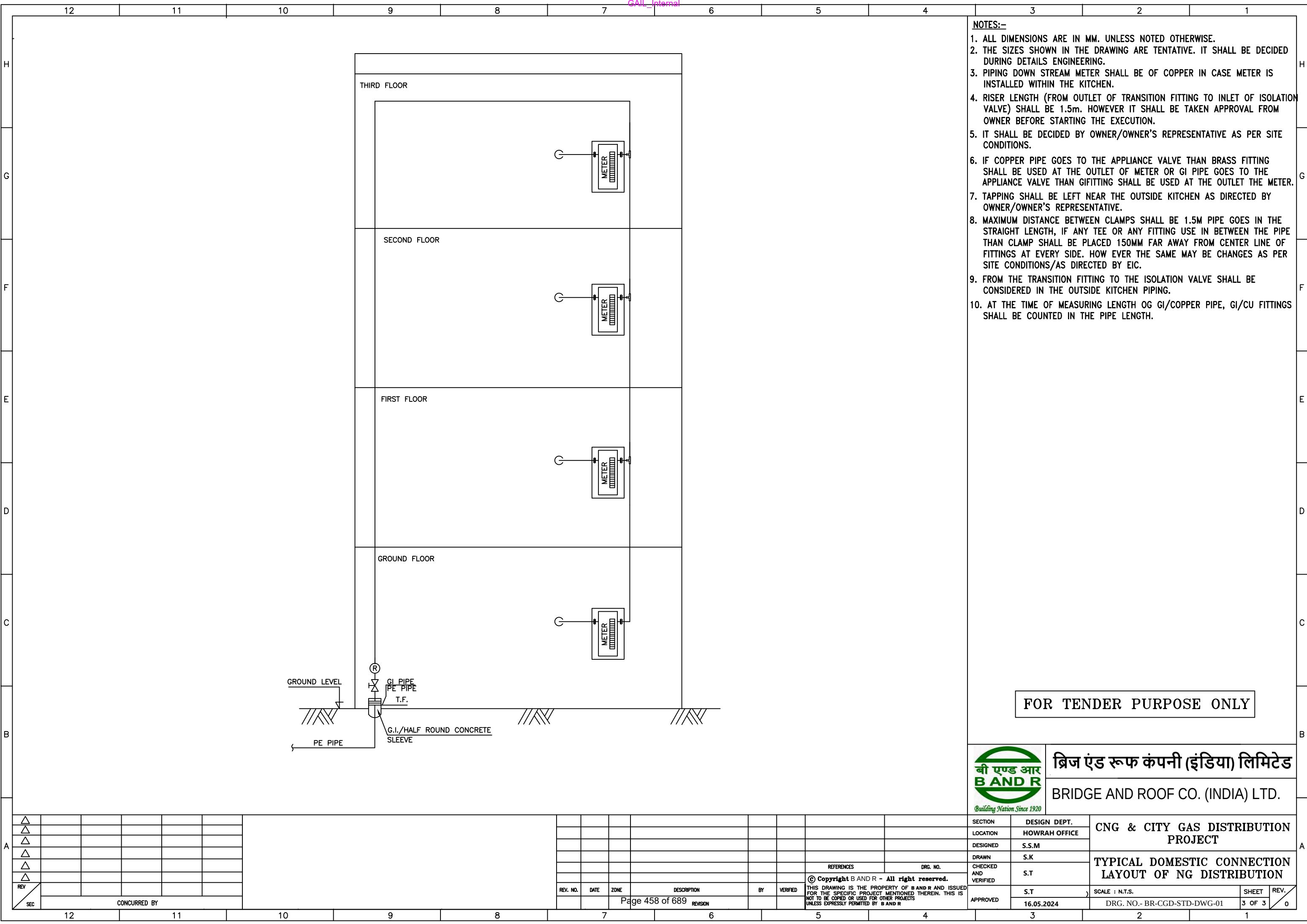
DRAWINGS



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(A Govt. of India Enterprise)
4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.









1. ALL DIMENSIONS ARE IN MM. UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE. IT SHALL BE DECIDED DURING DETAILS ENGINEERING.
3. PIPING DOWN STREAM METER SHALL BE OF COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5m. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVED FROM EIC.
5. G.I. INSTALLATION/METER INSTALLATION SHALL BE DECIDED BY OWNER/ OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THAN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR GI PIPE GOES TO THE APPLIANCE VALVE THAN GIFITTING SHALL BE USED AT THE OUTLET THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING USE IN BETWEEN THE PIPE THAN CLAMP SHALL BE PLACED 150MM FAR AWAY FROM CENTER LINE OF FITTINGS AT EVERY SIDE. HOW EVER THE SAME MAY BE CHANGES AS PER SITE CONDITIONS/AS DIRECTED BY EIC.

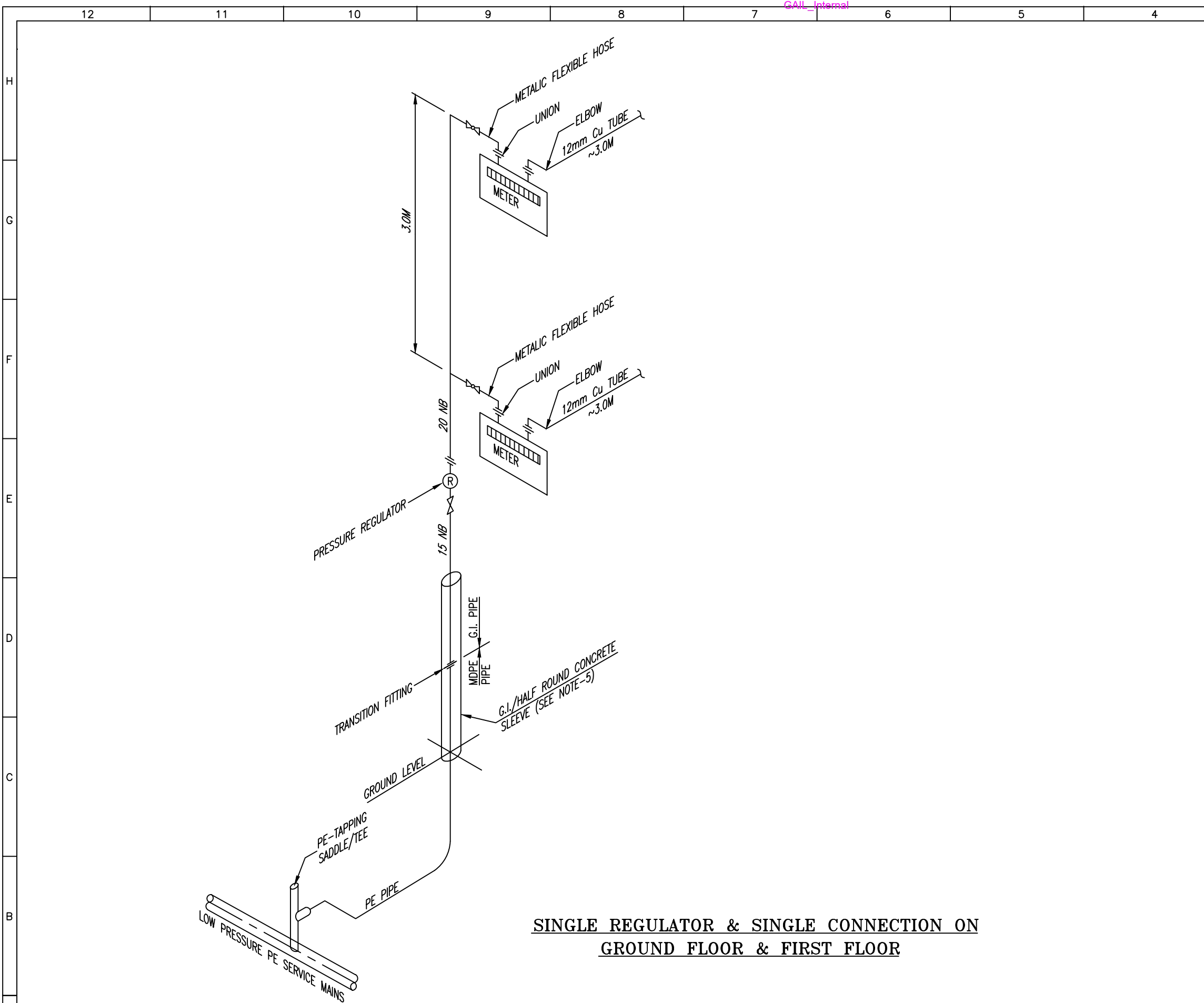


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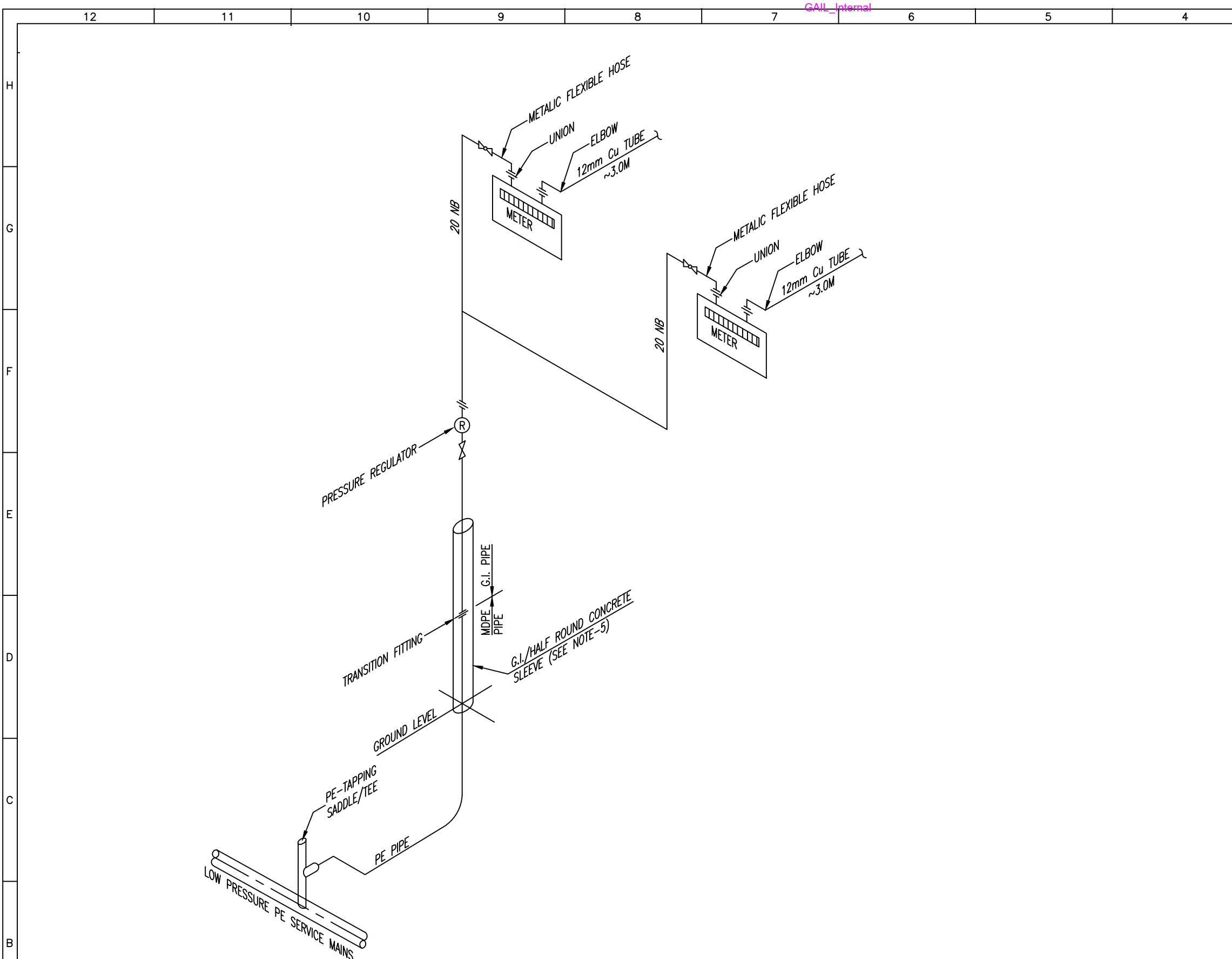
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FOR TENDER PURPOSE ONLY



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BRIDGE AND ROOF CO. (INDIA) LTD.

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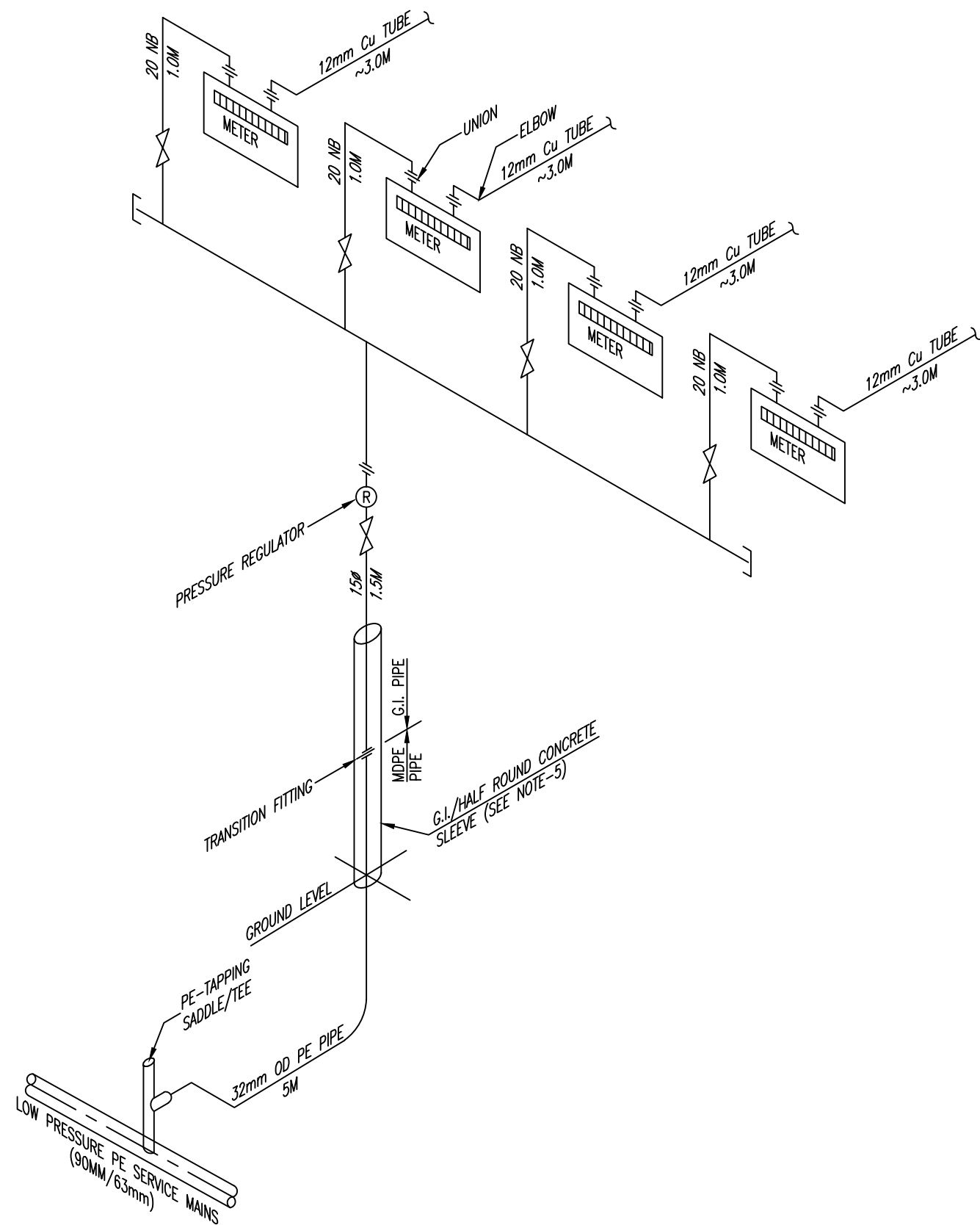
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BRIDGE AND ROOF CO. (INDIA) LTD.

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FOR TENDER PURPOSE ONLY



ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड

BRIDGE AND ROOF CO. (INDIA) LTD.

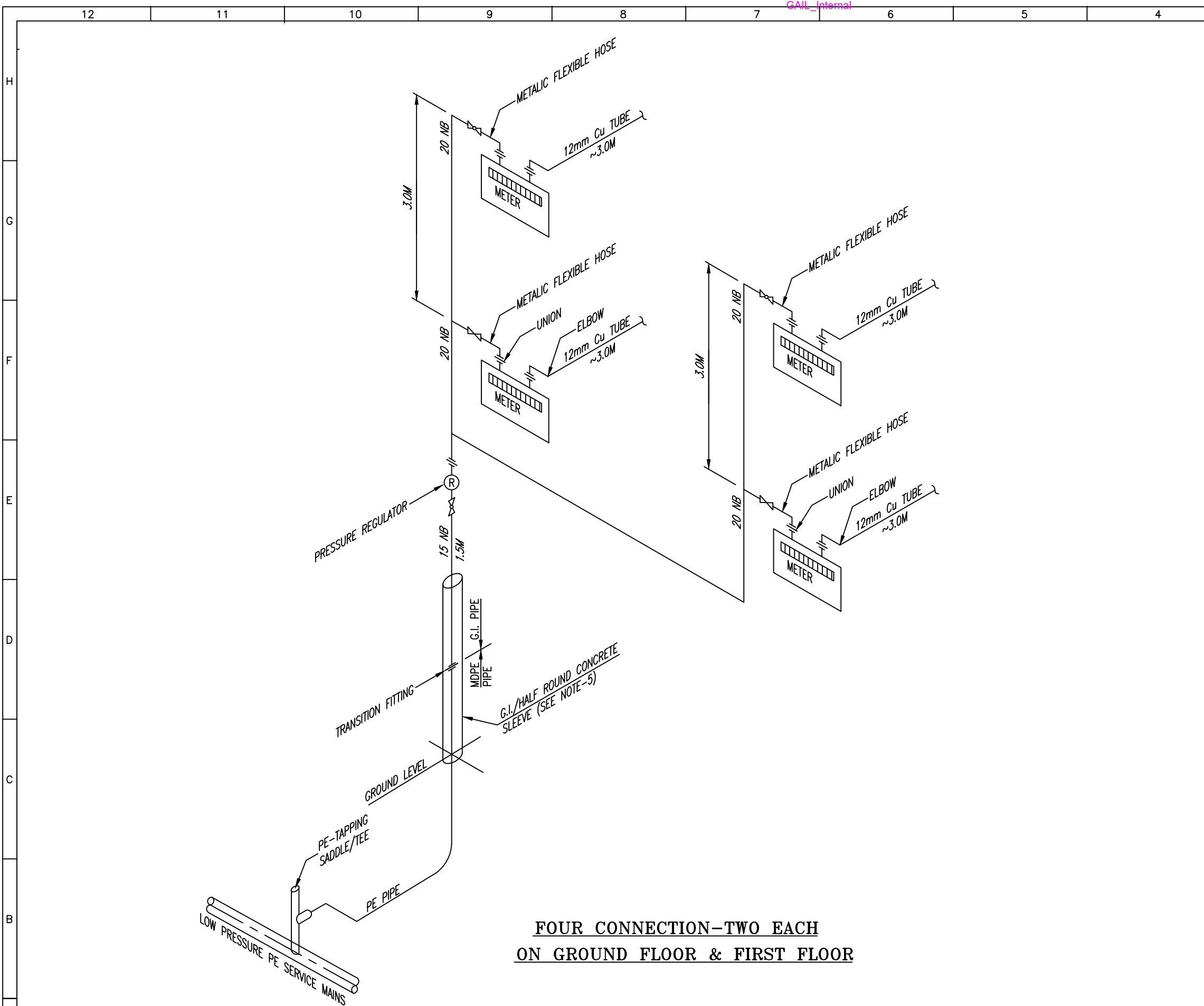
CNG & CITY GAS DISTRIBUTION PROJECT

TYPICAL DOMESTIC CONNECTION LAYOUT OF NG DISTRIBUTION

SECTION	DESIGN DEPT.
LOCATION	HOWRAH OFFICE
DESIGNED	S.S.M
DRAWN	S.K
CHECKED AND VERIFIED	S.T
APPROVED	S.T
	17.05.2024

SCALE : N.T.S.	SHEET	REV.
DRG. NO.- BR-CGD-STD-DWG-02	4 OF 6	0

REFERENCES
DRG. NO.
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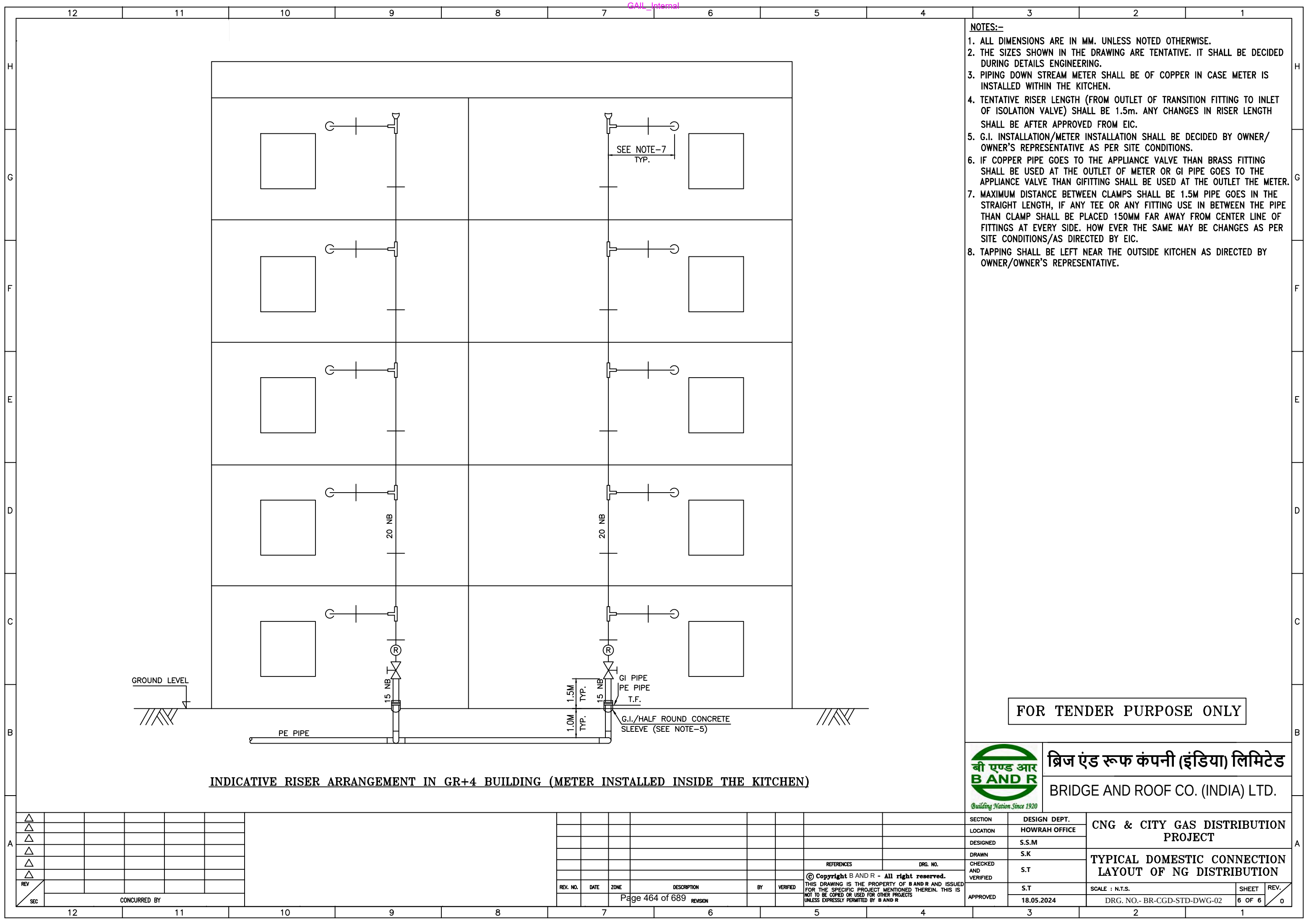
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BRIDGE AND ROOF CO. (INDIA) LTD.

CNG & CITY GAS DISTRIBUTION PROJECT

TYPICAL DOMESTIC CONNECTION LAYOUT OF NG DISTRIBUTION

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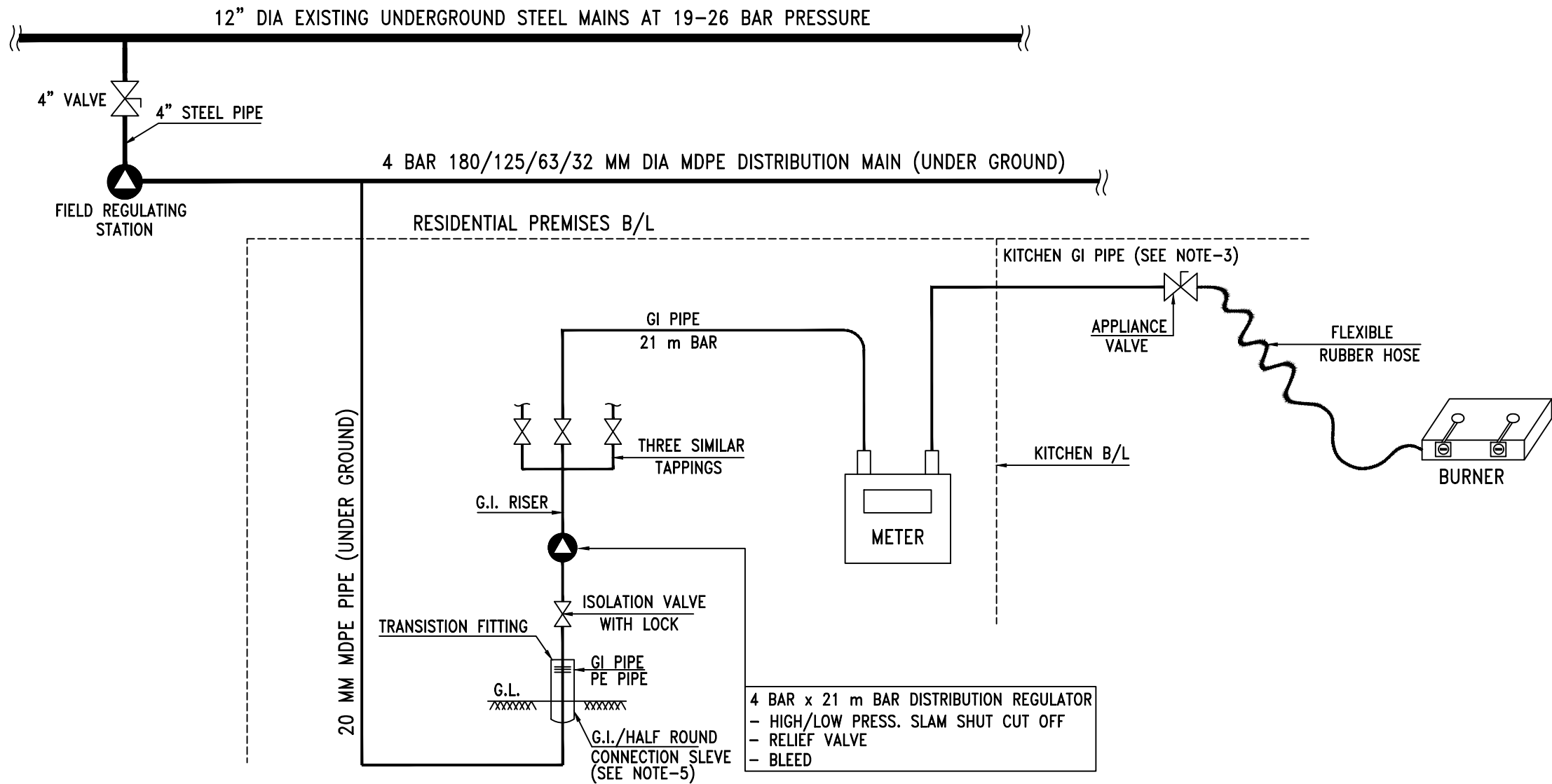
REV. NO.	DATE	ZONE	DESCRIPTION	BY	VERIFIED

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SECTION	DESIGN DEPT.
LOCATION	HOWRAH OFFICE
DESIGNED	S.S.M
DRAWN	S.K
CHECKED AND VERIFIED	S.T
APPROVED	S.T
	18.05.2024

SCALE : N.T.S.	SHEET	REV.
DRG. NO.- BR-CGD-STD-DWG-02	6 OF 6	0

SCHEMATIC DRAWING FOR DOMESTIC CONNECTION



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5. G.I. INSTALLATION/METER INSTALLATION SHALL BE DECIDED BY OWNER/ OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THAN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR GI PIPE GOES TO THE APPLIANCE VALVE THAN GIFTING SHALL BE USED AT THE OUTLET THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING USE IN BETWEEN THE PIPE THAN CLAMP SHALL BE PLACED 150MM FAR AWAY FROM CENTER LINE OF FITTINGS AT EVERY SIDE. HOW EVER THE SAME MAY BE CHANGES AS PER SITE CONDITIONS/AS DIRECTED BY EIC.

FOR TENDER PURPOSE ONLY



ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड

BRIDGE AND ROOF CO. (INDIA) LTD.

CNG & CITY GAS DISTRIBUTION PROJECT

SCHEMATIC DIAGRAM FOR DOMESTIC PNG CONSUMER CONNECTION

SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT	
LOCATION	HOWRAH OFFICE		
DESIGNED	S.S.M	SCHEMATIC DIAGRAM FOR DOMESTIC PNG CONSUMER CONNECTION	
DRAWN	S.K		
CHECKED AND VERIFIED	S.T	SCALE : N.T.S.	
APPROVED	S.T		
18.05.2024		DRG. NO.- BR-CGD-STD-DWG-03	SHEET REV. 1 OF 1 0

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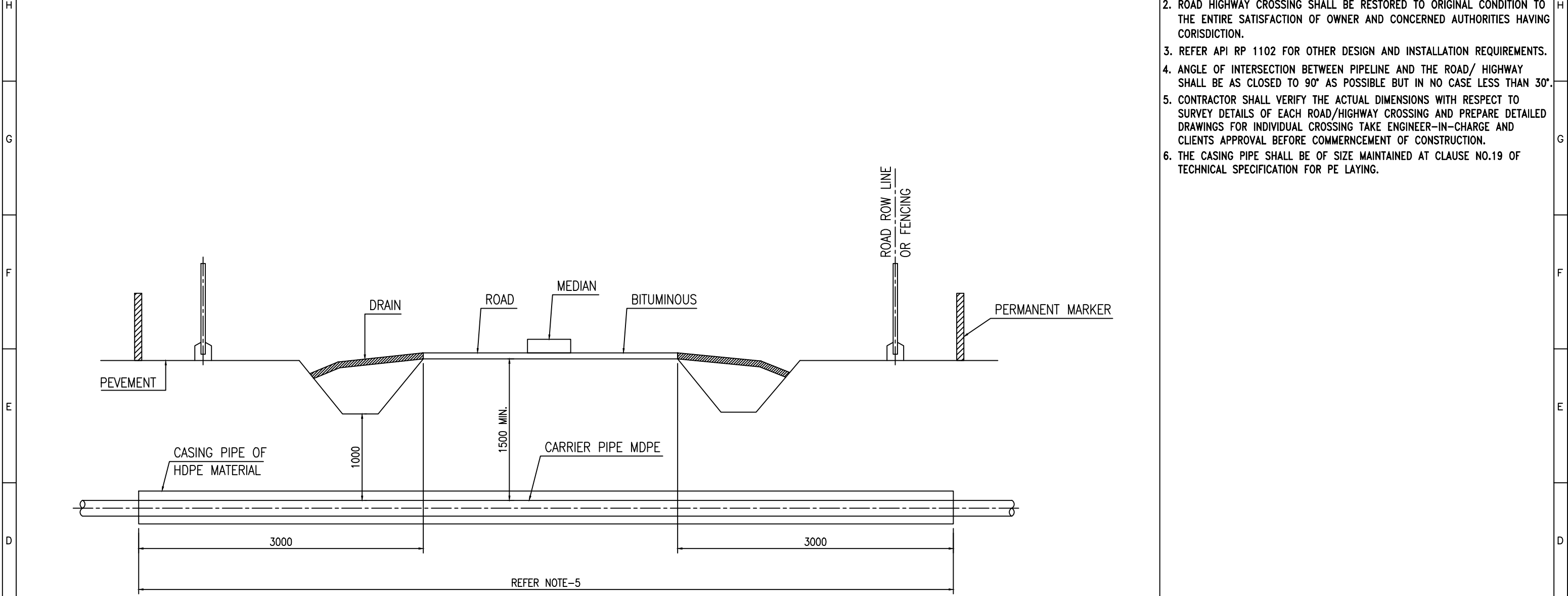
1. ALL DIMENSIONS ARE IN MM. UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE. IT SHALL BE DECIDED DURING DETAILS ENGINEERING.
3. PIPING DOWN STREAM METER SHALL BE OF COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5m. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVED FROM EIC.
5. G.I. INSTALLATION/METER INSTALLATION SHALL BE DECIDED BY OWNER/ OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THAN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR GI PIPE GOES TO THE APPLIANCE VALVE THAN GIFTING SHALL BE USED AT THE OUTLET THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING USE IN BETWEEN THE PIPE THAN CLAMP SHALL BE PLACED 150MM FAR AWAY FROM CENTER LINE OF FITTINGS AT EVERY SIDE. HOW EVER THE SAME MAY BE CHANGES AS PER SITE CONDITIONS/AS DIRECTED BY EIC.
8. METER CLAMP SHALL BE APPROVED FROM OWNER/OWNER'S REPRESENTATIVE.

FOR TENDER PURPOSE ONLY



BRIDGE AND ROOF CO. (INDIA) LTD.

SECTION		DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT			A
LOCATION		HOWRAH OFFICE				
DESIGNED		S.S.M				
DRAWN		S.K	TYPICAL NATURAL GAS INSTALLATION INSIDE KITCHEN			
CHECKED AND VERIFIED		S.T				
APPROVED		S.T				
		18.05.2024	DRG. NO.- BR-CGD-STD-DWG-04		1 OF 1	0



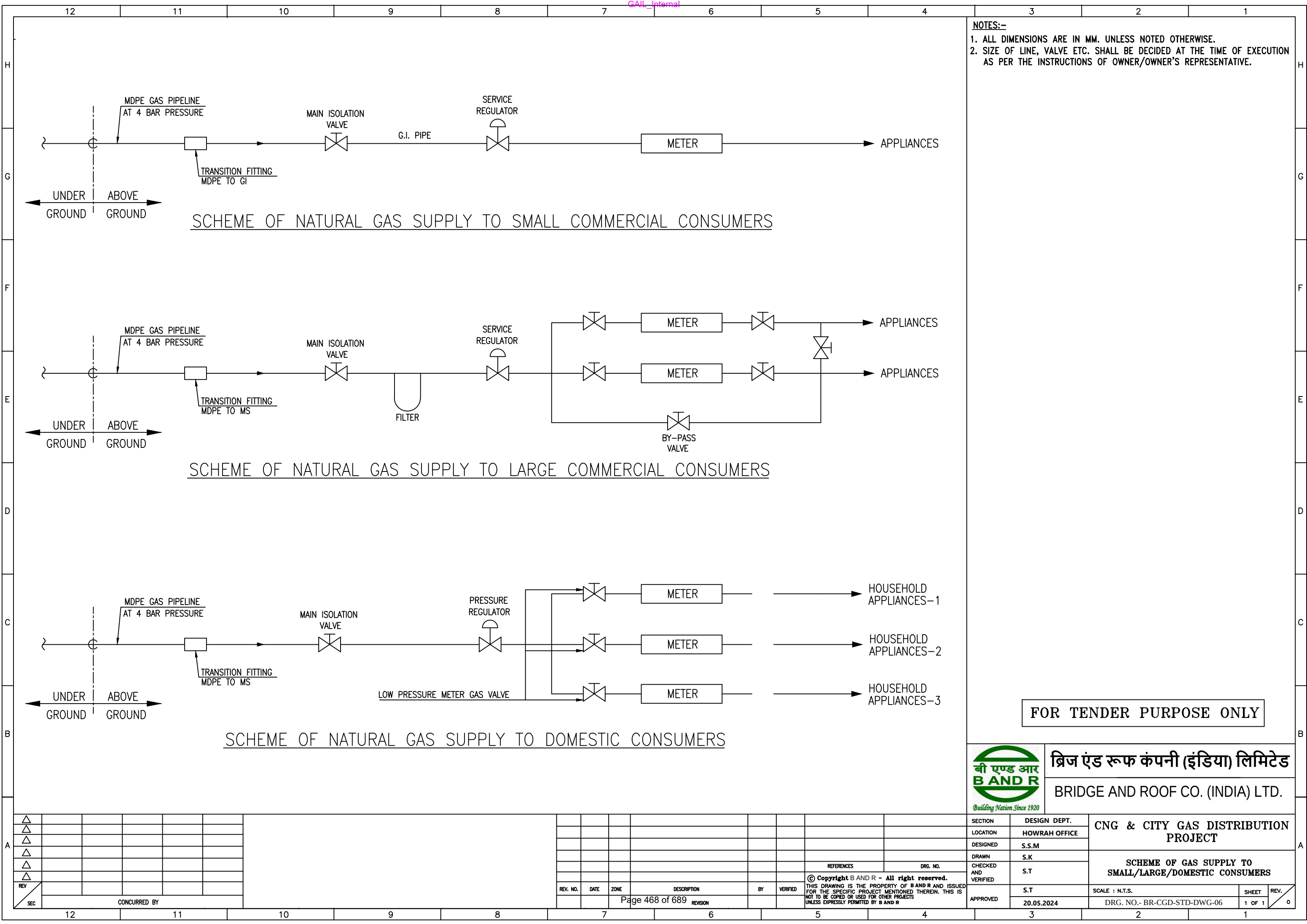
TYPICAL SECTION

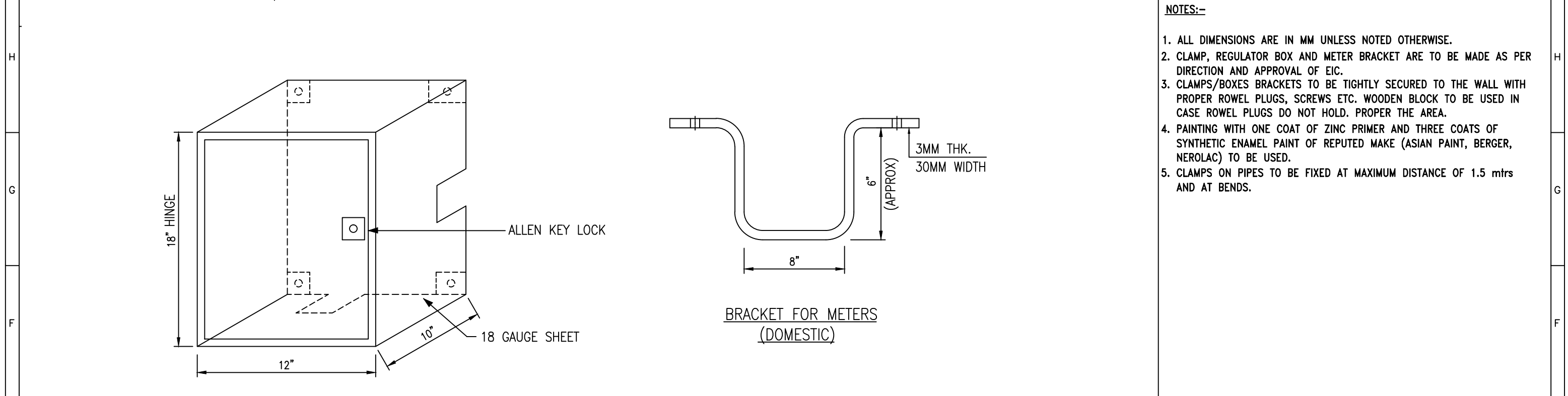
FOR TENDER PURPOSE ONLY

**ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड**

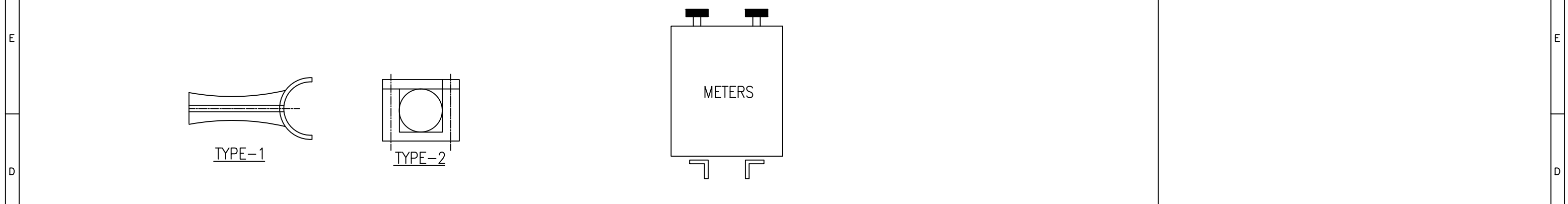
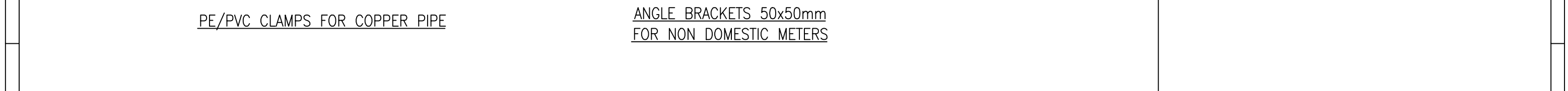
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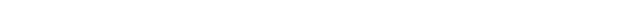
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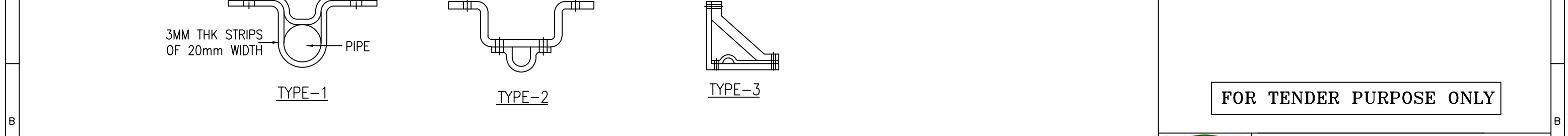




REGULATOR BOX

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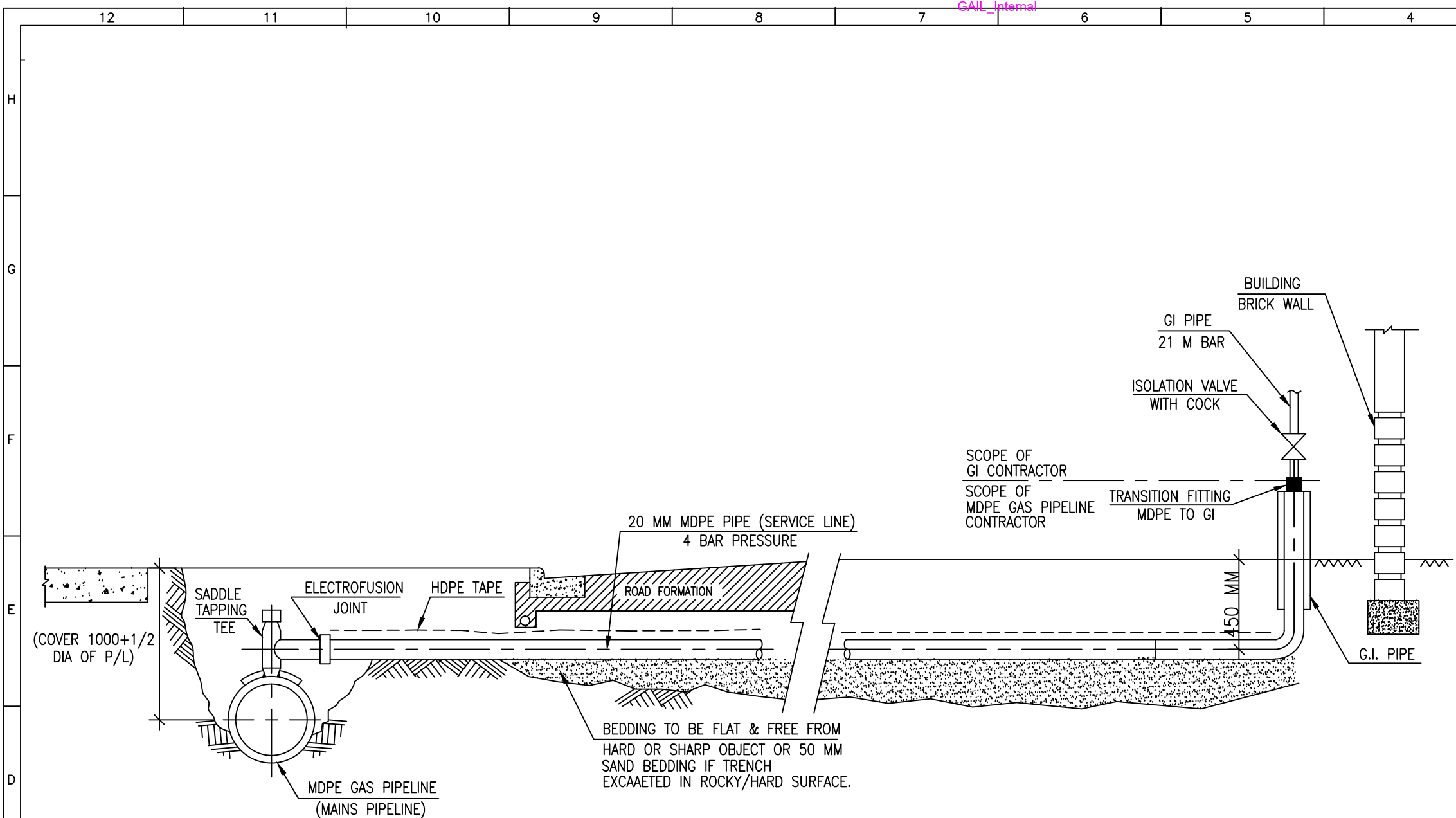


<u>TYPE-1</u>	<u>TYPE-2</u>	<u>TYPE-3</u>	FOR TENDER PURPOSE ONLY
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[illegible]

	<u>MS CLAMPS FOR GI PIPE</u>	 ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड BRIDGE AND ROOF CO. (INDIA) LTD.
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[illegible][illegible]



- GENERAL NOTES**
1. FOR CLAMPING TO BRICK WALL USE SUITABLE WALL BRACKETS.
 2. TRENCH BACK FILL TO BE FREE FROM STONES OR SHARP OBJECTS. CARE TO BE EXERCISED WHEN CONSOLIDATING BACK FILL TO AVOID DAMAGING PLASTIC PIPE.
 3. THIS SKETCH IS INDICATIVE AND FINAL LAYING WILL BE DECIDED BY ENGINEER-IN-CHARGE.

FOR TENDER PURPOSE ONLY



ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड
BRIDGE AND ROOF CO. (INDIA) LTD.

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ISOMETRIC VIEW

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. IT SHALL BE TAKEN APPROVAL FROM OWNER/OWNER'S REPRESENTATIVE. BEFORE STARTING THE PROCUREMENT.
3. SIZES ARE SHOWN AS A TENTATIVE ONLY.

FOR TENDER PURPOSE ONLY

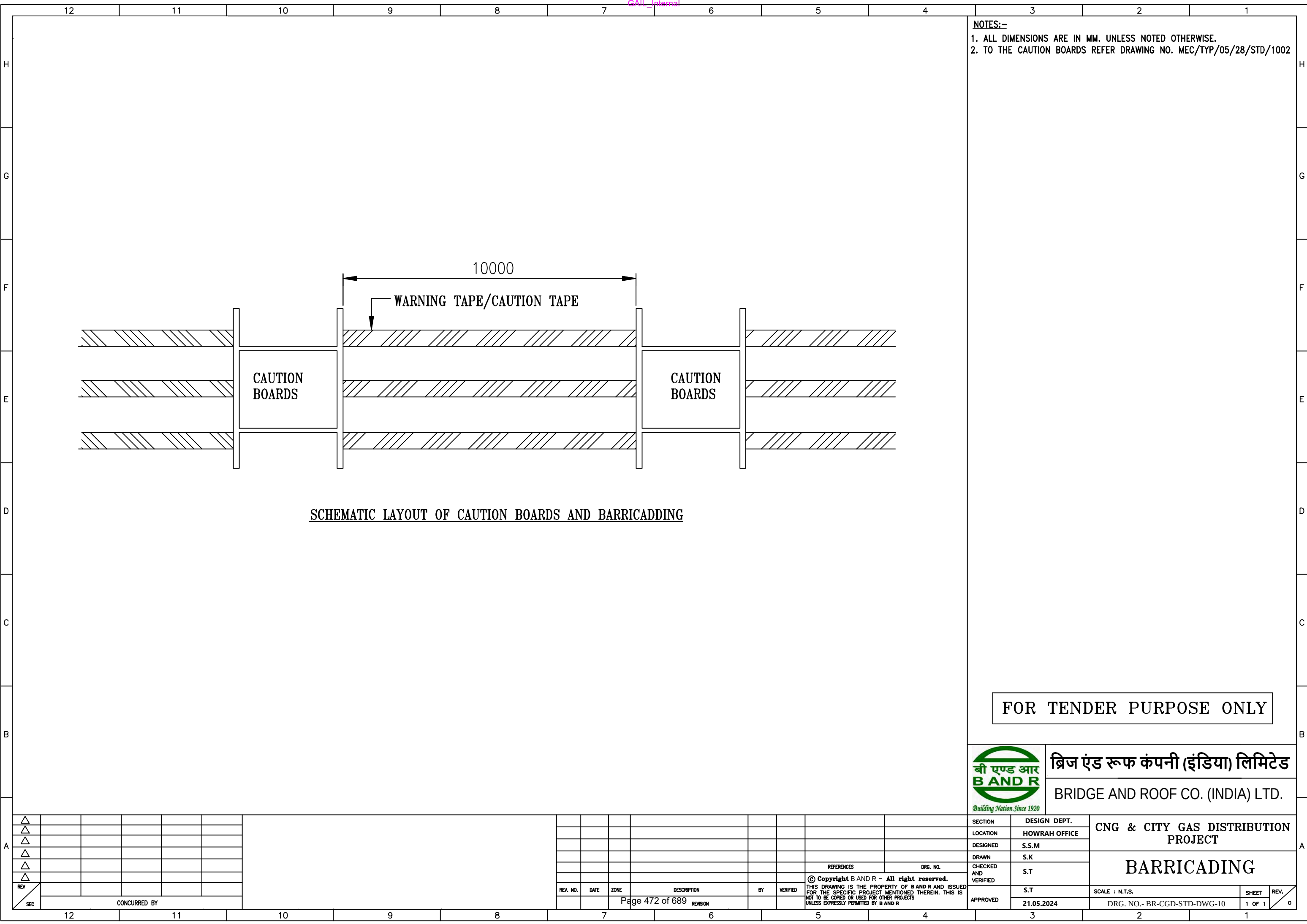


ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड

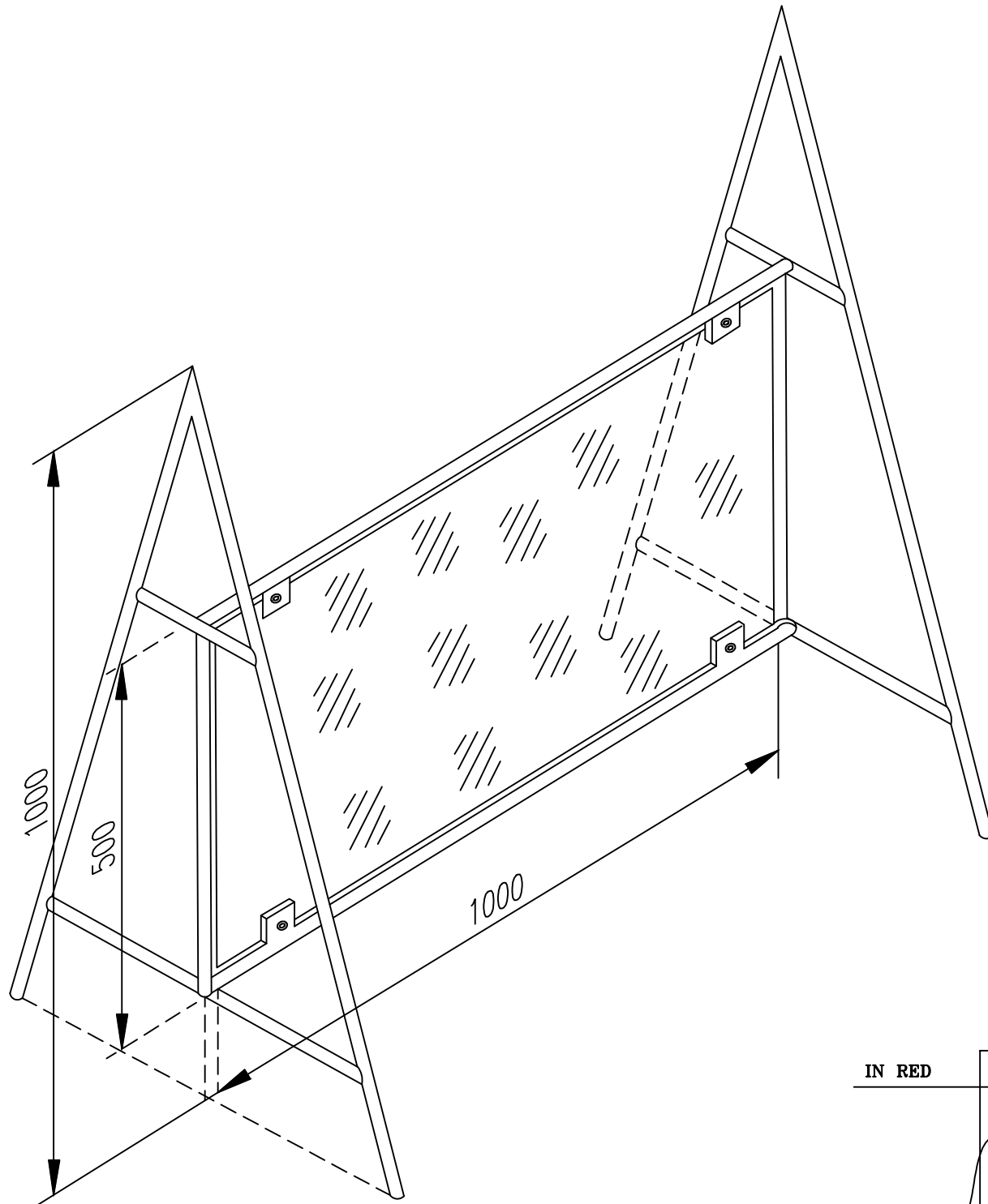
BRIDGE AND ROOF CO. (INDIA) LTD.

SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT		
LOCATION	HOWRAH OFFICE			
DESIGNED	S.S.M			
DRAWN	S.K	HALF ROUND CONCRETE SLEEVE		
CHECKED AND VERIFIED	S.T			
APPROVED	S.T	SCALE : N.T.S.	SHEET	REV.
	21.05.2024	DRG. NO.- BR-CGD-STD-DWG-09	1 OF 1	0

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	REV					
	SEC	CONCURRED BY				



1. ALL DIMENSIONS ARE IN MM. UNLESS NOTED OTHERWISE.



IN BLACK

WORK IN PROGRESS

CLIENT : OWNER'S NAME

CONTRACTOR NAME :

DATE OF COMMENCEMENT :

DATE OF COMPLETION :

EMERGENCY PHONE NOS:

CLIENT'S LOGO

FOR TENDER PURPOSE ONLY



BRIDGE AND ROOF CO. (INDIA) LTD.

SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT		
LOCATION	HOWRAH OFFICE			
DESIGNED	S.S.M			
DRAWN	S.K	CAUTION BOARD		
CHECKED AND VERIFIED	S.T			
APPROVED	S.T	SCALE : N.T.S.	SHEET	REV.
	22.05.2024	DRG. NO.- BR-CGD-STD-DWG-11	1 OF 1	0

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	SEC	CONCURRED BY				



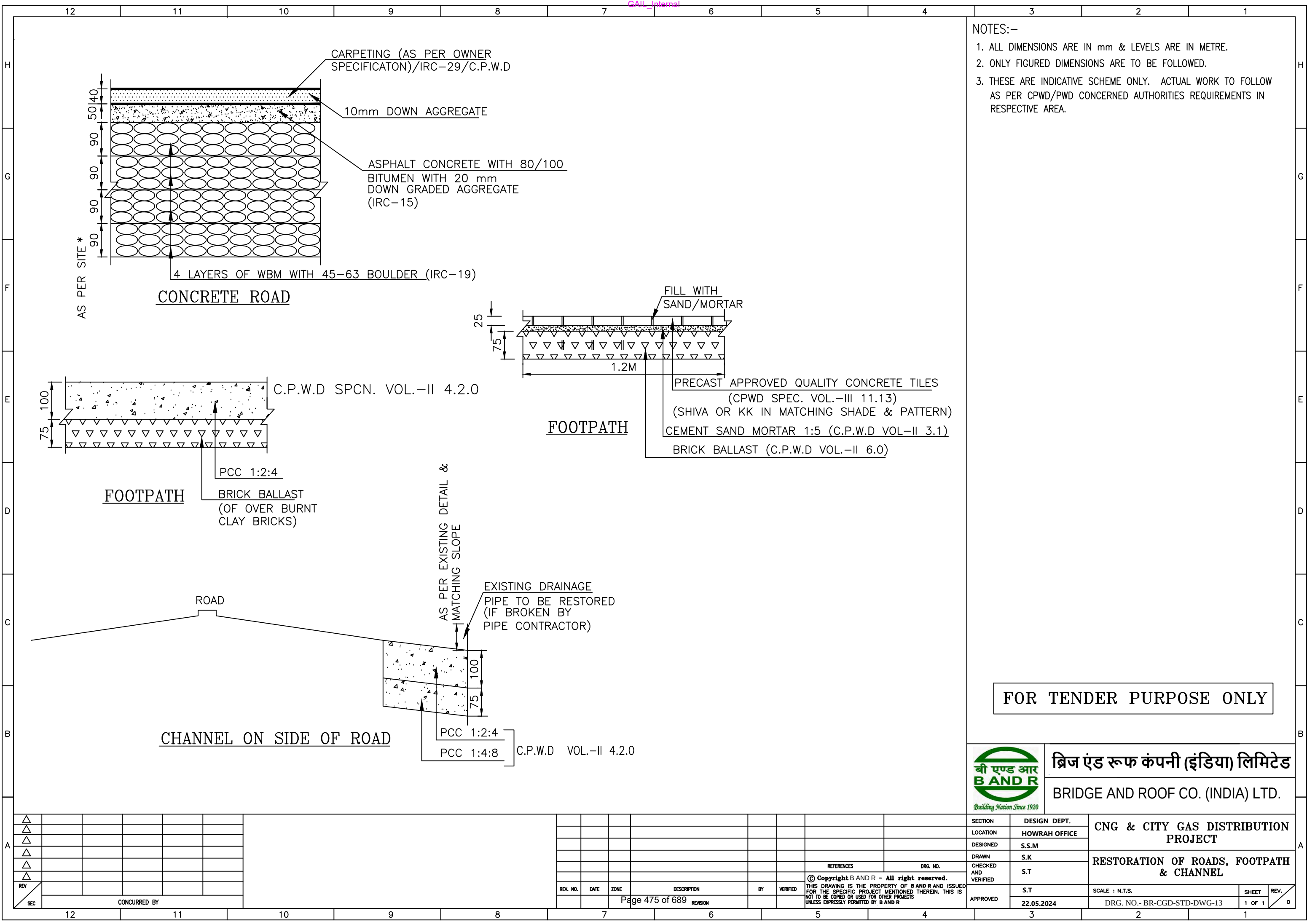
1. BACKFILLING OF THE DISTURBED BANK AREA SHALL BE FINISHED A MINIMUM OF 100mm ABOVE THE ADJACENT UNDISTURBED BANK LEVELS.
2. BACKFILLING SHALL BE FINISHED FLUSH WITH INVERT AND BANK SLOPES EXCEPT THE REINSTATED SLOPE WHICH SHALL NOT EXCEED 40° IN WHICH CASE THE SLOPE SHALL BE EQUAL TO ADJACENT UNDISTURBED BANKS.
3. MIN. COVER 1.5M BELOW SCAMING DEPTH.



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B AND P
Building Nation Since 19

SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT			A
LOCATION	HOWRAH OFFICE				
DESIGNED	S.S.M				
DRAWN	S.K	STD. DETAIL OF BACKFILL, FOR DRAIN CROSSING			
CHECKED AND VERIFIED	S.T				
APPROVED	S.T				SCALE : N.T.S.
	22.05.2024	DRG. NO.- BR-CGD-STD-DWG-12	1 OF 1	0	

A



- NOTES:-
- 1. ALL DIMENSIONS ARE IN mm & LEVELS ARE IN METRE.
 - 2. ONLY FIGURED DIMENSIONS ARE TO BE FOLLOWED.
 - 3. THESE ARE INDICATIVE SCHEME ONLY. ACTUAL WORK TO FOLLOW AS PER CPWD/PWD CONCERNED AUTHORITIES REQUIREMENTS IN RESPECTIVE AREA.

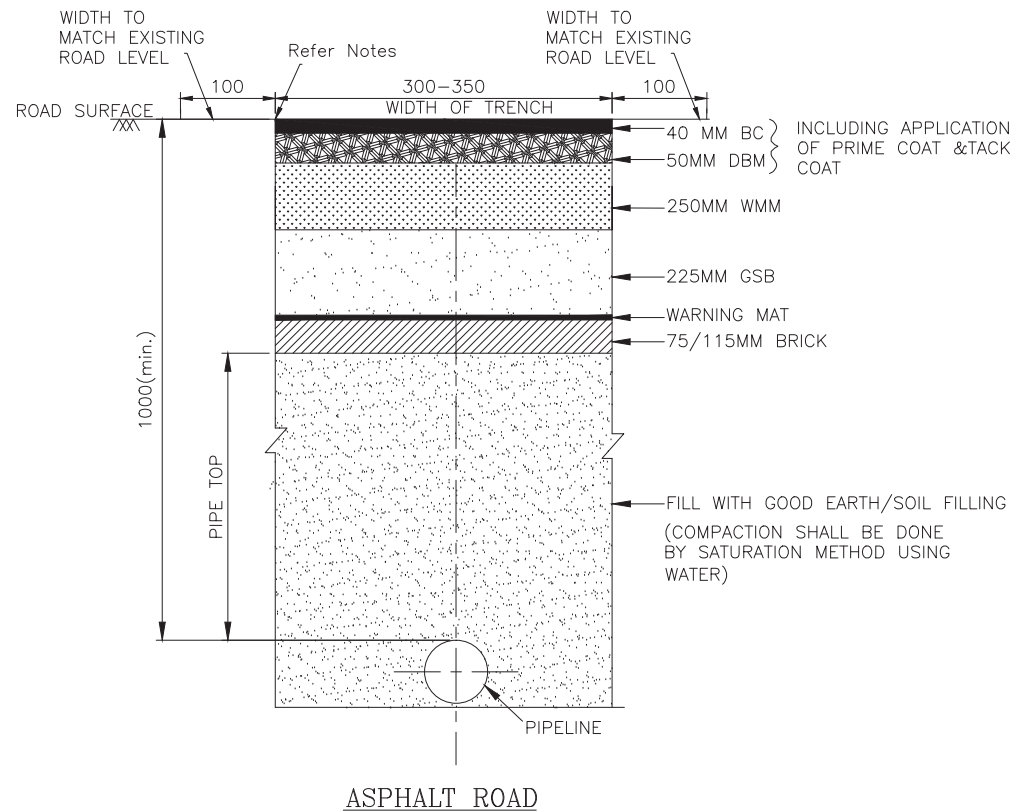
FOR TENDER PURPOSE ONLY



ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड

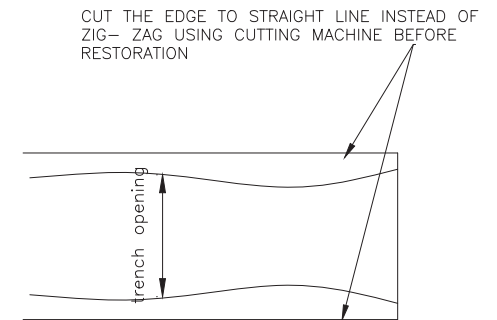
BRIDGE AND ROOF CO. (INDIA) LTD.

SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT		
LOCATION	HOWRAH OFFICE			
DESIGNED	S.S.M			
DRAWN	S.K			
CHECKED AND VERIFIED	S.T			
APPROVED	S.T	RESTORATION OF ROADS, FOOTPATH & CHANNEL		
22.05.2024		SCALE : N.T.S.	SHEET	REV.
		DRG. NO.- BR-CGD-STD-DWG-13	1 OF 1	0



NOTES:-

1. ALL DIMENSIONS ARE IN mm & LEVELS ARE IN METRE.
2. ONLY FIGURED DIMENSIONS ARE TO BE FOLLOWED.
3. THE LEVEL SHOULD MATCH WITH THE EXISTING ROAD TOP WITH OVERLAP.
4. 100mm OVERLAP WITH TRENCH EDGE AND EXISTING ROAD.
5. THE TOP OF BC SHALL NOT EXCEED 15MM FROM THE EXISTING ROAD TOP LEVEL.



FOR TENDER PURPOSE ONLY

CLIENT		GAIL INDIA LTD.
ENGINEERING		ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड BRIDGE AND ROOF CO.(I) LTD
DIVISION	SANTOSH KUMAR	CITY GAS DISTRIBUTION WORK
DESIGNED	SANTOSH KUMAR	STANDARD DETAILS OF RESTORATION OF MAJOR ROADS (BBMP/BDA/NHAI etc.)
DRAWN	SANTOSH KUMAR	
CHECKED & VERIFIED	A. MUKHERJEE	
APPROVED	SANDIP TALUKDAR	SCALE : NTS
DATE	24.06.2024	SHEET 1 OF 1
		DRG. NO : BR-CGD-STD-DWG-034

REFERENCES

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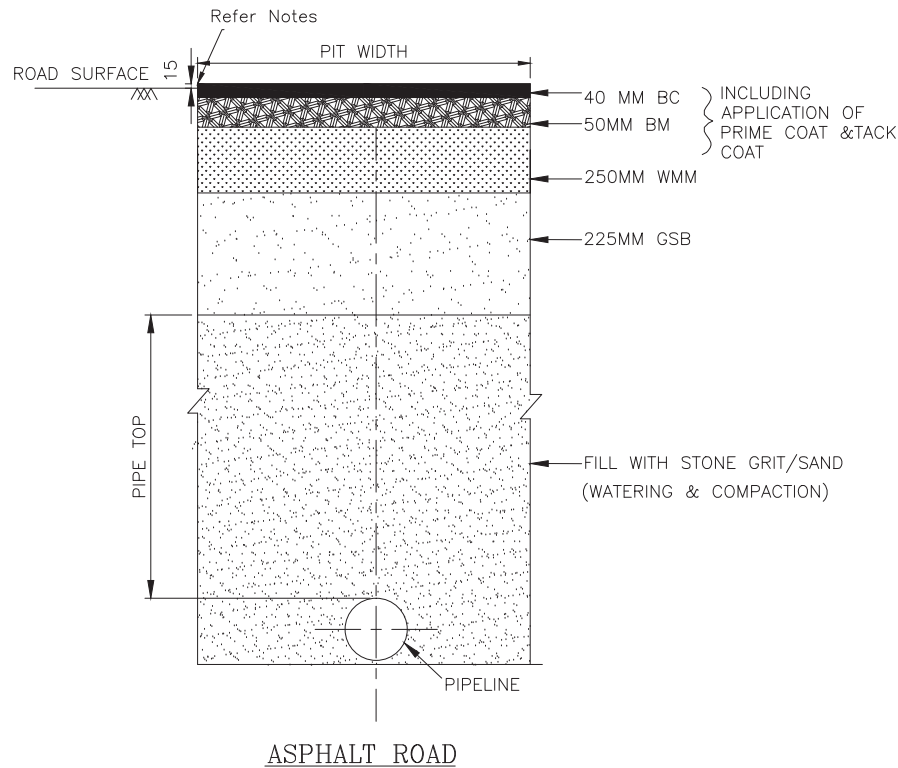
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DBG NO

REV.No.	DATE	ZONE	DESCRIPTION	BY	VERIFIED

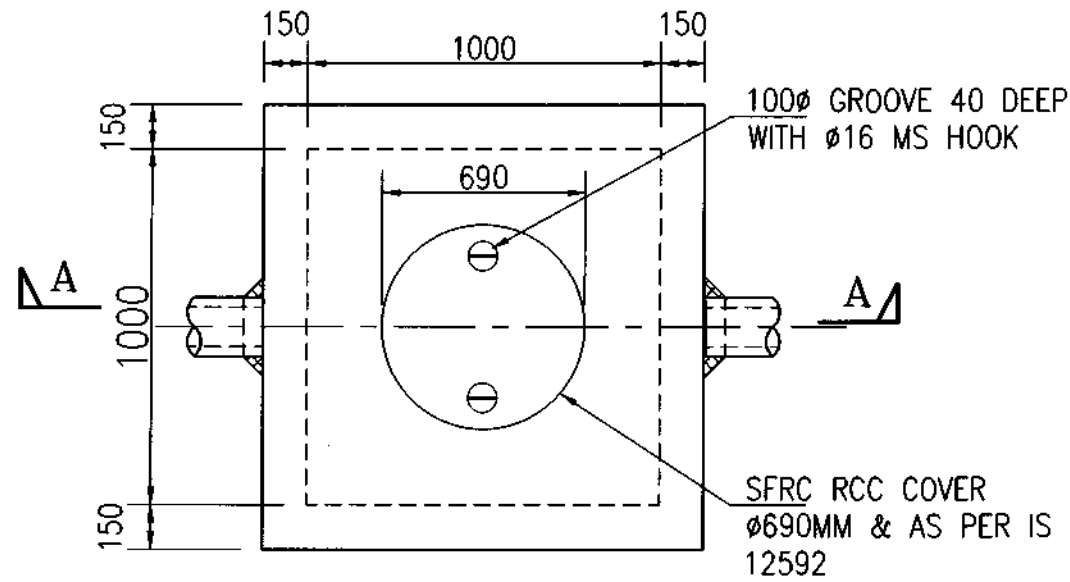
REVISION

1. ALL DIMENSIONS ARE IN MM & LEVELS ARE IN METRE.
2. ONLY FIGURED DIMENSIONS ARE TO BE FOLLOWED.
3. RESTORATION OF PITS SHALL BE DONE AS PER REQUIREMENT OF CONCERNED AUTHORITIES I.E. CPWD/PWD/BBMP ETC. IN RESPECTIVE AREA.
4. THE TOP OF BC SHALL NOT EXCEED 15MM FROM THE EXISTING ROAD TOP LEVEL.

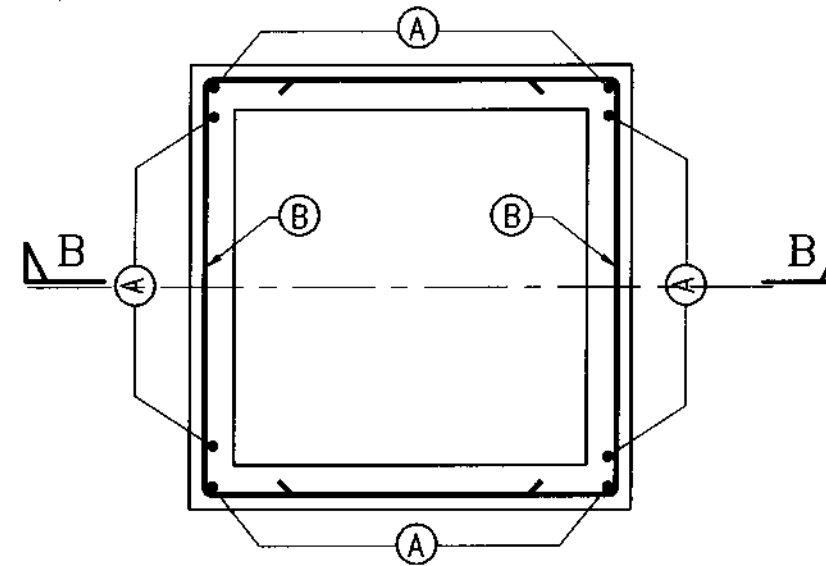


FOR TENDER PURPOSE ONLY

CLIENT		GAIL INDIA LTD.	
ENGINEERING CONSULTANT		ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड BRIDGE AND ROOF CO.(I) LTD	
DIVISION		CITY GAS DISTRIBUTION WORK	
DESIGNED	SANTOSH KUMAR	RESTORATION OF ROADS FOR HDD PITS	
DRAWN	SANTOSH KUMAR		
CHECKED & VERIFIED	A. MUKHERJEE		
APPROVED	SANDIP TALUKDAR	SCALE : NTS	SHEET 1 OF 1
DATE	24.06.2024	DRG. NO : BR-CGD-STD-DWG-033	

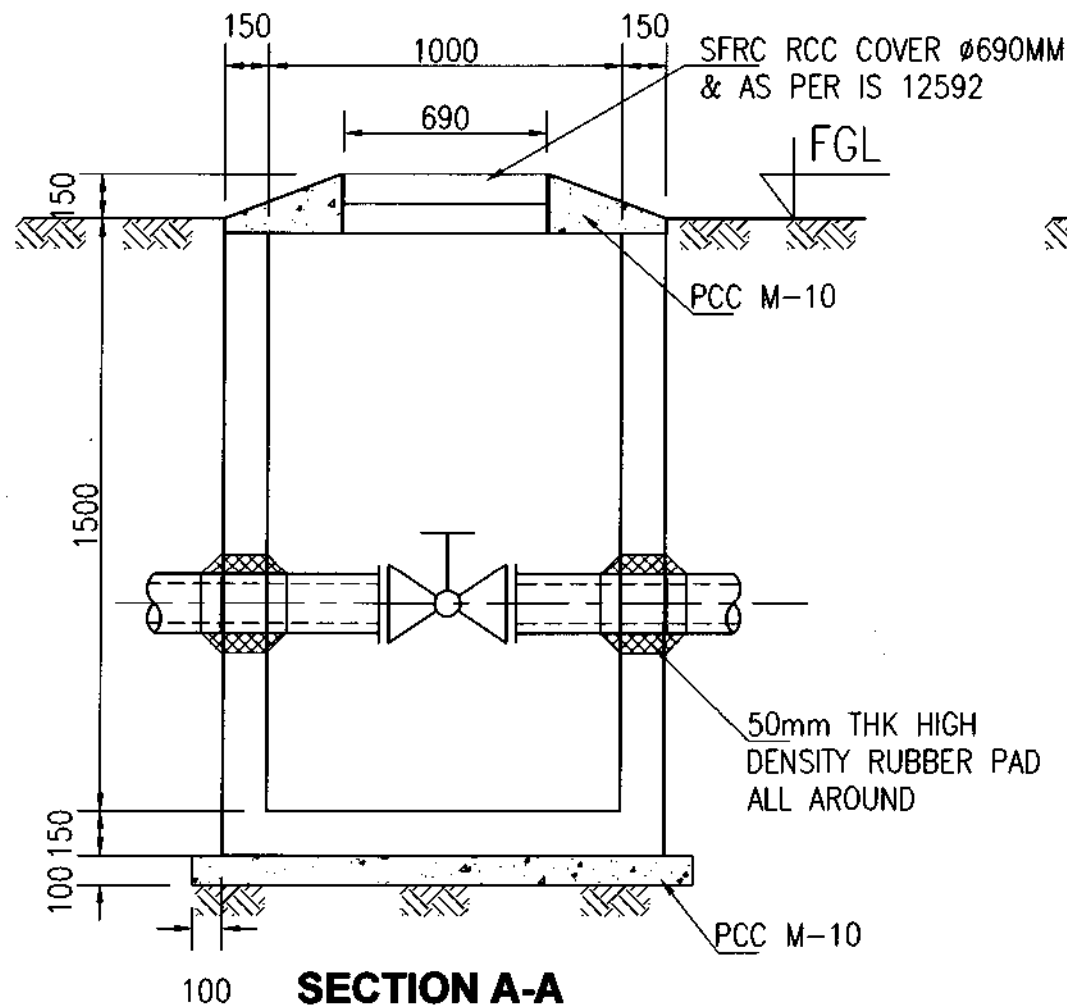


PLAN OF VALVE PIT VP-1

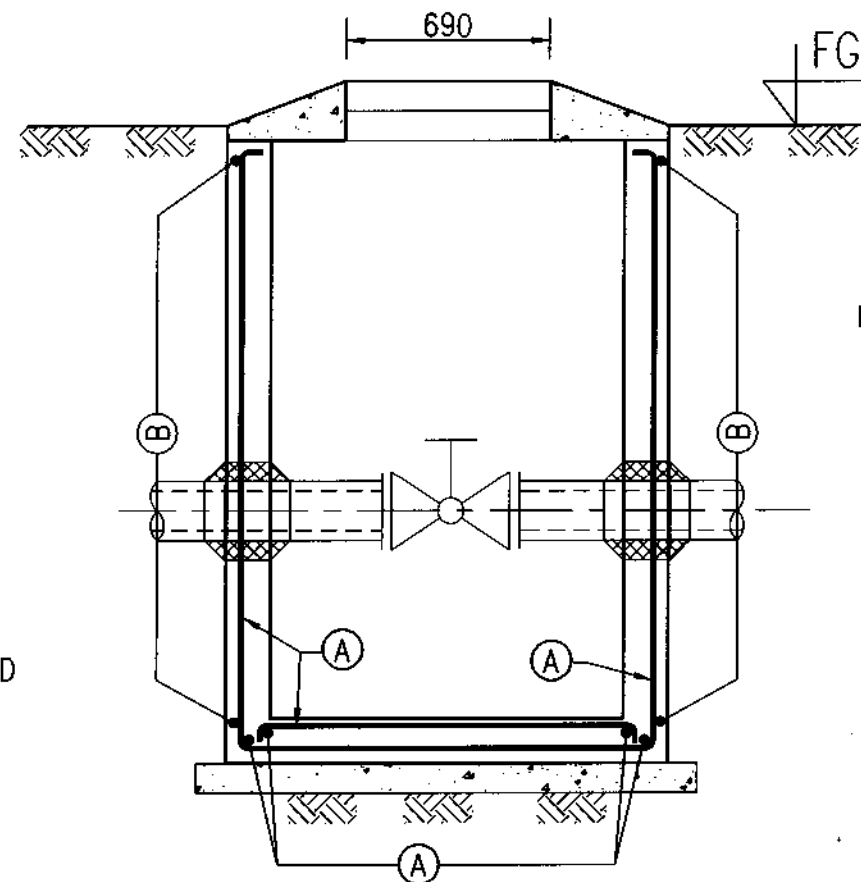


REINF. DETAIL OF VALVE PIT

REINF.	
A	B
12 Φ 150c/c	12 Φ 150c/c



SECTION A-A



SECTION B-B

NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. ONLY FIGURED DIMENSIONS ARE TO BE FOLLOWED.
3. ALL R.C.C. USED SHALL BE OF GRADE M25 AS PER IS:456-2000. UNLESS OTHERWISE SPECIFIED.
4. ALL R/F STEEL SHALL BE HYSD (Fe 415) CONFORMING TO IS: 1786.
5. CLEAR COVER TO MAIN R/F SHALL BE 40mm.
6. FOR EXACT LOCATION & ORIENTATION OF VALVE PIT REFER LAYOUT DRAWING.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD
			REVISIONS		
			REFERENCES		
			DRG. NO.		

SECTION :- CIVIL				
NAME	DATE	CHKD	DATE	
DSGN	SSM	30.05.2024		
DRWN	S.K	30.05.2024		

CITY GAS DISTRIBUTION NETWORK

DETAILS OF VALVE PIT TYPE-I



ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड

BRIDGE AND ROOF CO. (I) LTD

SCALE :- N.T.S.

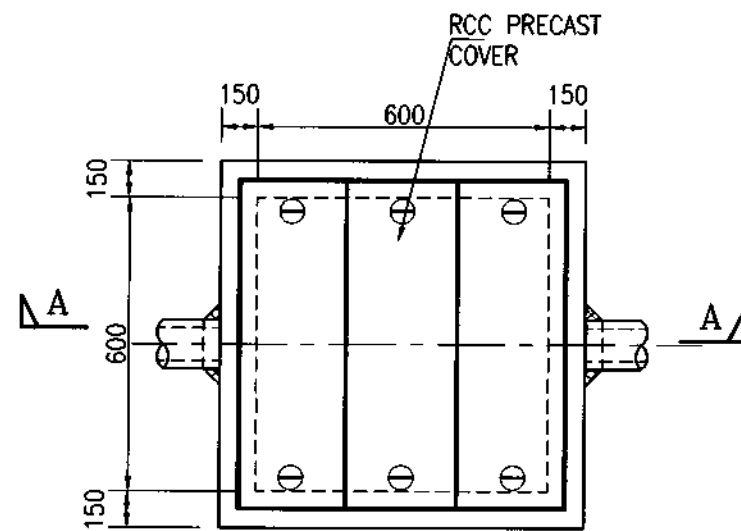
DRG. NO. - BR-CGD-STD-DWG-014

SHEET

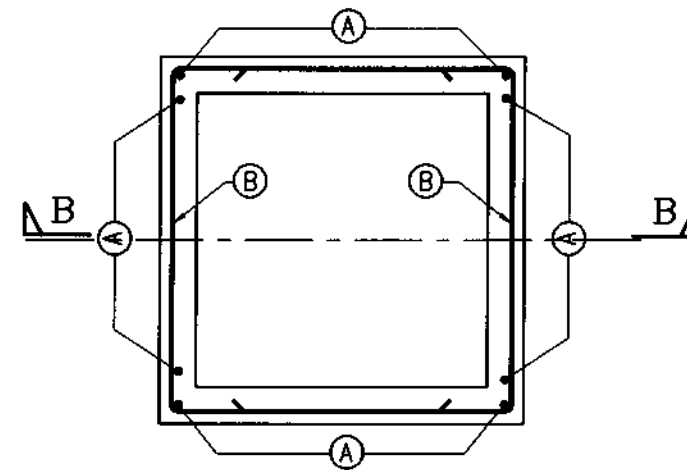
REV

1 0

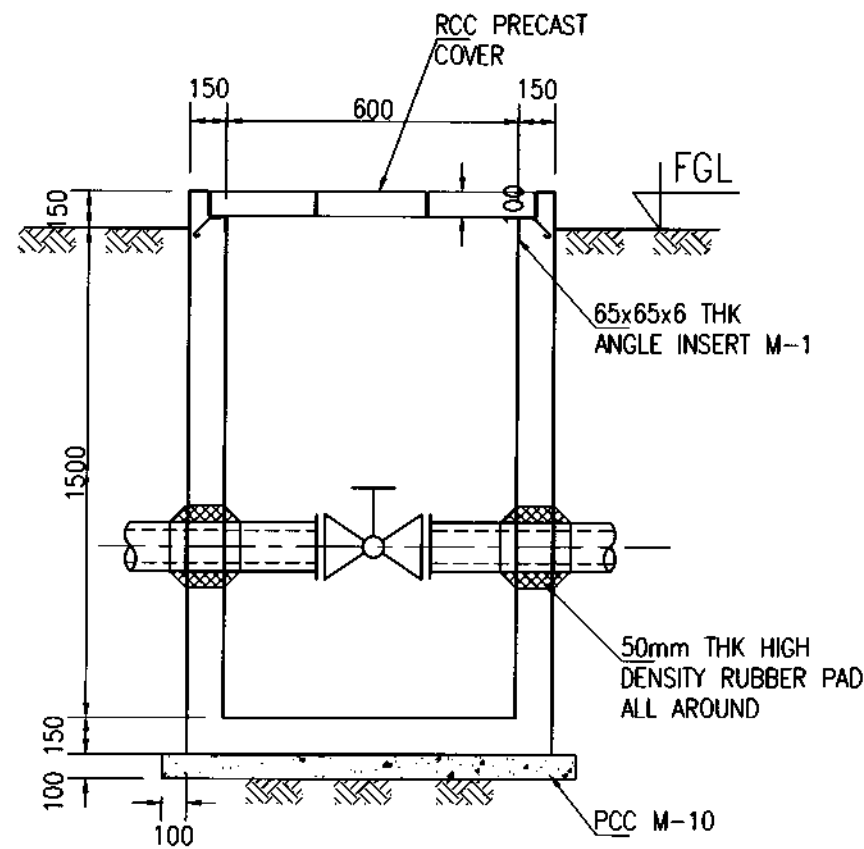
THIS DRAWING IS PROPERTY OF BANDR AND IS ISSUED FOR THE SPECIFIC PROJECT MENTIONED THEREIN. THIS IS NOT TO BE COPIED OR USED FOR OTHER PROJECTS UNLESS EXPRESSLY PERMITTED BY BANDR.



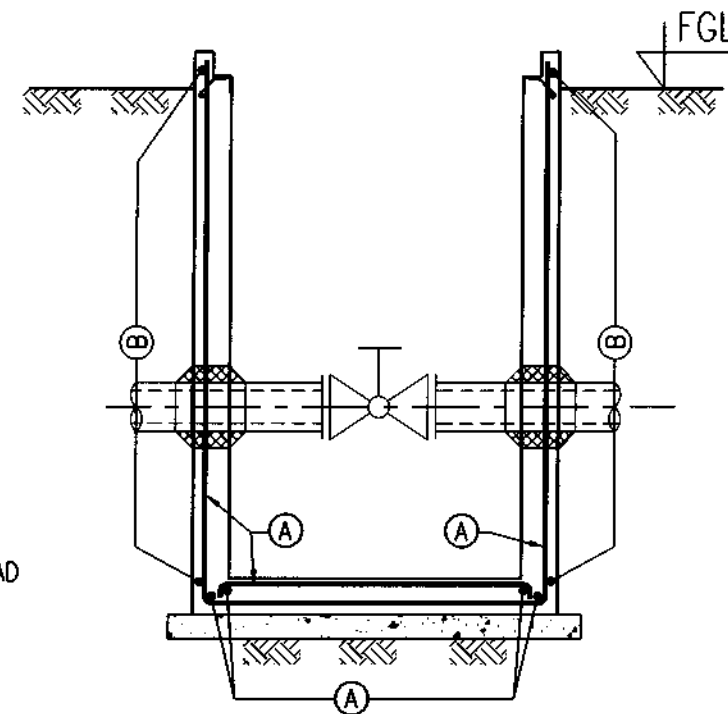
PLAN OF VALVE PIT



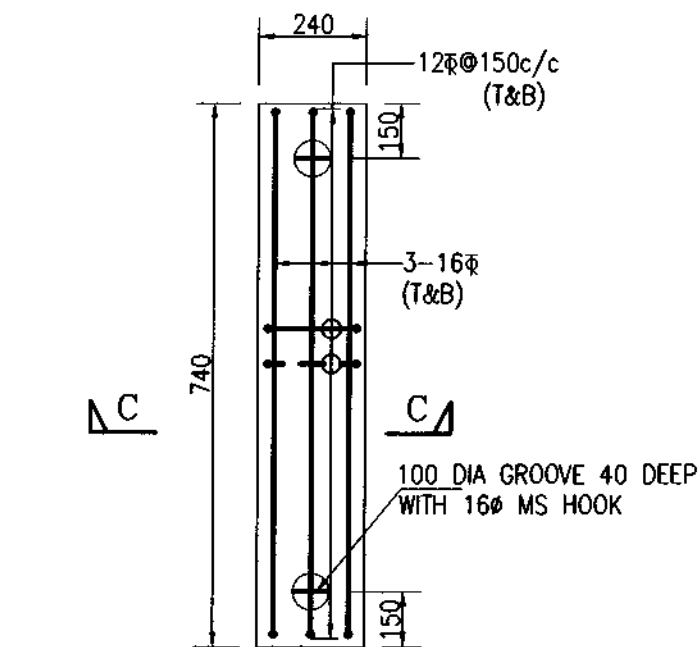
REINF. DETAIL OF VALVE PIT



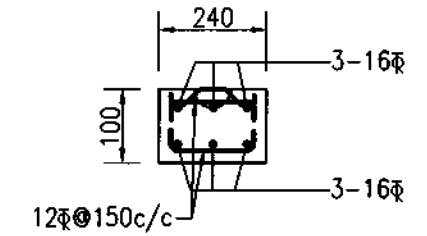
SECTION A-A



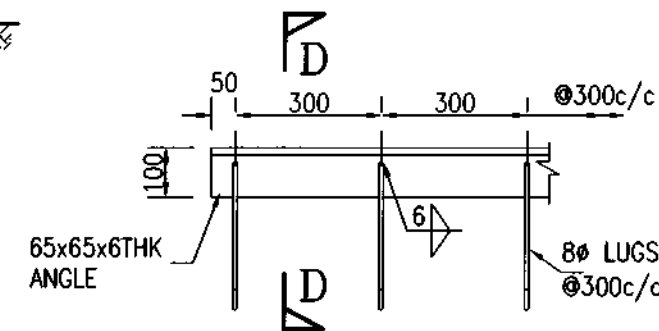
SECTION B-B



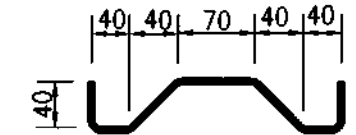
RCC DETAIL OF PRECAST SLAB



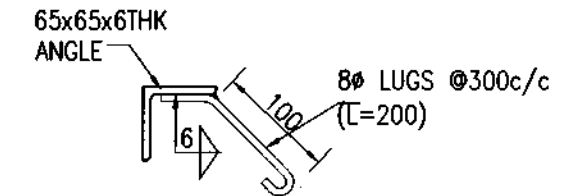
SECTION C-C



DETAIL OF INSERT IN-1



DETAIL OF 16Ø MS LIFTING HOOK



SECTION D-D

REINF.	
A	B
12 Φ 150c/c	12 Φ 150c/c

NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. ONLY FIGURED DIMENSIONS ARE TO BE FOLLOWED.
3. ALL R.C.C. USED SHALL BE OF GRADE M25 AS PER IS:456-2000. UNLESS OTHERWISE SPECIFIED.
4. ALL R/F STEEL SHALL BE HYSD (Fe 415) CONFORMING TO IS: 1786.
5. CLEAR COVER TO MAIN R/F SHALL BE 40mm.
6. FOR EXACT LOCATION & ORIENTATION OF VALVE PIT REFER LAYOUT DRAWING.

CONCURRED BY

REV NO DATE ZONE DESCRIPTIONS BY APPRD

REVISIONS

REFERENCES

DRG. NO.

Page 479 of 68 SANDIP TALUKDAR

SECTION :- CIVIL				
NAME	DATE	CHKD	DATE	
DSGN	SSM	22.05.24		
DRWN	SK	22.05.24		

CITY GAS DISTRIBUTION NETWORK

DETAILS OF VALVE PIT TYPE-II



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BRIDGE AND ROOF CO. (I) LTD

SCALE :- N.T.S.

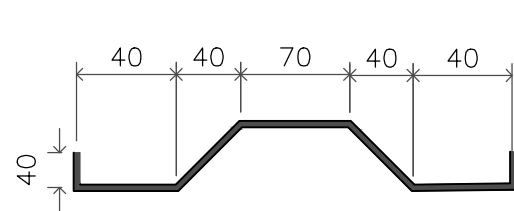
DRG. NO. - BR-CGD-STD-DWG-015

SHEET

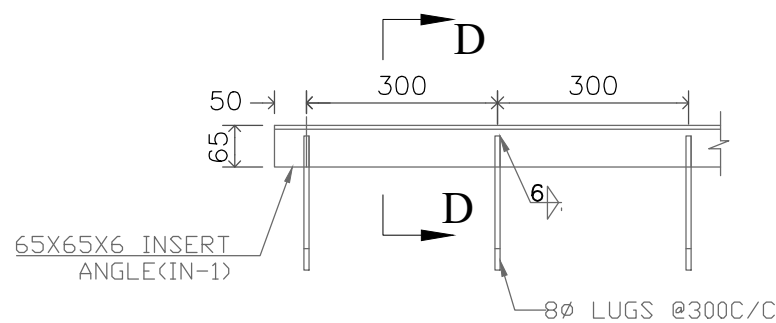
REV

1 0

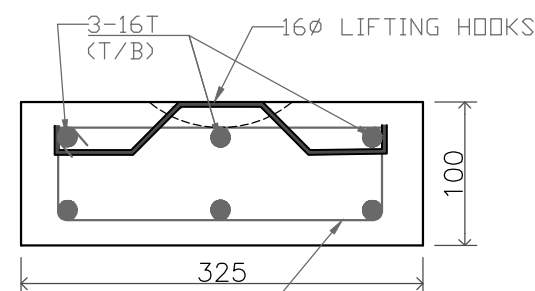
THIS DRAWING IS PROPERTY OF BAND R AND IS ISSUED FOR THE SPECIFIC PROJECT MENTIONED THEREIN. THIS IS NOT TO BE COPIED OR USED FOR OTHER PROJECTS UNLESS EXPRESSLY PERMITTED BY BAND R.



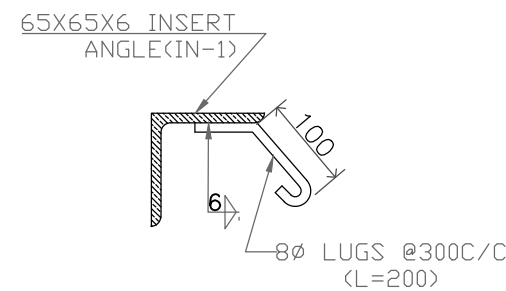
DETAIL OF 16Ø MS
LIFTING HOOK



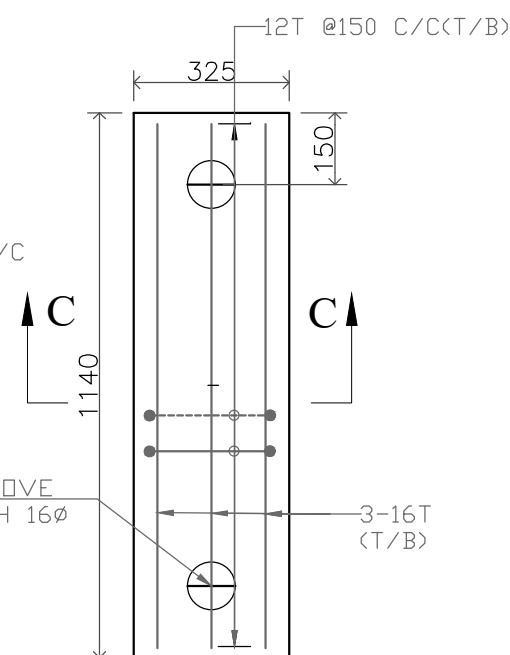
DETAIL OF INSERT
IN-1



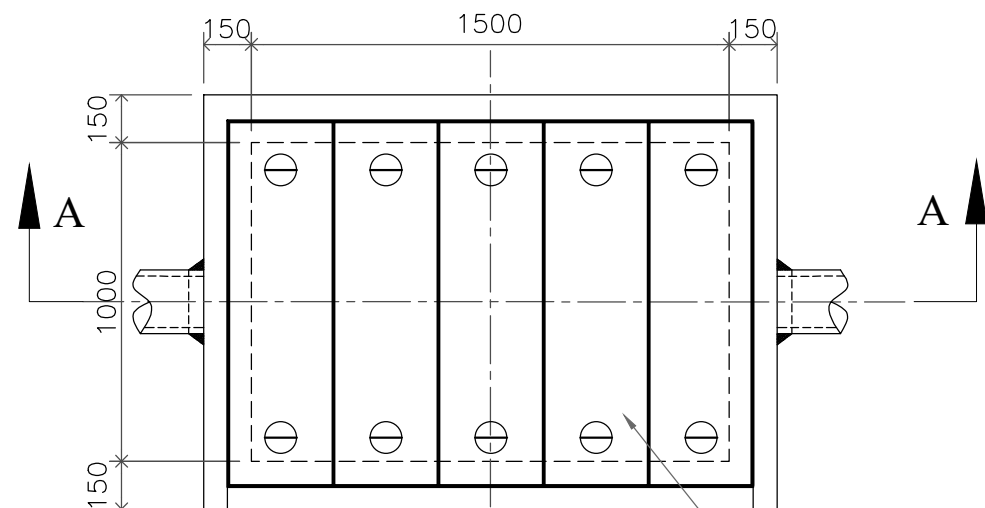
SECTION-C-C'



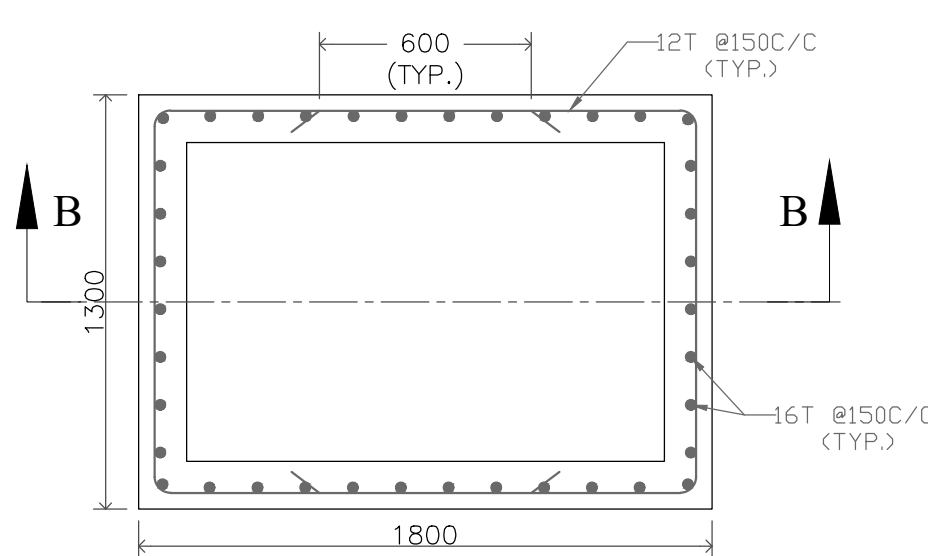
SECTION-D-D'



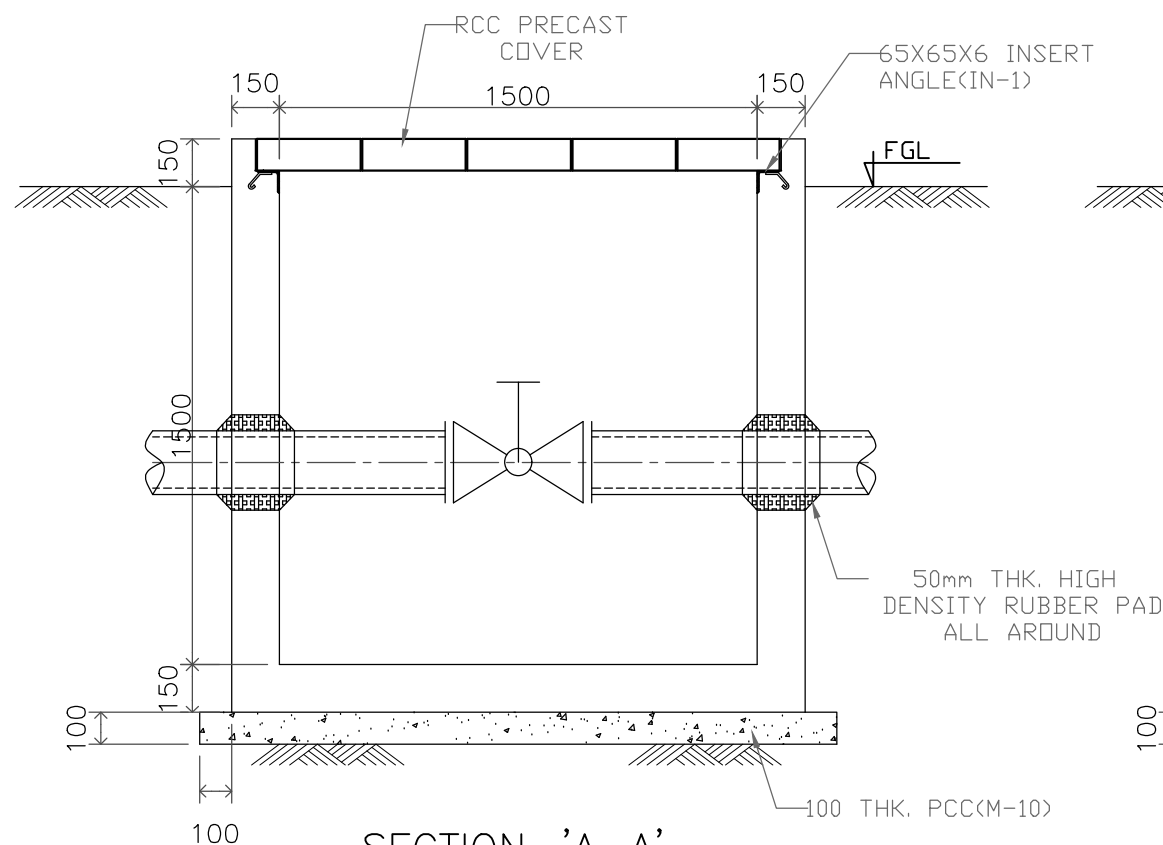
RCC DETAIL OF
PRECAST SLAB



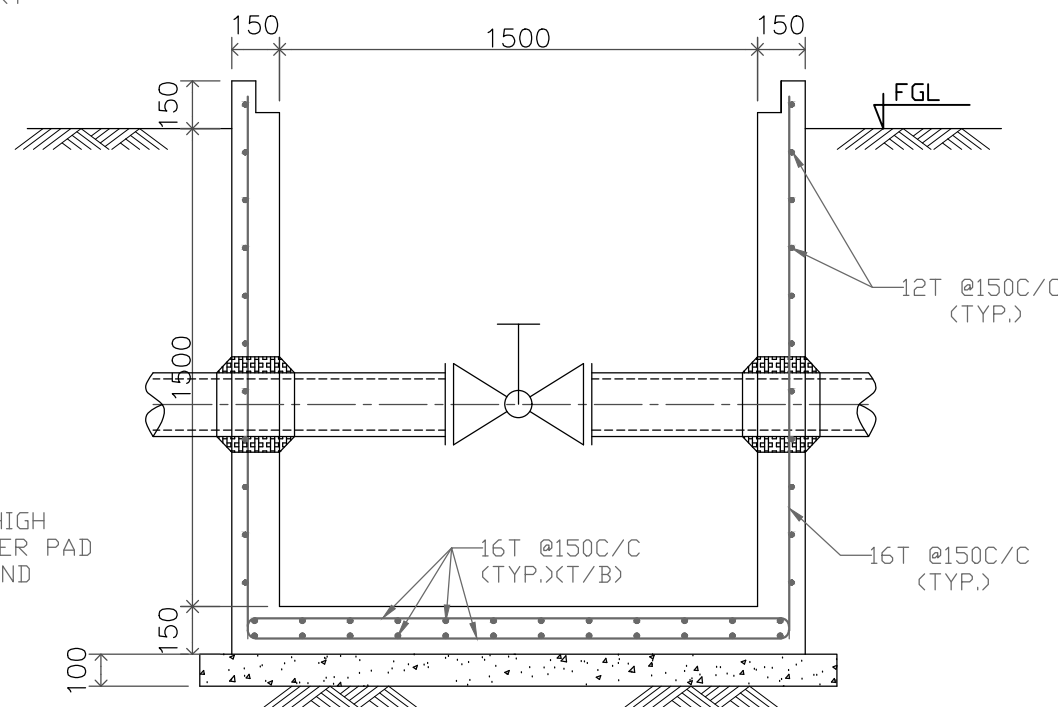
PLAN OF VALVE PIT



R/F DETAILS OF VALVE
PIT



SECTION-A-A'



SECTION-B-B'

LEGEND :-

B/W - BOTHWAYS
TYP. - TYPICAL
NTS - NOT TO SCALE

NOTES :-

- ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED.
- ± 0.00 CORRESPOND TO TOP OF FORECOURT LEVEL
- GRADE OF CONCRETE SHALL BE R.C.C M-25 & P.C.C M-10 UNLESS NOTED OTHERWISE.
- ALL REINF. STEEL SHALL BE HYSD OF GRADE Fe500D AND CONFIRMING TO IS1786.
- ALL LOOSE SOIL BELOW THE FOUNDATION RAFT SHALL BE WELL COMPACTED BEFORE PCC/RCC WORK.
- CLEAR COVER TO MAIN R/F SHALL BE 45mm IN PEDESTAL/COLUMN AND 50mm IN BOTTOM SLAB.
- DEVELOPMENT LENGTH SHALL BE 50 TIMES DIA. OF BAR.
- FOR EXACT LOCATION & ORIENTATION OF VALVE PIT REFER LAYOUT DRAWING.



GAIL INDIA LIMITED



BRIDGE AND ROOF CO. (INDIA) LTD.
A GOVERNMENT OF INDIA ENTERPRISE.
427/1, GRAND TRUNK ROAD, HOWRAH-711101

PROJECT :

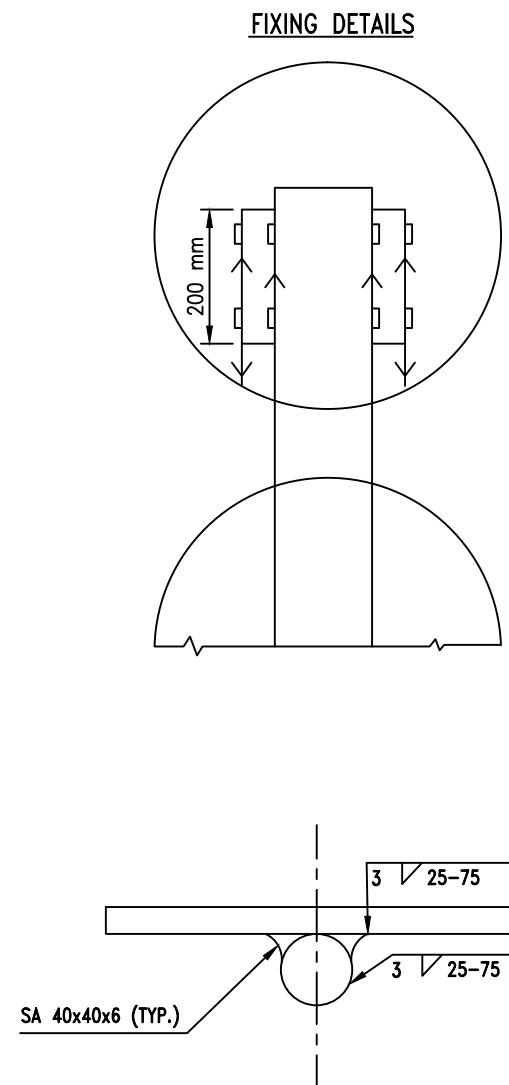
CITY GAS DISTRIBUTION NETWORK
IN SIX GA

TITLE :

TYPICAL DETAILS OF VALVE PIT TYPE-III

0	ISSUED FOR CONSTRUCTION	S.K	09/12/24	A.M	09/12/24	S.T	09/12/24	SCALE	JOB NO.	DRAWING NO.	SHT	REV
REV	DESCRIPTION	BY	ON	BY	ON	BY	ON	N.T.S	71150	BR-CGD-STD.-DWG-106	-	0
		DRAWN	CHECKED	APPROVED								

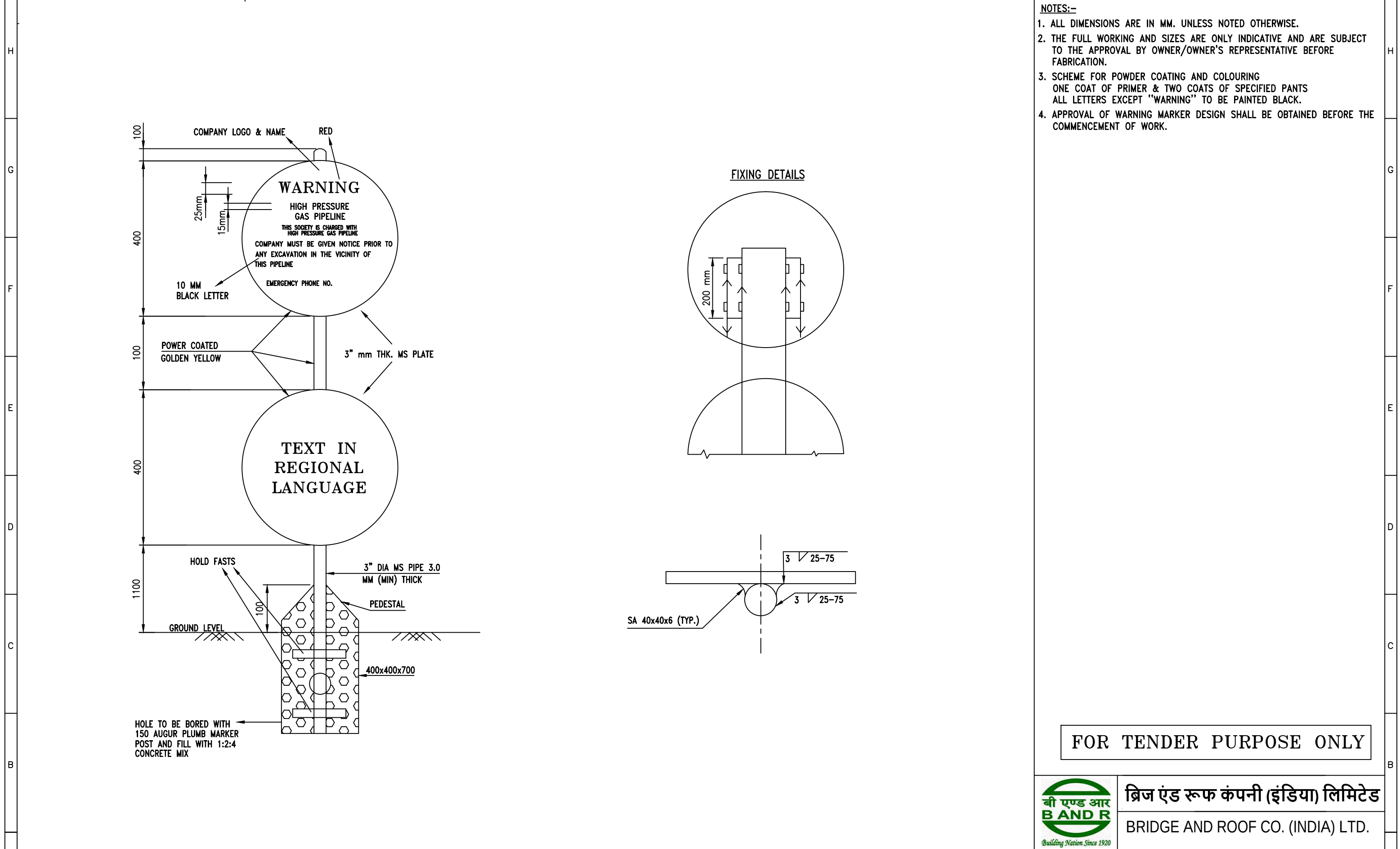
1. ALL DIMENSIONS ARE IN MM. UNLESS NOTED OTHERWISE.
2. THE FULL WORKING AND SIZES ARE ONLY INDICATIVE AND ARE SUBJECT TO THE APPROVAL BY OWNER/OWNER'S REPRESENTATIVE BEFORE FABRICATION.
3. SCHEME FOR POWDER COATING AND COLOURING
ONE COAT OF PRIMER & TWO COATS OF SPECIFIED PANTS
ALL LETTERS EXCEPT "WARNING" TO BE PAINTED BLACK.
4. APPROVAL OF WARNING MARKER DESIGN SHALL BE OBTAINED BEFORE THE COMMENCEMENT OF WORK.



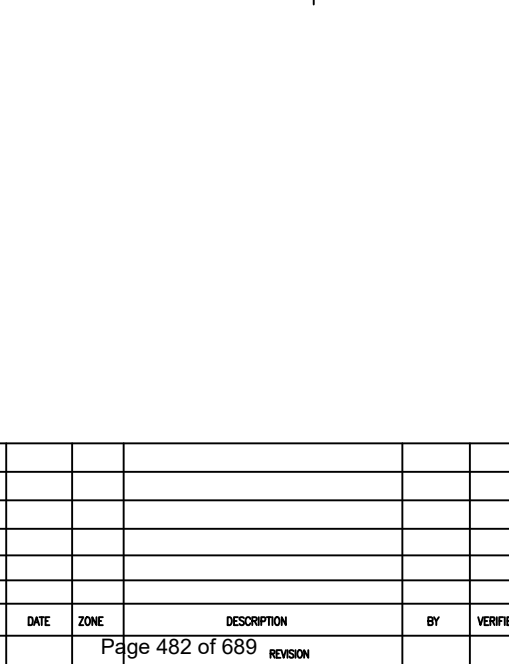
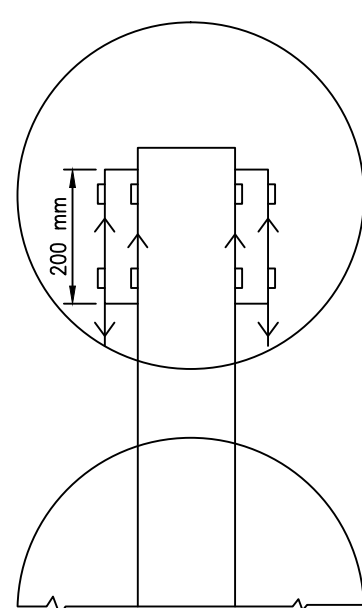
बी एण्ड आ
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Building Nation Since 1946

	SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT		
	LOCATION	HOWRAH OFFICE			
	DESIGNED	S.S.M			
	DRAWN	S.K			
	CHECKED AND VERIFIED	S.T	POLE MARKER WITH FOUNDATION		
QUED IS					
	APPROVED	S.T	SCALE : N.T.S.	SHEET	REV.
		22.05.2024	DRG. NO.- BR-CGD-STD-DWG-16	1 OF 1	/

[illegible]



1. ALL DIMENSIONS ARE IN MM. UNLESS NOTED OTHERWISE. 2. THE FULL WORKING AND SIZES ARE ONLY INDICATIVE AND ARE SUBJECT TO THE APPROVAL BY OWNER/OWNER'S REPRESENTATIVE BEFORE FABRICATION. 3. SCHEME FOR POWDER COATING AND COLOURING ONE COAT OF PRIMER & TWO COATS OF SPECIFIED PANTS ALL LETTERS EXCEPT "WARNING" TO BE PAINTED BLACK. 4. APPROVAL OF WARNING MARKER DESIGN SHALL BE OBTAINED BEFORE THE COMMENCEMENT OF WORK.	H
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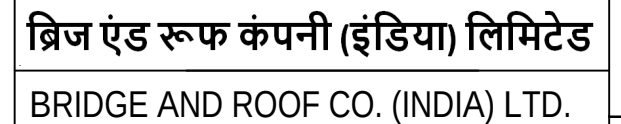


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BRIDGE AND ROOF CO. (INDIA) LTD.

[illegible]

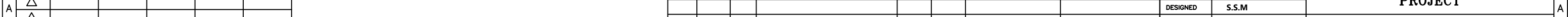


- FOR TENDER PURPOSE ONLY

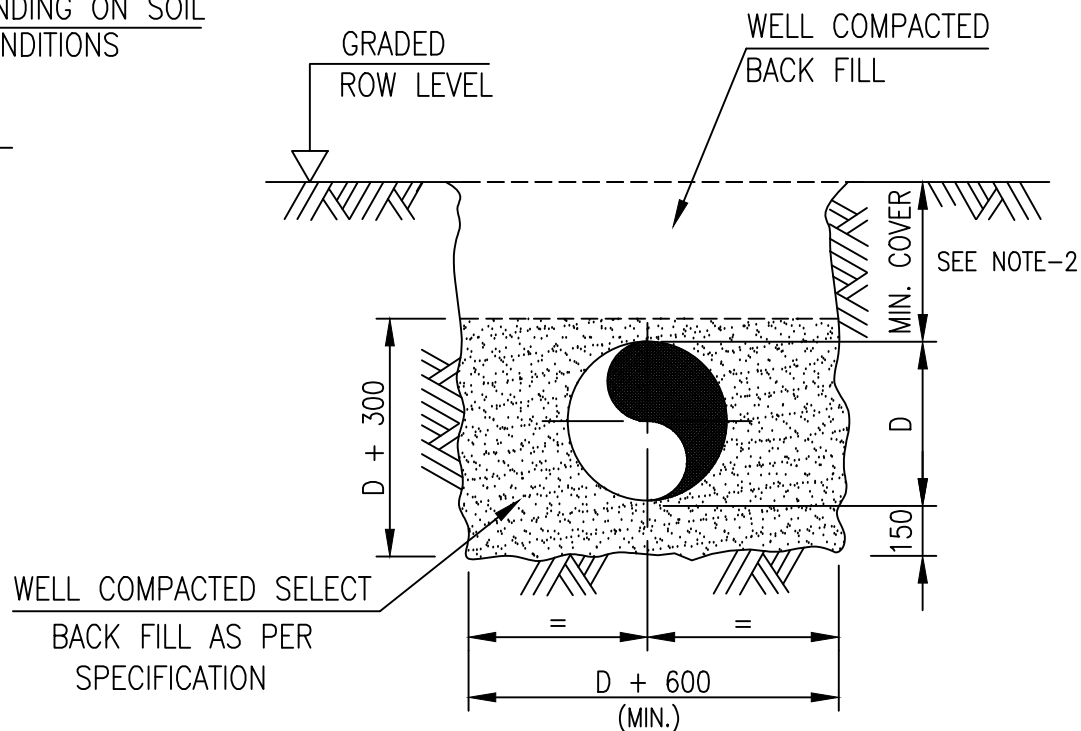
[illegible]



B	— M.S. PLATE 3.0 MM (MIN.) THICK	— POWDER COATED GOLDEN YELLOW	B
---	----------------------------------	-------------------------------	---

[illegible][illegible]

1. ALL DIMENSIONS ARE IN MM. UNLESS SPECIFIED OTHERWISE.
2. FOR ALL PIPELINES TO BE CONSTRUCTED IN THE LAND UNDER JURISDICTION OF GOVT. OF INDIA THE MINIMUM COVER TO BE ADOPTED SHALL BE 1000 MM. IN ACCORDANCE WITH GOVT. OF INDIA PETROLEUM PIPELINES (ACQUISITION OF RIGHT OF USER IN LAND) ACT NO. 50,1962 AND AMENDMENT ACT NO. 13,1977. ANY EXTRA REQUIREMENT SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.
3. MINIMUM COVER REQUIREMENT SHALL BE SUBJECTED TO APPROVAL OF CONCERNED AUTHORITIES WHEREVER REQUIRED.
4. EXTRA COVER REQUIREMENT SHALL BE ESTABLISHED AT ALL COVER BENDS, SAG BENDS AND HORIZONTAL BENDS WHEREVER REQUIRED.
5. FOR MINIMUM COVER REQUIREMENT AT PIPELINES CROSSING ROADS, RAILWAY TRACKS, RIVERS, MARSHY AREAS ETC, REFER RELEVANT STANDARDS.

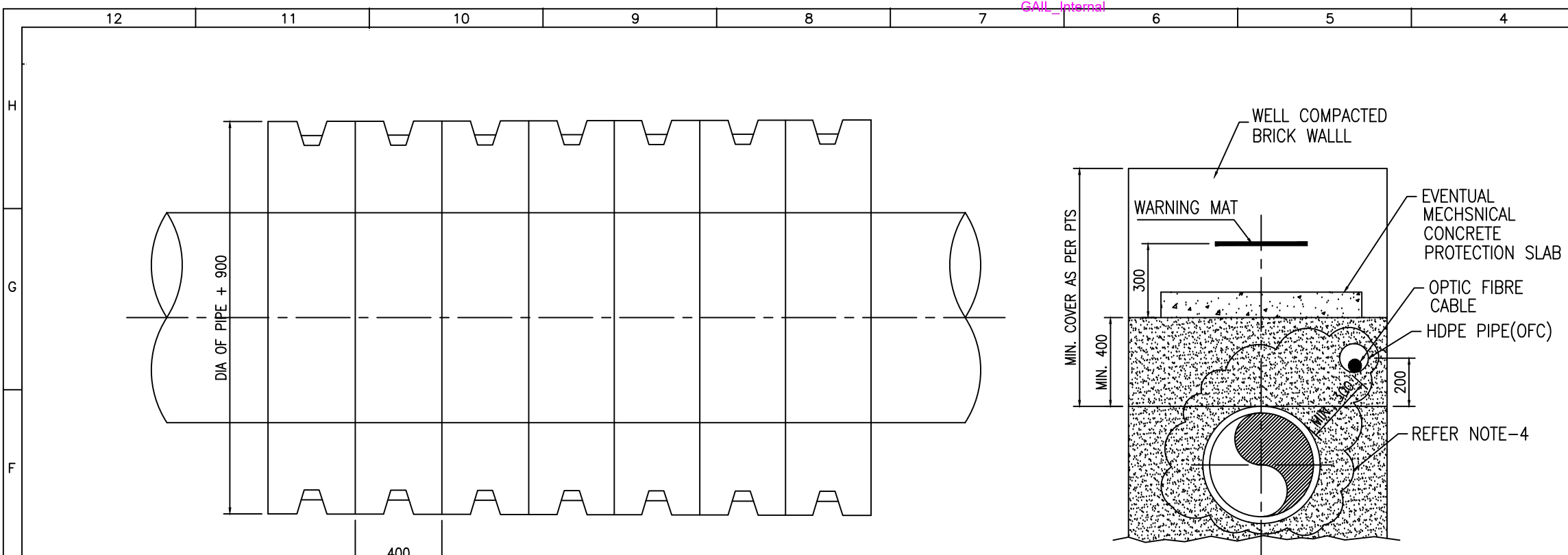


TRENCH IN CONSOLIDATED ROCK
TYPICAL SECTION

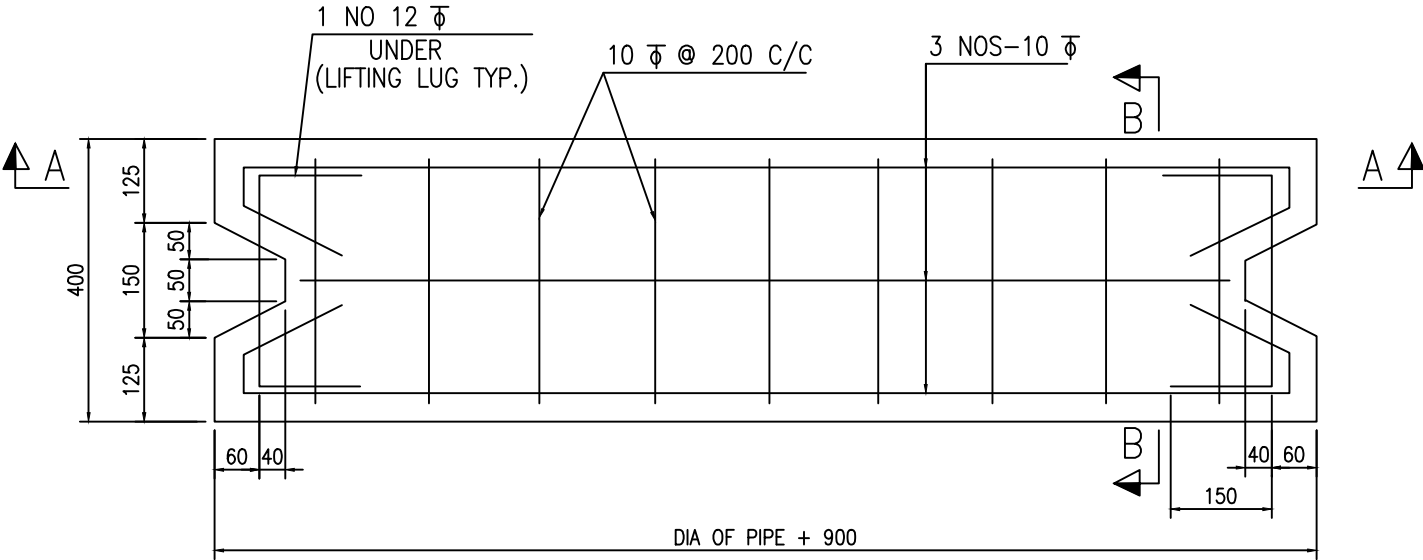
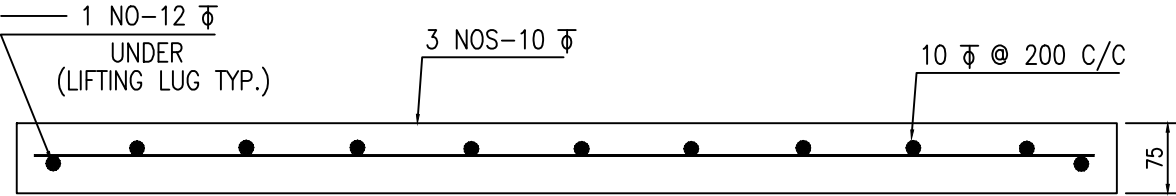
FOR TENDER PURPOSE ONLY



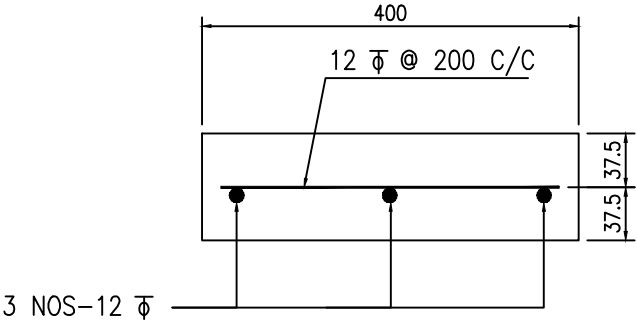
SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT		
LOCATION	HOWRAH OFFICE			
DESIGNED	S.S.M			
DRAWN	S.K	TYPICAL TRENCH DIMENSIONS FOR PIPE LINE		
CHECKED AND VERIFIED	S.T			
ED				
APPROVED	S.T	SCALE : N.T.S.	SHEET	REV.
	23.05.2024	DRG. NO.- BR-CGD-STD-DWG-20	1 OF 1	



PROTECTIVE CONCRETE SLAB PLAN



REINF. DETAIL PROTECTIVE CONCRETE SLAB



SECTION B-B
(SCALE - 1:10)

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. MINIMUM COVER OVER LINE PIPE SHALL BE AS PER SPECIFICATION AND REQUIREMENT OF CONCERNED AUTHOTITIES.
3. THIS SKETCH IS INDICATIVE ONLY.
4. TYPE OF TRENCHING SHALL BE AS PER PTS AND APPROVED PROCEDURE.
5. CONCRETE MIX M20 SHALL BE USED.

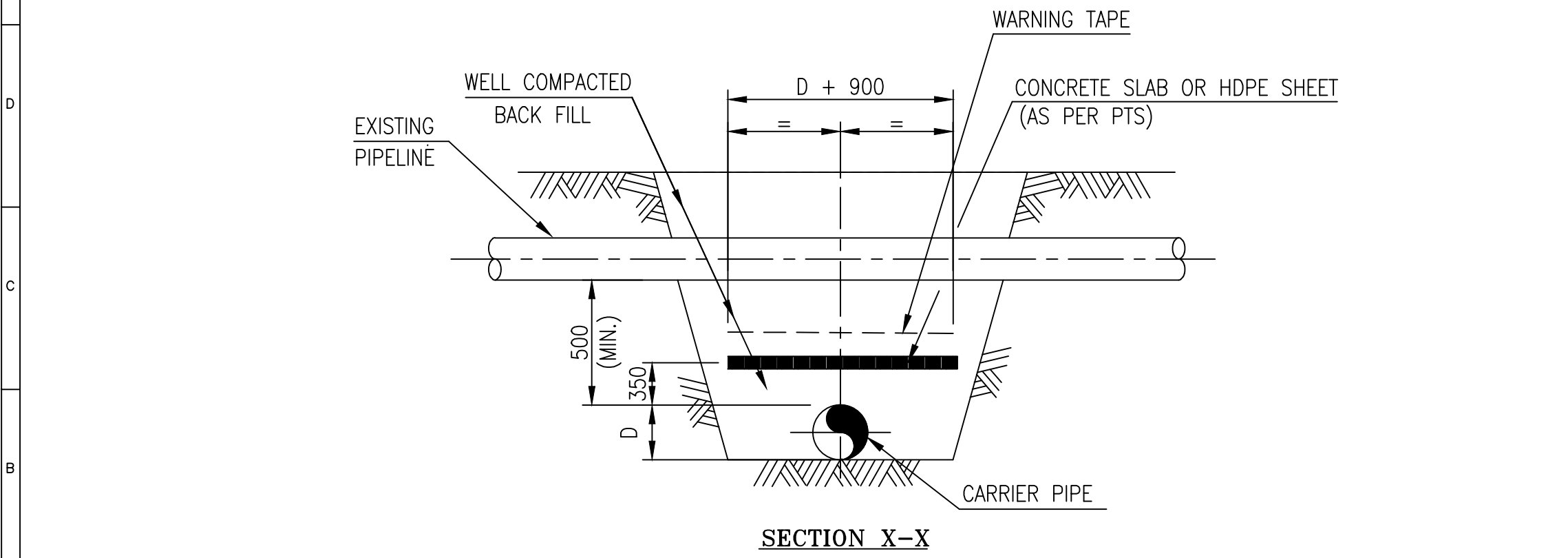
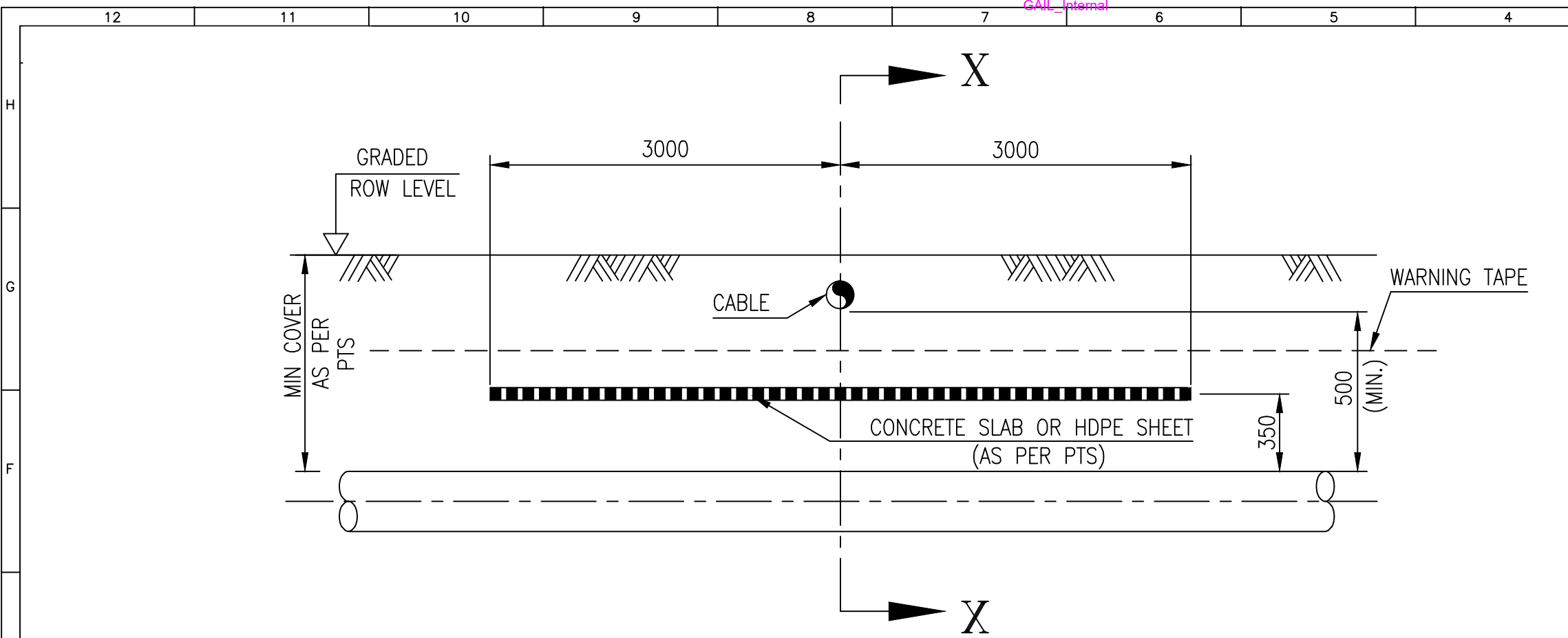
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SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT	
LOCATION	HOWRAH OFFICE		
DESIGNED	S.S.M	TYPICAL MECHANICAL PROTECTION CONCRETE SLAB DETAILS	
DRAWN	S.K		
CHECKED AND VERIFIED	S.T	SCALE : N.T.S.	
APPROVED	S.T		
24.05.2024		DRG. NO.- BR-CGD-STD-DWG-22	1 OF 1

REV	NO.	DATE	ZONE	DESCRIPTION	BY	VERIFIED	REFERENCES	DRG. NO.
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								



- NOTES:-
1. ALL DIMENSIONS ARE IN MM. UNLESS SPECIFIED OTHERWISE.
 2. A MODIFIED PIPELINE WARNING SIGN SHALL BE INSTALLED CLOSE TO THE CROSSING.
 3. IN CASE OF ARMOURWD OFC CABLE, CP BONDING IS NOT BE PROVIDED BETWEEN PIPELINE AN CABLE ARMOUR IN CASE OF UNARMoured CABLE ARRANGEMENT FOR SHIELDIND (BY PROVIDING CASING ON EITHE SIDE OF THE PIPELINE OR CABLE) SHALL BE CONSIDERED.
 4. FOR APPROVAL OF XING SHALL BE OBTAINED FROM CONCERNED AUTHORITIES.

FOR TENDER PURPOSE ONLY



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BRIDGE AND ROOF CO. (INDIA) LTD.

CONCURRED BY						REV. NO. DATE ZONE DESCRIPTION BY VERIFIED						REFERENCES DRG. NO.						SECTION DESIGN DEPT.						CNG & CITY GAS DISTRIBUTION PROJECT					
12 11 10 9 8 7 6 5 4 3 2 1						Page 488 of 689						© Copyright B AND R - All right reserved. THIS DRAWING IS THE PROPERTY OF B AND R AND ISSUED FOR THE SPECIFIC PROJECT MENTIONED THEREIN. THIS IS NOT TO BE COPIED OR USED FOR OTHER PROJECTS UNLESS EXPRESSLY PERMITTED BY B AND R						HOWRAH OFFICE						TYPICAL UNDERGROUND CABLE CROSSING DETAILS					
12 11 10 9 8 7 6 5 4 3 2 1						REV. NO. DATE ZONE DESCRIPTION BY VERIFIED						DESIGNED S.S.M						DRAWN S.K						SCALE : N.T.S.					
12 11 10 9 8 7 6 5 4 3 2 1						REV. NO. DATE ZONE DESCRIPTION BY VERIFIED						CHECKED AND VERIFIED S.T						APPROVED S.T						DRG. NO.- BR-CGD-STD-DWG-23					
12 11 10 9 8 7 6 5 4 3 2 1						REV. NO. DATE ZONE DESCRIPTION BY VERIFIED						24.05.2024						1 OF 1						0					



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	SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT		
	LOCATION	HOWRAH OFFICE			
	DESIGNED	S.S.M			
	DRAWN	S.K	HOSE ASSEMBLY FOR NATURAL GAS SERVICE		
	CHECKED AND VERIFIED	S.T			
APPROVED IS	APPROVED	S.T	CALE : N.T.S.	SHEET	REV.
		24.05.2024	DRG. NO.- BR-CGD-STD-DWG-24	1 OF 1	0

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REV					
SEC	CONCURRED BY				

						REFERENCES	DWG. NO.
REV. NO.	DATE	ZONE	DESCRIPTION	BY	VERIFIED	© Copyright B AND R - All right reserved. THIS DRAWING IS THE PROPERTY OF B AND R AND ISSUE FOR THE SPECIFIC PROJECT MENTIONED THEREIN. THIS IS NOT TO BE COPIED OR USED FOR OTHER PROJECTS UNLESS EXPRESSLY PERMITTED BY B AND R	



Technical drawing of a stepped shaft. The drawing shows a shaft with a central hole. The total length is 20.2. The central hole has an inner diameter of 11.965 and an outer diameter (O.D.) of 12.105. The shaft has a central section with a diameter of 3. The distance from the center to the end of the shaft is 8.6. The thickness of the shaft material is 0.6. The drawing includes a dashed line indicating the center of the shaft.

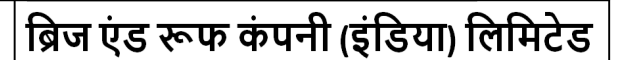
FITTING AS PER EN 1254 PART-1



FITTING AS PER EN 1254 PART-1

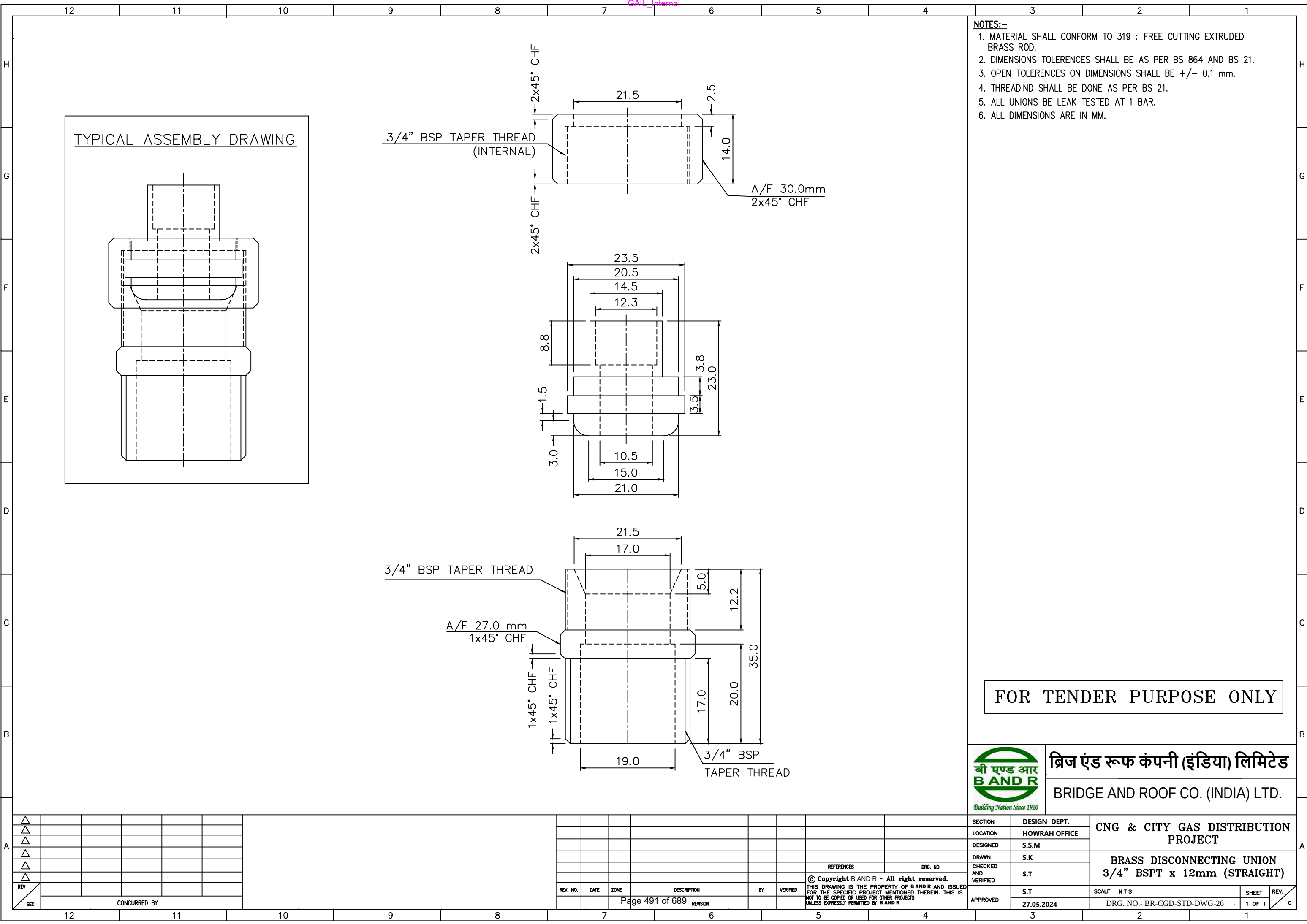
1. ALL DIMENSIONS ARE IN MM.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE.
3. OPEN TOLERANCES ON DIMENSIONS SHALL BE AS PER EN 1254.
4. FOR DETAIL REFER SPEC NO.
5. THESE DRAWINGS ARE INDICATIVE ONLY. DETAIL DRAWING TO BE PREPARED BY THE VENDOR AS PER DESIGN CODE/MANUFACTURING STANDARD.

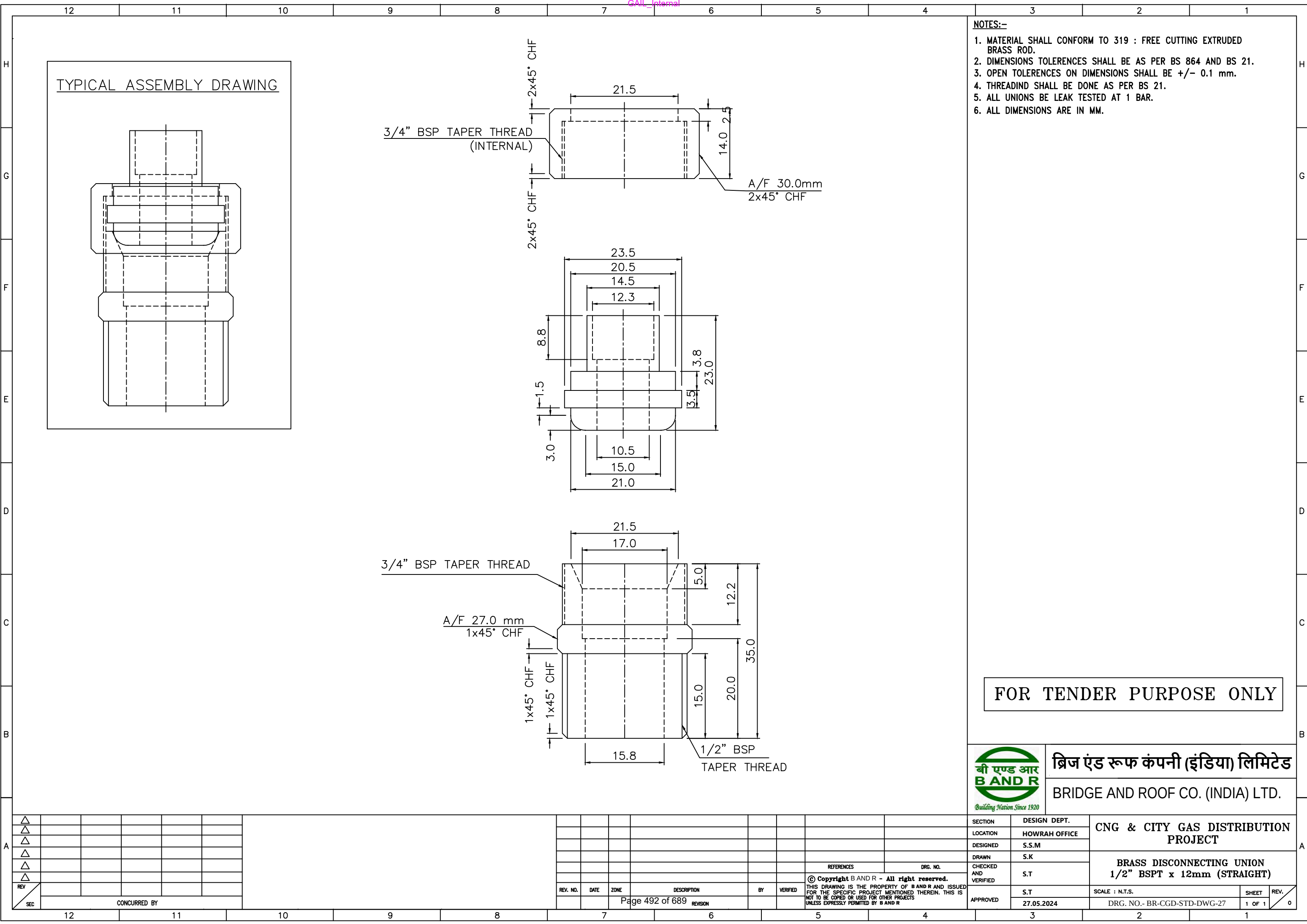
FOR TENDER PURPOSE ONLY

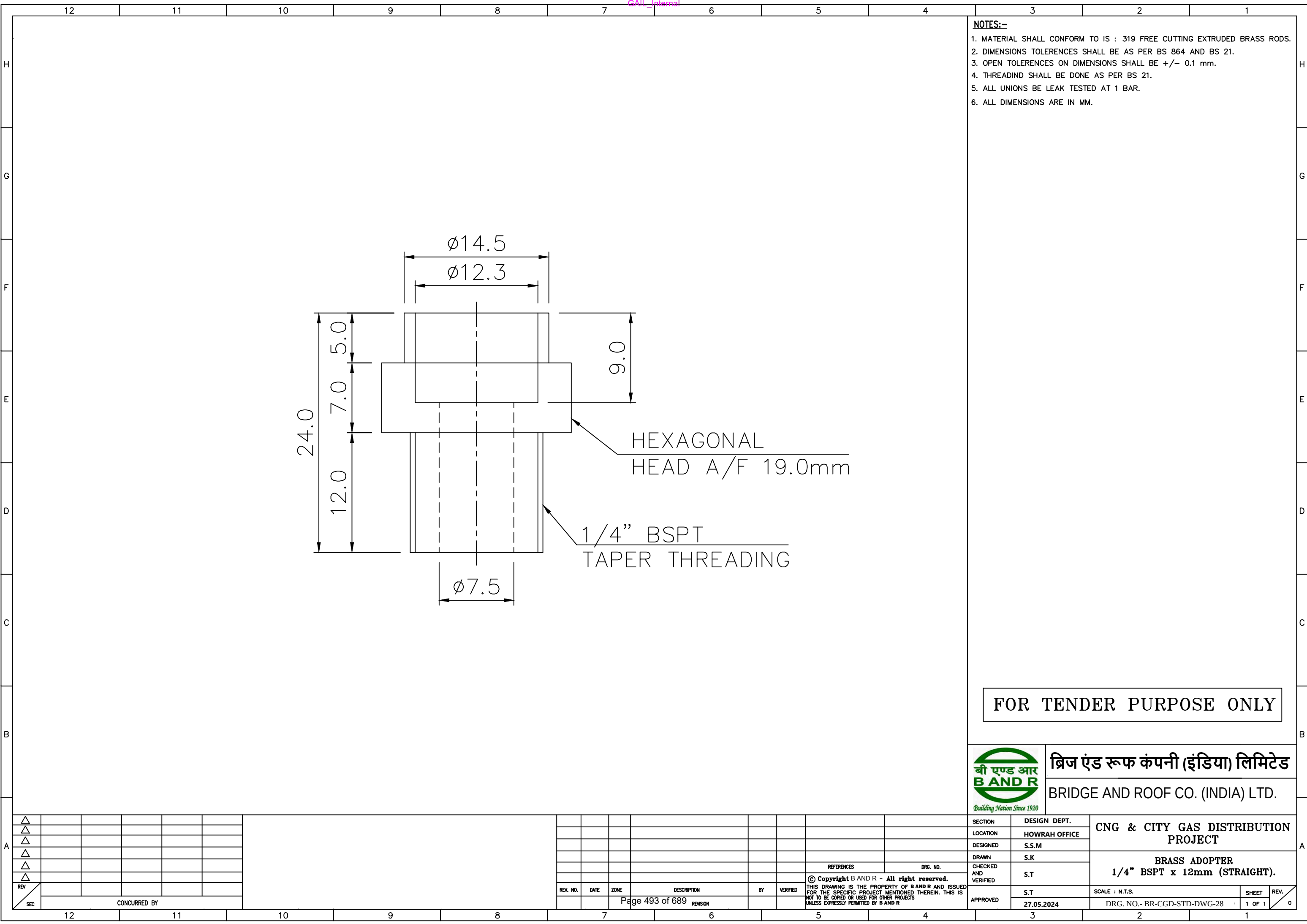


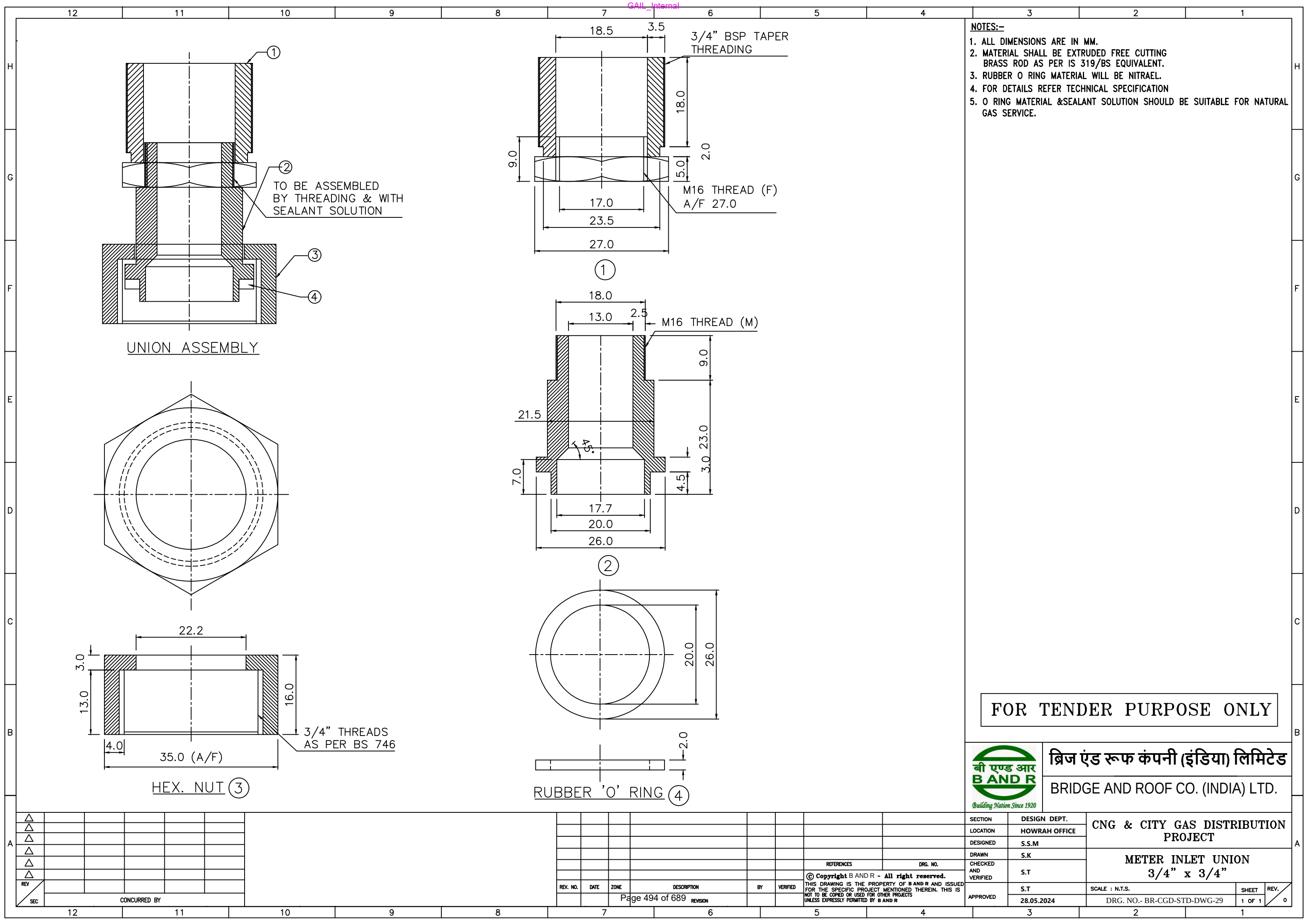
BRIDGE AND ROOF CO. (INDIA) LTD.

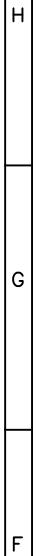
	SECTION	DESIGN DEPT.	CNG & CITY GAS DISTRIBUTION PROJECT		
	LOCATION	HOWRAH OFFICE			
	DESIGNED	S.S.M			
	DRAWN	S.K	COPPER FITTING FOR NATURAL GAS SERVICE		
	CHECKED AND VERIFIED	S.T			
ED S		S.T			
	APPROVED	24.05.2024	SCALE : N.T.S.	SHEET 1 OF 1	REV. 0



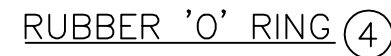




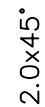




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B



REV. NO.	DATE	ZONE	DESCRIPTION
			Page 495 of 689 REVISION

	DESIGNED	S.S.M
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METER OUTLET UNION
3/4" x 12 mm (STRAIGHT)

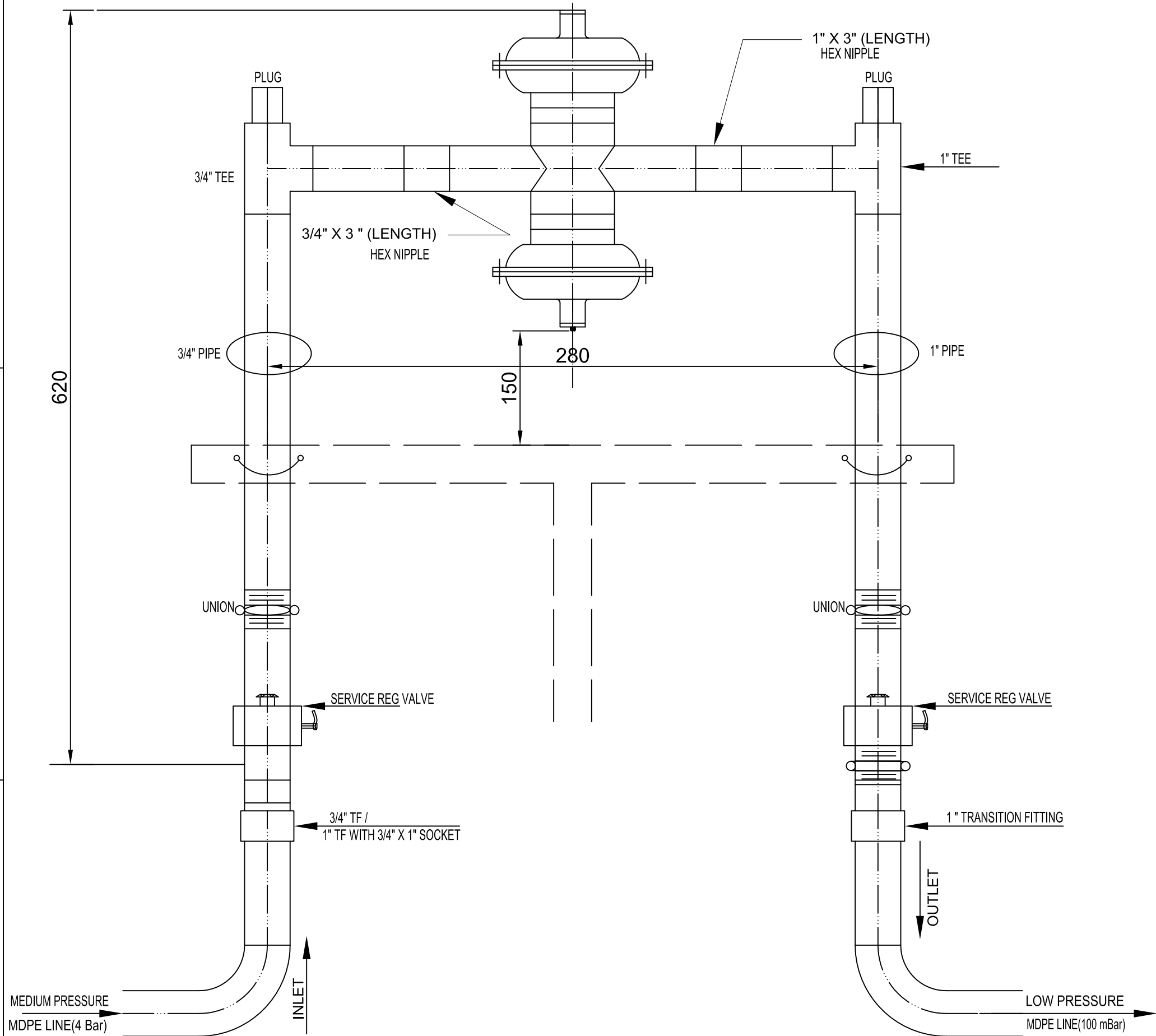
SCALE : N.T.S.	SHEET	REV.
DRG. NO.- BR-CGD-STD-DWG-30	1 OF 1	0



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ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड	
BRIDGE AND ROOF CO. (INDIA) LTD.	

1. ALL DIMENSIONS ARE IN MM. 2. MATERIAL SHALL BE EXTRUDED FREE CUTTING BRASS ROD AS PER IS 319/BS EQUIVALENT. 3. RUBBER O RING MATERIAL WILL BE NITRAEL. 4. FOR DETAILS REFER TECHNICAL SPECIFICATION 5. O RING MATERIAL & SEALANT SOLUTION SHOULD BE SUITABLE FOR NATURAL GAS SERVICE.	H
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NOTE:ALL DIMENSION ARE IN mm.			
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	NAME	SIGN. & DATE	SECTION
DESIGNED	S.S.M	28.05.2024	SCALE : SH.No. of
CAD	S.K	28.05.2024	
REVIEWED	S.T	28.05.2024	
APPROVED			



ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड

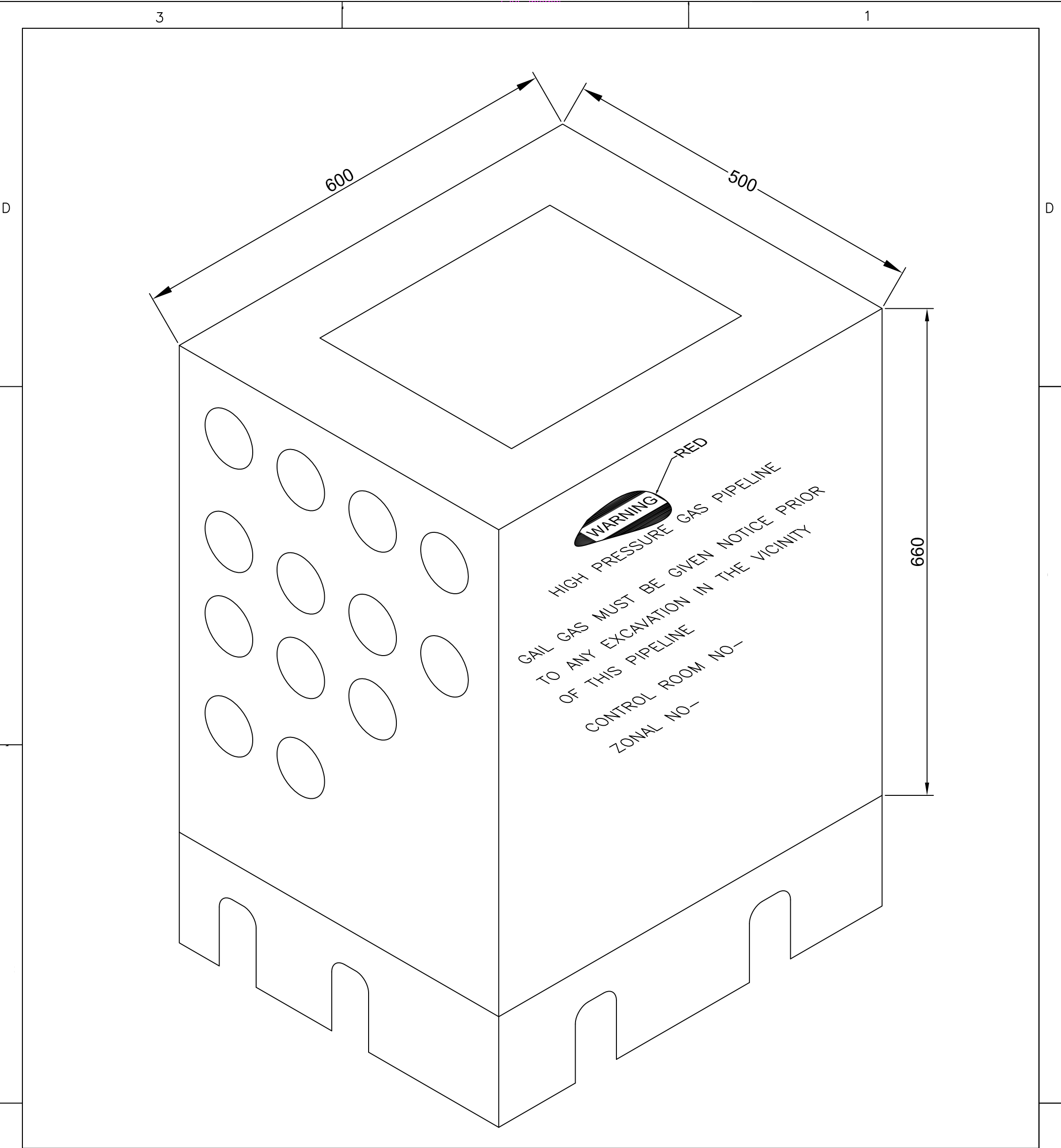
BRIDGE AND ROOF CO. (I) LTD

SCHEMATIC DIAGRAM FOR SINGLE
STREAM SERVICE REGULATOR

DRG. NO. - BR-CGD-STD-DWG-031

A

A



NOTE:ALL DIMENSION ARE IN mm.
THE HOUSING SHOULD BE OF FIBER REINFORCED PLASTIC (RFP)
40mm GROUTING WITH NON SHRKAGE COMPUND SHALL BE PROVIDED AT BOTTOM OF SERVICE REGULATOR

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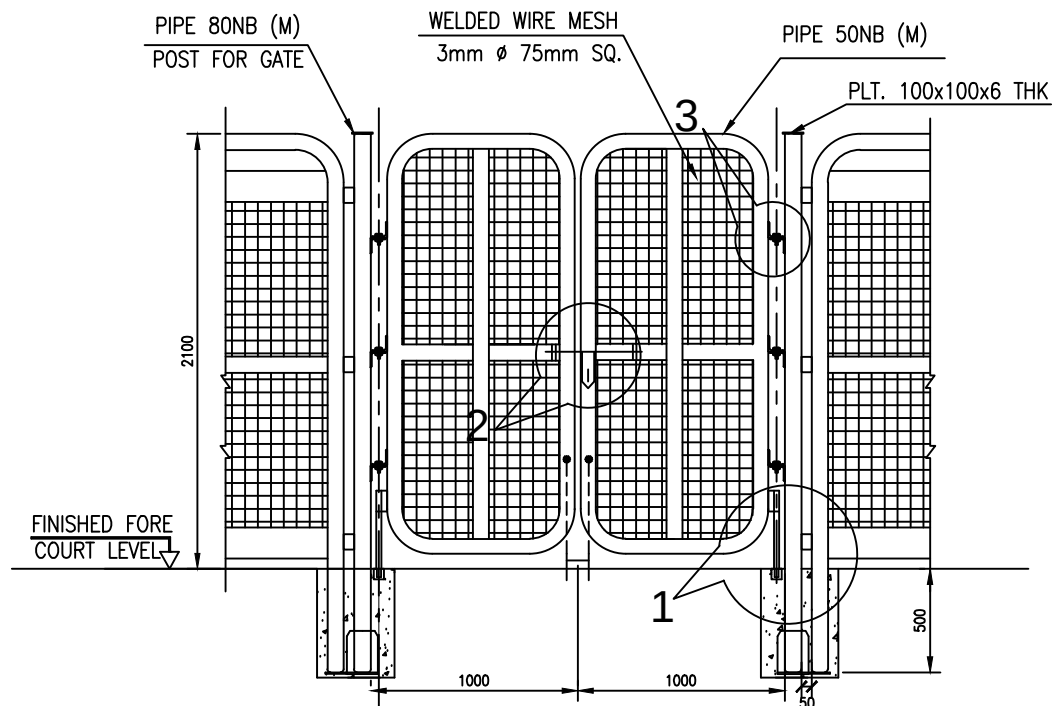
ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड

BRIDGE AND ROOF CO. (I) LTD

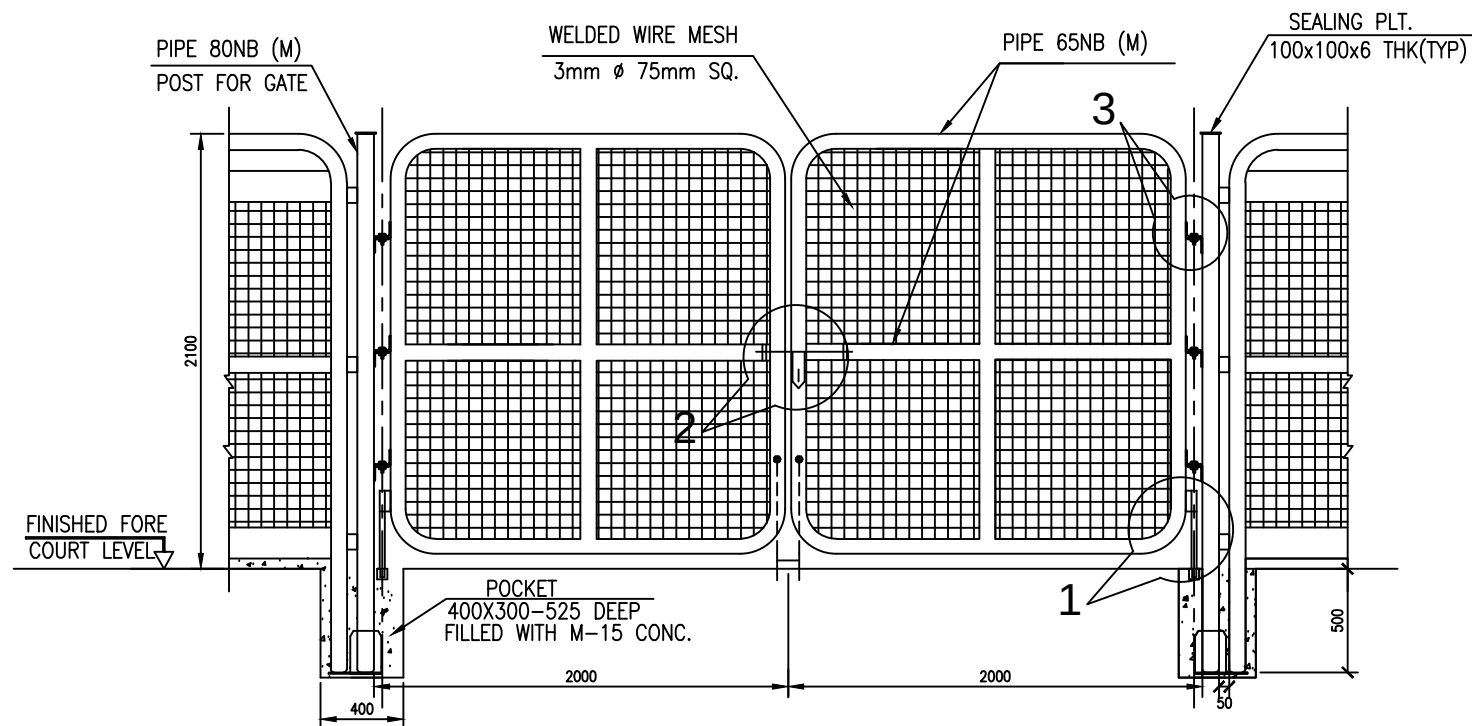
	NAME	SIGN. & DATE	SECTION :
DESIGNED	S.S.M	28.05.2024	SCALE : NTS
CAD	S.K	28.05.2024	
REVIEWED	S.T	28.05.2024	
APPROVED			SH.No. 1 of 1

DRG. NO. - BR-CGD-STD-DWG-032

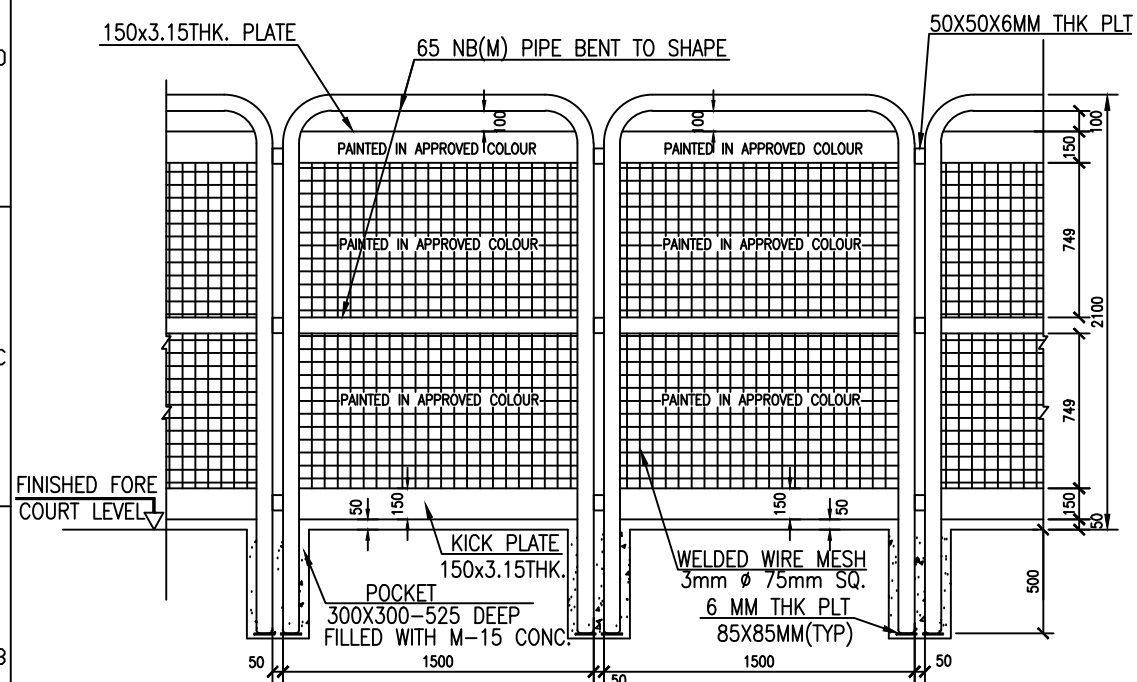
DRG. NO. BANDR/U999/05/12/S/062



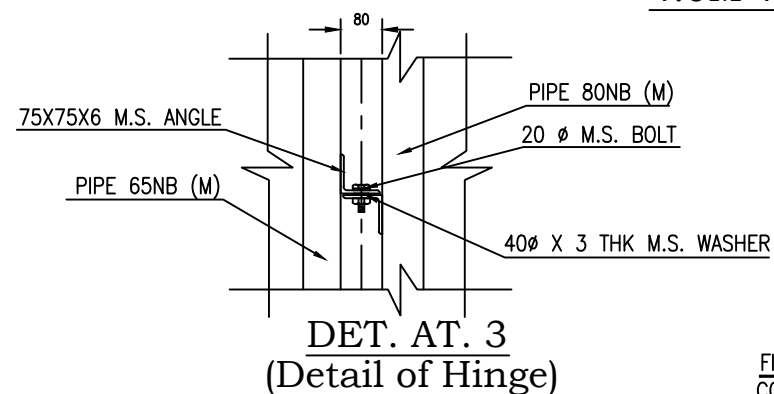
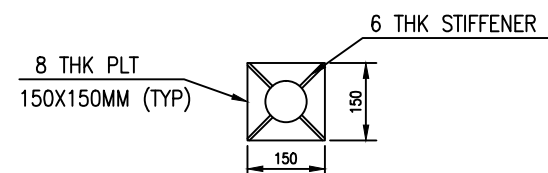
2.0M WIDE GATE DETAIL



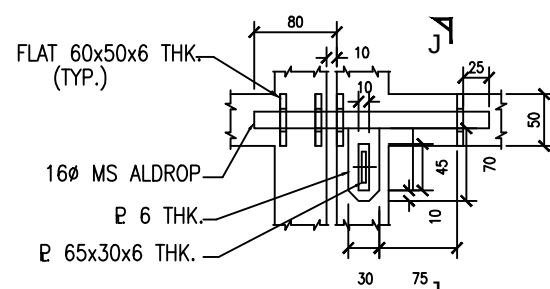
4.0M WIDE GATE DETAIL



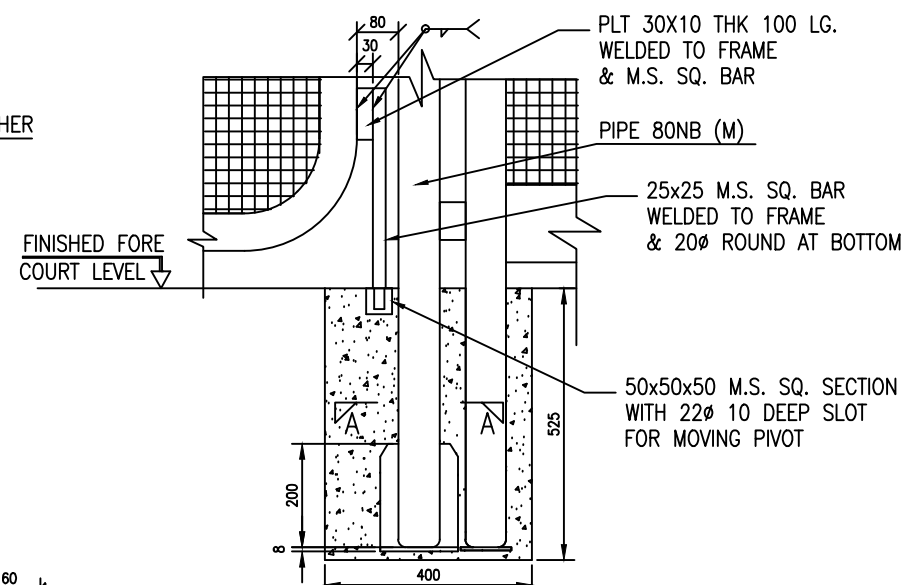
TYPICAL FENCING DETAIL

DET. AT. 3
(Detail of Hinge)

SECTION A-A



DETAIL-2



DETAIL 1

SECTION J-J

FOR TENDER PURPOSE ONLY

REV	NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
REVISIONS								
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SECTION STRUCTURAL				
	NAME	DATE	CHKD	DATE
DSGN	MKB		MH	
DRWN	SR			
APPROVED				

CNG DISTRIBUTION PROJECT

TYPICAL DETAIL OF
GATE & FENCING
(2100 MM HIGH)

ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड

BRIDGE AND ROOF CO. (I) LTD

SCALE:- NTS

DRG. NO. BANDR/U999/05/12/S/062

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CONCURRED BY

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZE SHOWN IN THE DRAWING ARE TENTATIVE SHALL BE DECIDED DRAWING DETAIL ENGINEERING.
3. G.I INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNERS REPRESENTATIVE AS PER SITE CONDITION.

REV. NO.	DATE	ZONE	DESCRIPTION	BY	VERIFIED

REVISION

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REFERENCES

DRG. NO.

APPROVED	DATE
	10.02.2025

ST	DATE
	10.02.2025

SCALE :N.T.S.

(SH. 1 OF 1)

REV

DRG. NO. BANDR/IC/23V1-W-GI SLEEVE

0



GAIL INDIA LIMITED



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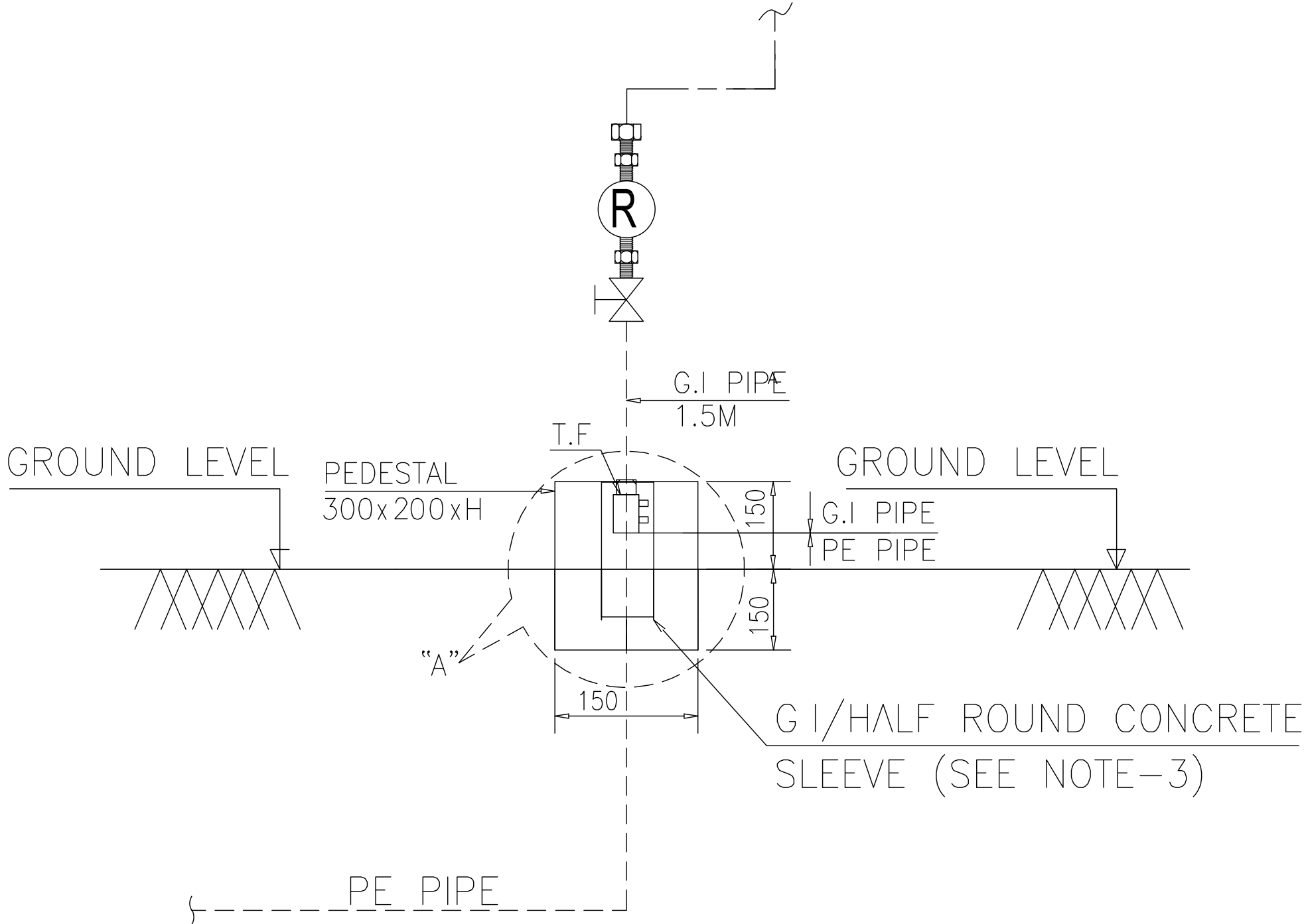
CITY GAS DISTRIBUTION NETWORK

GI PIPE SLEEVE

G.I SLEEVE
2.5" TO 3" DIA

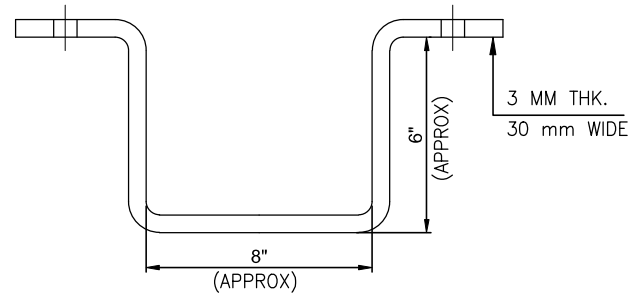
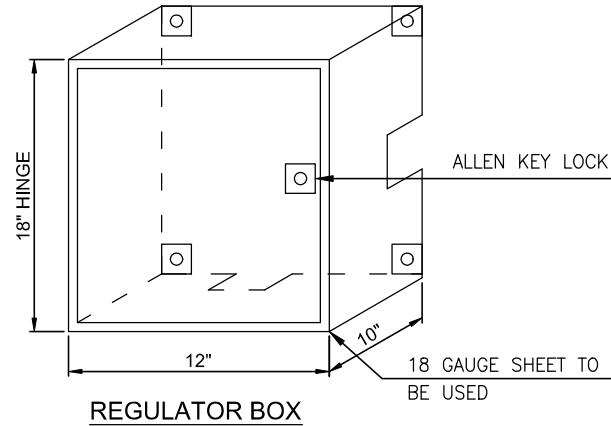
PEDESTAL

DETAIL - "A"

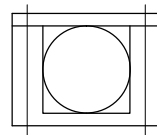


PEDESTAL

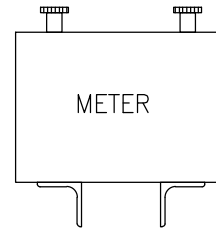
SKETCH OF REGULATOR BOX, BRACKETS & CLAMPS



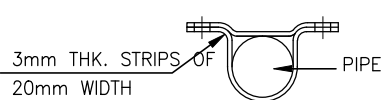
BRACKETS FOR METER (DOMESTIC)



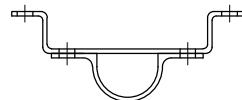
TYPE-1
PE/PVC CLAMPS FOR COPPER PIPE



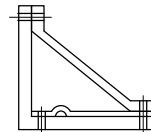
ANGLE BRACKETS 50x50mm
FOR NON DOMESTIC METERS



TYPE-1



TYPE-2



TYPE-3

MS CLAMPS FOR
3/4\"

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. CLAMPS, REGULATOR BOX AND METER BRACKET ARE TO BE MADE AS PER DIRECTION AND APPROVAL OF EIC.
3. CLAMPS/BOXES BRACKETS TO BE TIGHTLY SECURED TO THE WALL WITH PROPER ROWEL PLUGS, SCREWS ETC WOODEN BLOCKS TO BE USED IN CASE ROWEL PLUGS DO NOT HOLD PROPER THE AREA.
4. PAINTING WITH ONE COAT OF ZINC PRIMER AND THREE COATS OF SYNTHETIC ENAMEL PAINT OF REPUTED MAKE.
5. CLAMPS ON PIPES TO BE FIXED AT MAXIMUM DISTANCE OF 1.5 METERS AND AT BENDS.

REV.	DATE	DESCRIPTION	PREP.	CHKD.	APPD.
CLIENT:  GAIL(INDIA) LTD.					
PMC:  BRIDGE AND ROOF CO.(I) LTD.					
PROJECT: CITY GAS DISTRIBUTION PROJECT IN SIX GA's					
TITLE: SKETCH OF REGULATOR BOX, BRACKETS & CLAMPS					
SIZE	SCALE	DRAWING NUMBER	SHEET	REV.	
A3	NTS	BR-CGD-STD.-DWG-121	1 OF 1	A	



CHARGING PLAN/PROCEDURE

Project: City Gas Distribution Projects

Client: GAIL(I)

Consultant: .

Contractor:

Date of charging: -

S. No.	Description	Details			
1	N ₂ Purging Detail	Purging Date: -			
		Number of nitrogen cylinder consumed: -			
2	Length of PE P/L Pneumatically Tested and flushed as well as cleaned (m)	Date of Pneumatic testing: -			
		Type/size	ø125	ø63	ø32
		Revived PE line			
		New PE line			
		Total (meter)			
3	No of PE Isolation Valve Chamber (in Nos.): -				
4.	Check List: -				
a)	Isolation valve plugged	Yes / No /NA			
b)	Any Exposed Pipe	Yes / No			
c)	RCC/Plate/Pole Markers installation	Yes / No			
d)	Charging Tools available	Yes / No			
e)	As-built Drawing	Yes / No			
f)	Certificates confirming nitrogen available	Yes / No			
g)	Fire Extinguisher / Gas Detector	Yes / No			
h)	Sleeves / half round filled with sand	Yes / No/NA			
i)	Valve Chamber construction done	Yes / No/NA			
j)	Safety equipment /First Aid available	Yes / No			
k)	Emergency Nos.provided to the society	Yes / No / NA			

ACTIVITY/PROCEDURE FOR CHARGING

Sr. No.	Steps to be followed	Activity Description
1.	Integration of PE network to be charged	Ensure that 125mm primary/main line is integrated with 63mm secondary line and further integrated with 32mm/20mm service line. If step-1 is ensured then proceed to step-2.
2	Pneumatic testing	Final pneumatic testing at 6.2kg/cm ² of all PE network to be charged and the same pressure will be held up for at least 4-6 hrs. Ensure no leak is observed throughout the network to be charged. If step-2 is ensured then proceed to step-3.
3	Purging procedure	Purging will be done with the help of Nitrogen medium of 99.96% purity. Proper vent to be provided at specified safe location. If step-3 is ensured then proceed to step-4.
4	Gas charging	1. Ensure all the PE valve on the network to be charged is in closed position. 2. DRS outlet valve to be open and pressure point to be set at 2kg/cm². 3. Valve of 125 mm main line will be plugged in / open position. Now the pressure will be checked at the tail end of the main pipeline with the help of pressure gauge and reducing arrangement made at the tail end. 4. If all is ok then valve of 63mm secondary line will be plugged in/open position and ensured that there is no any pressure drop on the gauge of the main line. 5. If all is ok then valve of 32mm tertiary/service line will be plugged in/open position and ensured that there is no any pressure drop on the gauge of the main line and gauge of the tertiary line at different locations.

CHARGING PHILOSOPHY IN DETAIL**1. Intent**

It is intended to apply this guideline for the purpose of safe purging, commissioning and de-commissioning of City or Local Natural Gas Distribution Network, which has been constructed and tested confirming to specifications laid down in the PNGRB Technical Standards for CGD Networks (T4S).

2. Pre-Commissioning checks

Prior to commissioning, the entire pipeline system shall be checked with respect to the “as built drawings” and other design specifications.

The pre-commissioning checks should include, but not limited to, following, namely:-

(a) Tightness test The tightness test (pneumatic) should be completed at a pressure of at least 2 bar(g) with air after completion of all mechanical activities including pneumatic test, cleaning and flushing process. For low pressure network tightness test should be done at least at operating / working pressure. Once the pipeline is connected with live line for purging/ gas-in, it should be commissioned immediately and completed as a continuous process.

(b) Function test of field equipment and system The supports, route markers, valves, instruments, controls, interlocks etc. are adequately installed and physically checked along the pipeline. All the valves / equipments are checked for intended applications by simulating the operation condition before the gas is introduced to ensure that each valve is operating correctly.

The pipeline and allied systems, including safety systems shall be fully function-tested. The pressure and temperature gauges shall be calibrated prior to use before installation.

(c) Survey of the pipeline—A detailed survey (preferably through line walk) of the pipeline route shall be carried out to confirm that no leakage is observed along the pipeline alignment and at the associated equipment & installations and also to ensure that proper fittings / supports, route markers etc. have been installed along the network. Ensure all points other than purging & venting are in closed condition.

(d) Purging in the Pipeline—The entire primary network, which is ready and proposed for commissioning, shall be purged with air or Inert Gas at positive pressure of not less than 2 bar(g). Reading of Pressure Gauge installed at each Inlet point, Exit point and other specific points shall be noted in a specified format.

Displacement method to be adopted for purging activity. Purging stack, Flame-trap and purging adapter to be arranged at site.

(e) Checking of Communication System—Availability of proper communication system should be checked and confirmed to the Commissioning In-charge.

3. Safety Clearance- Before start of commissioning works, the Safety Officer of CGD entity shall carry out a Safety clearance, the relevant details of which shall be recorded on the Safety Checklist in accordance with the Technical & Safety Guidelines as per Technical standards.

They shall verify that:

- a) All Commissioning personnel have been made aware of the safety hazards of the operations to be undertaken.
- b) Procedures & Documents including those for possible emergencies shall be developed and followed.
- c) Communications are working satisfactorily.

4. Safety Measures- Adequate no. of Safety gadgets, personal protective equipments, emergency handling facilities, sign boards, do and don'ts etc as required in the commissioning document should be positioned and available at designated place before start of commissioning activities. A minimum of following shall be ensured at all purging sites.

- a) A minimum of 2 dry powder type extinguishers (5 kg) should be available on all purging /venting sites.
- b) Smoking, naked light or other sources of ignition should be prohibited. Warning signage/ pictograms like "NO SMOKING" and "NO NAKED LIGHTS" should be prominently displayed around the work site, including at vent points.
- c) Electrical continuity bonds (copper) need to be fitted across separated metallic pipes prior to purging operation.
- d) Adequate hearing protection should be available, where required.
- e) It should be emphasized that purged gas other than air is potentially dangerous leading to asphyxiation and information to prevent asphyxiation should be provided in procedure.

5. Responsibilities during the commissioning operations-

The CGD entity authorized for a GA shall have the overall responsibility for the implementation, record and control of all procedures, forms & formats contained in this Technical Document. The Commissioning In-charge along with the team of Supervisors/Technicians, involved in the Main Line (ML) network commissioning shall have the direct responsibility for following all the procedure(s) and generating all the records as per the formats prescribed in this Technical Document.

6. Commissioning Process-

As a part of procedure, the entity should ensure specific checklist prior to pipeline commissioning based on type of purging method adopted by them i.e. complete displacement as discussed herein. However, illustrative check lists are annexed to this guideline for reference.

- (a) Valves are checked for respective opening / closing positions.
- (b) Check Line Pressure.
- (c) Nitrogen flow rate shall be controlled by opening / closing the inlet purging valve.
- (d) Record the line pressure at every 30 minutes interval.
- (e) Ensure Positive Pressure (not less than 2 kg/cm²) for Nitrogen Purging in the entire Pipeline.
- (f) After ensuring the nitrogen purging, close purging valve.
- (g) Remove the Nitrogen Purging Connection and install a Blind / Plug and Close the Valve.
- (h) Gas-in to be started after confirmation of readiness at all valve stations with closed valves in closed position.
- (i) Gas Inlet valve to be opened for 50 angle (crack open) and simultaneously nitrogen shall be vented. With further valve opening, Pipeline shall be pressurized up to 4 kg/cm². Gas availability shall be ensured at this point by LEL / Methane detector and shall be communicated back to DRS station.
- (j) Subsequently, each section of Pipeline shall be pressurized so that entire ML network is free from Nitrogen and is pressurized with Natural Gas at a pressure of 2 kg/cm² up to end of the pipeline.
- (k) Hold the pressure of 4 kg/cm² for a minimum of 04 hour and check the entire ML network for No Leakage.
- (l) If any leakage is observed, it shall be recorded and arrested properly.

7. Commissioning Records- The commissioning records should as a minimum include, but not limited to, following, namely: -

- a) Pneumatic test report.
- b) Functional-testing of pipeline.
- c) Completed pre-start checklist.
- d) Purging report.
- e) Commissioning report.
- f) As-built Drawings.

Remarks If any:		
SIG:	SIG:	SIG:
NAME:	NAME:	NAME:
CONTRACTOR	CONSULTANT	M/s GAIL(I) PROJECT / (O & M)

 Contrcator's Logo			
COMMISSIONING REPORT (P.E. LINE) BR/WP/003			
Client	M/S GAIL(I)	Area Name:	
Consultant Name		Locality Name	
CONTRACTOR			

Details :

1	Length of the Pipe :		5	Date of commissioning :	
2	Size of Pipe:		6	Number of nitrogen cylinders consumed:	
3	Purging Medium:	Nitrogen	7	Line Pr. after gas charging:	
4	Date of Pneumatic testing :				

Check List:

1	Isolation valve plugged	Yes / No /NA	7	Fire Extinguisher / Gas Detector	Yes / No
2	Any Exposed Pipe	Yes / No	8	Sleeves / half round filled with sand	Yes / No/NA
3	RCC/Plate/Pole Markers installation	Yes / No	9	Valve Chamber construction done	Yes / No/NA
4	Charging Tools available	Yes / No	10	Safety equipment /First Aid available	Yes / No
5	As-built Drawing	Yes / No	11	Emergency Nos.provided to the society	Yes / No / NA
6	Certificates confirming nitrogen available	Yes / No			

Contractor**CONSULTANT****GAIL(I)**



BRIDGE AND ROOF CO. (INDIA) LTD.



Contractor's Logo

Fusion welding Checklist

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT

Dia. Of Pipe _____ Loop No. _____ Joint no. _____

Coupler Type _____

Project : CITY GAS DISTRIBUTION

Client : M/s GAIL(I)

Consultant :

Contractor :

Location :

Joining Details:

Sr. No.	Description	Requirement	Remarks
1	Fusion Machine	Bar coded electro-fusion machine (Automatically Readable)	
2	Whether Fusion Machine verification format available		
3	Coupler Type		
4	Whether material inspection report available		
5	Whether Pipeline is free from dust, water, mud etc.		
6	Whether Alignment Clamp available		
7	Whether approved pipe cutting tool available		
8	Availability of DG set		
9	Whether Jointer is having ID card signed by GAIL(I)/Consultant		
10	Whether Removal of oxidized surface (0.1 to 0.4 mm from outer surface of PE pipe)		
11	Whether Pipes Securely fasten		



BRIDGE AND ROOF CO. (INDIA) LTD.



Contractor's Logo

Fusion welding Checklist

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT

12	Whether Pipes Faces are parallel & aligned through proper alignment clamp		
13	Whether bar code reading done		
14	Fusion completed as per required time through automatic bar code reading		
15	Joint hold immobile under fusion force for 5 minutes		
16	Avoided of any activity near or on joint for 30 minutes		
17	GPS coordinates for joint/joint no. with location		

Contractor	Consultant
------------	------------

CGD PE REPORT

GAIL Internal



Vendor Name				LOA NO : ----- Dated : -----		Date																						
MachineNo/Name		Shot Length (M)		Site Location		LinkName: Report No.-----																						
No.ofDuct		DuctLength (M)																										
EntryPitGPS Cord.		Latitude/Longitude		ExitPitGPS		Latitude/Longitude																						
Rod	Pitch	Depth																								Rod	Pitch	Depth
1																										26		
2																										27		
3																										28		
4																										29		
5																										30		
6																										31		
7																										32		
8																										33		
9																										34		
10																										35		
11																										36		
12																										37		
13																										38		
14																										39		
15			Rod Length (M) =3 M SCALE : X axis = 1CM = 3M SCALE : Y axis = 1CM = 1M																							40		
16			OFFSETDRAWING																							41		
17																										42		
18																										43		
19																										44		
20																										45		
21																										46		
22																										47		
23																										48		
24																										49		
25																												
Signature		Contractor		Consultant		GAIL(I)																						
Date																												

Standard Work Procedure (SWP) PE Laying

Specification of PE Pipes

1	PE Pipes as per IS code- 14885
2	Grade: PE 100 SDR 11

3	PE Carrier Pipe Size (mm)	Thickness (mm)	Length m	HDPE Casing Pipes Min. Dia (mm)	HDPE Casing Pipes Max. Dia (mm)
	20	3	200	50	50
	32	3	150	50	90
	63	5.8	100	110	160
	125	11.4	50	200	250
	180	16.4	12	250	315

ROUTE SURVEY

1	PE Route for assigned area shall be finalized by Consultant/EIC and accordingly sketch will be prepared by contractor.
2	Sketch prepared by contractor to be approved by Consultant/ EIC and same shall be used for laying of PE network.
3	Sketch shall have following information/data:-
a.	Total route length
b.	Type of Method for laying like Open cut, HDD or Moling
c.	sizing detail
d.	Break-up of Katcha and Pakka Road

TRENCHING

DEPTH OF TRENCH

1	Minor water body crossing/Canal	2.5 meter
2	Uncased/Cased Road Crossing	1.5 meter
3	Rail/Road Cased Crossing	1.5 meter
4	Normal Areas	1.5 meter

Minimum depths may change depending on requirement of approving authority.

CLEARANCES

1	150 mm Where the gas pipe Crosses other assets/utilities
2	300 mm Where the gas pipe Crosses (or along) Electrical Cable
3	300 mm Where the gas pipe is laid along other assets /utilities

TF PROTECTION

1	GI sleeve IS 1239 (Heavy Duty) L 300 mm x Dia. 2.5 inch (3-inch dia. in case of commercial connections)
2	Making of Pedestal (PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) X Height (H)), (H>=300mm & will be as per site condition)))
3	Half round concrete sleeve (min size 250 x 250 x 150 mm)
4	Material M-20 1:2:4
5	T F Pits Will be must restored as per site condition.

PE WARNING MAT

- | | |
|---|---|
| 1 | Specification of Warning mat shall be as per Approved QAP. |
| 2 | Warning Mat is to be placed after pedding of about 300 mm on the top of carrier pipes. |

PE Laying

- | | |
|---|---|
| 1 | Before starting of PE laying written permission (From concerned Authorities) should be provided by Owner/EIC/Consultant to contractor |
| 2 | All the machinery & adequate manpower should be available at site (by contractor) before commencing of the job. Extent of mobilisation is to be finalised by EIC as per availability of work front. |
| 3 | Safety measure like Sign board, berricading ,PPE is to be taken up as specified in Technical Specification during PE laying. |
| 4 | After PE laying, jointing & before backfilling ,top cover of PE pipe is to witnessed by EIC/Consultant. |

Flushing

- | | |
|---|---|
| 1 | Flushing of PE network is to be done by Air from 4-6 kg/cm ² pressure. |
| 2 | Proper flushing is to be ensured before testing. |

Testing

- | | |
|----|---|
| 1 | PE network is to be tested by Air at 6.2 Kg/cm ² pressure. |
| 2 | Pressure is to be hold for the duration as given below:- |
| a. | PE Length <=500 M ,4 hours. |
| b. | PE Length >=500 M ,24 hours. |

Purging

- | | |
|---|---|
| 1 | Purging is to be done using Nitrogen at 2 kg/cm ² presure. |
| 2 | Pressure Holding is to be ensured by contractor till gas charging. |

Commssioning

- | | |
|----|--|
| 1 | Before Gas charging in PE network following points are to be complied: |
| a. | Completeness of valve chamber along with valves. |
| b. | installation of Pole, and RCC marker. |
| c. | As built drawing |
| d. | Also refer Annexure-1 |

VALVE SIZE

	Dia	Length	Valve Chamber Size
1	180 mm	650 mm	As per tender
2	125 mm	600 mm	
3	63 mm	450 mm	
4	32 mm	300 mm	

Note:-

- 1 This Procedure is to be read along with PNGRB and T4S Guidelines.**



BRIDGE AND ROOF CO. (INDIA) LTD.



Contractor's Logo

PNEUMATIC TESTING REPORT PE Line

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT

Project: City Gas Distribution at Dakshin Kannada

Client: M/s GAIL(I)

Consultant:

Contractor:

Location:

Details :-

1	Size of PE Pipe :	6	Holding Time:
2	Total Length of the pipe:	7	Pressure Gauge Make & No.:
3	Testing Medium: Compressed air (oil free):	8	Gauge calibration valid upto:
4	Testing Pressure:	9	Result:
5	Start Date:	10	Line Pr. after release :

Observation Chart:

S.No.	Time	Reading (Kg.f/cm ²)	S.No.	Time	Reading (Kg.f/cm ²)
1.			13.		
2.			14.		
3.			15.		
4.			16.		
5.			17.		
6.			18.		
7.			19.		
8.			20.		
9.			21.		
10.			22.		
11.			23.		
12.			24.		

Contractor's Logo



Ref. No.:

PNEUMATIC TESTING REPORT PE Line

Project: CITY GAS DISTRIBUTION PROJECT

Check List :-

Flushing

Pipe cleared from water & debris: - Yes/ No

Witnessed by :

1. GI Sleeves/ Half round concrete sleeve properly installed : - Yes/ No
2. Isolation Valve plugged: - Yes/ No
3. Regulator piece properly clamped: - Yes/ No
4. Sand filling in GI/ Half round concrete sleeve and non exposure of PE pipe/ Transition fitting – Yes/ No
5. Isolation Valve in open condition with open end plugged- Yes/ No

Contractor**Consultant**



STANDARD WORK PROCEDURE FOR PE LAYING AND GI WORKS

Project: City Gas Distribution Projects

Client: M/s GAIL(I)

Consultant:

Contractor:

Date: -

Standard Work Procedure (SWP) For PE Laying

Specification of PE Pipes

1	PE Pipes as per IS code- 14885
2	Grade: PE 100 SDR 11

3	PE Carrier Pipe Size (mm)	Thickness (mm)	Length m	HDPE Casing Pipes Min. Dia (mm)	HDPE Casing Pipes Max. Dia (mm)
	20	3	200	50	50
	32	3	150	50	90
	63	5.8	100	110	160
	125	11.4	50	200	250
	180	16.4	12	250	315

ROUTE SURVEY

1	PE Route for assigned area shall be finalized by Consultant/EIC and accordingly sketch will be prepared by contractor.
2	Sketch prepared by contractor to be approved by Consultant/ EIC and same shall be used for laying of PE network.
3	Sketch shall have following information/data:-
a.	Total route length
b.	Type of Method for PE laying like Open cut, HDD or Moling.
c.	Sizing detail
d.	Break-up of Katcha and Pakka Road

TRENCHING

DEPTH OF TRENCH

1	Minor water body crossing/Canal	2.5 meter
2	Uncased/Cased Road Crossing	1.5 meter
3	Rail/Road Cased Crossing	1.5 meter
4	Normal Areas	1.5 meter



STANDARD WORK PROCEDURE FOR PE LAYING AND GI WORKS

Minimum depths may change depending on requirement of approving authority.

CLEARANCES

1	150 mm Where the gas pipe Crosses other assets/utilities
2	300 mm Where the gas pipe Crosses (or along) Electrical Cable
3	300 mm Where the gas pipe is laid along other assets /utilities

TF PROTECTION

1	GI sleeve IS 1239 (Heavy Duty) L 300 mm x Dia. 2.5 inch (3-inch dia. in case of commercial connections)
2	Making of Pedestal (PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) X Height (H)), (H>=300mm & will be as per site condition)))
3	Half round concrete sleeve (As per tender)
4	Material M-20 1:2:4
5	T F Pits Will be must restored as per site condition.

PE WARNING MAT

1	Specification of Warning mat shall be as per Approved QAP.
2	Warning Mat is to be placed after padding of about 300 mm on the top of carrier pipes.

PE Laying

1	Before starting of PE laying written permission (From concerned Authorities) should be provided by Owner/EIC/Consultant to contractor
2	All the machinery & adequate manpower should be available at site (by contractor) before commencing of the job. Extent of mobilization is to be finalized by EIC as per availability of work front.
3	Safety measure like Sign board, barricading, PE is to be taken up as specified in Technical Specification during PE laying.
4	After PE laying, jointing & before backfilling, top cover of PE pipe is to be witnessed by EIC/Consultant.

Flushing

1	Flushing of PE network is to be done by Air from 4-6 kg/cm ² pressure.
2	Proper flushing is to be ensured before testing.

Testing

1	PE network is to be tested by Air at 6.2 Kg/cm ² pressure.
2	Pressure is to be hold for the duration as given below: -
a.	PE Length <=500 M, 4 hours.
b.	PE Length >=500 M, 24 hours.

Purging

1	Purging is to be done using Nitrogen at 2 kg/cm ² pressure.
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BRIDGE AND ROOF CO. (INDIA) LTD.

STANDARD WORK PROCEDURE FOR PE LAYING AND GI WORKS

- 2 Pressure Holding is to be ensured by contractor till gas charging.

Commissioning

- 1 Before Gas charging in PE network following points are to be complied:
- Completeness of valve chamber along with valves.
 - Installation of Pole, and RCC marker.
 - As built drawing
 - Also refer Annexure-1

VALVE SIZE

	Dia	Length	Valve Chamber Size
1	180 mm	650 mm	1000 (L)X1000 (W)
2	125 mm	600 mm	1000 (L)X1000 (W)
3	90 mm	500 mm	1000 (L)X1000 (W)
4	63 mm	450 mm	600 (L)X600 (W)
5	32 mm	300 mm	600 (L)X600 (W)

Note:-

- This Procedure is to be read along with PNGRB and T4S Guidelines.



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Contractor's Logo

VALVE CHAMBER CONSTRUCTION CHECKLIST /POUR CARD

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT, _____

Report no: _____

Project	:	CITY GAS DISTRIBUTION, _____
Client :	:	M/s GAIL(I)
Consultant	:	
Contractor	:	-----
Location	:	-----
Dia of Pipe	:	-----
Type of Valve chamber	:	-----
Date:-	:	

Valve Chamber Details

Sr. No.	Description	Requirement	Witnessed by
1.	Excavation of Pit	As per Drawing/tender requirement	
2.	Inspection of contractor supplied materials	Sand, Corse Sand, Cement, Steel Bar, Concrete	
3.	Concrete Grade		
a)	Aggregate Size	20 MM & Down	
b)	Sand	Coarse sand of approved quality	
c)	Cement	Reputed manufacturer	
4.	Reinforcement Rods	As per Drawing/tender requirement	
5.	Manhole cover	As per tender drawing	
6.	Laying of PCC for foundation (Casting of 100 mm thick PCC for foundation, M10 Grade)	As per Drawing/tender requirement	
7.	Curing of base PCC	At proper interval	
8.	Inspection of Shuttering, Spacing and Dimension of walls	As per Drawing/tender requirement	
9.	Laying of RCC on top of PCC (Casting of 150mm thick RCC on top of PCC (M-25))	As per Drawing/tender requirement	



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VALVE CHAMBER CONSTRUCTION CHECKLIST /POUR CARD

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT, _____

10.	Concrete casting of pedestal to support of Valve	As per Drawing/tender requirement	
11.	Fabrication of reinforcement along with angle insert as per drawing for wall	As per Drawing/tender requirement	
12.	Spacing of reinforcement between shuttering	Proper in between and as per Drawing/tender requirement	
13.	Casting of 150mm thick RCC for walls (M-25)	RCC M-25	
14.	Curing of casting (walls) along with base PCC/RCC	At proper interval	
15.	Fabrication of reinforcement as per drawing for top cover	Not Require	
16.	Centering, Shuttering, Spacing and Dimension of top Cover	Not Require	
17.	Casting of top RCC	As per Drawing/tender requirement	
18.	Curing of top cover RCC	As per standard	
19.	Plastering of wall with Cement Mortar with water Proofing (16 mm thk)	As per Drawing/tender requirement	
20.	Coping and sealing of entry and exit of pipe in the chamber	As per drawing	
21.	Sand filling	Coarse sand of approved quality	
22.	Supply and placement of Manhole cover	Heavy duty (with lifting hook) and proper placement	

Contractor	Consultant
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SPECIFICATION FOR PIPING FABRICATION AND ERECTION

SPECIFICATION NO.: BR/WP/005



**BRIDGE AND ROOF COMPANY
(INDIA) LIMITED**

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	PIPING FABRICATION AND ERECTION	DOCUMENT NO. BR/WP/005	Page 1 of 1
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C O N T E N T S

<u>SL.NO.</u>	<u>DESCRIPTION</u>
1.0	GENERAL
2.0	SCOPE
3.0	BASIS FOR WORK
4.0	FABRICATION
5.0	ERECTION
6.0	WELDING
7.0	ERECTION
8.0	INSPECTION
9.0	PROTECTIVE COATING
10.0	FLUSHING
11.0	HYDROSTATIC TESTING

ANNEXURE-1 - WELDING SPECIFICATION

EXHIBIT-A -	ELECTRODE QUALIFICATIONS TEST RECORD
EXHIBIT-B -	STRESS RELIEF HEAT TREATMENT PROCEDURE SPECIFICATION
EXHIBIT-C -	STANDARD PROCEDURE SPECIFICATION NO.
EXHIBIT-D -	COUPON TEST RECORD
EXHIBIT-E -	WELDER's IDENTIFICATION CARD
EXHIBIT-F -	RADIOGRAPHIC PROCEDURE FOR PIPE WELDING
EXHIBIT-G -	WELDING SPECIFICATION CHART

ANNEXURE-2 - DESTRUCTIVE TESTING OF WELDED JOINT - BUTT WELDS

ANNEXURE-3 - ULTRASONIC INSPECTION

ANNEXURE-4 - RADIOGRAPHY

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
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1.0 GENERAL

This specification covers general requirements of fabrication and erection of aboveground and trench piping systems at site. The specification covers the scope of work of contractor, basis of work to be carried out by contractor and standards, specifications and normal practice to be followed during fabrication and erection by the contractor.

2.0 SCOPE

Generally the scope of work of contractor shall include the following :

- 2.1 Transportation of required piping materials, pipe support and all other necessary piping materials from Owner's storage point or contractor's storage point (in case of contractor's scope of supply) to work site / shop including raising store requisitions for issue of materials in the prescribed format & maintaining an account of the materials received from Owner's stores.
 - 2.1.1 Piping materials include the following but not limited to the same.
 - a. Pipes (All sizes and schedule)
 - b. Flanges (All sizes, types & Pressure ratings).
 - c. Fittings (All sizes, types and schedule)
 - d. Valves (All sizes, types and Ratings)
 - e. Gaskets (All sizes, types & Ratings)
 - f. Bolts, Nuts or M/C Bolts (All types)
 - g. Expansion Joint / Bellows (All types)
 - h. Specialty items like online filters, ejectors, sample coolers, steam traps, strainers, air traps etc.
 - i. Online instruments like control valve, orifice flange, rotameter, safety valves etc.
- 2.2 Shop & field fabrication and erection of piping in accordance with documents listed under Cl. 3.0 i.e. 'BASIS OF WORK' including erection of all piping materials enumerated above.
- 2.3 Fabrication and erection of pipe supports like shoe, saddle, guide, stops, anchors, clips, cradles, hangers, turn buckles, supporting fixtures, bracket cantilevers, struts, teeposts including erection of spring supports and sway braces.
- 2.4 Fabrication
 - 2.4.1 Fabrication of piping specials like special radius bends, reducers, mitres etc.

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- 2.4.2 Fabrication of plain and threaded nipples from pipes as required during erection.
- 2.4.3 Fabrication of swage nipples as and when required.
- 2.4.4 Fabrication of odd angle elbow like 60°, 30° or any other angle from 90/45° elbows as and when required.
- 2.4.5 Fabrication of flange, reducing flange, blind flange, spectacle blinds as and when required.
- 2.4.6 Fabrication of stub-in connection with or without reinforcement.
- 2.4.7 Grinding of edges of pipes, fittings, flanges etc. to match mating edges of uneven / different thickness wherever required.
- 2.5 Modifications like providing additional cleats, extension of stem of valve, locking arrangement of valves etc. as and when required.
- 2.6 Preparation of Isometrics, bill of materials, supporting details of all NON-IBR lines upto 2-1/2" within the unit battery limit and get subsequent approval from Engineer-in-Charge as and when called for.
- 2.7 Obtaining approval for drawings prepared by contractor from statutory authority, if required.
- 2.8 Spun concrete lining of the inside of pipes 3" NB & above including fittings and flanges as required in accordance with specification.
- 2.9 Rubber lining inside pipes, fittings, flanges as and when required, in accordance with specification.
- 2.10 Radiography, stress relieving, dye penetration, magnetic particle test etc. as required in specification.
- 2.11 Performing PMI using alloy analysers as per 'Standard Specification for Positive Material Identification at Construction Sites, 6-82-0002'.
- 2.12 Casting of concrete pedestals and fabrication & erection of small structures for pipe supports including supply of necessary materials.
- 2.13 Providing insert plates from concrete structures and repair of platform gratings around pipe openings.
- 2.14 Making material reconciliation statement and return of Owner's supply left over materials to Owner's storage.
- 2.15 Flushing and testing of all piping systems as per standard specification for inspection, flushing and testing of piping systems (Specification No. BR/WP/006).

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3.0 BASIS FOR WORK

3.1 The complete piping work shall be carried out in accordance with the following

3.1.1 "Approved for Construction" drawings and sketches issued by PMC to the Contractor - Plans and/or Isometrics.

3.1.2 "Approved for Construction" drawings and sketches issued by Turn-key bidders to the Contractor - Plans and/or Isometrics.

3.1.3 Approved Process licensor's standards and specifications.

3.1.4 Drawings, sketches and documents prepared by contractor duly approved by Engineer-in-Charge (such as isometrics and offsite piping etc.)

3.1.5 Approved construction job procedures prepared by Contractor as stipulated in 2.16

3.1.6 B AND R specifications/documents as below :

- a. Process and Instrument Diagram.
- b. Piping Materials Specification
- c. Piping support standards.
- d. Line list / Number
- e. Piping support index.
- f. Standard specification of NDT Requirement of Piping
- g. Welding specification charts for piping classes.
- h. Standard specification for Pressure Testing of Erected Piping System.
- i. Welding specification for fabrication of piping
- j. Any other B AND R or OTHER specifications attached with Piping Material Specification or special condition of contract.
- k. Procedure for storage, preservation and positive identification of materials Contractors works / stores.

3.1.7 Following codes, standards and regulations

- a. ASME B 31.3 : Process Piping
- b. ASME Sec. VIII : Code for unfired pressure vessel.
- c. IBR Regulations

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- d. IS:823 : Code for procedure for Manual Metal Arc Welding of Mild Steel (for structural steel).
- e. NACE Std. : Code for Sour Services material requirements MR.

Note : All codes referred shall be latest edition.

3.2 Deviations

Where a deviation from the "Basis of Work" and approved job procedure described above is required or where the basis of work does not cover a particular situation, the matter shall be brought to the notice of Engineer - in - Charge and the work carried out only after obtaining written approval from him in each case.

4.0 FABRICATION

4.1 Piping Material

Pipe, pipe fittings, flanges, valves, gaskets, studs bolts etc. used in a given piping system shall be strictly as per the "Piping Material Specification" for the "Pipe Class" specified for that system. To ensure the above requirement, all piping material supplied by the Owner / Contractor shall have proper identification marks as per relevant standards / B AND R's specifications / Licensors specification. Contractor shall provide identification marks on left over pipe lengths wherever marked up pipe lengths have been fabricated / erected. Material traceability is to be maintained for AS., S.S., NACE, LTCS, material for Hydrogen service and other exotic materials by way of transferring heat number, etc. (hard punching) as per approved procedure. This shall be in addition to colour coding for all piping materials to avoid mix-up.

4.2 Fabrication

- 4.2.1 All fabrication shall be carried out in accordance with piping general arrangement drawings, (prepared by CONTRACTOR and approved by COMPANY) including this specification and codes as specified in section 2.0.
- 4.2.2 CONTRACTOR shall be responsible for working to the exact dimensions as per the approved drawings. Dimensional tolerances to be adopted during implementation of fabrication work shall be as per attached sketch "TOLERANCES FOR FABRICATION".
- 4.2.3 Flange bolt holes shall generally straddle the established centre lines unless other orientation is required and as called out in approved drawings.
- 4.2.4 Threading shall be NPT to ANSI B 1.20.1. Threading shall preferably be done after bending, forging or heat treatment operation. However if it is not possible, precaution shall be taken to protect threading against deformation. Thread shall be clean cut with no burrs or stripping. Dies shall be new, sharp and properly designed for piping material. Ends shall be reamed to remove burrs.

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- 4.2.5 All threaded joints shall be aligned properly. The pipe entering unions shall be true to centrelines so as to avoid forcing of union coupling during make up. Damaged threads shall be cut from the end of run and the pipe shall be rethreaded.
- 4.2.6 Immediately before testing the piping, all threads of pipe and fittings shall be thoroughly cleared of cuttings, fuel oil or other foreign matter. The male threads shall be sealed with thread sealant and the piping made up sufficiently for the thread to seize. Sealant shall be teflon tape.
- 4.2.7 Seal welding of threaded connections when specified shall include the first block valve, cover all threads. The joint shall be cleaned of all cutting oil and other foreign material and made up dry to full thread engagement. Instrument threaded connections which are frequently subjected to testing and maintenance shall not be seal welded.
- 4.2.8 All threaded connections shall be protected from rusting by applying greases or oil when in operating condition.
- 4.2.9 When socket weld fittings or valves are used, pipe shall be spaced approximately 1/16" to avoid bottoming which could result in excessive weld stress.
- 4.2.10 Where the ends of the piping components being welded have an internal surface misalignment exceeding 1.6mm, the wall of the component extending internally shall be trimmed by machining so that the adjoining internal surface will approximately flush.

For the purpose of common understanding the construction job procedure, to be submitted by the contractor, shall include proposal for

- Maximizing prefabrication, inspection and testing at fabrication shop with minimum field joints.
- Positive material identification, handling, storage & preservation.

4.3 Dimensional Tolerances

Dimensional tolerances for piping fabrication shall be as per B AND R Standard Specification. The Contractor shall be responsible for working to the dimensions shown on the drawings. However, the Contractor shall bear in mind that there may be variations between the dimensions shown in the drawing and those actually existing at site due to minor variations in the location of equipments, inserts, structures etc. To take care of these variations "Field Welds" shall be provided during piping fabrication. An extra pipe length of 100 mm over and above the dimensions indicated in the drawing may be left on one side of the pipe at each of the field welds. During erection, the pipe end with extra length at each field weld, shall be cut to obtain the actual dimension occurring at site. Isometrics, if supplied may have the field welds marked on them. However, it is the responsibility of the Contractor to provide adequate number of field welds. In any case no extra claims will be entertained from the Contractor on this account. Wherever errors / omissions occur in drawings and Bills of Materials it shall be the Contractor's responsibility to notify the Engineer-in-Charge prior to fabrication or erection.

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4.4 IBR Piping

- 4.4.1 Contractor shall be supplied generally with all drawings for steam piping falling under the purview of Indian Boiler Regulations duly approved by Boiler Inspectorate. The Contractor shall carry out the fabrications, erection and testing of this piping as per requirements of Indian Boiler Regulations and to the entire satisfaction of the local Boiler Inspector. The Contractor shall also get the approval of IBR inspector for all fabrication and testing done by him at his own cost. All certificates of approval shall be in proper IBR forms. .
- 4.4.2 Approval of boiler inspector on the drawings prepared by the contractor shall be obtained by the contractor at his own cost.

4.5 Pipe Joints

The piping class of each line specifies the type of pipe joints to be adopted. In general, joining of lines 2" and above in process and utility piping shall be accomplished by butt welds. Joining of lines 1-1/2" and below shall be by socket welding / butt welding / threaded joints as specified in "Piping Material Specifications". However, in piping 1-1/2" and below where socket welding/ threaded joints are specified butt - welds may be used with the approval of Engineer-in-Charge for pipe to pipe joining in long runs of piping. This is only applicable for non-galvanized piping without lining.

Flange joints shall be used at connections to Vessels, Equipment's, Valves and where required for ease of erection and maintenance as indicated in drawings.

4.6 Butt Welded and Soet Welded Piping

End preparation, alignment and fit-up of pipe pieces to be welded, welding, pre-heat, post-heating and heat treatment shall be as described in the welding specification and NDT specification.

4.7 Srewed Piping

In general, Galvanized piping shall have threads as per IS:554 or ANSI B 2.1 NPT as required to match threads on fittings, valves etc. All other piping shall have threads as per ANSI B 2.1, tapered unless specified otherwise.

Threads shall be clean cut, without any burrs or stripping and the ends shall be reamed. Threading of pipes shall be done preferably after bending, forging or heat treating operations. If this is not possible, threads shall be gauge checked and chased after welding heat treatment etc.

During assembly of threaded joints, all threads of pipes and fittings shall be thoroughly cleaned of cuttings, dirt, oil or any other foreign matter. The male threads shall be coated with thread sealant and the joint tightened sufficiently for the threads to seize and give a leakproof joint.

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Threaded joints to be seal-welded shall be cleaned of all foreign matter, including sealant and made up to full thread engagement before seal welding.

4.8 Flange Connetions

All flange facings shall be true and perpendicular to the axis of pipe to which they are attached. Flanged bolt holes shall straddle the normal centerlines unless different orientation is shown in the drawing.

Wherever a spectacle blind is to be provided, drilling and tapping for the jack screws in the flange, shall be done before welding it to the pipe.

4.9 Branch Connetions

Branch connections shall be as indicated in the piping material specifications. For end preparation, alignment, spacing, fit-up and welding of branch connections refer welding specifications. Templates shall be used wherever required to ensure accurate cutting and proper fit-up.

For all branch connections accomplished either by pipe to pipe connections or by using forged tees the rates quoted for piping shall be inclusive of this work.

Reinforcement pads shall be provided wherever indicated in drawings/ specifications etc.

4.10 Bending

Bending shall be as per ASME B31.3 except that corrugated or creased bends shall not be used.

Cold bends for lines 1-1/2" and below, with a bend radius of 5 times the nominal diameter shall be used as required in place of elbows wherever allowed by piping specifications. Bending of pipes 2" and above may be required in some cases like that for headers around heaters, reactors etc.

The completed bend shall have a smooth surface, free from cracks, buckles, wrinkles, bulges, flat spots and other serious defects. They shall be true to dimensions. The flattening of a bend, as measured by the difference between the maximum and minimum diameters at any cross-section, shall not exceed 8% and 3% of the nominal outside diameter, for internal and external pressure respectively.

4.11 Forging and forming

Forging and forming of small bore fittings, like reducing nipples for piping 1-1/2" and below, shall be as per ASME B 31.3.

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4.12 Mitre Bends and Fabricated Reducers

The specific application of welded mitre bends and fabrication reducers shall be governed by the Piping Material Specifications. Generally all 90 deg. mitres shall be 4-piece 3-weld type and 45 deg. mitres shall be 3-piece 2-weld type as per B AND R Standard unless otherwise specified. Reducers shall be fabricated as per directions of Engineer-in-Charge. The radiographic requirements shall be as per Material Specifications for process and utility systems and NDT Specification for steam piping under IBR, radiographic requirements of IBR shall be complied with.

4.13 Cutting and Trimming of Standard Fittings & Pipes

Components like pipes, elbows, couplings, half-couplings etc. shall be cut / trimmed / edge prepared wherever required to meet fabrication and erection requirements, as per drawings and instructions of Engineer-in-Charge. Nipples as required shall be prepared from straight length piping.

4.14 Galvanised Piping

Galvanised carbon steel piping shall be completely cold worked, so as not to damage galvanised surfaces. This piping involves only threaded joints and additional external threading on pipes may be required to be done as per requirement.

4.15 Jacketed Piping

The Jacketing shall be done in accordance with B AND R Specification or Licensors specification as suggested in material specification or special condition of contract.

Pre-assembly of jacketed elements to the maximum extent possible shall be accomplished at shop by Contractor. Position of jumpover and nozzles on the jacket pipes, fittings etc. shall be marked according to pipe disposition and those shall be prefabricated to avoid damaging of inner pipe and obstruction of jacket space. However, valves, flow glasses, in line instruments or even fittings shall be supplied as jacketed.

4.16 Shop Fabrication / Prefabrication

The purpose of shop fabrication or pre-fabrication is to minimise work during erection to the extent possible. Piping spool, after fabrication, shall be stacked with proper identification marks, so as facilitate their withdrawal at any time during erection. During this period all flange (gasket contact faces) and threads shall be adequately fabricated by coating with a removable rust preventive. Care shall also be taken to avoid any physical damage to flange faces and threads.

4.17 Miscellaneous

- 4.17.1 Contractor shall fabricate miscellaneous elements like flash pot, seal pot, sample cooler, supporting elements like turn buckles, extension of spindles and interlocking arrangement of valves, operating platforms as required by Engineer-in-Charge.

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4.17.2 Spun Concrete Lining

The work of inside spun concrete lining of pipes and specials of diameter 3" and above shall be done as per material specifications and special condition contract.

4.17.3 Fabrication of pipes from plate

Pipes shall be fabricated at site as and when required as per the specifications attached and the actual Piping Material Specification.

5.0 ERECTION

5.1 Cleaning of Piping before Erection

Before erection all pre-fabricated spool pieces, pipes, fittings etc. shall be cleaned inside and outside by suitable means. The cleaning process shall include removal of all foreign matter such as scale, sand, weld spatter chips etc. by wire brushes, cleaning tools etc. and blowing with compressed air/or flushing out with water. Special cleaning requirements for some services, if any shall be as specified in the piping material specification or isometric or line list. S.S jacketed piping requiring pickling shall be pickled to remove oxidation and discolouring due to welding.

5.2 Piping Routing

No deviations from the piping route indicated in drawings shall be permitted without the consent of Engineer- in-Charge.

Pipe to pipe, pipe to structure / equipments distances / clearances as shown in the drawings shall be strictly followed as these clearances may be required for the free expansion of piping / equipment. No deviations from these clearances shall be permissible without the approval of Engineer-in-Charge.

In case of fouling of a line with other piping, structure, equipment etc. the matter shall be brought to the notice of Engineer-in-Charge and corrective action shall be taken as per his instructions.

5.3 Cold Pull

Wherever cold pull is specified, the Contractor shall maintain the necessary gap, as indicated in the drawing. Confirmation in writing shall be obtained by the Contractor from the Engineer-in-Charge, certifying that the gap between the pipes is as indicated in the drawing, before drawing the cold pull. Stress relieving shall be performed before removing the gadgets for cold pulling.

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5.4 Slopes

Slopes specified for various lines in the drawings / P&ID shall be maintained by the Contractor. Corrective action shall be taken by the Contractor in consultation with Engineer-in-Charge wherever the Contractor is not able to maintain the specified slope.

5.5 Expansion Joints / Bellows

Installation of Expansion Joints/Bellows shall be as follows:

- All Expansion joints / Bellows shall be installed in accordance with the specification and installation drawings, supplied to the Contractor.
- Upon receipt, the Contractor shall remove the Expansion Joints/ Bellows from the case(s) and check for any damage occurred during transit.
- The Contractor shall bring to the notice of the Engineer-in-Charge any damage done to the bellows / corrugations, hinges, tie-rods, flanges / weld ends etc.
- Each Expansion Joint / Bellow shall be blown free of dust / foreign matter with compressed air or cleaned with a piece of cloth.
- For handling and installation of Expansion Joints, great care shall be taken while aligning. An Expansion Joints shall never be slinged from bellows corrugations / external shrouds, tie / rods, angles.
- An Expansion Joints / Bellow shall preferably be slinged from the end pipes / flanges or on the middle pipe.
- All Expansion Joints shall be delivered to the Contractor at "Installation length", maintained by means of shipping rods, angles welded to the flanges or weld ends or by wooden or metallic stops.
- Expansion Joints stop blocks shall be carefully removed after hydrostatic testing. Angles welded to the flanges or weld ends shall be trimmed by saw as per manufacturer's instructions and the flanges or weld ends shall be ground smooth.
- The pipe ends in which the Expansion Joint is to be installed shall be perfectly aligned or shall have specified lateral deflection as noted on the relevant drawings.
- The pipe ends / flanges shall be spaced at a distance specified in the drawings.
- The Expansion Joint shall be placed between the mating pipe ends / flanges and shall be tack welded/bolted. The mating pipes shall again be checked for correct alignment.
- Butt-welding shall be carried out at each end of the expansion joint. For flanged Expansion Joint, the mating flanges shall be bolted.

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- After the Expansion Joint is installed the Contractor shall ensure that the mating pipes and Expansion Joints are in correct alignment and that the pipes are well supported and guided.
- The Expansion Joint shall not have any lateral deflection. The Contractor shall maintain parallelism of restraining rings or bellows convolutions.
- Precautions
 - For carrying out welding, earthing lead shall not be attached with the Expansion Joint.
 - The Expansion bellow shall be protected from arc weld spot and welding spatter.
 - Hydrostatic Testing of the system having Expansion Joint shall be performed with shipping lugs in position. These lugs shall be removed after testing and certification is over.

5.6 Flange Connections

While fitting up mating flanges, care shall be exercised to properly align the pipes and to check the flanges for trueness, so that faces of the flanges can be pulled together, without inducing any stresses in the pipes and the equipment nozzles. Extra care shall be taken for flange connections to pumps, turbines, compressors, cold boxes, air coolers etc. The flange connections to these equipments shall be checked for misalignment, excessive gap etc. after the final alignment of the equipment is over. The joint shall be made up after obtaining approval of Engineer-in-Charge.

Temporary protective covers shall be retained on all flange connections of pumps, turbines, compressors and other similar equipments, until the piping is finally connected, so as to avoid any foreign material from entering these equipments.

The assembly of a flange joint shall be done in such a way that the gasket between these flange faces is uniformly compressed. To achieve this the bolts shall be tightened in a proper sequence. All bolts shall extend completely through their nuts but not more than 1/4".

Steel to C.I. flange joints shall be made up with extreme care, tightening the bolts uniformly after bringing flange flush with gaskets with accurate pattern and lateral alignment.

5.7 Vents and Drains

High point vents and low point drains shall be provided as per the instructions of Engineer-in-Charge, even if these are not shown in the drawings. The details of vents and drains shall be as per piping material specifications / job standards.

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5.8 Valves

Valves shall be installed with spindle / actuator orientation / position as shown in the layout drawings. In case of any difficulty in doing this or if the spindle orientation / position is not shown in the drawings, the Engineer-in-Charge shall be consulted and work done as per his instructions. Care shall be exercised to ensure that globe valves, check valves, and other uni-directional valves are installed with the "Flow direction arrow "on the valve body pointing in the correct direction. If the direction of the arrow is not marked on such valves, this shall be done in the presence of Engineer-in-Charge before installation.

Fabrication of stem extensions, locking arrangements and interlocking arrangements of valves (if called for), shall be carried out as per drawings / instructions of Engineer-in-Charge.

5.9 Instruments

Installation of in-line instruments such as restriction orifices, control valves, safety valves, relief valves, rotameters, orifice flange assembly, venturimeters, flowmeters etc. shall form a part of piping erection work.

Fabrication and erection of piping upto first block valve / nozzle / flange for installation of offline Instruments for measurement of level, pressure, temperature, flow etc. shall also form part of piping construction work. The limits of piping and instrumentation work will be shown in drawings / standards / specifications. Orientations / locations of take-offs for temperature, pressure, flow, level connections etc. shown in drawings shall be maintained.

Flushing and testing of piping systems which include instruments mentioned above and the precautions to be taken are covered in flushing, testing and inspection of piping. Care shall be exercised and adequate precautions taken to avoid damage and entry foreign matter into instruments during transportation, installation, testing etc.

5.10 Line Mounted Equipments / Items

Installation of line mounted items like filters, strainers, steam traps, air traps, desuperheaters, ejectors, samples coolers, mixers, flame arrestors, sight glasses etc. including their supporting arrangements shall form part of piping erection work.

5.11 Bolts and Nuts

The Contractor shall apply molycoat grease mixed with graphite powder (unless otherwise specified in piping classes) all bolts and nuts during storage, after erection and wherever flange connections are broken and made-up for any purpose whatsoever. The grease and graphite powder shall be supplied by the Contractor within the rates for piping work.

5.12 Pipe Supports

Pipe supports are designed and located to effectively sustain the weight and thermal effects of the piping system and to prevent its vibrations. Location and design pipe supports will be shown in drawing for lines 2" NB. However, any extra supports desired by Engineer-in-Charge

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shall also be installed.

No pipe shoe / cradle shall be offset unless specifically shown in the drawings.

Hanger rods shall be installed inclined in a direction opposite to the direction in which the pipe move during expansion.

Preset pins of all spring supports shall be removed only after hydrostatic testing and insulation is over. Springs shall be checked for the range of movement and adjusted if necessary to obtain the correct positioning in cold condition. These shall be subsequently adjusted to hot setting in operating condition. The following points shall be checked after installation, with the Engineer-in-Charge and necessary confirmation in writing obtained certifying that :

- All restraints have been installed correctly.
- Clearances have been maintained as per support drawings.
- Insulation does not restrict thermal expansion.
- All temporary tack welds provided during erection have been fully removed.
- All welded supports have been fully welded.

6.0 **WELDING**

Welding of pipelines shall be done as per applicable codes and **Annexure-1**

7.0 **ERECTION**

7.1 **Pre-fabrication and Field Assembly**

Extent of pre-fabrication shall be purely at the discretion of CONTRACTOR keeping in view the following :-

7.1.1 Field joint shall be decided by CONTRACTOR keeping in view the transportation of pre-fabricated pieces to site.

7.1.2 There can be some variations in the dimensions and level appearing in the arrangement drawings and those actually occurring at site due to minor variations in the location of equipments, structures, cut out etc. Adequate field joints shall be provided, permitting assembly and erection of pipe work without major modification.

7.2 **Supporting**

Location and design of pipe supports shown in approved drawings and support drawings shall be strictly followed.

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7.2.1 Supports shall be installed in such a way that they do not contribute to over stressing of a line.

7.2.2 Fabrication and erection of additional supporting elements and structural fixtures which in COMPANY's view are required for proper supporting of the system, shall be carried out by CONTRACTOR at no extra cost.

7.2.3 All temporary supports, elements required for alignment, erection and assembly shall be removed after completion of work.

7.3 **Equipment hook-up**

7.3.1 Prior to hook-up, the alignment and trueness of flange faces shall be checked to ensure that no undue stresses shall be induced in the system while hooking up.

8.0 **INSPECTION**

8.1

8.2 CONTRACTOR shall provide all facilities/ assistance to COMPANY for proper execution of their inspection without any extra charge.

8.3 All piping work shall be subjected to inspection by COMPANY at any time during fabrication. CONTRACTOR shall furnish to COMPANY detailed work programme sufficiently in advance, in order to enable COMPANY to arrange for inspection.

9.0 **PROTECTIVE COATING**

9.1 All above ground piping system shall be applied with protective coating in accordance with specification for shop & field painting.

9.2 All under ground portion of piping system shall be coated with three layer P.E. coating. CONTRACTOR shall prepared procedure for epoxy painting of buried pipeline for approval of COMPANY. Procedure shall include surface preparation, brand and type of coating to be adopted. Coating of pipes shall not commence without approval of coating procedure. Total dry film thickness to be achieved shall not be less than 300 microns. Compatible primer and finish coat as recommended by coating manufacturer shall only be applied. Coating integrity shall be checked by "Holiday detector" over full length of coated pipe work. Coating to be supplied by CONTRACTOR shall be suitable for design temperature.

9.3 Once the coating has been accepted by COMPANY, backfilling operation can be started. In order to protect coated pipe from damage, the excavated trench shall be examined for stone, rock and any other hard substance detrimental to coating. All such substances shall be removed before lowering the pipe in the trench. COMPANY may ask for a 100mm padding of clear sand under and above pipeline in rocky or otherwise hard soil area. No additional payment on account of padding shall however be admissible.

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10.0 **FLUSHING**

Completed piping systems shall be flushed by CONTRACTOR with fresh water, to clean the pipe of all dirt, debris, and foreign material. CONTRACTOR shall prepare a procedure for flushing of the system for approval of COMPANY. Flushing shall not be commenced without approval of flushing procedure.

10.1 CONTRACTOR shall perform all activities like dismantling and reinstalling of all strainers, in line instruments etc. before and after completion of flushing.

10.2 Flushing shall be considered as complete only after inspection and approval by COMPANY.

10.3 Disposal of muck and flushing media shall be arranged by CONTRACTOR as directed by COMPANY, in such a manner that it does not spoil the adjacent installation. CONTRACTOR shall obtain COMPANY approval regarding the place and method to be adopted for disposal of debris.

10.4 Record of flushing giving following details shall be submitted by CONTRACTOR to COMPANY for its approval and records :

- a) Date of flushing
- b) Identification of line : flushed-line number

11.0 **HYDROSTATIC TESTING**

11.1 Completed piping system as approved by COMPANY shall be hydrostatically tested in the presence of COMPANY. The general requirements of hydrostatic testing shall be in accordance with codes specified in section 2.0.

11.2 CONTRACTOR shall prepare hydrostatic test procedure based on specified codes. The hydrostatic test shall commence only after approval of procedure by COMPANY.

11.3 Piping system shall be hydrostatically tested to a pressure corresponding to 1.4 times the design pressure.

11.4 Fresh water shall be used as test media. CONTRACTOR shall locate the source of water supply and arrange for transportation of water to test site. CONTRACTOR shall arrange at his own cost the water analysis and confirm that water is suitable for testing. In case any corrosion inhibitor is to added, the same shall be done after approval of COMPANY.

11.5 Lines repaired subsequent to hydrostatic test shall be retested using the same procedure as originally adopted. However COMPANY may waive such retest in case of minor repairs by taking precautionary measures to ensure sound construction.

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11.6 All equipment and instruments used for hydrostatic test shall be approved by COMPANY before start of tests.

11.7 Pressure gauges shall be installed on line to measure test pressures. In case of longer lines two or more pressure gauges shall be installed as directed by COMPANY. One gauge shall be installed at the discharge of the pressurising pump. Pressure gauge used for hydrostatic testing shall be calibrated with dead weight tester in the presence of Engineer-in-charge. Range of pressure gauge shall generally be 1.5 times the test pressure.

11.8 Orifice plates and restriction orifices shall not be installed until hydrostatic testing is completed. Temporary gaskets shall be used during testing.

11.9 First block valve of pressure instruments shall be half open & plugged at the time of hydrostatic testing. Temperature connections shall be blanked off during testing.

11.10 All equipments, in line instruments, relief valves shall be disconnected from piping system by means of blinds during testing. Control valves shall be replaced by spool pieces during testing.

11.11 High point vents and low point drain required for testing in addition to those marked in the drawings shall be provided by CONTRACTOR at his own cost.

11.12 All welded and screwed joints shall be kept clean for detecting leaks during testing.

11.13 Test pressure shall be maintained long enough to facilitate complete inspection of the system. Minimum duration of test shall be 6 hours unless other wise specified. Pressurising equipment shall be isolated immediately after test pressure is attained.

11.14 After successful completion of hydrostatic testing, the piping system shall be dewatered. All lines shall be completely dried using compressed air. CONTRACTOR shall make his own arrangement for supply of compressed air. Drying of lines shall be considered complete on approval by COMPANY.

11.15 **Test Records**

The records in duplicate shall be prepared and submitted by CONTRACTOR as below :

- a) Date of test
- b) Identification of pipe tested - line number
- c) Test pressure
- d) Test results
- e) Signature of CONTRACTOR
- f) Approval signature by COMPANY.

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ANNEXURE-1**WELDING SPECIFICATION****1.0 GENERAL**

This specification shall be followed for the fabrication of all types of welded joints of carbon steel above ground natural gas service piping systems.

The welded pipe joints shall include the following :

- a) All line pipe joints of the longitudinal and circumferential butt welded.
- b) Attachments of castings, forgings, flanges.
- c) Welded manifold headers and other sub-assemblies
- d) Welded branch connections with or without reinforcing pads.
- e) Joints in welded/ fabrication piping components.
- f) The attachments of smaller connections for vents drain drips and other instrument tapplings.

Any approval granted by the Engineer-in-charge or owner's inspectors shall not relieve the contractor of his responsibilities & guarantees.

1.1 Applicable Codes & Standards

All welding work, equipments for welding, heat treatment, other auxiliary functions and the welding personnel shall be as per the requirements of the latest editions of the following approved standards and procedures :-

- i) Code for gas transmission and distribution piping systems. ANSI B31.8.
- ii) Code for petroleum refinery piping, ANSI B31.3.

In addition, the following codes/ specifications referred to in the relevant code of fabrication shall be followed for the welding/ brazing qualifications, consumable qualifications and non destructive test procedures.

- i) Standard for welding of pipelines and related facilities API-1104.
- ii) Material Specifications - Welding rods, electrodes and filler materials - ASME Sec. - IIC.
- iii) Code for non destructive examination ASME Sec-V.
- iv) Qualification standard for welding and brazing procedure and welders, brazers, welding and brazing operators - ASME Sec-I

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In the event of any difference due to the additional requirements mentioned in this specification, over and above those obligation as per codes, this specification shall be binding.

1.2 **Base Material**

- a) In general carbon steel is used in this plant. The details of material specifications are given in the welding Specification Chart.
- b) The contractor shall provide the Manufacturer's test certificates for every heat of the materials supplied by him.

1.3A **Filler Materials**

- a) The Contractor shall provide all the necessary welding electrodes, filler materials, etc. required for the execution of the work.
- b) The welding electrodes/ filler wires supplied by the Contractor shall conform to the class specified in the welding specification chart. The materials shall be of the make approved by the Engineer-in-charge.
- c) The electrode shall be suitable for the welding process recommended and base metal used. Unless otherwise specified physical properties of the welds produced by a electrode recommended for the welding of a particular base metal shall not be lower than the minimum values specified for the base metal and shall correspond to the physical properties of the class of electrode adopted. The choice of electrode shall be made after conducting the required tests on the electrodes as per relevant standards, and shall be the sole prerogative of the Engineer-in-charge.
- d) Tungsten electrodes used shall conform to ASME Sec. II C SFA 5.12 specification. Thoriated Tungsten electrodes shall not be permitted due to possible radiation hazard. Instead, ceriated Tungsten Electrodes (EWCe-2 or equivalent) shall be used for GTA Welding.
- e) Electrode qualification test records should be submitted as per the **Exhibit-A** (attached) in respect of the electrodes tested by the contractor, for obtaining the approval of the Engineer-in-charge.
- f) The Contractor shall submit batch test certificate from the electrode Manufacturers giving details of physical and chemical tests carried out by them, for each batch of electrodes to be used.
- g) All electrodes shall be purchased in sealed containers and stored properly to prevent deterioration. The electrodes removed from the containers shall be kept in holding ovens at temperature recommended by the electrode Manufacture. Out-of-the oven time of electrodes before they are consumed shall not exceed the limits recommended by the electrodes manufacturer. The electrodes shall be handled with care to avoid any damage to flux covering.

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- h) All low hydrogen type of electrodes shall be rebaked at 350°C for 1 hour minimum and stored in ovens kept at 80-100°C before use. Recommendations of the electrode Manufacturer shall be followed if available.
- i) The electrodes, filler wires and flux used shall be free from rust, oil, greases, earth and other foreign matter which can affect the quality of welding.

1.3B

SHIELDING & PURGING GAS

- a) Argon gas used in GTA welding for shielding purposes shall be 99.995% pure. The purity of the gas shall be certified by the manufacturer. The rate of flow for shielding purposes shall be established through procedure qualification tests. Normally this rate may be 12-20 CFH.
- b) Argon gas with a purity level of 99.995% shall be used for purging.
- c) When GTAW process alone or a combination of GTA Wand SMAW processes is recommended for the production of a particular joint, the purging shall be maintained during the root pass and for the first filling pass to minimize oxidation on the inner side of the pipe, unless otherwise specified in Welding Specification Chart.
- d) Initial purging shall be maintained for sufficient period of time so that at least 4-5 times the volume between the dams is displaced, in order to completely remove the entrapped air. In no case should the initial purging period be less than 10 minutes. High gas pressure should be avoided.
- e) After initial purging, the flow of the backing gas should be reduced to a point where only a slight positive pressure prevails. For systems, which have a small volume (up to 1/2 cubic foot) to be purged, a gas flow rate of 6-CFH is usually adequate. Systems of larger volume may require higher flow rates and these should be established during procedure qualification tests.
- f) Gas backing (purging) is not required for socket type of welded joints.
- g) Dams, used for conserving inert gas during purging, shall be removed after completion of the welding, and shall be accounted for. Wherever, removal of dams is not possible after welding, use of water-soluble dams should be made.

1.4

Welding Consumables

The Contractor shall provide at this own expense all the welding consumables necessary for the execution of the job such as electrodes filler wires, oxygen, acetylene, etc. and these should bear the approval of the COMPANY.

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1.5 **Equipment & Accessories**

1.5.1 The Contractor should have the arrangement of sufficient number of welding and cutting equipments, auxiliaries and accessories of sufficient capacities so as to meet the target schedule.

1.5.2 All the equipment for performing the heat treatment, including transformers, thermocouples, flow meters, automatic temperature recorders with suitable calibration arrangement etc. shall be provided by the Contractor, at his own expense and these should bear the approval of the COMPANY.

1.5.3 Contractor shall make necessary arrangements at his own expense for providing the radiographic equipment, radiographic films, and all the equipment/ materials required for carrying out the dye penetrant/ magnetic particle test for satisfactory and timely completion of the job.

1.5.4 Redoing of any work necessitated by faulty equipments or operation used by the Contractor, will be done at his own expense.

1.6 **Welding Processes**

1.6.1 Welding of various materials under this specification shall be carried out using Shielded Metal Arc Welding (SMAW) Process with the approval of the Engineer-in-charge.

1.6.2 The welding processes to be employed are given in the welding specification chart. Any deviation desired by the Contractor shall be obtained through the express consent of the Engineer-in-charge.

1.6.3 Automatic and semi-automatic welding processes shall be employed only with the express approval of the Engineer-in-charge. The welding procedure adopted and consumables used shall be specifically approved.

1.6.4 A combination of different welding processes or a could be employed for a particular joint only after duly qualifying the welding procedure as per the requirements of code of fabrication to be adopted and obtaining the approval of the Engineer-in-charge.

1.7 **End Preparation**

1.7.1 **End Preparation**

The edges to be welded shall be prepared to meet the joint design requirements by gas cutting, machining or grinding method. After gas cutting, oxides shall be removed by chipping or grinding.

1.7.2 **Cleaning**

a) The ends to be welded shall be properly cleaned to remove paint, oil, greases, rust, oxides, sand, earth and other foreign matter. The ends shall be

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completely dry before the welding commences.

- b) On completion of each run, craters, welding irregularities, slag etc., shall be removed by grinding and chiseling. Wire brushes used for cleaning stainless steel joints shall have stainless steel wires and the grinding wheels used for grinding stainless steel shall be of a suitable type. Separate grinding wheels and wire brushes should be used for carbon steels and stainless steels.

1.8 Alignment and Spacing

- a) Prior to alignment, the contractor shall inspect the pipe ends inside and outside for damage, dents, laminations etc. Pipe for welding shall be set up correctly spaced. Temporary attachment of any kind shall not be welded. Every effort shall be made to reduce misalignment by the use of clamp and rotation of pipes to the best fit. For pipes of same nominal wall thickness, the offset should not exceed 1.6mm. Any branch connections sleeve shall be at least 150mm from any other weld. The welds for fitting shall be so located that top of the weld shall not come within 50mm of any other weld. The use of internal line up clamps is mandatory for diameters 10" and above. However, in case where it is impossible to use internal line up clamp, external line up clamp may be used.
- b) Tack welds, for maintaining the alignment, of pipe joints shall be made only by qualified welders using approved WPS. Since the tack welds become part of the final weldment they shall be executed carefully and shall be free from defects. Defective tack welds must be removed prior to the actual welding of the joints.

1.9 Weather Conditions

- 1.9.1 The parts being welded and the welding personnel should be protected from rain and strong winds. In the absence of such a protection no welding shall be carried out.
- 1.9.2 During field welding using GTAW process, particular care shall be exercised to prevent any air current affecting the welding process.

1.10 Welding

1.10.1 Root Pass

- a) Root pass shall be made with electrodes/ filler wires recommended in the welding specification chart. The preferable size of the electrode is 2.5mm diameter (12 SWG) but in no case greater than 3.25mm (10 SWG).
- b) Uphill welding shall be adopted for welding pipes weld fixed with its axis horizontal. Downward technique of welding shall not be used for welding of pipes in horizontal position, unless specifically permitted by Engineer-in-charge for a particular case.

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- c) The root pass of butt joints should be executed properly so as to achieve full penetration with complete fusion of the root edges. Weld projection inside the pipe shall not exceed .4mm wherever not specified by the applicable code.
- d) Any deviations desired from the recommended welding technique and electrodes indicated in the welding specification chart should be adopted only after obtaining express approval of the Engineer-in-charge.
- e) Welding shall be continuous & uninterrupted during a pass.
- f) On completion of each run, craters, welding irregularities, slag etc., shall be removed by grinding and chiselling.
- g) While the welding is in progress care should be taken to avoid any kind of movement of components, to prevent occurrence of weld cracks.
- h) Fillet welds shall be made by shielded metal arc/ GTAW welding process irrespective of the thickness and class of piping.
- i) Peening shall not be used unless specified in the welding specification chart.

1.10.2

Joint Completion

- a) Joint shall be completed using the class of filler wires/ electrodes, recommended in the welding specification chart. Size of the electrode shall not exceed 4 mm in diameter for stainless steels and alloy steels used for low temperature applications.
- b) Two weld beads shall not be started at the same point in different layers.
- b) Butt joints shall be completed with a cover layer that would effect good cover at the joint edge and a gradual notch free surface.
- d) Each weld joints should have a workman like finish.
- e) Weld identification mark shall be stamped clearly at each joint, just adjacent to the weld. Metal stamping shall not be used on the thin wall pipe. Suitable paint shall be used on thin wall pipes for identification.
- f) No painting shall be done until the weld joint has been hydrostatically tested.

1.10.3

Dissimilar Welds

Where welds are to be produced between carbon steels and alloy steels, preheat and post weld heat treatment requirements shall be those specified for corresponding alloy steels and filler wire / electrodes shall correspond to ER 70 S-G or AWS E-7016/7018 type. For welds between two dissimilar Cr-Mo low alloy steels, preheat and post weld

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heat treatments shall be those specified for higher alloy steel and electrodes used shall correspond to those specified for steel of lower alloy content. For carbon steel or alloy steel to stainless welds, use of filler wire / electrodes E/ER-309/E-310/E NiCr Fe-3 shall be made. The welding procedure, electrodes / filler wires to be used shall be approved by the Engineer-in-Charge.

1.11 Heat Treatment

1.11.1 Preheating

- a) Preheating requirements for the various materials shall be as per the welding specification chart attached. No welding shall be carried out without preheating the joint to 10°C (50°F) when the ambient temperature is below 10 degree.
- b) Preheating shall be performed using resistance or induction heating methods. Preheating by gas burners, utilising any acetylene or oxy-propane gas mixtures, with neutral flame may also be carried out when permitted by the Engineer-in-charge.
- c) Preheating shall extend uniformly to atleast three times the thickness of the joint, but not less than 50mm, on both sides of the weld.
- d) Preheating temperature shall be maintained over the whole length of the joint during welding. Temperature indicating crayons or other temperature indicating devices shall be provided by the contractor to check the temperature.
- e) Preheating temperature shall be maintained over the whole length of the joint during welding. Temperature recorders shall be provided by the Contractor to record the temperature.

1.11.2 Post Heating

In case of alloy steel materials such as Cr-Mo steels, if the post weld heat treatment is not performed immediately after welding, the weld joint and adjacent portion of pipe, at least 50 mm on either side of weld, shall be uniformly heated to 300°C. This temperature shall be maintained for half an hour minimum, and then wrapped with mineral wool before allowing it to cool to room temperature. If the Post Heating temperature specified in the Welding Specification Charts exceeds 300°C, the same shall be followed. Similarly, if the welding specification chart specifies post-heat time, the same shall be applicable. Post weld heat treatment as specified in the Welding Specification Chart shall be carried out later on.

1.11.3 Postweld Heat Treatment

- a) Post weld heat treatment, wherever required for joints between pipes, pipes and fittings, pipe body and supports shall be carried out as per the relevant specifications, applicable standards and the instructions of the Engineer-in-charge. In this regard procedure qualification to be done before carrying out

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PWHT in production welds.

- b) The heat treatment of welded joints shall be carried out as per the requirements laid down in ANSI B31.8 and welding specification chart.
- c) The contractor shall submit for the approval of the Engineer-in-charge, the details of the post weld heat treatment procedure, as per **Exhibit 'B'** attached, that the propose to adopt for each of the materials/ assembly/ part involved, well before carrying out actual heat treatment.
- d) Post weld heat treatment shall be done by using an electric resistance or induction heating equipment as decided by the Engineer-in-charge.
- e) While carrying out local post weld heat treatment, technique of application of heat must ensure uniform temperature attainment at all points of the portion being heat treated. Care shall be taken to ensure that width of treated band over which specified post weld heat treatment is carried out, the temperature attained is atleast as that specified in the relevant applicable standards/ codes.
- f) Throughout the cycle of heat treatment, the portion outside the heated band shall be suitably wrapped under insulation so as to avoid any harmful temperature gradient at the exposed surface of pipe. For this purpose temperature at the exposed surface of the pipes should not be allowed to exceed 400°C.
- g) The temperature attained by the portion under heat treatment shall be recorded by means of thermocouple pyrometers. Adequate number of thermocouples should be attached to the pipe directly at the equally spaced location along the periphery of the pipe joint. The minimum number of thermocouples attached per joint shall be 1 upto 6" dia, 2 upto 10" dia and 3 upto 12" and above. However the Engineer-in-charge can increase the required minimum number of thermocouples to be attached if found necessary.
- h) Automatic temperature recorders which have been duly calibrated should be employed. The calibration chart of each recorder should be submitted to the Engineer-in-charge prior to starting the heat treatment operation and his approval should be obtained.
- i) Immediately on completion of the heat treatment, the post weld heat treatment charts/ records alongwith the hardness test results on the weld joints (whenever required as per the welding specification chart), shall be submitted to Engineer-in-charge for his approval.
- j) Each joint shall bear an identification number which shall be maintained in the piping sketch to be prepared by the contractor. The joint identification number should appear on the corresponding post weld heat treatment charts. The same identification numbers shall also be followed for identification for corresponding radiographic films. The chart containing the identification

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numbers and piping sketch shall be submitted to the Engineer-in-charge in suitable folders.

- k) The hardness of the heat affected zone as well as of the weld metal, after heat treatment, shall be measured using suitable hardness tester and shall not exceed the maximum hardness specified in the welding specification chart. The weld joint shall be subjected to re-heat treatment when hardness measured exceeds the specified limit, at the contractor's own expenses.
- l) The contractor shall arrange for the hardness testing and shall maintain the records of all joints tested. These records shall be checked by the plant Owner's inspector.

1.12 **Cleaning of the Weld Joints**

All weld joints shall be free from adherent weld spatter, slag, dirt or foreign matter. This can be achieved by brushing.

1.13 **Inspection & Testing**

1.13.1 **General**

- a) The owner's inspector shall have free access to all concerned areas, where the actual work is being performed. The contractor shall also offer the Owner's inspector all means and facilities necessary for carrying out inspection.
- b) The owner is entitled to depute his own inspector to the shop or field where pre-fabrication and erection of pipelines are being done with (but not limited to) the following objectives :-
 - i. To check the conformance to relevant standards and suitability of various welding equipments and the welding performance.
 - ii. To supervise the welding procedure qualification.
 - iii. To supervise the welder performance qualifications.
- c) Contractor shall intimate sufficiently in advance the commencement of qualification tests welding works and acceptance tests, to enable the plant owner's inspector to be present to supervise them.

1.13.2 **Welding Procedure Qualifications**

- a) Welding Procedure Qualification shall be carried out in accordance with the relevant requirements of API 1104/ ASME Sec-IX or other applicable codes and other job requirements by the contractor at his expense. The contractor shall submit the welding procedure specifications in format as per **Exhibit-C** (attached) immediately after the receipt of the order.

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- b) COMPANY's inspector will review, check and approve the welding procedure submitted and shall release the procedure for procedure qualification tests. The procedure qualification test shall be carried out by the Contractor under field conditions at this own expense. A complete set of test results in format as per **Exhibit-D** (attached) shall be submitted to the COMPANY's inspector for approval immediately after completing the procedure qualification test and atleast 2 weeks before the commencement of actual work. Standard tests as specified in the code shall be carried out in all cases. In addition to these tests, other tests like radiography, macro/ micro examination, hardness testers, dye penetrant examination, Charpy V-notch etc. shall be carried out on specimens. It shall be the responsibility of the contractor to carry out all the tests required to the satisfaction of the COMPANY's Inspector. The destructive testing of welded joints shall be as per **Annexure-2** and ASME Sec-IX.

1.13.3

Welders Qualification

- a) Welders shall be qualified in accordance with the API 1104/ ASME IX and other applicable codes by the contractor at his expense. The butt weld test pieces of the qualification test shall meet the radiographic tests requirements as mentioned in this specification. The COMPANY's inspector shall witness the test and certify the qualification of each welder separately. Only those welders who have been approved by the COMPANY's inspector shall be employed for welding. Contractor shall submit the welder qualification test reports in the standard format and obtain express approval, before commencement of the work. No welder shall be permitted to work without the possession of the identify card. It shall be the responsibility of contractor to carry out Qualification tests of welders.
- b) The welders shall always have in their possession the identification card as shown in **Exhibit-E** and shall produce it on demand by the COMPANY's Inspector. It shall be the responsibility, of the Contractor to issue the identify cards after it has been duly certified by the COMPANY. If a welder is found to perform a type of welding for which he is not qualified, he shall be debarred from doing any further work. All welds performed by an unqualified welder shall be cut and redone by a qualified welder at the expense of the Contractor.

1.13.4 Visual Inspection

Inspection of all welds shall be carried out by COMPANY as per the latest editions of the applicable codes and specifications. All finished welds shall be visually inspected for parallel and axial alignment of the work, excessive reinforcement, concavity of welds, shrinkage, cracks, under cuts, dimensions of the weld, surface porosity and other surface defects. Under-cutting adjacent to the completed weld shall not exceed the limits specified in the applicable standard/ code.

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1.13.5 Non-destructive Examination

The non destructive examination shall mainly consist of examination using x-ray radiography as detailed in **Annexure-4**.

Radiographic examination of one hundred percent (100%) girth welds will be required by the COMPANY. Welds shall meet the standards of acceptability as set forth in API 1104 and as per the requirements laid in subsequent paragraphs.

The CONTRACTOR shall make all the arrangements for the radiographic examination of work covered by this specification at his expense.

The COMPANY will review all the radiographs of welds and inform the CONTRACTOR regarding unacceptable welds. The decision of the COMPANY shall be final and binding in this regard.

All requirements mentioned in the specification shall be arranged and executed by the CONTRACTOR through his own resources. In addition, for pipes with wall thickness 9.5mm and above, ultrasonic inspection is required in the following cases as per **Annexure-3** of this specification.

- a) On the first 100 welded joints corresponding to each automatic (GTAW/ GMAW) welding procedure used.
- b) When 20mm or more are cut from the pipe end as supplied, the ends shall be ultrasonically inspected for an additional length of 20mm to ensure no lamination exist.
- c) When welds are repaired.
- d) When in the opinion of COMPANY, ultrasonic inspection is required to confirm or clarify defects indicated by radiography.
- e) When automatic procedure is used at least 10cm on each weld shall be ultrasonically inspected at COMPANY's discretion.

In addition, ultrasonic inspection may be required for certain critical weldings of the pipeline (i.e. tie-ins, welding of valves, flanges) randomly selected at COMPANY's discretion. All fillet and groove welds other than that radiographed shall be subjected to dye penetrant/ MP inspection. The non destructive test system used for inspecting welds must be approved by the COMPANY.

Weld quality is judged on the basis of the acceptability criteria mentioned below :

Any weld which as a result of radiographic and / or ultrasonic examination in the opinion of COMPANY **exhibits** imperfections greater than the limits stated in API-1104 latest edition or as superseded in this article shall be considered defective and shall so be marked with an identification paint marker.

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In addition to the API-1104 requirements, the welds containing cracks including crater cracks regardless of size of location are unacceptable.

- i. Any amount of inadequate penetration of the root bead as defined by API-1104 is unacceptable.
- ii. Any amount of incomplete fusion between the root and bevel as defined by API-1104 is unacceptable.
- iii. Unrepaired burn through areas are unacceptable.

Contractor shall appoint agency for carrying out the radiography works at site from the list of agency (ies) enclosed in the bid document.

- The Radiographic Examination procedures to be adopted shall be submitted by the contractor as per **Exhibit-F** and shall be got approved from the Owner's Inspector prior to employment. A person qualified to ASNT Level-II or ASNT Level-III in Radiographic testing shall prepare the procedure. The Radiography Procedure shall be established to demonstrate that the required sensitivity can be consistently achieved under the most unfavorable parameters (e.g. source to film distance, geometric unsharpness, thickness etc.). The radiographic technique and procedure adopted shall conform of the requirements mentioned in Article 2 as well as Article 22 of ASME Sec.V. The IQI sensitivity obtained shall be equal to or better than the requirements mentioned in Article 2 of ASME Sec.V. Source side penetrameter shall be used in establishing radiographic procedure / technique. The acceptance criteria shall be as per the relevant codes of Fabrication and over riding requirements if mentioned else where in the technical specifications of the contract. The Contractor shall be responsible for carrying out Radiography; rectification of defects and re-radiography of welds repaired/rectified at his cost.
- The extent of Radiography shall be as per specifications to be supplied to the Contractor. For welds between dissimilar materials, the extent of Radiographic Examination shall be the more stringent of the two recommended for the materials being welded. Wherever random Radiography is called for, in a particular piping class, the dissimilar materials weld joints shall essentially be included.
- Type of Radiation source and film to be used shall be as per **Exhibit-H** for carrying out radiographic examination. However if specifications (as given else where in the contract) for some critical material require usage of X-Radiation, then Radiography shall be done using X-Rays only.
- The Contractor shall fulfill all the statutory and owner's safety requirements while handling X-ray and Gamma-ray equipments.

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- In case of random radiography, the joints for Radiography shall be selected by the Owner's Inspector and the Radiography shall be performed in his presence, if he instructs the contractor to do so. The contractor shall furnish all the radiographs, to the Owner's Inspector immediately after processing along with evaluation by a person qualified to ASNT Level-II in Radiographic testing, inline with Article 2 of ASME Sec.V. The certificate of ASNT / ISNT Level II qualification of the NDT personnel shall be submitted to owner's inspector for his approval prior to start of job.
- The Contractor shall provide the Owner's Inspector, all the necessary facilities at site such as a dark room with controlled temperature, illuminator (viewer) suitable for varying densities, a duly calibrated electronic densitometer with batteries, magnifying glass, tracing papers, ruler, marking pencils etc. to enable him to review the radiographs.
- Where random radiography is specified, the first weld of each welder shall be completely radiographed. In the case of pipe of size 6" and below, the first two welds shall be completely radiographed.
- For each weld performed by a welder found unacceptable, two additional checks shall be carried out on welds performed by the same welder. This operation is iterative and the of two additional welds for each weld deemed unsatisfactory shall be continued till such time that two consecutive welds of satisfactory quality are found for every defective weld.
- The Contractor shall carry out these additional radiographic testing at his own expense. To avoid the possibility of too many defective welds by a single welder remaining undetected for a long period to time, the Contractor shall promptly arrange for Radiographic Examination so that there is no accumulation of defective joints.
- Contractor shall quote rates for X-ray as well as Gamma Ray for joints indicated to be radiographed by X-ray in Table of **Exhibit-H**.

1.13.6

Checkshots

- (a) Owner / Engineer- in- charge or his representative shall select 5% of the total joints radiographed on a day for check shots. Contractor shall carry out check shots as directed.
- (b) Weld profiles of check shots shall be compared with weld profile observed in the earlier Radiographs. In the event of anyone variation in the check shots and earlier Radiographs, contractor shall re-shoot the entire lot of joints radiographed by particular Radiography agency on the particular date. All the re-shot films shall be compared with the originally submitted films.

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1.13.7 **Magnetic Particle & Liquid Penetrant Examination**

- a) Whenever such tests are specified, the tests shall be carried out on joints chosen by the Owner's inspector, as per ASME Section V article 6 and 7 respectively. The tests are to be performed by a person possessing a valid ASNT / ISNT Level-II qualification in the method being used.
- (b) For austenitic stainless steels and other nonmagnetic materials, liquid (dye) penetrant test shall be carried out. For carrying out this test, the materials shall be brought within a temperature limit of 15° to 50°C.

1.13.8 **Hardness Test**

Hardness requirements for welds shall be as per the Welding Specification Chart / Non Destructive Examination Specification attached elsewhere in the contract. Hardness testing shall be carried out by Vickers Hardness Tester during welding procedure qualification and shall be cross sectional. For production welds, hardness testing shall be carried out by portable digital hardness testers. Poldi hardness tester shall not be permitted. Contractor shall produce documentary evidence/calibration certificate to the Owner's Inspector and obtain approval of the hardness testing equipment.

1.13.9 **Proof Tests**

Hydrostatic and pneumatic tests shall be performed as per the requirements laid down in the respective flushing & testing specification/ applicable codes to demonstrate the soundness of the welds. The tests shall be conducted only after fulfilling the requirements of visual examination, radiography etc. and after the entire work has been certified by the Owner's inspector, as fit for subjecting to such test.

1.14 **Repairs of Welds**

- a) Defects ascertained, through the inspection methods, which are beyond acceptable limits shall be removed from the joint completely by the process of chipping and grinding.
- b) When an entire joint is judged unacceptable, the welding shall be completely cut and the edges be suitably prepared as per required alignment tolerances. The welded joint shall again be examined following standard practices.
- c) No repair shall be carried out without prior permission of the Owner's inspector.
- d) Where random radiography is specified, the test welds of each welder shall be completely radiographed. In the case of pipes of sizes 6" and below, the first two welds shall be completely radiographed.
- e) For each weld found unacceptable due to a welder's fault, two additional checks should be carried out on welds performed by the same welder. This operation is interactive and the procedure of radiographing two additional

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welds for each weld deemed unsatisfactory shall be continued till such time that the two consecutive welds of satisfactory quality are found for every defective weld.

The contractor shall carry out these additional radiographic testing.

To avoid the possibility of too many defective welds by a single welder remaining undetected for a long period of time, the Contractor shall promptly arrange for radiographic examination so that there is no accumulation of defective joints.

1.15 Limitations on Repairs

Only one attempt at repair of any region is permitted. Repairs are limited to a maximum 30% of the weld length. For internal or external repairs which open the weld root, only 20% of the weld length may be repaired. Repairs opening the root must only be carried out in the presence of COMPANY. The minimum length of a repaired area shall be 100mm as measured over the recapped length. Welds containing cracks shall be cut out and rebevelled to make a joint, COMPANY shall authorise all repairs.

1.16 Weld Rejected by Accumulation of Defects

Where a weld is rejected by the accumulation of defect clause, as defined by API-1104 and this specification, repairs within these limitations are permitted. Defects in the filling and capping passes shall be repaired preferentially.

1.17 DOCUMENTS TO BE SUBMITTED BY CONTRACTOR (4 COPIES EACH)

- a) Electrode and Welding Consumable Qualification Records as per **Exhibit-A**, for the Welding Consumables tested and approved for the work.
- b) Batch Test Certificates, for the Electrodes used, obtained from the Electrode Manufacturers.
- c) Proposed Heat Treatment Procedure as per **Exhibit-B**.
- d) Heat Treatment Charts.
- e) Weld joint hardness test results.
- f) Welding Procedure Specifications as per **Exhibit-C** immediately after receipt of the order.
- g) Welding Procedure Qualification records as per **Exhibit-D**.
- h) Welder Performance Qualification records as per **Exhibit-E** immediately after conducting Welder Qualification Tests.
- i) Radiography Procedure as per **Exhibit-F** and other NDT procedures.
- j) Radiographic test Report along with Radiographs and other NDT reports.
- k) Piping Sketch (Isometric) giving all the details regarding the pipe specifications, welded joints, joints radiographed magnetic particle, tested, ultrasonic tested, penetrant tested, joints heat treated, WPS used, welders identification number, etc.

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EXHIBIT-A

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ELECTRODE QUALIFICATIONS TEST RECORD

A : Tested at (Site Name) Date : Test Period :

Manufacturer's Name :

Brand Name :

Batch Number & size Tested :

Classification & Code :

Intended for Welding in positions :

In combination with (if any) :

Code of Reference (used for testing) :

Special requirements (if any) :

B : **All - Weld Tensile Test**

Base Material used :

Pre-heat temperature :

Postweld Heat Treatment Details :

Visual Examination :

Radiographic Examination Results :

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Tensile Test Results

:

Sl. No.	Identification Number	U.T.S. Yield Point	Elongation	Remarks
------------	--------------------------	--------------------	------------	---------

C : Impact Test Results

Test Temperature

:

Notch in :

Type of Specimens (Impd, Charpy)

:

Size of Specimens :

Specimen No.	Impact Value	Average
--------------	--------------	---------

- 1.
- 2.
- 3.
- 4.
- 5.

D : Chemical Analysis Result

Electrode size used :

Batch No.

%C	%S	%P	%Si	%Mn	%Cr	%Ni	%Mo
----	----	----	-----	-----	-----	-----	-----

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E : Fillet Weld Test Results

Welding Positions :

Base Materials :

Size of electrode used :

Visual Inspection Results : 1)
2)
3)

Micro Test Results

Fracture Test Results :

Remarks :

F : Other Test Results

i) Transverse Tensile Test :

In Combination with :

Base Material used :

Position of Welding :

Preheat Temperature :

Postweld Heat Treatment :

Radiography :

Identification No.	U.T.S.	Fracture in	Remarks

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2. **Guide Bend Test**

Position	ID No.	Root, Face or Side Bend	Remarks
	1		
	2		
	3		
	4		
	5		

3. **Any other tests****Conclusions**

Approved By :

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STRESS RELIEF HEAT TREATMENT PROCEDURE SPECIFICATION

Name of the Heat - Treatment :

Name of the Project :Specification

Reference No.

1. General Details

Name of the Equipment :

Name of the Assembly/ Part :

Assembly/ Part Drawing No. :

Material :

2. Furnace Details

Type of Heating : Gas/ Oil/ Elec. Res./ Induction (Tick Mark)

Capacity (size) :

Maximum Temp. (°C)

Method of temp. measurement :

Atmosphere Control :

3. Heat Treatment Cycle Details

Charging Temp. °C :

Rate of Heating, °C/Hr :

Soaking Temp., °C :

Soaking Time, Hrs. :

Rate of Cooling, °C/Hr :

Mode of Cooling :

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4. Other Details, if any :
5. The following documents are to be furnished :
along with these specification :
 - i) Material Test Certificates
 - ii) Assembly/ Part Details

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STANDARD PROCEDURE SPECIFICATION NO.

for Welding of Pipe and Fittings

- Process & type (Details of special machines).
- Material (Pipes to which the procedure applied, grade of steel, type of pipe, Reference Specification).
- Diameter and wall thickness (Series of dia and thickness to which procedure is applicable)
- Joint Design
- Filler Metal and Number of Beads
- Electrical or Flame Characteristics
- Position
- Direction of Weldings (Uphill, Downhill, Mixed)
- Number of Welders
- Time Lapse between passes
- Type of Line-up Clamp
- Removal of Line-up Clamp (Minimum percentage of welding carried out before removal of clamps)
- Cleaning
- Preheat, Stress Relief
- Shielding Flux
- Speed of Travel
- Sketches and Tabulations (to be attached)
- Wire Speed (rate of wire speed and variation range)
- Minimum No. of passes which must be completed before discontinuing weld.

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- Minimum No. of welders required for the first pass and second pass :

Tested : Welder

Approved : Welding Supt.

Accepted : Chief Engineer

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COUPON TEST RECORD

Location
Date State Roll Weld Fixed position
weld welder Mark
..... Welding Time Time of day
..... M. Temperature F. Weather Condition
..... Wing break used Voltage
..... Amperage Type of welding machine
..... Size Filler Metal
..... Size of reinforcement
..... Pipe kind and Grade
..... Wall thickness
..... Dia O.D.

1 2 3 4 5 6 7

Bead No. Size of electrode
..... No. of electrode
.....

1 2 3 4 5 6 7

Coupon Stenciled Original
Dimension of Plate Original area of plate
(inch²) Maximum Load
..... Tensile S/ in. plate area
..... Fracture Location
.....

Procedure Qualifying Test Qualified
Welder Line Test Disqualified

Max. tensile strength min. tensile strength

Avg. tensile strength Remarks on tensile strength

1.
2.
3.
4.

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Remarks on Bend Tests

1.
2.
3.
4.

Remarks on Nick Tests

1.
2.
3.
4.

Other Tests

(Use back for additional remarks)

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EXHIBIT-E**WELDER's IDENTIFICATION CARD**

Name :
 Identification :
 Date of Testing :
 Valid Unit :
 Approval of Welding :
 Welding Position :
 Material :
 Diameter :
 Wall Thickness :
 Type of Welding Consumable :

Approved By :

Employer's Signature
with Seal

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RADIOGRAPHIC PROCEDURE FOR PIPE WELDING

1. Location
2. Date of Testing
3. Name of Supervised Contractor
4. Material
5. Dia. & Thickness
6. Type of Weld Joint
7. Radiation Source (X-ray, gamma ray)
8. Type of equipment (external/ internal)
9. Intensifying screens and material
10. Filter type and placement mask, diaphragm lead screen etc. adjacent to radiation sources or specimen.
11. Geometric relationship (source local spot size, max and min source strength, object to film distance, radiation angle with respect to weld and film).
12. Limit of film coverage
13. Film type and make
14. Exposure Time
15. Processing (time temperature for development stop bath or rinse, fixation, washing, drying etc.)
16. Density
17. Sensitivity
18. Type of penetrameter

Approval of the COMPANY

Signature of CONTRACTOR
with seal

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WELDING SPECIFICATION CHART**EXHIBIT-G**

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Class :

Material Specification :

Pipes : API 5L Gr. X 60, API 5L Gr. B API 5L Gr. X 42

Fittings : A 105, A234 Gr. WPB. MSS-SP-75, Gr. WPHY42, MSS-S

Flanges : A 105, MSS-SP-44 Gr. F42, MSS-SP as Gr. WPH 60

Other : _____ 44 Gr. F6C

Base Metal of NCL :

Welding Processes : Groove Joints : Butt

Root Pass SMAW Filler Pass SMAW Root Pass SMAW Filler Pass SMAW Filler Joints/ Socket Joints : SMAW

Welding Materials : Groove Joints : Butt

Root Pass E6010G/ E7010G Filler Pass F7010G/ E8010G/ E8818G

Root Pass E7010/ E7018G/ E8018G Filler Pass F7016/ E7018G/ E80118G

Filler Joints/ Socket Joints : E7016/ E7018/ E7018G/ E8018G

Backing Page _____ Consumable :

Gases : Purging _____ Sheilding

Gas Composition : Purging _____ Sheilding

Preheating : 10 min for all welds, 100°C Post heating

Post weld heat treatment :

Holding temp. : 595-650 C Holding Time : 1 Hr. per inch thk

Rate of heating : 200 C/hr max. Min holding time : 1 hr.

Method of cooling : Controlled Rate of cooling : 200°C/hr max.

Mechanical property requirements :

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Charpy `V' notch impact test valve :

Normal : 22 J
 Average : 27 J
 At temperature : 0 °C
 Hardness : 300 HV10 (for weld & HAZ)

Code of fabrication : ANSI B31.8; API 1104 and welding specifications.

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TECHNICAL NOTES

- Welding, heat treatment and non destructive testing shall be carried out in accordance with the requirement of ANSI B31.8/ API-1104 and additional requirement specified in the specification. In case of conflict between code and specification more stringent conditions shall be applicable.
- No welding shall be carried out without preheating the joint to 10°C (50 °F) when the ambient temperature is below 10°C (50 °F).
- Preheat shall be applied while welding the following material as detailed below :

API 5L Gr. B	:	Thickness upto	100 °F min.
		and inclusive of 12mm	
A 105	:		
MSS-SP-44 Gr. F60	:	Thickness beyond	200 °F
A 234 Gr. WPB	:	12 mm	
MSS-SP-75-WPHY60	:		
- For fillet welds complete welding may be carried out using the electrodes recommended for filler passes.
- All weldments & HAZ shall meet the hardness requirements of 300 HV10 during procedure qualification. If the hardness exceeds 300 HV10 the joints shall be heat treated at temp. 1100-1250 °F for one hour. The heating and cooling rates shall be decided during procedure qualification subject to a maximum of 200 °C/Hr. Hardness testing shall be carried out by Vickers hardness tester during welding procedure qualification test only. No hardness test is required for production welds.
- The electrodes used shall meet the following additional requirement :

<u>Specification</u>	<u>UTS (Min.) (As welded)</u>	<u>Impact (As welded)</u>
E7018-G	52.7 kg/mm ²	20 ft. lb. at 0°C
E7018-I	52.7 kg/mm ²	-
E6010	-	-
E6018	-	20 ft. lb. at 0°C
- All the weldments & HAZ shall meet the impact test requirement of 20 ft. lb at 0°C.

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ANNEXURE-2**1.0 DESTRUCTIVE TESTING OF WELDED JOINT - BUTT WELDS****1.1 Preparation**

Having passed the visual and the non destructive inspection, the test weld shall be subjected to mechanical test.

After satisfactory completion of all visual and non destructive testing the procedure test weld shall be set aside for a period not less than 24 hours. No further work on the test weld and no cutting of test specimens from the weld be performed till a period of at least 24 hours has expired.

Weld specimens, for pipe diameter greater than or equal to 12.3/4" shall be taken from the positions indicated in Fig. 1 of this specification from areas as free from defects as possible. For this reason it is necessary to take the previous non destructive tests into account. The minimum no. of tests to be carried out is given in Table-I of this specification.

The test shall be carried out at laboratories approved by COMPANY. The specimens shall be prepared in accordance with the figure given in the paragraphs which refer to the individual test.

Table-I**TYPE AND NUMBER OF TEST SPECIMENS FOR
PROCEDURE QUALIFICATION TEST**

Pipe Size, Out-side diameter Inches	Number of Specimens									
	Tensile API	Tensile ISO	Nick Break	Root Bend	Face Bend	Side Bend	Macro	Hard- ness	Impa ct	Total
Wall Thickness > 1/2 inch (12.7mm) and under										
Under 2 3/8	0	0	2	2	0	0	0	0	0	4
2 3/8 to 4 1/2 incl.	0	0	2	2	0	0	0	0	0	4
Over 4 1/2 less than 12 3/4	2	0	2	2	2	0	2	2	12	24
12 3/4 and over	2	2	4	4	4	0	2	2	24	44
Wall Thickness > 1/2 inch (12.7mm)										
4 1/2 and smaller	0	2	0	0	0	2	0	0	0	4
Over 4 1/2 less than 12 3/4	2	0	2	2	2	0	2	2	12	24
12 3/4 and over	2	2	4	0	0	8	2	2	24	44

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1.2 Tensile Strength

Specimens for pipe diameter over 12 3/4" shall be taken from the position indicated in Fig. 1 of this specification. Two API type specimen shall be taken for pipe diameter greater than or equal to 12 3/4".

1.3 Nick-Break Test

1.3.1 Preparation

Specimens for nick-break test with notches thus worked can break in the base metal, instead of in the fusion zone; therefore an alternative test piece may be used after authorisation by the COMPANY with a notch cut in the reinforcement of outside weld bead to a maximum depth of 1.5mm measured from the surface of the weld bead.

1.4 Macroscopic Inspection

1.4.1 Preparation

Specimens shall be taken from the positions indicated in Fig. 1 of this specification and shall be prepared in accordance with ASTM E2 and E3.

The width of the macrosection has to be at least three times the width of the weld. The section is to be prepared by grinding or polishing and etching to clearly reveal the weld metal and heat effected zone.

1.4.2 Method

Specimens shall be carefully examined under the microscope with a magnification of at least 25 times. The COMPANY may ask for a macrograph with 5 times magnification for documentation purposes.

1.4.3 Requirements

Under macroscopic examination, the welded joints shall show good penetration and fusion, without any defect exceeding the limits stated in the evaluation criteria of the nick break test.

1.5 Hardness Test

1.5.1 Preparation

The prepared macrosection is to be used for hardness testing using the Vickers method with 100 N (10 kg) load. Indentations are to be made along traverses each approximately 1mm below the surface at both side of the weld.

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In the weld metal a minimum of 6 indentations equally spaced along the traverses are to be made. The HAZ indentations are to be made along the traverses for approximately 0.5mm each into unaffected material, and starting as close to the fusion line as possible.

One indentation at each side of the weld along each traverse has to be made on parent metal. Reference is made to fig. 3 of this specification. The indentation are to be made in the adjacent region as well as on the opposite side of the macrosection along the specified traverses.

1.5.2 **Method**

The test shall be carried out in accordance with Recommendation ISO R81, Vickers hardness, using laboratory type machine controlled as per-recommendation of ISO R 146 and using a diamond pyramid penetrator set at 2.37 rad. (136) with a load of 100 N (10 kg).

1.5.3 **Requirements**

Hardness value shall not exceed 300 H VI0 . In case of a single reading slightly (+10 HV) higher than the specified limit, further indentations should be made to check if the high value was an isolated case.

All the hardness values obtained from the heat effected zone shall not exceed 100 HV with respect to the average hardness of the values obtained for the base metal.

If these additional tests mentioned above give a hardness within the specification limit, the slightly higher value may be accepted.

1.6 **Charpy-V-notch Impact Test**

1.6.1 Specimens shall be taken from the position indicated in Fig. 1 of this specification. The test specimens will be prepared in accordance with ISO R 148. Charpy V-notch specimens shall have dimensions as given in Fig. 3 of the specification.

Three test specimens shall be taken from each sample and they shall be cut and worked so that their length is transversal and perpendicular to the weld bead with the notch position as shown in Fig. 4 of this specification. The notch shall be perpendicular to the roller surface. The test specimens width shall depend upon the pipe wall nominal thickness as following :

Nominal wall thickness in
mm

Test Specimens width in
mm

> 12

12

> 9.5 and ≤ 12

7.5

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 ≥ 7 and ≤ 9.5

5

 < 7

2.5

1.6.2 Test Method

The test shall be carried out as indicated in ISO R 148 "Beam Impact Test V-notch.

Test pieces shall be immersed in a thermostatic bath and maintained at the test temperature for at least 15 minutes. They shall then be placed in the testing machine and broken within 5 seconds of their removal from the bath.

1.6.3 Requirements

The impact energy shall be greater or equal to :-

Test Specimens in mm	Average of Three specimens Joule (min) (Note-2)	Minimum Single Value Joules (Note 1)
10	27	22
7.5	21.5	17.5
5	18.5	15.0
2.5	10.0	8.0

Note:

- 1) Only one value is permitted to be lower than average upto the value specified.

1.7 Bend Test Requirements

The bend test specimens shall be made and tested as per the requirements of API-1104 sixteenth edition - May, 1983 except that the dimensions of Jig for guided bend test fig. 5 para 2.6 API-1104 shall be modified as follows :

Radius of the plunger	°A'	= 2 t
Radius of the die	°B'	= 3 t + 1.6mm
Width of the die	°C'	= 50.8

The acceptance criteria shall however be as per para 2.643 and 2.653 of API-1104 sixteenth edition - May, 1983.

Note t = Thickness of Specimen (nominal)

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ANNEXURE-3**1.0 ULTRASONIC INSPECTION**

In addition to the radiographic inspection ultrasonic inspection is required as per conditions mentioned in **Annexure-1** of this specification.

This section concerns manual ultrasonic inspection. However ultrasonic inspection by automatic equipment may be used if approved by the COMPANY.

1.1 Equipment and Operators

The CONTRACTOR who carries out the ultrasonic inspection shall have sufficient qualified personnel, equipment and instrument at his disposal to be able to effect the tests without hindering or delaying the pipeline assembly operations.

- Calibrate the equipment;
- Perform an operational test under production conditions;
- Interpret the screen picture;
- Evaluate the size and location of reflectors
- Interpret the type of defects detected.

The COMPANY has the option of checking the ability of personnel employed for ultrasonic testing by means of qualification tests.

The CONTRACTOR appointed to carry out UT inspection shall supply the instruments necessary for their execution on site.

1.2 Specification for Ultrasonic Testing Procedure**Qualification**

Before work begins the CONTRACTOR shall present a specification describing the proposed U.T. procedure qualification.

This specification shall be state, as an indication only but not limited to the following information :

- Type of U.T. equipment used
- Type and dimensions of transducers
- Frequency range
- Details for calibration
- Coupling medium
- Inspection technique
- Record details
- Reference to the welding procedure where it is intended to adopt the specification.
- Temperature range of the joints to be inspected.

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1.3 **Qualification of Ultrasonic Inspection Procedure**

The ultrasonic inspection procedure shall be approved by the COMPANY. Before inspection begins, the COMPANY may require the qualification test of the ultrasonic inspection procedure. This specification test consists in testing (under normal operating conditions) some CONTRACTOR welds made according to the same production procedure, when there are typical defects the test intends to detect.

1.4 **Test Procedure**

Circumferential weld shall be inspected from both sides using angled. Probes.

The surface with which the probe comes into contact shall be free of metal spatter, dirt, iron oxide and scales of any type: therefore it shall be necessary to clean a strip at least 50mm wide on both sides of the weld with steel - wire brushes and anyhow the cleaned strip must be atleast wide enough to allow full skip examination.

If during the test, echoes of doubtful origin appear, it shall be necessary to inspect a convenient area on the pipe surface, close to the weld, with a straight beam transducer in order to check whether any manufacturing defects are present which could have interfered with the ultrasonic beam.

By way of an example, the equipment shall include but not be limited to the following :

- Ultrasonic equipment and coupling medium
- Sample sections for calibration of instruments.
- Equipment for cleaning of surface to be examined.
- Rulers calibrated in centimeters for exact location of the position of defects.

The characteristics of the above-listed instruments and equipment shall guarantee:

- a) that the required standards of the inspection procedure, as previously established and approved by the COMPANY, are satisfied.
- b) continuous operation

All the instruments and equipment shall be approved by the COMPANY before being used. The COMPANY has the authority to reject any item which is considered unsuitable. The decision of the COMPANY is final. The CONTRACTOR appointed to carry out ultrasonic inspection shall also ensure the operational efficiency and maintenance of the instruments and equipment, and shall immediately substitute any item rejected by the COMPANY.

All the instrument and equipment necessary for carrying out ultrasonic inspection on site shall satisfy the requirements laid down by the public board of institutions which regulate "safety at work".

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1.5 **Ultrasonic Instruments**

The ultrasonic instruments :

- Shall be each pulse type, able to generate, receive and display, on the screen a cathode ray tube (CRT) pulse, at frequencies between 1 and 6 mhz. The useful part of the CRT screen shall be at least 70mm wide and at least 50mm high.
- Shall have various amplification, with steps of 1 or 2 dB over a range of a least 60 dB.
- The regulation control shall be accurate to within 1 dB and this accuracy shall be certified by the instrument manufacturer.
- May be powered by a battery or an electric generator. In the first case, the autonomy of operation (endurance) of the instrument shall be sufficient to carry on working without frequent interruptions, and the instrument shall be equipped with an automatic switch which switches it off when the battery runs down, in the second case, there must be a voltage stabilising device with a tolerance of 2 volts.

1.6 **Probes**

The probes used shall have dimensions, frequencies, and a refraction angle suited to the type of steel, the diameter the thickness of the pipeline and to the joint design.

1.7 **Reference Sample Pieces**

The efficiency of the equipment used, the effective refraction angle of the probe, and the beam output points, shall be checked using a V_1 and V_2 sample block, IIW type or the calibration block ASTM E-428.

For the calibration of runs and the regulation of detection sensitivity during the test, a calibration piece be used. This piece shall be taken from the production material, and will be at least 150mm long (measured in the direction of the axis), and at least 50mm wide (measured in the direction of the circumference), (see Fig. 4 of this specification).

In the middle of the inside and the outside surface of the calibration piece a groove shall be made. The groove will have a rectangular cross-section, a flat bottom and the following dimensions :-

- Depth : 1 +/- 0.1mm
- Breadth (measured parallel to the 150mm side) : 1 +/- 0.1mm
- Length (measured parallel to the 50mm side) not less than 30mm.

In addition, the calibration piece shall have a hole, 2mm in diameter, passing through its thickness and positioned so that during calibration the echoes returning from the two grooves do not interfere with those returning from the hole.

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1.6 Calibration

For a precise check of the sound paths necessary for a full inspection of the weld joint, the probe shall be moved (half skip and full skip distance) until internal and external notches on the test piece are detected (see Fig. 5 of this specification).

The relevant defect limits the path lengths on the time base. The calibration of reference sensitivity is obtained by utilising the through drilled test hole in the thickness of the reference block to draw the distance amplitude correction curve relevant to the test probe.

Calibration shall be carried out according to the following procedure : place its internal vertex until the maximum height of echo is displayed on the screen; this echo is adjusted to 80% of full screen height by means of the sensitivity adjuster set in dB. Without varying the amplification, the probe placed at full skip distance from the hole is moved to detect the external vertex the hole until the maximum height of echo is obtained. The straight line connecting the peaks of the two echoes obtained by the above procedure, represents the 100% reference level, while the one connecting the two points at half height of the same echoes represents "50% reference level".

The two straight lines shall be marked on the screen with a pen. Calibration shall be repeated each time tests are re-started at intervals not longer than 30 minutes during normal operations; each time the conditions fixed in advance are altered. This calibration is applicable provided that the crystal of the probe is 8 x 9mm size. Should this size of the crystal be different, the value of the sensitivity obtained from the calibration by a crystal of a different size shall be brought to the value of sensitivity obtained from the calibration by a 8 x 9mm crystal. The sensitivities of the two different size probes shall be compared through the echoes obtained on the notch of the test piece with the probe position at half skip of the distance.

1.9 Regulation of Amplification during Production Testing

The amplification during production testing shall be obtained by adding 2-6 dB (according to the surface condition of the pipe and its cleanness) to the reference amplification.

1.10 Qualification of Ultrasonic Testing Operators

Before the inspection begins or during the same inspection, the COMPANY may require a qualification test for the ultrasonic equipment operators.

1.11 Evaluation of Indications given by Ultrasonic Tests

Each time that echoes from the weld bead appear during production testing, the instrument amplification shall be altered to coincide with the reference amplifications and the probe shall be moved until maximum respond is obtained paying attention all the time to the probetube coupling.

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If, under these conditions, the height of the defer echo is equal to or greater than that of the reference echo, the defect shall be evaluated. If the defect has also been detected by the radiographic and or visual examination, the dimensions shall be judged according to the type of examination which detects the greater defects. Returns which are less than 50% of the reference echo, will not be considered. It returns are above 50% but lower than 100% of the reference echo, and if the operator has good reasons to suspect that the returns are caused by unfavorably oriented cracks, he shall inform the COMPANY. Moreover, when there is a defect to be repaired such defect shall be removed for a length corresponding to the one where no more return echo is given.

1.12

Other Equipment

The use of rules calibrated in centimeters, attached if possible to the probe, for the precise location of the position of welding defects, it recommended. Defect location is effected by measuring the projection distance between the probe output and the reflecting surface.

The operators carrying out the tests shall have besides the probing instrument, tools for cleaning the pipe surface (files, brushes, etc.) as well as the coupling liquid or paste appropriate for the temperature of the section to be examined.

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ANNEXURE-4**RADIOGRAPHY**

1.0

SCOPE

This annexure covers the radiographic inspection of all types of welded joints of the main pipeline. The welded joints shall include the following :

- i) Full girth welds on the mainline construction including double jointing of pipe, if adopted.
- ii) Welds for installation of block valves, insulating joints and other appurtenances and tie-ins.
- iii) Welds at scraper launching and receiving barrels
- iv) Terminal Piping.

2.0

APPLICABLE STANDARDS

This specification shall apply in conjunction with the following (all latest edition) :

- i) API 1104, Standard for welding pipelines and related facilities.
- ii) ANSI B31.8, code for Gas Transmission and Distribution Piping Systems.
- iii) ANSI B31.4, Code for Liquid Petroleum Transportation Piping System.
- iv) ASTM E94, Recommended practice for Radiographic Testing.
- v) ASTM, E 142, Standard Method for Controlling Quality of Radiographic Testing.
- vi) The American Society for non-destructive Testing. Recommended Practice No. SNT-TC-1A Supplement-A.

3.0

PROCEDURE

3.1

The radiographic examination procedure to be adopted shall be submitted by the CONTRACTOR as per **Exhibit-F**.

3.2

The procedure of radiographic examination shall be qualified to the entire satisfaction of COMPANY prior to use. It shall include but not be limited to the following requirements.

- i) Lead foil intensifying screens, at the rear of the film shall be used in all exposures.

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- ii) Type 2 and 3 films as per ASTM E-94 shall be used.
- iii) A densitometer shall be used to determine film density. The transmitted film density shall be 2.0 and 3.5 through out the weld. The unexposed base density of the film shall not exceed 0.30.
- iv) Radiographic identification system and documentation for radiographic interpretation reports and their recording system.

- 3.3 The CONTRACTOR shall qualify each procedure in the presence of the COMPANY prior to use.
- 3.4 The procedure of radiographic examination shall produce radiographs of sufficient density, clarity and contrast so that defects in the weld or in the pipe adjacent to the weld, and the outline and holes of the pentrameter are clearly discernible.
- 3.5 All the girth welds of mainline shall be subjected to 100% radiographic examination. The CONTRACTOR shall furnish all the radiographs to the COMPANY, immediately after processing them, together with the corresponding interpretation reports on approved format. The details of the radiographs alongwith the joint identification number shall be duly entered in a register and signed by the CONTRACTOR and submitted to the COMPANY for approval.
- 3.6 When the radiation source and the film are both on the outside of the weld and located diametrically opposite each other, the maximum acceptable length of film for each exposure shall not exceed the values given in Table 4 of API 1104. The minimum film overlap, in such cases, shall be 40mm. The ellipse exposure technique may be used on nominal pipe sizes of 2 inch and smaller provided that the source to film distance used is a minimum of 12 inches.
- 3.7 Three copies of each acceptable radiographic procedure (as outlined in Specification no. BR/WP/007) and three copies of radiographic qualification records, shall be supplied to COMPANY. One set of the qualifying radiographs on the job shall be kept by the CONTRACTOR's authorised representative to be used as a standard for the quality of production radiographs during the job. The other two sets shall be retained by COMPANY for its permanent record.
- 3.8 Three copies of the exposure charts relating to material thickness, kilo voltage, source to film distance and exposure time shall also be made available to aCOMPANY by the CONTRACTOR.
- 3.9 The CONTRACTOR shall, on a daily basis, record for each radiograph (1) radiography number (2) approximate chainage of weld location, (3) whether or not the welds meet the specified acceptance standards and (4) the nature and approximate location of unacceptable defects observed. It must be possible to relate to a particular butt weld and welder on piping drawing and pipeline alignment drawing.

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3.10 Each day's production of processed radiographs shall be properly packaged separately, identified by at least the (1) date, (2) radiographic unit, (3) job locations, (4) starting and ending progress survey stations and (5) shall include original and three copies of the daily radiographic record. The package shall be submitted to the COMPANY daily when possible, but in no event later than noon of the following day.

3.11 The CONTRACTOR shall provide all the necessary facilities at site, such as a dark room with controlled temperature, film viewer etc. to enable the COMPANY to examine the radiographs.

3.12 The CONTRACTOR, if found necessary, may modify the procedure of radiographic examination suiting the local conditions prevailing. This shall, however, be subject to the approval of the COMPANY.

3.13 COMPANY shall have free access to all the CONTRACTOR's work facilities in the field.

3.14 Any approval granted by the COMPANY shall not relieve the CONTRACTOR of his responsibilities and guarantees.

4.0 **RADIATION SOURCE**

4.1 Radiographic examination shall be carried out using x-radiations. Radiographic examination by Gamma rays may be allowed, at the discretion of the COMPANY, in case of inaccessible joints.

4.2 Whenever possible, pipeline welds will be inspected by placing the radiation source inside the pipe, on the pipeline axis, with a radiation of 6.28 rad. (360°).

If it is impossible to place the radiation source inside the pipe, the weld will be inspected with the source on the outside. An overlap of at least 40mm at the ends of each film shall be required to ensure that the first and last location increment numbers are common to successive films and to establish that no part of a weld has been omitted.

5.0 **LEVEL OF QUALITY**

The quality level of radiographic sensitivity required for radiographic inspection shall be at least equivalent to the values in Figure-6.

6.0 **PENETRIMETERS**

6.1 The image quality indicator (abbreviation : IQI) shall be used for the qualification of the welding procedure and during normal line production. Radiographic sensitivity shall be measured with the wire image quality indicator (Penetrameter). The penetrameter shall be selected according to DIN 54109 or ISO 1027. For radiographs made with the source on the outside, a penetrameter shall be placed on each side of the film with the smaller wire of the penetrameter turned towards the end of the film itself. When a complete weld is radiographed in a single exposure using a source inside the piping,

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four penetrameters approximately equally spaced around the circumference shall be used. During the procedure qualification, IQI shall be placed both on the source side and on the film side. The sensitivity obtained with IQI on the source side shall not be less than the values shown in Fig. 6 of this specification.

The sensitivity limit may be considered to have been reached when the outline of the IQI, its identification number and the wire of the required diameter show up clearly on the radiographs.

The COMPANY may authorise use of types of IQI other than those planned, provided that they conform with recognised standards and only if the CONTRACTOR is able to demonstrate that the minimum sensitivity level required is obtained. For this demonstration, a test shall be carried out comparing the IQI specified and the CONTRACTOR's to show up the identification number and other details of the proposed IQI, which must be visible in the test radiograph.

7.0 **FILM IDENTIFICATION MARKERS**

All films shall be clearly identified by lead numbers, letters, and/ or markers. The image of the markers shall appear on the films, without interfering with the interpretation. These markers positions shall also be marked on the part to be radiographed and shall be maintained during radiography.

8.0 **PROTECTION AND CARE OF FILM**

8.1 All unexposed films shall protected and stored properly as per the requirements of API 1104 standard and ASTM E 94.

8.2 The exposed and unexposed film shall be protected from heat, light, dust and moisture. Sufficient shielding shall be supplied to prevent exposure of film to damaging radiation prior to and following the use of the film for radiographic exposure.

9.0 **RE-RADIOGRAPHY**

9.1 The weld joints shall be re-radiographed in case of unsatisfactory quality of the radiographs, at the expense of the CONTRACTOR.

9.2 All the repaired weld joints shall be re-radiographed at no extra cost to the COMPANY in the same manner as that followed for the original welds. In addition, the repaired weld area shall be identified with the original identification number plus the letter 'R' to indicate the repair.

9.3 When evaluating repair film, radiographers shall compare each section (exposure) of the weld with the original film to assure repair was correctly marked and original defect removed.

9.4 The COMPANY will review prior to any repair of welds, all the radiographs of welds which contain, according to the CONTRACTOR's interpretation, unacceptable defects.

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The final disposition of all unacceptable welds shall be decided by the COMPANY.

10.0 **QUALIFICATION OF RADIOGRAPHERS**

10.1 Pipeline radiographers shall be qualified in according with the requirement of API 1104 and to the full satisfaction of COMPANY.

10.2 Certification of all the radiographers, qualified as per 10.1 above, shall be furnished by the CONTRACTOR to the COMPANY before a radiographer will be permitted to perform production radiography. The certificate record shall include :

- i) Background and experience record
- ii) Training course record
- iii) Technical examination record
- iv) Doctor's report on radiographer's Oaecuer 0-1 acquity eye test.
- v) Date of qualification.

10.3 The radiographers shall be required to qualify with each radiographic procedure they use, prior to performing the work assigned to him in accordance with the specification.

11.0 **PRESERVATION OF RADIOGRAPHS**

11.1 The radiographs shall be processed to allow storage of films without any discoloration for at least three years. All the radiographers shall be presented in suitable folders for preservation alongwith necessary documentation.

11.2 All radiographs shall become property of the COMPANY.

12.0 **EQUIPMENT AND ACCESSORIES**

12.1 CONTRACTOR shall make necessary arrangement at his own expense, for providing the radiographic equipment, radiographic films and the accessories for carrying out the radiographic examination for satisfactory and timely completion of the job.

12.2 For carrying out the mainline radiographic examination the CONTRACTOR shall be equipped with suitable mobile/ stationary type with rooms. These shall have all the required facilities for film processing. Film viewer used shall be equipped with the film illuminator that has a light source of sufficient intensity and can be suitably controlled to allow viewing film densities upto 4.0 without damaging the film.

13.0 **RADIATION PROTECTION**

13.1 CONTRACTOR shall be responsible for the protection and personal monitoring of every man with or near radiation sources.

13.2 The protection and monitoring shall comply with local regulations.

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13.3 In view of visual hazards in the handling of radioactive source of material, CONTRACTOR shall be solely responsible for complying with all rules and regulations set forth by Atomic Energy Commission or any other Government agencies of India in this regard and COMPANY shall not be responsible and shall be kept indemnified by the CONTRACTOR for default(s) of whatever nature by the Contractor. Safety equipment as considered adequate by the COMPANY for all necessary personnel shall be made available for use and maintained for immediate and proper use by the CONTRACTOR.

14.0 **DISPLAY OF SAFETY INSTRUCTIONS**

14.1 The safety provisions shall be brought to the notice of all concerned by display on a notice board at prominent place at the work spot. The person responsible for the "safety" shall be named by the CONTRACTOR.

15.0 **ENFORCEMENT FOR SAFETY REGULATIONS**

15.1 To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangement made by the CONTRACTOR shall be open to inspection by COMPANY or its representatives.

16.0 **FIRST AID INDUSTRIAL INJURIES**

16.1 CONTRACTOR shall maintain first aid facilities for its employees and those of its sub-contractors.

16.2 CONTRACTOR shall make outside arrangements for ambulance service and for treatment of industrial injuries. Names of those providing these services shall be furnished to COMPANY prior to start of work and their telephone no. shall be posted prominently in CONTRACTOR's field office.

16.3 All critical industrial injuries shall be reported promptly to the COMPANY and a copy of CONTRACTOR's report covering each personal injury requiring the attention of physician shall be furnished to the COMPANY.

17.0 **NO EXEMPTION**

17.1 Not withstanding the above there is nothing in these clauses to exempt the CONTRACTOR from the operation of any other act or rules in force.

SPECIFICATION FOR QUALITY ASSURANCE SYSTEMS REQUIREMENTS

SPECIFICATION NO.: BR/QA/002



**BRIDGE AND ROOF
COMPANY (INDIA) LIMITED**

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C O N T E N T S

<u>Sl.No.</u>	<u>Description</u>
---------------	--------------------

1.0	INTRODUCTION
2.0	DEFINITIONS
3.0	CONTRACTORS SCOPE OF WORK
4.0	QUALITY ASSURANCE REQUIREMENTS

FORMAT FOR QUALITY PLAN	FORMAT 00001
FORMAT FOR OBSERVATION ON	FORMAT 00002

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1.0 **INTRODUCTION**

This specification establishes the Quality Assurance Requirements to be met by the sub-contractors (including turnkey Contractors) and their sub-vendors.

In case of any conflict between this specification and other provisions of the contract/ purchase order, the same shall be brought to the notice of PMC, at the stage of bidding and shall be resolved with PMC, prior to the placement of order.

2.0 **DEFINITION**

Bidder

For the purpose of this specification, the word “Bidder” means the person(s), firm, company or organisation who is under the process of being contracted by PMC/ Owner for delivery of some products (including service). The word is considered synonymous to supplier, contractor or vendor.

Correction

Action taken to eliminate the detected non-conformity.

Refers to repair, rework or adjustment and relates to the disposition of an existing non-conformity.

Corrective Action

Action taken to eliminate the causes of an existing non-conformity, defect or other undesirable situation in order to prevent recurrence.

Preventive Action

Action taken to eliminate the causes of a potential non-conformity, defect or other undesirable situation in order to prevent its recurrence.

Process

Set of inter-related resources and activities which transform inputs into outputs.

Special Process

Processes requiring pre-qualification of their process capability.

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3.0 **CONTRACTORS SCOPE OF WORK**

3.1 **Prior to award of contract**

The bidder shall understand scope of work, drawings, specifications and standards etc., attached to the tender/ enquiry document, before he makes an offer.

The bidder shall submit milestone chart showing the time required for each milestone activity and linkages between different milestone activities alongwith overall time period required to complete the entire scope of work.

The bidder shall develop and submit manpower and resource deployment chart.

The bidder shall submit, alongwith the bid, a manual or equivalent document describing/ indicating/ addressing various control/ check points for the purpose of quality assurance and the responsibilities of various functions responsible for quality assurance.

3.2 **After the award of contract**

The bidder shall submit the schedule for submission of following documents in the kick-off meeting or within two weeks of the placement of order, whichever is earlier.

- Detailed Bar Chart
- Quality plan for all activities, required to be done by the bidder, to accomplish offered scope of work.
- Inspection and test plans, covering various control aspects.
- Job procedures as required by Consultant / Owner.
- Procurement schedule for items to be supplied by contractor covering inspection of the same.

Various documents submitted by the bidder shall be finalised in consultation with PMC. Here it shall be presumed that once a bidder has made an offer, he has understood the requirements given in this specification and agrees to comply with them in totality unless otherwise categorically so indicated during pre-award stage through agreed deviation/ exception request. All Quality Assurance Plan (QAP) documents shall be reviewed by concerned functional groups of PMC and the bidder shall be required to incorporate all comments within the framework of this specification at this stage of the contract. It is also obligatory on the part of the bidder that obtains approval on every Quality Assurance Plan (QAP) documents, before he starts using a particular document for delivery of contracted scope of work. Participation of PMC/ Owner in review/ approval of quality plan/ QAP documents does not absolve the contractor of his contractual obligations towards specified and intended use of the product (or service) provided/ to be provided by him under the contract.

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3.3 During job execution

During job execution, the bidder shall fully comply with all quality document submitted and finalised/ agreed against the requirements of this specification. Approval of Consultant on all these documents shall be sought before start of work.

Bidder shall produce sufficient quality records on controlled/ agreed forms such that requirements given in this specification are objectively/ demonstrable.

Bidder shall facilitate Consultant/ Owner during quality/ technical audits at his works/ sites.

Bidder shall discharge all responsibilities towards enforcement of this specification on all his sub-contractors for any part of the scope which is sub-contracted.

4.0 QUALITY ASSURANCE SYSTEM REQUIREMENTS

- 4.1 The bidder shall nominate an overall incharge of the contract titled as "Project Manager" for the scope of work of agreed contract. The name of this person shall be duly intimated to Consultant including all subsequent changes, if any. Consultant shall correspond only with the project manager of the bidder on all matters of the project. The project manager of the bidder shall be responsible for co-ordination and management of activities with bidder's organisation and all sub-vendors appointed by the bidder.

After award of work, the bidder may review augmentation of manpower and resources deployment chart (submitted earlier), detail it out, if so consented by Consultant/ Owner and resubmit the same as "issued for effective implementation of the project".

- 4.2 The bidder shall plan the contract scope of work on quality plan format such that no major variation is expected during delivery of contract scope of work. These quality plan shall be made on enclosed format complete in all respect. The quality plan shall be assumed to be detailing bidder's understanding and planning for the contract/ offered scope of work. The bidder shall plan the type of resources including various work methodology which he agrees to utilize for delivery of contract scope of work.
- 4.3 The bidder is required to review the contract at all appropriate stages to evaluate his capabilities with respect to timely and quality completion of all activities pertaining to contracted scope of work and shall report for constraints, if any to Consultant/ Owner.
- 4.4 The design activities, if any, performed during delivery of contract scope of work shall be so controlled that the outputs is reliable enough. It is expected that during development of design, the bidder shall take recourse to detailed checking, inter departmental reviews and documented verification methods.

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- 4.5 For all documents which the bidder is likely to utilise for delivery of contract scope of work, a system must exist which assures that latest/ required version(s) of the document(s) is available at all location/ point of use.
- 4.6 In case the bidder decides to sub-contract any part/ full of the contract scope of work (without prejudice to main Contractual condition), the bidder shall :
- Evaluate the technical and financial capabilities and past performance of the sub-contractor(s) and their products and/ or services before awarding them with the sub-contracted scope of work. Selection of a sub-contractor should meet PMC approval in documented form.
 - Requirement of this specification shall be enforced on sub-contracted agency also. The bidder shall choose sub-contractor based on their capability to meet requirements of this specification also.
- Note: It may so happen that, in a given situation, a sub-contractor may not have a system meeting the requirements of this specification. In all such eventualities, bidder may lend his system to sub-contractor for the contract such that sub-contractor effectively meets the requirements of this specification. In all such cases PMC/Consultant shall be duly informed.
- 4.7 Bidder shall establish adequate methodology such that the materials supplied by the Owner/ PMC/Consultant shall be adequately preserved, handled and made use of for the purpose for which they are provided.
- 4.8 All output delivered against contract scope of work shall be suitably identified in such a manner that either through identification or some other means, sufficient traceability is maintained which permits effective resolution of any problem reported in the outputs.
- 4.9 Critical activities shall be identified and the bidder is required to have documented methodologies which he is going to utilize for carrying out such activities under the contract scope of work. Wherever it is difficult to fully inspect or verify the output (special process), bidder shall pre-qualify, the performers and methodologies.
- 4.10 All inspections carried out by the bidder's surveillance/ inspection staff shall be conformity to quality plans and/ or inspection and test plans. All inspection results shall be duly documented on controlled/ agreed forms such that results can be co-related to specific product, that was inspected/ tested.
- 4.11 All inspection, measuring & test equipments (IMTEs) shall be duly calibrated as per National/ International standards/ codes and only calibrated and certified IMTEs shall be utilized for delivery of contract scope of work.

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- 4.12 All outputs/ products delivered against contract scope of work shall be duly marked such that their inspection status is clearly evident during all stages/ period of the contract.
- 4.13 All non-conformities (NCs) found by the contractor's inspection/ surveillance staff shall be duly recorded, including their disposal action. The deficiencies observed during stage of the product, shall be recorded and resolved suitably. Effective corrective and preventive action shall be implemented by the bidder for all repetitive NCs, including deficiencies.
- 4.14 All deficiencies noticed by Consultant / Owner representative(s) shall be recorded on a controlled form (Format No. 00002). Such deficiencies shall be analysed by the bidder and effective and appropriate correction, corrective and preventive actions shall be implemented. Bidder shall intimate Consultant/ Owner of all such corrective and preventive action implemented by him.
- 4.15 Bidder shall establish appropriate methodologies for safe and effective handling, storage, preservation of various materials/ inputs encountered during delivery of contract scope of work.
- 4.16 Bidder shall prepare sufficient records for various processes carried out by him for delivery of contract scope of work such that requirements of this specification are objectively demonstrable. In case Consultant/ Owner finds that enough objective evidence/ recording is not available for any particular process, bidder shall be obliged to make additional records so as to provide sufficient objective evidence. The decision of Consultant/ Owner shall be final and binding on such issues.
- 4.17 The bidder shall arrange internal quality audits at quarterly intervals, to independently assess the conformance by various performers to the requirements of this specification. The findings of such assessment shall be duly recorded and a copy shall be sent to Consultant/ Owner for review.
- 4.18 For all special processes, bidder shall deploy only qualified performers. Wherever Consultant/ Owner observes any deficiency, the bidder shall arrange the adequate training to the performer(s) before any further delivery of work.

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FORMAT – 00001

Bidder's Quality Plan			Project Name :			PO/ Contract Ref:				
General			Performing Functions			Inspection Functions			Audit Function	
Activity Description	Procedure Number	Code of Conformance	Performer	Checker	Reviewer/ Approver	Sampling Plan	Testing and Inspection Code	Type of (Approval) Surveillance	Audit Scope	Owner's/ Consultant Review/ Audit Requirement

- Note: 1) The bidder ensures that the filled up format conforms to minimum requirements on Quality Plan/ Quality Assurance, specified by Consultant on drawings/ standards/ specifications/ write-up.
- 2) The bidder confirms that document is issued for information/ approval of Owner/ Consultant for the project implementation

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OBSERVATION OF QUALITY ASPECTS**FORMAT – 00002**

Job No. and Description Issued to : M/s		No. : Date :	
Location of Work : Item of Work :			
Details of Observation(Deficiency)		Recommended Course of Action	
		Time Allowed for Correction :	
Issued by : _____ Name of Signature of RCM, Consultant Site			
Corrective Action taken report by Contractor/ Vendor : Date : Name and Signature			
Distribution (before resolution) :			
Project Manager Owner	Chief Executive Consultant	Business	Consultant Inspection Resident Construction Manager, Consultant Site
Verification of Resolution by Consultant: Date : Name of Signature			
Distribution (before resolution) :			
Project Manager Owner	Chief Executive Consultant	Business	Consultant Inspection Resident Construction Manager, Consultant Site



**LAYING & CONSTRUCTION OF 12"/10"/8"/6"/4" NB STEEL PIPELINE
SYSTEM & ASSOCIATED WORKS FOR CITY GAS DISTRIBUTION
NETWORK**

PIPING MATERIAL SPECIFICATION



BRIDGE AND ROOF CO. (INDIA) LTD.

4Th & 5Th Floor, Kankaria Centre,
2/1 Russell Street, Kolkata-700071,
West Bengal, India.



**LAYING & CONSTRUCTION OF 12"/10"/8"/6"/4" NB STEEL PIPELINE
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LAYING & CONSTRUCTION OF 12"/10"/8"/6"/4" NB STEEL PIPELINE SYSTEM & ASSOCIATED WORKS FOR CITY GAS DISTRIBUTION NETWORK

B AND R

1.0 **SCOPE**

This specification covers the requirements of various piping materials used in piping/ pipeline system handling Natural Gas / Regasified Liquid Natural Gas (RLNG) and associated utilities in the pipeline network.

2.0 **CODES AND STANDARDS**

2.1 Pipeline network and terminal/station facilities envisaged as a part of this project shall be designed and Engineered primarily in accordance with the provision of AS ME B 31.8 – Gas Transmission & Distribution Piping System - Latest edition and OISD Standard 226-Natural Gas Transmission Pipeline and City Gas Distribution Networks.

2.2 All codes standards and specifications referred herein shall be the latest edition of such documents.

2.3 For sake of brevity, the initials of the society to which the codes are referred are omitted in the specification, for example, B16.5 is a code referring to ANSI/ ASME, A 105 is a code referring to ASTM.

2.4 In addition PMC specifications for various piping and pipeline materials shall also be applicable.

3.0 **MATERIAL SPECIFICATION**

Piping material specifications are classified for the general purpose of selection of material for the class of services. The maximum design pressure and design temperature together with the fluid in line governs the selection of material specifications. Deviation of materials from class specifications may occur due to specific design condition. These deviations are permissible if they are equal or better than the individual class requirements.

4.0 **CLASS DESIGNATION CODE**

The piping class designation consist of three digits numbering system made up of letter, number and letter e. g. A1A, B1A, D1A, etc as follows:

First letter indicates ANSI class rating e. g.

A-Class 150

B-Class 300

D-Class 600



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The middle number indicates differences in the specification within the same rating and material.

The last letter indicates type of material e. g.

A-Carbon Steel

5.0 **PIPELINE**

The material for linepipe shall be as per the requirements of specification as indicated in Table-1.

6.0 **PIPING**

6.1 Carbon steel pipe shall be made by open hearth, electric furnace or basic oxygen process only. The steel used shall be fully killed and made with fine grain structure. The grade and wall thickness of various sizes of pipes shall be as per piping material specification for the applicable class.

6.2 Pipe dimension shall be in accordance with ANSI B 36.10 for carbon steel pipes and ANSI B 36.19 for stainless steel pipes.

6.3 All pipe threads shall conform to American Standard taper as per ANSI B 1.20.1 NPT, unless otherwise specified.

6.4 For butt weld end, bevel shall be in accordance to ANSI B 16.25/ API 5L as applicable.

7.0 **FITTINGS**

7.1 Fully killed carbon steel shall be used in the manufacture of fittings.

7.2 Threaded joints, if used shall conform to American Standard taper as per ANSI 1.20.1 NPT.

7.3 Dimension of socket weld/ screwed fittings shall conform to ASME B 16.11

7.4 Bore of socket welded fittings shall suit O. D. of pipe and its thickness.

7.5 Dimensions of butt welded carbon steel fittings shall be as per ASME B 16.9 / MSS-SP-75, as applicable.



**LAYING & CONSTRUCTION OF 12"/10"/8"/6"/4" NB STEEL PIPELINE
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- 7.6 Butt welding ends shall conform to ANSI B 16.25/ API 5L. In case of difference in thickness of matching ends, requirements of ASME B 31.8 shall apply.
- 7.7 Integrally reinforced forged branch fittings such as sockolet, threadolet, weldolet, nipple etc. shall be as per MSS-SP-97. Fittings not covered in ASME B 16.9 and MSS-SP-97 shall conform to manufacturer's standard.
- 7.8 Fittings thickness tolerances shall match pipe thickness tolerance.
- 8.0 **BENDS**
- 8.1 Unless otherwise specified for terminal piping, the elbow of radius $R=1.5 D$ shall only be used.
- 8.2 The radius of cold field bends shall not be less than 30 times the nominal diameter for pipes upto nominal diameter of 16" and shall not be less than 40 times the nominal diameter for pipes of nominal diameter of 18" and above. Limited use of long radius bends ($R = 6D$) / ($R=3D$) may be permitted for reason of space constraints.
- 9.0 **FLANGES**
- 9.1 Flange rating shall be same as ANSI B 16.5/MSS-SP-44/ B 16.47 Series A as specified.
- 9.2 Dimensions of flanges shall be in accordance with ANSI B 16.5/ B 16.47 Series A, as applicable.
- 9.3 Neck of Weld Neck (WN) flanges to suit pipe bore and thickness.
- 9.4 Bore of Socket Welded (SW) flanges shall suit pipe O.D. and its thickness.
- 9.5 Threads for screwed flanges if used shall conform to American Standard taper as per ANSI B 1.20.1 NPT.
- 9.6 Sizes for blind flanges shall be indicated by nominal pipe sizes.
- 9.7 Carbon steel flanges faces shall have smooth finish as indicated in the material specification. Flanges faces shall have smooth finish to 125-250 micro inches AARH as per MSS-SP-6.
- 9.8 Butt welding ends of WN flanges shall conform to ANSI B 16.25.



**LAYING & CONSTRUCTION OF 12"/10"/8"/6"/4" NB STEEL PIPELINE
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9.9 Spectacle blind/ spacer & blinds shall be in accordance with ASME B 16.48 / Manufacturer's Standard. Spectacle blind shall be used for sizes up to 8" NB and spacer & blind for 10" & above shall be used.

9.10 Two jack screws 180° apart shall be provided for all spectacle blind assemblies. The jack screws shall be as per PMC standard.

10.0 GASKETS

10.1 Spiral wound metallic gaskets shall conform to B 16.20 and API 601 shall be provided with graphite filler. All spiral wound gaskets shall be provided with stainless steel centering ring.

11.0 BOLTING

11.1 Nuts for stud bolts shall be American Standard Hexagonal Heavy series and double chamfered.

11.2 Dimension and tolerances for stud bolts and nuts shall be as per ANSI B 18.2.1 and 18.2.2 with full threading to ANSI B 1.1 Class 2A thread for bolts and Class 2B for nuts. Diameter and length of stud bolts shall be as per ANSI B 16.5/ ASME B 16.47 with full threading.

11.3 Threads for nuts shall be as per ANSI B 1.1, as follows:

Nuts for stud dia 1/4" to 1"	:	UNC-2B
Nuts for stud bolts dia 1 1/8" to 3 1/4"	:	8UN-2B

11.4 Threads for stud bolts shall be as per ANSI B 1.1, as follows.

Studs bolts dia 1/4" to 1"	:	UNC-2A
Stud bolts dia 1 1/8" to 3 1/4"	:	8UN-2A

11.5 Heads of jack screws shall be heavy hexagonal type. Jack screw end shall be rounded. Stud bolts shall be fully threaded with two hexagonal nuts.

12.0 THREAD SEALANT

12.1 Threaded joints shall be made with 1" wide PTFE Jointing tape.



LAYING & CONSTRUCTION OF 12"/10"/8"/6"/4" NB STEEL PIPELINE SYSTEM & ASSOCIATED WORKS FOR CITY GAS DISTRIBUTION NETWORK

13.0 VALVES

- 13.1 Valve ends shall be as per piping material specifications (Appendices).
- 13.2 Flange dimensions and face finish of flanged end valves shall confirm to clause 9.0 of this specification.
- 13.3 Butt welding ends of Butt Welded valves shall conform to ANSI B 16.25.
- 13.4 Face to face and end to end dimensions shall conform to applicable standards.
- 13.5 Buried valves on mainline /CGD Pipeline network shall be provided with stem extension/ without stem (as applicable), sealant, vent/drain & shall have butt welded ends.
- 13.6 Sectionalizing Valves (Block valves) installed on the main pipeline shall be Ball valves with fully welded body having butt welded ends and shall be full bore to allow smooth passage of cleaning pigs as well as intelligent pigs.
- 13.6 A Sectionalizing valves (Block valve) installed on the CGD pipeline network Shall be ball valve with fully welded body having Butt welded end and shall be preferable of full bore opening.
- 13.7 Unless specified otherwise. Valves shall confirm to the following standards:

Screwed / Socket welded / Flanged end valves (1 1/2" and below)

Ball Valves	-	BS 5351(latest)
Plug Valves	-	BS 5353(latest)
Globe Valves	-	BS 5352(latest)
Gate Valves	-	API 602(latest)

Flanged / Butt weld end Valves (2" and above)

Ball Valves	-	API 6D
Plug Valves	-	API 6D
Check Valves	-	API 6D
Globe Valves	-	BS 1873



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Gate Valves - API 6D

13.8 Manual Valve operators shall be as indicated below, unless specified otherwise in the P&ID.

a) **Gate and Globe Valves**

i) For ANSI class 150 & 300 - Hand Wheel operated for size $\leq 12"$ NB.
Gear operated for size $\geq 14"$ NB.

ii) For ANSI class 600 - Hand Wheel operated for size $\leq 10"$ NB.
Gear operated for size $\geq 12"$ NB.

b) **Ball and Plug Valves**

i) For ANSI class 150, 300, 600 – Wrench operated for size $\leq 4"$ NB.
Gear operated for size $\geq 6"$ NB.

b) **Actuated Valves**- Actuated valves shall be as per approved Data Sheet.

14.0 QUICK OPENING END CLOSURE

Quick opening end closure to be installed on scrapper traps shall be equipped with safety locking devices in compliance with section VIII, division 1, UG-35.2 of ASME Boiler and Pressure Vessel code.

15.0 HYDRO TESTING VENTS AND DRAINS

High point vents and low point drains required for the purpose of hydro testing shall be of size $3/4"$ and consist of socket, Plug/ Ball valve for vent, Globe / Ball Valve for drain, flange & blind flange.

16.0 PIPELINE SPECIALITY ITEMS

Pipeline Specialty items viz., Scrapper Traps, Flow Tee, Insulating Joints, LR bends, QOEC for Venting shall be as per respective data sheets, specifications and Project Specific drawing showing Mainline CGD Pipeline Network & Terminal / Station materials.



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TABLE-1

PIPE WALL THICKNESS DETAIL FOR CGD PIPELINE NETWORK

Sl. No.	Pipe Material Description	Size (NB)	Thickness (mm)	Length
1.	API 5L Gr. X-70, PSL-2	12"	6.4 to 9.7	As per SOR Quantity
2.	API 5L Gr. X-52, PSL-2	8"	6.4 to 8.7	As per SOR Quantity
3.	API 5L Gr. X-52, PSL-2	6"	6.4	As per SOR Quantity
4.	API 5L Gr. X-52 PSL -2	4"	6.4	As per SOR Quantity



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TABLE-2

INDEX OF PIPING MATERIAL SPECIFICATIONS

Class	Service	C.A. (mm)	Basic Material	Design Code	Enclosed as
A1A	Natural Gas/ RLNG	1.5	ASTM A 106 Gr. B /API 5L Gr. B	ANSI B31.8	Appendix-I
A4A	Natural Gas/ RLNG	1.5	ASTM A 333 Gr. 6	ANSI B31.8	Appendix-II
B1A	Natural Gas/ RLNG	1.5	ASTM A 106 Gr. B /API 5L Gr. B	ANSI B31.8	Appendix-III
B4A	Natural Gas/ RLNG	1.5	ASTM A 333 Gr. 6	ANSI B31.8	Appendix-IV

ANSI CLASS: 150 #	CORROSION ALLOWANCE: 1.5 MM	TEMP °C	-29	38.0	50	100	150	200
		PRESS. KG/CM ² _g	19.98	19.98	19.57	18.05	16.11	14.07
SERVICE : NATURAL GAS			BASE MATERIAL: CARBON STEEL (MATERIAL GROUP 1.1)					

NOTES: -

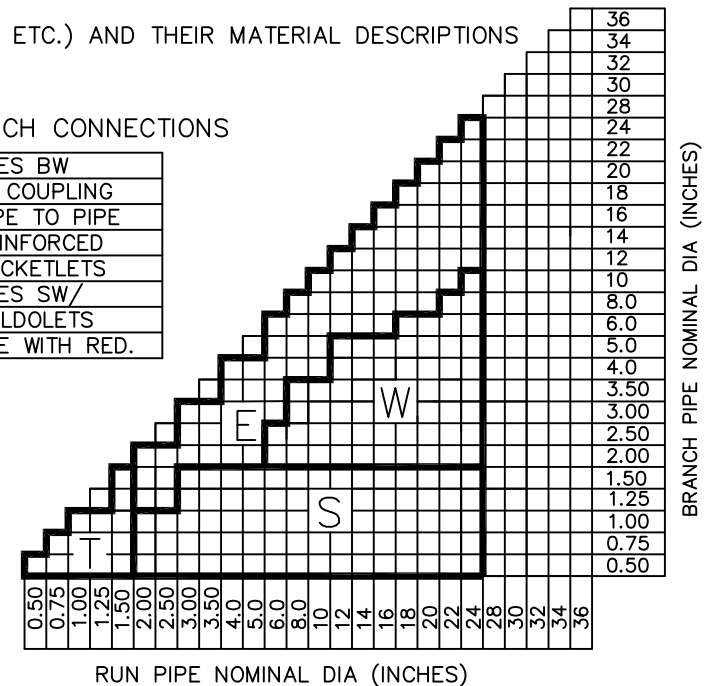
1. ALL VENTS & DRAIN SHALL BE PROVIDED WITH PLUG VALVE UNLESS MENTIONED OTHERWISE IN P&IDs.
2. FITTINGS SHALL BE OF SEAMLESS CONSTRUCTION UP TO 16" AND SHALL BE OF WELDED CONSTRUCTION 18" AND ABOVE.
3. WALL THICKNESS FOR LINEPIPE USED IN VARIOUS SECTIONS SHALL BE AS PER TABLE-1 OF PMS.
4. BALL VALVE TO BE USED IN MAINLINE SHALL HAVE BUTT WELDED ENDS EXCEPT FOR THE VALVES USED FOR HOT TAPPING WHICH SHALL BE ONE SIDE BUTT WELDED AND OTHER SIDE FLANGED.
5. PROCUREMENT OF MATERIALS SHALL BE AS PER DETAILED RELEVANT SPECIFICATIONS.
6. DESIGN PRESSURE & TEMP. FOR PIPELINE AND RELATED FACILITIES ARE 19 Kg/Cm²g & (-29° TO +65°C) RESPECTIVELY.
7. PRESSURE-TEMPERATURE RATING INDICATED ARE FOR FLANGES ONLY IN ACCORDANCE WITH ANSI B 16.5
8. FOR VALVES, STEELPIPE AND ASSOCIATED STEEL COMPONENTS OF 2" AND LARGER NOTCH TOUGHNESS PROPERTIES SHALL BE AS SPECIFIED IN RELEVANT SPECIFICATIONS/CODES, **B AND R** STANDARD TECHNICAL SPECIFICATIONS AND DATA SHEETS ETC.
9. AT STATIONS, BRANCH CONNECTIONS SHALL BE AS PER BRANCH CONNECTION TABLE BELOW
10. ALL BUTT WELDS SHALL BE 100% RADIOGRAPHED.
11. 100% OF SOCKET WELD SHALL BE SUBJECTED TO MPI/DPT.
12. PRESSURE-TEMPERATURE RATING OF VALVE BODY SHALL BE AS PER API 6D.
13. PIPELINE DESIGN CODE – ASME B 31.8 & OISD 226.
14. FOR PIPELINE SPECIALITY ITEMS (SCRAPPER TRAP, BARRED TEE, IJ, LR BENDS ETC.) AND THEIR MATERIAL DESCRIPTIONS REFER DATA SHEET OF RESPECTIVE ITEMS.

STATION PIPING MATERIAL SPECIFICATION

ITEM	SIZE	DESCRIPTION
MAINTENANCE JOINTS	ALL	FLGD., BUT TO BE KEPT MINIMUM
PIPE JOINTS	1.5" & BELOW	SOCKET WELD
	2" & ABOVE	BUTT WELDED
DRAINS	ON LINES $\leq$ 1.5"	3/4",
	ON LINES $\geq$ 2"	3/4"
VENTS	ON LINES $\leq$ 1.5"	3/4",
	ON LINES $\geq$ 2"	3/4"
TEMP. CONN.	1.5"	FLGD. INSTL.
PRESS CONN.	3/4"	SCH. 160 NIPPLE WITH BALL VALVE TO SPEC. INSTALLATION A

BRANCH CONNECTIONS

E	TEES BW
H	H. COUPLING
P	PIPE TO PIPE
R	REINFORCED
S	SOCKETLETS
T	TEES SW/
W	WELDOLETS
D	TEE WITH RED.



6		5		4		3		2		1		A	
REV NO		DATE		ZONE		DESCRIPTIONS		BY		APPRO		REFERENCES	
A		B		C		D		E		F		G	
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REV NO		DATE	ZONE	DESCRIPTIONS		BY	APPRO	REFERENCES		DRG. NO.	
NATURAL GAS PIPELINE PROJECT		PIPING MATERIAL SPECIFICATIONS		150# (A4A)		BRIDGE AND ROOF CO. (INDIA) LTD.		SCALE : N.T.S.		APPENDIX-II	
ANSI CLASS: 150#		CORROSION ALLOWANCE: 1.5MM		TEMP °C		-45	38	50	100	150	
PRESS. KG/CM ² g		18.76		18.76		18.55		17.74		16.11	
SERVICE : RLNG		BASE MATERIAL:		CARBON STEEL		(MATERIAL GROUP 1.3)					
NOTES: -											
1. ALL VENTS & DRAIN SHALL BE PROVIDED WITH PLUG VALVE UNLESS MENTIONED OTHERWISE IN P&IDs.											
2. FITTINGS SHALL BE OF SEAMLESS CONSTRUCTION UP TO 16" AND SHALL BE OF WELDED CONSTRUCTION 18" AND ABOVE.											
3. WALL THICKNESS FOR LINEPIPE USED IN VARIOUS SECTIONS SHALL BE AS PER TABLE-1 OF PMS.											
4. BALL VALVE TO BE USED IN MAINLINE SHALL HAVE BUTT WELDED ENDS EXCEPT FOR THE VALVES USED FOR HOT TAPPING WHICH SHALL BE ONE SIDE BUTT WELDED AND OTHER SIDE FLANGED.											
5. PROCUREMENT OF MATERIALS SHALL BE AS PER DETAILED RELEVANT SPECIFICATIONS.											
6. PRESSURE-TEMPERATURE RATING INDICATED ARE FOR FLANGES ONLY IN ACCORDANCE WITH ANSI B 16.5											
7. FOR VALVES,STEELPIPE AND ASSOCIATED STEEL COMPONENTS OF 2" AND LARGER NOTCH TOUGHNESS PROPERTIES SHALL BE AS SPECIFIED IN RELEVANT SPECIFICATIONS/CODES, BAND R STANDARD TECHNICAL SPECIFICATIONS AND DATA SHEETS ETC.											
8. AT STATIONS, BRANCH CONNECTIONS SHALL BE AS PER BRANCH CONNECTION TABLE BELOW											
9. ALL BUTT WELDS SHALL BE 100% RADIOGRAPHED.											
10. 100% OF SOCKET WELD SHALL BE SUBJECTED TO MPI/DPT.											
11. PRESSURE-TEMPERATURE RATING OF VALVE BODY SHALL BE AS PER API 6D.											
12. PIPELINE DESIGN CODE - ASME B 31.8 & OISD 226.											
13. FOR PIPELINE SPECIALITY ITEMS (SCRAPPER TRAP, FLOW TEE, IJ, LR BENDS ETC.) AND THEIR MATERIAL DESCRIPTIONS, REFER DATA SHEET OF RESPECTIVE ITEMS.											
14. DESIGN PRESSURE&TEMP. FOR PIPELINE AND RELATED FACILITIES ARE 19 KG/cm ² g &(-45° TO +65° C) RESPECTIVELY.											
STATION PIPING MATERIAL SPECIFICATION											
ITEM	SIZE	DESCRIPTION									
MAINTENANCE JOINTS	ALL	FLGD., BUT TO BE KEPT MINIMUM									
PIPE JOINTS	1.5" & BELOW	SOCKET WELD									
	2" & ABOVE	BUTT WELDED									
DRAINS	ON LINES ≤ 1.5"	3/4",									
	ON LINES ≥ 2"	3/4"									
VENTS	ON LINES ≤ 1.5"	3/4",									
	ON LINES ≥ 2"	3/4"									
TEMP. CONN.	1.5"	FLGD. INSTL.									
PRESS CONN.	3/4"	NIPPLE WITH BALL VALVE TO SPEC. INSTALLATION									
Page 602 of 689											

BRANCH CONNECTIONS	
E	TEES BW
H	H. COUPLING
P	PIPE TO PIPE
R	REINFORCED
S	SOCKETLETS
T	TEES SW/
W	WELDOLETS
D	TEE WITH RED.

0.50	0.75	1.00	1.25	1.50	2.00	2.50	3.00	3.50	4.0	5.0	6.0	8.0	10	12	14	16	18	20	22	24	28	30	32	34	36																	
																	0.50	0.75	1.00	1.25	1.50	2.00	2.50	3.00	3.50	4.0	5.0	6.0	8.0	10	12	14	16	18	20	22	24	28	30	32	34	36

BRANCH PIPE NOMINAL DIA (INCHES)

RUN PIPE NOMINAL DIA (INCHES)

REV NO		DATE	ZONE	DESCRIPTIONS		BY	APPRO	REFERENCES		DRG. NO.
1				NATURAL GAS PIPELINE PROJECT				BRIDGE AND ROOF CO. (INDIA) LTD.		
2				BRIDGE AND ROOF CO. (INDIA) LTD.				BRIDGE AND ROOF CO. (INDIA) LTD.		
3				BRIDGE AND ROOF CO. (INDIA) LTD.				BRIDGE AND ROOF CO. (INDIA) LTD.		
4				BRIDGE AND ROOF CO. (INDIA) LTD.				BRIDGE AND ROOF CO. (INDIA) LTD.		
5				BRIDGE AND ROOF CO. (INDIA) LTD.				BRIDGE AND ROOF CO. (INDIA) LTD.		
6				BRIDGE AND ROOF CO. (INDIA) LTD.				BRIDGE AND ROOF CO. (INDIA) LTD.		

PIPELINE/PIPING DESIGN CODE		ASME B 31.8/ OISD 226										DESIGN FACTOR – 0.5					
ITEM	NOMINAL DIAMETER (INCHES)	0.50	0.75	1.00	1.50	2.00	3.00	4.00	6.00	8.00	10.0	12.0	14.0				
PIPE	WALL THICKNESS (MM/SCH)	S160	S160	XS	XS	XS	STD	STD	STD	STD	STD	STD	STD				
	MATERIAL	ASTM A333 GR.6															
	DIMENSION STD.	B36.10															
	METHOD OF MANUFACTURE, ENDS	SEAMLESS PE					SEAMLESS BE										
FLANGE	MATERIAL AND GRADE	ASTM A 350 GR. LF2, CL-I															
	TYPE, FLANGE FACING	SW. RF 125AARH					WN. THICKNESS TO MATCH PIPE THICKNESS, RF 125AARH										
	DIMENSION STD.	B16.5															
BLIND FLANGE	MATERIAL AND GRADE	ASTM A 350 GR. LF2, CL-I															
	FLANGE FACING	RF 125AARH															
	DIMENSION STD.	B16.5															
BLANK	MATERIAL AND GRADE	ASTM A 350 GR. LF2, CL-I															
	FLANGE FACING	FF 125AARH															
	DIMENSION STD.	B16.48															
	TYPE	FIG.8 FLANGE										SPACER & BLIND					
BOLTING	STUD BOLTS (FULLY THREADED)	A 320 GR L7, B-18.2															
	NUTS (HEAVY HEXAGONAL)	A 194 GR 4, B-18.2															
GASKET	TYPE, MATERIAL AND Dmn. STD.	SPIRAL, SP.WND SS316+GRAPHITE FILLED, B-16.20-ANSI B16.5,															
ELBOW-90 ELBOW-45	MATERIAL	ASTM A350 GR.LF2					ASTM A 420 GR.WPL6										
	END DETAIL	SW,6000# SW,3000#					BW, 1.5D										
	DIMENSION STD.	B-16.11					B-16.9										
T-EQUAL T-RED	MATERIAL	ASTM A350 GR.LF2					ASTM A 420 GR.WPL6										
	END DETAIL	SW,6000# SW,3000#					BW										
	DIMENSION STD.	B-16.11					B-16.9										
CAP & PLUG (UPTO 1.5")	MATERIAL	ASTM A350 GR.LF2					ASTM A 420 GR.WPL6										
	END DETAIL	SCRF6000 SCRF3000					BW, THK TO MATCH PIPE THICKNESS										
	DIMENSION STD.	B-16.11					B-16.9										
FITTING	MATERIAL	ASTM A350 GR.LF2					ASTM A 420 GR.WPL6										
	END DETAIL	SW-6000 SW-3000					BW, THICKNESS TO MATCH PIPE THICKNESS										
	DIMENSION STD.	B-16.11					B-16.9										
	TYPE	COUPLING FULL,HALF LH.,RED.					RED. CON. RED. ECC.										
O'LET	MATERIAL	ASTM A350 GR.LF2					ASTM A 350 GR.LF2										
	END DETAIL	SW,6000# SW,3000#					BW										
	DIMENSION STD.	MSS-SP97					MSS-SP97										
	TYPE	SOCKOLET					WELDOLET										

BRIDGE AND ROOF CO. (INDIA) LTD.

SCALE : N.T.S.

APPENDIX-II

BRIDGE AND ROOF CO. (INDIA) LTD.

BRIDGE AND ROOF CO. (INDIA) LTD.

Page 603 of 689

PIPELINE/PIPING DESIGN CODE				ASME B 31.8/ OISD 226								DESIGN FACTOR – 0.5							
ITEM	NOMINAL DIAMETER (INCHES)	0.50	0.75	1.00	1.50	2.00	3.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0			
PIPE	WALL THICKNESS (MM/SCH)	S160	S160	XS	XS	XS	STD	S40	S40	7.9	STD	S40	S40	S40	S40	15.9			
	MATERIAL	ASTM A106 GR.B				ASTM A106 GR.B (CHARPY)				API 5L GR.B PSL2									
	DIMENSION STD.	B36.10								API 5L									
	METHOD OF MANUFACTURE, ENDS	SEAMLESS PE					SEAMLESS BE								BE SAW				
FLANGE	MATERIAL AND GRADE	ASTM A 105				ASTM A 105 (CHARPY)													
	TYPE, FLANGE FACING	SW. RF 125AARH				WN. THICKNESS TO MATCH PIPE THICKNESS,RF 125AARH													
	DIMENSION STD.	B16.5																	
BLIND FLANGE	MATERIAL AND GRADE	ASTM A 105				ASTM A 105 (CHARPY)													
	FLANGE FACING	RF 125AARH																	
	DIMENSION STD.	B16.5																	
BLANK	MATERIAL AND GRADE	ASTM A 105				ASTM A 105 (CHARPY)													
	FLANGE FACING	FF 125AARH																	
	DIMENSION STD.	B16.48																	
	TYPE	FIG.8 FLANGE										SPACER & BLIND							
BOLTING	STUD BOLTS (FULLY THREADED)	A 193 GR B7, B–18.2																	
	NUTS (HEAVY HEXAGONAL)	A 194 GR 2H, B–18.2																	
GASKET	TYPE ,MATERIAL AND Dmn. STD.	SPIRAL 300# , SP.WND SS316+GRAPHITE FILLED, B–16.20–ANSI B16.5,																	
ELBOW–90 ELBOW–45	MATERIAL	ASTM A 105				ASTM A 234 GR.WPB (CHARPY)													
	END DETAIL	SW,6000#				SW,3000#				BW, 1.5D									
	DIMENSION STD.	B–16.11				B–16.9													
T–EQUAL T–RED	MATERIAL	ASTM A 105				ASTM A 234 GR.WPB (CHARPY)													
	END DETAIL	SW,6000#				SW,3000#				BW, THICKNESS TO MATCH PIPE THICKNESS									
	DIMENSION STD.	B–16.11				B–16.9													
CAP	MATERIAL	ASTM A 105				ASTM A 234 GR.WPB (CHARPY)													
	END DETAIL	SCRF6000#				SCRF3000#				BW,THICKNESS TO MATCH PIPE THICKNESS									
	DIMENSION STD.	B–16.11				B–16.9													
FITTING	MATERIAL	ASTM A 105				ASTM A 234 GR.WPB (CHARPY)													
	END DETAIL	SW,6000#				SW,3000#				BW,THICKNESS TO MATCH PIPE THICKNESS									
	DIMENSION STD.	B–16.11				B–16.9													
	TYPE	COUPLING FULL,HALF LH.,RED.				RED. CON. RED. ECC.													
O’LET	MATERIAL	ASTM A 105				ASTM A 105 (CHARPY)													
	END DETAIL	SW,6000#				SW,3000#				BW									
	DIMENSION STD.	MSS–SP97				MSS–SP97													
	TYPE	SOCKOLET				WELDOLET													

REV NO		DATE	ZONE	DESCRIPTIONS		BY	APPRO	REFERENCES		DRG. NO.
SECTION:		OIL & GAS		NATURAL GAS PIPELINE PROJECT		PIPING MATERIAL SPECIFICATIONS		300# (B1A)		 ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड BRIDGE AND ROOF CO. (INDIA) LTD.
SCALE :		N.T.S.		APPENDIX-II		REV 0		(SH. 2 OF 2)		0

ANSI CLASS: 300#	CORROSION ALLOWANCE: 1.5MM	TEMP °C	-45	38	50	80	100	120	150
		PRESS. KG/CM ² g	48.95	48.95	48.44	46.72	46.19	45.54	44.76
SERVICE : RLNG		BASE MATERIAL: CARBON STEEL (MATERIAL GROUP 1.3)							

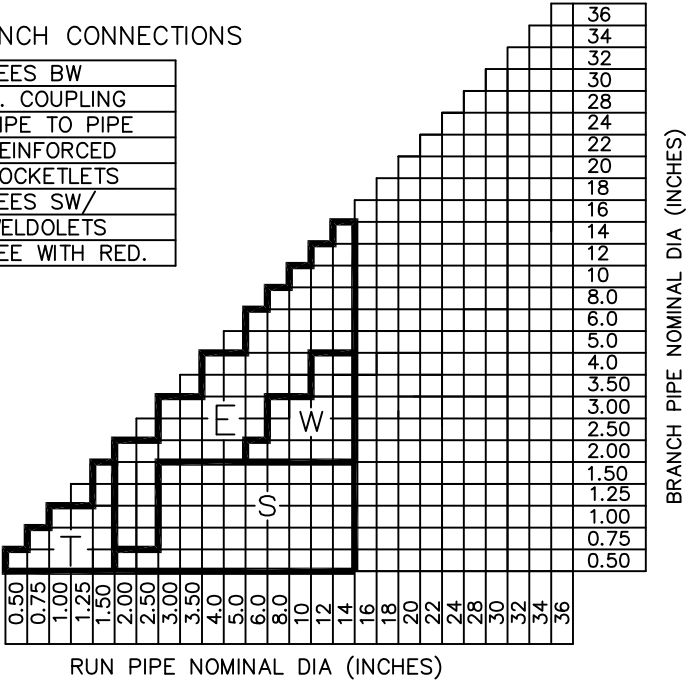
- NOTES: -
1. ALL VENTS & DRAIN SHALL BE PROVIDED WITH PLUG VALVE UNLESS MENTIONED OTHERWISE IN P&IDs.
 2. FITTINGS SHALL BE OF SEAMLESS CONSTRUCTION UP TO 16" AND SHALL BE OF WELDED CONSTRUCTION 18" AND ABOVE.
 3. WALL THICKNESS FOR LINEPIPE USED IN VARIOUS SECTIONS SHALL BE AS PER TABLE-1 OF PMS.
 4. BALL VALVE TO BE USED IN MAINLINE SHALL HAVE BUTT WELDED ENDS EXCEPT FOR THE VALVES USED FOR HOT TAPPING WHICH SHALL BE ONE SIDE BUTT WELDED AND OTHER SIDE FLANGED.
 5. PROCUREMENT OF MATERIALS SHALL BE AS PER DETAILED RELEVANT SPECIFICATIONS.
 6. PRESSURE-TEMPERATURE RATING INDICATED ARE FOR FLANGES ONLY IN ACCORDANCE WITH ANSI B 16.5
 7. FOR VALVES,STEELPIPE AND ASSOCIATED STEEL COMPONENTS OF 2" & LARGER NOTCH TOUGHNESS PROPERTIES SHALL BE AS SPECIFIED. IN RELEVANT SPECIFICATIONS/CODES, **BANDR** STANDARD TECHNICAL SPECIFICATIONS AND DATA SHEETS ETC.
 8. AT STATIONS, BRANCH CONNECTIONS SHALL BE AS PER BRANCH CONNECTION TABLE BELOW
 9. ALL BUTT WELDS SHALL BE 100% RADIOGRAPHED.
 10. 100% OF SOCKET WELD SHALL BE SUBJECTED TO MPI/DPT.
 11. PRESSURE-TEMPERATURE RATING OF VALVE BODY SHALL BE AS PER API 6D.
 12. PIPELINE DESIGN CODE - ASME B 31.8 & OISD 226.
 13. FOR PIPELINE SPECIALITY ITEMS (SCRAPPER TRAP, FLOW TEE, IJ, LR BENDS ETC.) AND THEIR MATERIAL DESCRIPTIONS REFER DATA SHEET OF RESPECTIVE ITEMS.
 14. DESIGN PRESSURE &TEMP. FOR PIPELINE AND RELATED FACILITIES ARE 49 KG/cm²g &(-45° TO +65° C) RESPECTIVELY.

STATION PIPING MATERIAL SPECIFICATION

ITEM	SIZE	DESCRIPTION
MAINTENANCE JOINTS	ALL	FLGD., BUT TO BE KEPT MINIMUM
PIPE JOINTS	1.5" & BELOW	SOCKET WELD
	2" & ABOVE	BUTT WELDED
DRAINS	ON LINES ≤ 1.5"	3/4",
	ON LINES ≥ 2"	3/4"
VENTS	ON LINES ≤ 1.5"	3/4",
	ON LINES ≥ 2"	3/4"
TEMP. CONN.	1.5"	FLGD. INSTL.
PRESS CONN.	3/4"	NIPPLE WITH BALL VALVE TO SPEC. INSTALLATION

BRANCH CONNECTIONS

E	TEES BW
H	H. COUPLING
P	PIPE TO PIPE
R	REINFORCED
S	SOCKETLETS
T	TEES SW/
W	WELDOLETS
D	TEE WITH RED.



REV NO

DATE

ZONE

DESCRIPTIONS

BY

APPRO

REV NO

DATE

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WELDING SPECIFICATION CHARTS TO SPECIFICATION FOR WELDING OF ONSHORE GAS PIPELINES NO.: BR/TS/016

Terminal Piping: PIPING CLASS:		A1A, A3A, B1A, D1A, E1A	
MATERIAL SPECIFICATIONS	PIPES	ASTM A106 GR.B, API 5L GR B PSL 2, API 5L GR X-65 PSL 2, API 5L GR X-70 PSL 2, IS-1239 (BLACK) ASSORTED PIPES	
	FITTINGS	ASTM A105, ASTM A234 GR. WPB, ASTM A234 GR. WPB-W, MSS SP-75 GR. WPHY-52, MSS SP-75 GR. WPHY-65	
	FLANGES	ASTM A105, ASTM A694 GR. F-52, ASTM A694 GR. F-70, ASTM A516 GR. 70	
	OTHERS	-	
BASE METAL 'P' NO		1	
WELDING PROCESS	GROOVE JOINTS SINGLE SIDE BEVEL		
	BUTT		OTHER THAN BUTT
	ROOT PASS: GTAW / SMAW	FILLER PASS: GTAW / SMAW	ROOT PASS: GTAW / SMAW
	FILLER PASS: SMAW / GTAW		
FILLET JOINTS / SOCKET JOINTS : SMAW			
WELDING MATERIAL	GROOVE JOINTS		
	BUTT		OTHER THAN BUTT
	ROOT PASS : ER70S-2 / E6010 HOT PASS : ER70S-2 / E7018-1	FILLER & CAP PASS ER70S-2 / E7018-1	ROOT PASS : ER70S-2 HOT PASS : ER70S-2 / E7018-1
	FILLER PASS : ER70S-2 / E7018-1		
	FILLET JOINTS / SOCKET JOINTS : E7018-1.		
BACKING RING : N.A.		CONSUMABLE INSERT : N.A.	
JOINT PREPARATION		ASME SEC. -IX, latest edition	
GASES	PURGING :	SHIELDING : Argon	
GAS COMPOSITION	PURGING :	SHIELDING : 99.995%	
PREHEATING/ INTERPASS	PREHEAT TEMP: 10⁰C -100⁰C INTERPASS: Max 200⁰C		POST HEATING : N.A.
CONTINUITY OF WELDING AND PREHEAT : REFER TO SPECIFICATION			
POST WELD HEAT TREATMENT	HOLDING TEMP :		HOLDING TIME :
	RATE OF HEATING:		MIN. HOLDING TIME :
	METHOD OF COOLING :		RATE OF COOLING :
MECHANICAL PROPERTY REQUIREMENTS	CHARPY 'V' NOTCH VALUE :		MIN: 22 J
	AT TEMPERATURE :		AVERAGE : 27 J
	HARDNESS :		0°C
CODE OF FABRICATION :		ASME SEC. -IX / B 31.8/ OISD 226, latest edition	
TECHNICAL NOTES :			

 BRIDGE AND ROOF CO. (INDIA) LTD.	WELDING SPECIFICATION CHART	Specification No.: BR/TS/019	Rev.0
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WELDING SPECIFICATION CHARTS TO SPECIFICATION FOR WELDING OF ONSHORE GAS PIPELINES NO.: BR/TS/016

Terminal Piping: PIPING CLASS:		A4A, B4A, D4A, E4A	
MATERIAL SPECIFICATIONS	PIPES	ASTM A 333 GR.6 ASSORTED PIPES	
	FITTINGS	ASTM A 350 GR.LF2, ASTM A 420 GR.WPL6, ASTM A 420 GR.WPL6-W	
	FLANGES	ASTM A 350 GR.LF2	
	OTHERS	-	
BASE METAL 'P' NO		1	
WELDING PROCESS	GROOVE JOINTS SINGLE SIDE BEVEL		
	BUTT		OTHER THAN BUTT
	ROOT PASS: GTAW / SMAW	FILLER PASS: GTAW / SMAW	ROOT PASS: GTAW FILLER PASS: SMAW / GTAW
	FILLET JOINTS / SOCKET JOINTS : SMAW		
WELDING MATERIAL	GROOVE JOINTS		
	BUTT		OTHER THAN BUTT
	ROOT PASS : ER70S-2 / E6010 HOT PASS : ER70S-2 / E7018-1	FILLER & CAP PASS ER70S-2 / E7018-1	ROOT PASS : ER70S-2 / E6010 HOT PASS : ER70S-2 / E7018-1 FILLER PASS : ER70S-2 / E7018-1
	FILLET JOINTS / SOCKET JOINTS : E7018-1		
	BACKING RING : N.A.		CONSUMABLE INSERT : N.A.
JOINT PREPARATION		ASME SEC. -IX, latest edition	
GASES	PURGING :		SHIELDING : Argon
GAS COMPOSITION	PURGING :		SHIELDING :99.995%
PREHEATING	PREHEAT TEMP: 10⁰C -100⁰C INTERPASS: Max 200⁰C		POST HEATING :
CONTINUITY OF WELDING AND PREHEAT : REFER TO SPECIFICATION			
POST WELD HEAT TREATMENT	HOLDING TEMP :		HOLDING TIME :
	RATE OF HEATING:		MIN. HOLDING TIME :
	METHOD OF COOLING :		RATE OF COOLING :
MECHANICAL PROPERTY REQUIREMENTS	CHARPY 'V' NOTCH VALUE :		MIN: 22 J AVERAGE : 27 J
	AT TEMPERATURE :		0°C
	HARDNESS :		
CODE OF FABRICATION :		ASME SEC. -IX / B 31.8 / OISD 226, latest edition	
TECHNICAL NOTES :			

 BRIDGE AND ROOF CO. (INDIA) LTD.	WELDING SPECIFICATION CHART	Specification No.: BR/TS/020	Rev.0
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SPECIFICATION FOR GASKETS, BOLTS & NUTS

SPECIFICATION NO.: BR/TS/017



BRIDGE AND ROOF CO. (INDIA) LTD.

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West Bengal, India.

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
TITLE	GASKETS, BOLTS & NUTS	DOCUMENT NO. BR/TS/017	Page 1 of 1
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C O N T E N T S

<u>SL.NO.</u>	<u>DESCRIPTION</u>
1.0	GASKETS
2.0	NUTS AND BOLTS

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TECHNICAL NOTES FOR GASKETS

- 1.0 All gaskets shall conform to the codes/standards and specifications given in the requisition. Vendor shall strictly comply with MR / PR stipulations and no deviations shall be permitted.
- 2.0 Process of manufacture, dimensions and tolerances not specified in requisition shall be in accordance with the requirements of the manufacturer's standards.
- 3.0 Test reports shall be supplied for all mandatory tests for gaskets as per the standards specified in the requisition.
- 4.0 Chemical composition and hardness of RTJ gaskets shall also be furnished in the form of test reports on samples.
- 5.0 For Spiral wound material following shall be furnished:
 - a. Manufacturer's test certificate for filler material and spiral material as per the relevant material specifications.
 - b. Manufacturer's test certificate for raw materials and tests for compressibility / seal-ability & recovery as per the relevant material specifications.
- 6.0 Full face gaskets shall have bolt holes punched out.
- 7.0 Filler material for spiral wound gaskets shall not have any colour or dye.
- 8.0 All spiral wound gaskets shall be supplied with Outer ring. Material of the outer ring shall be CS unless other wise specified in the MR.
- 9.0 For spiral wound gaskets, material of Inner Compression ring shall be same as Spiral Strip material. In addition to the requirements as per code and as specified in the MR, inner rings shall be provided for the following:
 - a. Sizes 26" and above.
 - b. Class 900 and above.
- 10.0 Hardness of metallic RTJ gaskets shall not exceed the values specified below unless otherwise specified in MR :

Ring Gasket Material

Maximum Hardness (BHN)

Soft Iron	90
Carbon steel	120
5 Cr. ½ Mo	130
Type 304, 316, 321, 347	140
Type 304L, 316L	120

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- 11.0 Face finish of metallic RTJ gaskets shall be 32 to 63 AARH.
- 12.0 Gaskets of different types and sizes shall be placed in separate shipping containers and each container clearly marked with the size, rating, material specification and item code.
- 13.0 All items shall be inspected and approved by B AND R :tor or any other agency authorized by B AND R
- 14.0 Any additional requirements specified in the requisition, shall be fully complied with.
- 15.0 Non-metallic ring gaskets as per ASME B16.21 shall match flanges to ASME B16.5 upto 24" (except 22" size) and to ASME B16.47B above 24" unless specified otherwise. For 22" size, the matching flange standard shall be MSS-SP44 unless specified otherwise.
- 16.0 Spiral wound gasket as per ASME B16.20 shall match flanges to ASME B16.5 upto 24" (except 22" size) and to ASME B16.47B above 24" unless specifically mentioned otherwise. For 22" size, the matching flange standard shall be MSS-SP44 unless specified otherwise.
- 17.0 The following abbreviations have been used in the Material Requisition for Spiral Wound Gaskets :
- | | | |
|--------|---|---------------------------|
| (I) | : | Inner Ring |
| (O) | : | Outer Ring |
| CAF | : | Compressed Asbestos Fibre |
| GRAFIL | : | Grafoil Filler |

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TECHNICAL NOTES FOR BOLTS & NUTS

- 1.0 The process of manufacture, heat treatment, chemical & mechanical requirements and marking for all stud bolts, m/c bolts, jack screws & nuts shall be in accordance with the codes / standards and specification given in the requisition. The applicable identification symbol in accordance with the material specification shall be stamped on each bolt and nut. Vendor shall strictly comply with MR / PR stipulations and no deviations shall be permitted.
- 2.0 Test reports shall be supplied for all mandatory tests as per the relevant material specifications.
- 3.0 Material test certificate shall also be furnished. (Heat Analysis, Product Analysis and Mechanical Requirement)
- 4.0 Stress Rupture Test as detailed in ASTM A453 shall be carried out for all ASTM A453 bolting material irrespective of the temperature.
- 5.0 All bolting shall be as per ANSI B 18.2.1 for studs. M/c bolts and jackscrews and ANSI BI8.2.2 for nuts.
- 6.0 Threads shall be unified (UNC for 1" dia and BUN for > 1" dia) as per ANSI B.1.1 with class 2A fit for studs, M/c bolts and jackscrews and class 2B fit for nuts.
- 7.0 Stud bolts shall be threaded full length with two heavy hexagonal nuts. Length tolerance shall be in accordance with the requirement as per ANSI B 16.5.
- 8.0 The nuts shall be double chamfered, semi-finished, heavy hexagonal type and shall be made by the hot forged process and stamped as per respective material specification.
- 9.0 Heads of jackscrews and m/c bolts shall be heavy hexagonal type. Jackscrew end shall be rounded.
- 10.0 Each size of studs & m/c bolts with nuts and jackscrews shall be supplied in separate containers marked with size and material specifications. 'CRYO' shall be marked additionally in case 'CRYO' is specified in the requisition.
- 11.0 All items shall be inspected and approved (stagewise) by Consultant inspector or any other agency authorized by Consultant/Client .
- 12.0 The heat treatment for stud bolts & nuts shall be as per code unless mentioned otherwise.
- 13.0 All austenitic stainless steel bolts, nuts, screws shall be supplied in solution annealed condition unless specified otherwise in the material specification.
- 14.0 Any additional requirements specified in the requisition shall be fully complied with.

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- 15.0 Stud bolts, nuts & jackscrews shall be impact tested wherever specified in the material specification and also where the material specification is indicated as "CRYO". For" S.S. nuts and bolts minimum impact energy absorption shall be 27 Joules and test temperature shall be -196°C unless mentioned otherwise. For other materials impact energy and test shall be as per respective code.
- 16.0 Bolts / nuts of material of construction B7M / 2HM shall be 100% Hardness tested as per supplementary requirement S3 of ASTM A 193.
- 17.0 When specified as galvanized, the studs, m/c bolts and nuts shall be 'hot dip zinc coated' in accordance with requirements of 'class C' of 'ASTM A 153'. As an alternative, electro-galvanizing as per IS 1573, 'Service Grade Number 2' is also acceptable.
- 18.0 All Stud Bolts of Bolt diameter size 1" and above shall be provided with three nuts irrespective of whatever has been specified elsewhere in the MR.

SPECIFICATION FOR PRE-COMMISSIONING AND COMMISSIONING OF PIPELINE PROJECT

SPECIFICATION NO.: BR/TS/018



BRIDGE AND ROOF CO. (INDIA) LTD.

4th & 5th Floor, Kankaria Centre,
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BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
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C O N T E N T S

<u>SL. NO.</u>	<u>DESCRIPTION</u>
1.0	INTRODUCTION
2.0	GENERAL
3.0	THE WORK
4.0	PRE-COMMISSIONING
5.0	PRE-COMMISSIONING CHECKS
6.0	COMMISSIONING
7.0	DOCUMENTATION

BRIDGE AND ROOF CO.(I) LTD	STANDARD TECHNICAL SPECIFICATION		
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1.0 **INTRODUCTION**

This specification covers the minimum technical requirements for pre-commissioning and commissioning of hydrocarbon pipeline, including commissioning activities such as pre-commissioning checks, flushing of terminal piping, dewatering, swabbing and nit rogen purging.

2.0 **GENERAL**

The scope of work for testing and commissioning including pre-commissioning activities shall include, but not be limited to the manpower, machinery & equipment, detailed procedures, materials and consumables, communications etc. to perform the work satisfactorily.

Contractor shall prepare detailed procedures for flushing of terminal piping, dewatering, swabbing, inertisation and commissioning of the pipeline, covering all aspects of work for company's approval. This shall include, but not be limited to, the sequence and description of all operations, data on materials, equipment, instruments, consumables, communications systems, necessary calculations, detailed time schedule and organisation chart.

The Contractor shall be responsible for demonstrating the successful completion of all the activities i.e. flushing of terminal piping, dewatering, swabbing, inertisation and commissioning of the pipeline. All necessary work to perform the job successfully including necessary modifications required shall be the responsibility of the Contractor.

Contractor shall design and supply all temporary line connections, valves, instruments, etc. as required during the various operations.

In the event of any detail which is not fully addressed, it is warranted by Contractor that work shall be performed in accordance with company's specification and the best recognised practices in the on-shore pipeline industry.

3.0 **THE WORK**

The work to be performed by the Contractor shall consist of the following activities :

- Pre-commissioning : Entire pipeline project shall be checked with respect to latest P&ID's and other design specification.
- Dewatering : Removal of hydrotest water from the entire pipeline network system.
- Swabbing : Reducing the amount of remaining water in the main pipeline system which is left behind after completion of the dewatering operations to make the pipeline free of water.

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Inertisation : Inertising the entire pipeline with nitrogen.

Commissioning : Charging the entire pipeline network with the product and achieving normal operating conditions of the pipeline.

4.0 **PRE-COMMISSIONING**

In order to execute and perform pre-commissioning activities, the pipeline contractor shall be responsible for (but not limited to) the following :

- Carrying out pre-commissioning checks of the pipeline system including Pig Launchers / Pig Receiver at Despatch Station / Tap-off Stations / Receipt Stations, Sectionalizing Valve (SV) Stations and their associated facilities under the scope of work to ascertain that the project has been mechanically completed in all respects.
- Checking of field instruments, laying out survey of pipeline, checking of communication system, checking of Electrical, Instrumentation system, controls & interlock etc.
- Dewatering of Pipeline and above ground piping, flushing / air-blowing and leak testing of piping i.e. piping and equipments under their scope of work.
- Operation of machinery and equipment for pre-commissioning.
- Supply and use of materials / consumables as required for the pre-commissioning activities.
- Erection of all temporary facilities like pig launcher / receiver, line connections, spool pieces, pigs and requisite accessories, valves, instruments, manpower etc. as required during various operations.
- Preparation of detailed pre-commissioning procedures, activity schedules, bar charts, schemes etc.

This shall include preparation of detailed procedures for dewatering, electronic geometric pigging / calliper pigging (By other Contractor), idle time preservation (if applicable), removal of idle time preservers (if applicable, flushing / blowing, leak testing and shall address the sequence and methodology describing all operations, data on materials, equipments, instruments, consumables (e.g. Pigs and associated Items), communication systems, necessary calculations, detailed time schedule and organization Chart.

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- All necessary work to perform the job successfully including all modifications that would be required at various stages.

The pipeline contractor shall demonstrate to the OWNER / CONSULTANT (for approval) the successful completion of all the above-mentioned activities.

5.0 **PRE-COMMISSIONING CHECKS**

- 5.1 The pre-commissioning checks shall be carried out for the pipeline to ascertain that the pipeline system has been mechanically completed in all respects. These checks shall cover the main pipeline including distribution network system and sectionalising valve stations. The pre-commissioning checks shall include the following:

i) System Checks

The entire facilities shall be checked against the latest P&ID's, Engineering & Vendor Drawings / Documents and other design specification codes. Any shortcoming observed shall be listed down in the form of punch list s and t hese should be duly attended or liquidated. The pipeline contractor should check the stations systems from the angle of pre-commissioning and commissioning and spell out any additional requirement of vents / drains, temporary arrangement / modification etc. that may be required during the pre-commissioning and commissioning activities and arrange for the same in consultation with the OWNER / CONSULTANT representative.

ii) Checking of Field Instruments

All the field instruments like control valves, sectionalising valves, transmitters, solenoid valves, shut down switches, alarms etc. shall be checked physically and also for their intended application by simulating the operating conditions. It will also include checking of different meters, gauges action of shutdown valves etc. as applicable.

iii) Survey of the Pipelines

This shall be per formed to confirm that proper fittings/ supports, route markets, fencing around SV Stations etc. have been installed along the pipeline.

iv) Checking of Communications System

This is to check that there is proper communications with adequate back-up power to ensure uninterrupted communication.

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v) Checking of Electrical Distribution System

This is to ensure safety and also to ensure an uninterrupted power supply during startup and normal pipeline operation.

vi) Checking of Instruments, Controls & Interlocks

This is to check that instrument controls and interlocks are functional as per the normal operating conditions.

vii) Checking of Utilities

This is to check that utilities like power, nitrogen, UPS system instrument air, etc. are available prior to startup.

viii) Any other checks as may be considered necessary.

5.2 **DEWATERING**

5.2.1 **General**

Dewatering of a pipeline section shall be done to facilitate EGP / caliper pigging. During the dewatering operation the major quantity of hydrotest water shall be removed from the main pipeline and distribution network. It is the responsibility of the Contractor to develop suitable dewatering procedure and submit for Company's approval.

The disposal of the water shall be performed such that no harm is done to the environment.

5.2.2 **Operational Requirements**

5.2.2.1 **Main Pipeline**

The dewatering operation shall consist of number of dewatering pig runs when air is used as propellant for pig trains.

Bi-directional cup pigs shall be used and will be suitable for traversing the entire length of the pipeline/ pipe segment being dewatered. Contractor shall ensure that all the pigs are designed to prevent damage to the pipeline internal coating, if any.

The Contractor shall propose the minimum speed and the back pressure of the pigs in order that continuous operation will be performed without the pig getting stuck. Contractor shall submit all the calculations regarding this procedure and a contingency plan for implementation in case the pigs get stuck.

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Contractor shall provide a suitable compressor for oil-free air with sufficient capacity and pressure.

Upon arrival of the pigs at the receiving end the Contractor in the presence of Company's representative shall remove the pigs without delay.

5.2.2.2 Aboveground Piping Terminal

The dewatering operation of the piping work in the stations shall consist of physically draining the water content in the piping work by opening low point drains and/or end flanges. If required, air shall be used to push-off water from the pipes, The pipeline contractor shall arrange suitable compressor for such purposes.

Flushing / Blowing of Aboveground Piping in the Terminal

Flushing / blowing of the above ground piping with water / air to remove debris / dirt / mud from within the piping has to be performed by the pipeline contractor. Subsequent to water flushing, to ensure complete cleanliness of the piping work, air blowing / cardboard blasting method has to be adopted. All Instruments, control valves, plates etc. to be dismantled from the piping work and any gap produced should be bridged with suitable temporary spool. Proper supporting of the piping, during such flushing / blowing activities is to be ensured by the pipeline contractor.

5.2.3 Acceptance Criteria

Before proceeding to the next stage of the inertisation operation Contractor shall ensure that bulk of the water has been removed from the pipeline. Contractor shall specify when the dewatering phase is finished and shall obtain approval of the company before proceeding to the next inertisation phase.

5.3 Swabbing

5.3.1 General

The swabbing operation is meant to reduce the remaining water in the pipeline to bring the pipeline into touch dry condition.

Swabbing operation shall be carried out to ensure that there is no free water left inside the pipeline. For swabbing, suitable foam pigs shall be used by pipeline contractor and will be suitable for traversing the whole length of the pipeline segment being swabbed. Before starting swabbing operation, the pipeline contractor has to weight the swabbing pigs and record. On arrival of the pigs at the receiving, the pipeline contractor to judge the weight gained by the swabbing shall again weight the pigs. This is done by driving number of swabbing pigs so that the weight increase in pig before and after the swabbing operation is

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not more than 25%. The Contractor shall submit the detailed procedure along with the duration of the swabbing operation and obtain approval of the company before starting the operation.

5.3.2 Acceptance Criteria

The Contractor shall ensure that the swabbing operation is considered to be completed when it is established that there is no free water left in the pipeline and the pipeline has achieved a touch dry condition requirement of EGP. This shall be subject to company's approval.

Note-1: After dewatering and swabbing of the main pipeline segment, other contractor shall carry out Electronic Geometry Pigging (EGP) / Calliper pigging of the pipeline.

Note-2: Ideally, EGP / Calliper pigging shall be followed by commissioning activities of the pipeline. If subsequent to EGP activities, commissioning activities of the pipeline is taken up after long time delay then adequate measures should be taken to preserve the pipeline during this idle period so that internal corrosion does not occur. Suitable preservative fluid should be introduced in the pipeline and the pipeline should be kept bottled up with this preservative inside it.

5.4 Internal Cleaning of Equipment

5.4.1 General

Equipments like Scraper Launcher, filters, Corrosion Inhibitor Dosing Tanks, Sump Tanks and Scraper Receiver are to be checked for Internal cleanliness and shall be ensured by the pipeline contractor.

5.4.2 Acceptance Criteria

The laying contractor has to demonstrate cleanliness of the internals of all equipment to the satisfaction of the Owner / Consultant and obtain approval for final box up of the equipment.

5.4.3 Trial Run of Rotating Equipments

The pipeline contractor has to arrange for trial run of the sump pump with water for short duration of time.

The pipeline contractor has to arrange all temporary arrangements required for such trial runs. The pipeline contractor has to submit procedure / method statement regarding how he plans to take such trial runs and take approval of the Owner / Consultant, before actually proceeding for the same. If pump vendor(s) is available for such trial run, the pipeline contractor has to provide all sorts of assistance to the vendor and help the vendor in completing the successful trial run.

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5.5 Drying

Unless otherwise stipulated the piping shall be dried with compressed air. The compressors used for drying shall have an absorption drying units with adequate dew point outlet.

Valves shall be drained as much as possible in the half – open position under air pressure through the vent pipes under the supervision of and in consultation with the Owner / Consultant. Manipulation of the valves without the supervision of the Owner / Consultant is strictly forbidden. The blowing shall be continued until a constant dew point of -8°C (or other dew point as per TS) is measured. Subsequently, the pipe shall be closed for 24 hours. If the dew point has not increased after 24 hours, the installation is considered dry.

- The piping to be dried must have the necessary measuring devices to measure constantly the temperature, pressure and dew point.
- The piping is considered dry if following several measurements in 24 hours and at several branches of the pipe the dew point measurements are constant and the desired value is not exceeded.

For faster drying, the Contractor may propose drying with heated Nitrogen. The temperature shall be limited to + 50°C.

5.6 Inertisation

During the inertisation operation, the air left in the pipeline shall be replaced by nitrogen before admitting the product hydrocarbon that the pipeline will ultimately carry.

The inertisation operation shall start as soon as possible after the swabbing operation has been completed and approved by the company. Contractor shall submit the detailed purging procedure for approval for the company prior to its implementation.

Nitrogen needed for inertisation of the pipeline, shall be provided by the Contractor. The maximum allowable oxygen content inside the pipeline shall be less than 1% by volume.

Multiple separation pigs with nitrogen slugs in between shall be used for pipeline commissioning. At least three batches of nitrogen separated by four separation pigs shall be used for inertisation of the pipeline during charging of gas in it. The combined nitrogen column length to be used for inertisation should be at least 5% of the total pipeline length.

5.6.1 Safety Review before start of commissioning

A pre-startup safety review shall be carried out of the pipeline system before permitting entry of hydrocarbon into the new facility. Owner/ Owner's representative shall also participate in the pre-startup safety review.

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6.0 COMMISSIONING

6.1 Ready for Commissioning

After completion of pre-commissioning activities and Owner approved safety start-up review followed by liquidation of review punch list points, the pipeline contractor shall notify the Owner / Consultant that the pipeline systems in totally are ready in all respects for hydrocarbon-in. 'Ready for commissioning status' shall be jointly assessed by Owner / Consultant, composite work contractor, pipeline contractor.

After such joint assessment, if all the criteria are met, it will then be declared by the Owner that the entire pipeline system has reached a stage of 'Ready for Commissioning'.

It should be noted that if the actual commissioning of the stations is taken up after idle time of sufficient length, then before starting the rotating equipment again, revisioning of the rotating equipments has to be done in presence of pump vendor(s). The pipeline contractor has to provide all sorts of assistance during such revisioning activities.

6.2 Commissioning and Stabilization

The pipeline contractor shall be responsible for providing all necessary assistance to carry out commissioning activities under the overall guidance and super vision of Owner / Consultant for the entire pipeline system.

Commissioning of pipeline shall be considered completed when the line is charged with product hydrocarbon at operating pressure and the total system operated at normal operating parameters for a minimum period of 72 hours with all the instruments, controls and interlocks working satisfactorily at normal operating conditions. Contractor shall submit a detailed commissioning procedure for company's approval.

7.0 DOCUMENTATION

Contractor shall submit for approval of the company the complete description, detailed procedure and time schedule of all the dewatering, swabbing, flushing / blowing, drying purging and commissioning operations, as applicable.

Documents shall also contain all procedures and safety plans to be followed while carrying out the activities.

Upon successful completion of the work, Contractor shall prepare a final report of the work which shall include necessary charts, diagrams, graphs, calculations, recordings, daily logs, measurements, details of the operation, etc. Report shall also include all certificates of calibration of instruments required together with records of calibration performed at site prior to the start of any operation.

7.1 Spares and Consumables

Supply of spares, tools and consumables for start-up & commissioning.

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7.2 Safety

Follow the safety practice during execution of pre-commissioning/ commissioning works as detailed in the scope of work. Maintain and follow all safety practices equivalent or better than those being practiced for the pipeline during pre-commissioning and commissioning

TECHNICAL SPECIFICATION FOR FABRICATION,
ERECTION AND PAINTING OF STEEL STRUCTURES,
GATES AND MISCELLANEOUS WORK

SPECIFICATION NO.: **BR/TS/063** (Rev-0)

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LIST OF ANNEXURES

Annexure - A Permissible Deviation in pitch and gauge of holes or bolts of normal accuracy

Annexure – B Tolerance of assembled components of steel structures

Annexure – C Tolerance in erected steel structures

Annexure – D Material of Construction

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**TECHNICAL SPECIFICATION FOR FABRICATION, ERECTION AND PAINTING OF
STEEL STRUCTURES AND CHAIN LINK FENCING**

1.0 GENERAL

- 1.1 This specification shall apply to general steelwork, for CNG & CGD distribution works. The structures shall include canopies, loading unloading platforms, hoarding, crossovers, ladders, Fencing and Fencing Gates, staircases, pipe supports, skid supports, sheds, stockades/trestles, Boundary wall MS Gate etc.

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SECTION-1: FABRICATION OF STEEL STRUCTURES

2.0 SCOPE OF WORK

2.1 The scope of work under fabrication includes, but not limited to, the following:

- a) Preparation and supply of material indents, bolt lists, bought out items list, etc.
- b) Procurement and collection of all material from stockyards/stores, including loading, transportation, unloading and stacking and storing on skids or supports.
- c) Procurement and collection of all consumables like bolts, nuts, washers, electrodes, paints, shims, packs, etc., including allowance for spares and wastage.
- d) Preparation and submission of modification/rectification sketches, As-Built drawings, erection drawings, bill of materials, and shipping documents for approval of CLIENT.
- e) Cold straightening of section and plates, whenever they are bent and kinked.
- f) Fabrication of all steel structural components covered under tender drawings, design drawings and generally described under the scope of the project.
- g) Making arrangements for and conducting tests such as chemical analysis, physical and mechanical tests on raw materials where specified/as directed by CLIENT.
- h) Control Assembly of steel structural components at shop, wherever required.
- i) Preparation of steel structural surfaces for painting as provided in the specifications/drawings.
- j) Application for one primer coat of painting at shop, as specified in the design drawing/specifications.
- k) Loading, transportation from fabrication workshop to site of erection and unloading of all steel structural components/units/assemblies.
- l) Preparation of 'As-built' drawings.

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3.0 MATERIALS

3.1 Structural Steel

3.1.1 Structural steel and other related materials for construction shall conform to Annexure-D.

3.1.2 Due to non-availability of specified materials, suitable substitutions may be provided with the consent of CLIENT. Such substitution shall be incorporated in the "As-built" drawings.

3.1.3 All the items are to be cut as per requirements of the drawing. If joints are to be provided in any item in order to meet requirements of size and shape, cutting plan showing locations of joints shall be prepared for consideration of purchaser. Joints provided shall be incorporated in "As-built" drawings.

3.1.4 Rolling and cutting tolerances shall be as per IS:1852-2017.

3.1.5 Only tested materials shall be used unless use of untested materials for certain secondary structural members is permitted by CLIENT. If test certificate for the material is not available from the main producer, the following tests shall be carried out at the discretion of CLIENT:

- a) Chemical Composition
- b) Mechanical Properties
- c) Weldability test

3.2 Bolts and Nuts

3.2.1 Black hexagonal bolts, nuts and lock nuts shall conform to IS:1363-2002.

3.3 Electrodes

3.3.1 Electrodes shall conform to IS:814-2019.

4.0 STORING OF MATERIALS

4.1 Materials shall be stored and stacked properly ensuring that place is properly drained and is free from dirt. It shall be ensured that no damage is caused due to improper stacking.

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5.0 MATERIAL PREPARATION

- 5.1 Cut edges shall be finished smooth by grinding or machining wherever necessary. Sufficient allowance (3mm to 5mm) should be kept in the items incase machining is necessary.
- 5.2 Cutting may be affected by gas cutting, shearing, cropping or sawing.
- 5.3 Straightening and bending shall be done in cold condition as far as practicable.
- 5.4 If required, straightening and bending may be done by application of heat between 900°C and 1100°C. Cooling down of the heated item shall be done slowly.

6.0 DRILLING AND PUNCHING OF HOLES

- 6.1 Drilling and punching of holes for bolts shall be in accordance with IS:800-2007, unless otherwise specified by CLIENT.
- 6.2 Drifting of holes for bolts during assembly shall not cause enlargement of holes beyond permissible limit or damage the metal.
- 6.3 Holes for bolted connection should match well to permit easy entry of bolts. Gross mismatch of holes shall be avoided.
- 6.4 Permissible deviation in holes for mild steel bolts of normal accuracy and high strength bolts are given in the Annexure-A.

7.0 ASSEMBLY FOR FABRICATION

- 7.1 Fabrication of all structural steelwork shall be in accordance with IS:800-2007 and in conformity with various clauses of this Specification, unless otherwise specified in the drawings.
- 7.2 Fabrication of structures shall preferably be taken up as per the sequence of erection.
- 7.3 All erection units shall bear reference drawing no. at a prominent location on the structures for easy identification at site.
- 7.4 Fabricated structures shall conform to tolerance as specified in this Specification and in IS:7215-2016. In case of contradiction, tolerance specified in this Specification shall prevail.

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- 7.5 All the components of structures shall be free from twist, bend, damage, etc.
- 7.6 Splice joints shall generally be of full strength butt weld and wherever possible, shall be located at zones of minimum or substantially lesser stress.
- 7.7 Splice joints of flange and web should preferably be staggered.
- 7.8 Where necessary, washers shall be tapered or otherwise suitably shaped to give the heads of nuts and bolts satisfactory bearing.
- 7.9 The threaded portion of each bolt shall project through the nut at least by one thread.
- 7.10 Tolerance of assembled components of structures are given in Annexure-B.
- 7.11 Permissible deviations from designed (true) geometrical form of the despatch elements shall be in accordance with IS:7215-2016.
- 8.0 **WELDING**
- 8.1 The Contractor shall work out welding procedure for CLIENT's approval, considering the following factors:
- i) Specification and thickness of steel.
 - ii) Specification of electrode or/and base wire.
 - iii) Welding process (manual arc welding, submerged arc welding).
 - iv) Type of structures to be welded (thickness of components meeting at a joint).
 - v) Sequence of welding.
 - vi) Weather condition.
 - vii) Inspection procedure to be followed
 - viii) Design requirements of the joints.
- 8.2 All metal arc welding shall be carried out as per IS:9595-1996.
- 8.3 Electrode shall conform to Clause no. 3.3 of this Specification.
- 8.4 Electrodes shall be stored in a dry place. Electrodes whose coatings are damaged due to absorption of moisture or due any other reason shall not be used.
- 8.5 Recommendations of electrode manufacturer are to be strictly followed.

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- 8.6 Welding surface shall be smooth, uniform, free from fins, tears notches or any other defect which may adversely affect welding.
- 8.7 For multi-run weld deposit, the next run should be done only after thorough removal of slag and proper cleaning of surface.
- 8.8 Fillet weld shall have the correct profile with smooth transition into parent metal. Dressing of welds, if specified, shall be done by such method which does not cause grooving and other surface defects on the weld or on the parent metal.
- 8.9 Fillet welds shall not be stopped at corners but shall be returned round them.
- 8.10 Welding shall not be done under such weather conditions which might adversely affect the efficiency of the welding.
- 8.11 Ends of structural members and portions of gussets receiving welding at site shall be left unpainted.
- 8.12 Permissible deviation in assembly of weld joints shall be in accordance with Annexure-C.
- 9.0 **INSPECTION & TESTING**
- 9.1 CLIENT/Inspector shall have free access at all times to those parts of Contractor's or his Sub-contractor's works which are concerned with the fabrication of steel works and shall be afforded all reasonable facilities at all stages of preparation, fabrication and trial assemblies for satisfying himself that the fabrication is being undertaken in accordance with the provisions of relevant specification.
- 9.2 All gauges and templates, tools, apparatus, labour and assistance for checking shall be supplied by the contractor free of charge. CLIENT/Inspector may, at his discretion, check the test results obtained at the Contractor's works, by independent test at the Government Test House or elsewhere, and should the material so tested be found to be unsatisfactory, the cost of such test shall be borne by the Contractor.
- 9.3 Contractor shall make all necessary arrangements for stage inspection by CLIENT/Inspector during the fabrication at shop and incorporate all on-the-spot instructions/ changes conveyed in writing to the Contractor.
- 9.4 Material improperly detailed or wrongly fabricated shall be reported to CLIENT/Inspector and shall be made good as directed. Minor misfits which can be remedied by moderate use of drift pins, and moderate amount of reaming and slight chipping may be corrected in that manner, if

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in the opinion CLIENT/Inspector, the strength or appearance of the structure will not be adversely affected. In the event CLIENT/Inspector directs otherwise, the items will be rejected and a completely new piece shall be fabricated. The cost of correcting errors shall be to the account of the Contractor.

9.5

- i) CLIENT/Inspector shall have the power:
 - a) To certify, before any structure is submitted for inspection, that the same is not in accordance with the contract, owing to the adoption of any unsatisfactory method of fabrication.
 - b) To reject any structure as not being in accordance with Specification and drawings.
 - c) To insist that no structure or parts of the structure once rejected is resubmitted for inspection/test, except in cases where CLIENT/ Inspector considers the defects as rectifiable.
- ii) If, on rejection of structure by CLIENT/Inspector, the Contractor fails to make satisfactory progress within the stipulated period, CLIENT/Inspector shall be at liberty to cancel the contract and fabricate or authorize the fabrication of the structures at any other place he chooses, at the risk and cost of the Contractor, without prejudice to any action being taken in addition to terms of General Conditions of Contract.
- iii) CLIENT/Inspector's decision regarding rejection shall be final and binding on the Contractor.
- iv) The Specifications prescribe various tests at specified intervals for ascertaining the quality of the work done. If the tests prove unsatisfactory, CLIENT/Inspector shall have liberty to order the Contractor to re-do the work, done in that period and/or to order such alterations and strengthening that may be necessary at the cost of the Contractor and the contractor shall be bound to carry out such orders failing which the rectification/redoing will be done by CLIENT through other agencies and the cost recovered from the Contractor.
- v) Notwithstanding any inspection at the workshop, CLIENT/Inspector shall have the liberty to reject, without being liable for compensation any fabricated members or materials brought to site that do not conform to specifications/drawings.
- vi) All rejected materials shall be removed from the site of fabrication by the Contractor at his own cost and within the time stipulated by CLIENT/Inspector.

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10.0 CONTROL IN WELDING

10.1 The extent of quality control in respect of welds for structural elements shall be as follows and shall be conducted by the contractor at his own cost:

a) Visual Examination - All welds shall be 100% visually inspected to check the following:

- i) Presence of undercuts
- ii) Visually identifiable surface cracks in both welds and base metals
- iii) Unfilled craters
- iv) Improper weld profile and size
- v) Excessive reinforcement in weld
- vi) Surface porosity

Before inspection, the surface of weld metal shall be cleaned of all slag, spatter matter, scales etc. by using wire brush or chisel.

b) Dye Penetration Test (DPT) - This shall be carried out for all important fillet welds and groove welds to check the following :

- i) Surface cracks
- ii) Surface porosity

Dye Penetration Test shall be carried out in accordance with American National Standard ASTM E165.

11.0 ACCEPTABLE LIMITS OF DEFECTS IN WELD

11.1 The limits of acceptability of defects detected during visual inspection and Dye Penetration Test shall be in accordance with clause 8.15.1 American National Standard ANSI/AWS D1.1-96.

12.0 RECTIFICATION OF DEFECTS IN WELDS

12.1 In case of detection of defects in welds , the rectification of the same shall be done as follows :

- i) All craters in the weld and breaks in the weld run shall be thoroughly filled with weld.

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- ii) Undercuts, beyond acceptable limits, shall be repaired with dressing so as to provide smooth transition of weld to parent metal.
- iii) Welds with cracks and also welds with incomplete penetration, porosity, slag inclusion etc. exceeding permissible limits shall be rectified by removing the length of weld at the location of such defects plus 10 mm from both ends of defective weld, and shall be re-welded. Defective weld shall be removed by chipping hammer, gouging torch or grinding wheel. Care shall be taken not to damage the adjacent material.

13.0 DESPATCH INSTRUCTIONS

Each despatchable structure shall bear mark no. along with reference drawing number at two prominent locations.

- 13.1 "As-built" drawings shall be prepared after fabrication is completed to indicate additions/alterations made during the process of fabrication. (Refer clause 3.1.2 & 3.1.3.)
- 13.2 Center lines of column flanges and both sides of web shall be punched, preferably at top and bottom to facilitate alignment after erection.

14.0 COMPLETION DOCUMENTS

- 14.1 On completion of work, the Contractor shall submit to CLIENT the following documents:
 - a) The technical documents according to which the work was carried out.
 - b) Copies of the "As built" drawings showing thereon all additions and alterations made during fabrication.
 - c) Manufacturer's test certificates
 - d) Certificates/documents on control checking
 - e) Test of welds
- 14.2 Inspection Certificates shall be issued to the contractor for the structures found acceptable in all respects by CLIENT/Inspector.

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SECTION-2: ERECTION OF STEEL STRUCTURES

15.0 SCOPE OF WORK

In addition to provision of erection and transport equipment, the scope of work includes supply of tools and tackles, consumables, materials, labour and supervision and shall cover the following:

- a) Storing and stacking of all fabricated structural components/units/ assemblies at site storage yards till the time of erection.
- b) Transportation of structures from storage yard to site of erection, including multiple handling, if required.
- c) All minor rectification/modifications such as:
 - i) Removal of bends, kinks, twists etc. for parts damaged during transportation and handling.
 - ii) Reaming of holes which do not register or which are damaged, for use of next higher size bolt.
 - iii) Plug welding and re-drilling of holes which do not register and which cannot be reamed for use of next higher size bolt.
 - iv) Drilling of holes which are either not drilled at all or are drilled in incorrect position during fabrication.
- d) Fabrication of minor missing items as directed by CLIENT.
- e) Verification of the position of embedded anchor bolts and inserts w.r.t. line find levels, installed by others based on Geodetic Scheme/Bench mark/ Reference co -ordinates taken by the Contractor.
- f) Rectifying at site damaged portions of shop primer by cleaning and application touch-up paint.
- g) Erection of structures including making connections by bolts/welding as per drawing.
- h) Alignment of all structures true to line levels plumb and dimensions within specified limits of tolerance.

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- i) Application at site after erection, required number of coats of primer and finishing paint as per specification and drawing.
- j) Rectification of structures as per instructions of the Engineer-Incharge.

16.0 STORING AND HANDLING

- 16.1 Storage of structures shall be preferably be done in such a manner that erection sequence is not affected.
- 16.2 While storing, care shall be taken so that structures do not come in direct contact with the earth surface and accumulated water.
- 16.3 Stacking of the structures shall be done in such a way that, erection marks are visible easily and handling does not become difficult. Wherever required, wooden sleepers/grillage may be used.
- 16.4 Handling and storage of materials shall be as per IS:7969-2017, to ensure safety.

17.0 ERECTION

17.1 General

- 17.1.1 Erection shall be carried out in accordance with IS:800-2007 and other relevant standards referred to therein.
- 17.1.2 For safe and accurate erection of structural steelwork, staging, temporary support, false work, etc. shall be erected as required.
- 17.1.3 The fabricated materials received at erection site shall be verified with respect of marking on the key plan/marketing plan or shipping list.
- 17.1.4 Any material found damaged or defective shall be stacked separately and the damaged or defective portions shall be painted in distinct colour for identification and the same shall be brought to the notice of CLIENT.

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17.2 Erection Drawings

17.2.1 The approved erection drawings and any approved arrangement drg, specification or instruction accompanying them shall be followed in erecting structures.

17.3 Erection of Structures

17.3.1 Erection work shall be taken up after receipt of clearance from CLIENT.

17.3.2 For safety requirements during erection, provisions in IS:7205-2016, IS:7969-2017 and other relevant Indian standards shall be followed.

17.3.3 Erection shall be carried out with the help of maximum mechanization possible.

17.3.4 Prior to commencement of erection, all the erection equipment, tools, tackles, ropes, etc. shall be tested for their load carrying capacity. Such tests may be repeated at intermediate stages also if considered necessary and frequent visual inspection shall be done of all vulnerable areas and components to detect damages or distress in the erection equipment, if any.

17.3.5 Following shall be taken care of during erection, whenever necessary:

17.3.5.1 Erected members shall be held securely in place by bolts to take care of dead load, wind load and erection load.

17.3.5.2 All connections shall achieve free expansion and contraction of structures wherever provided.

17.3.5.3 No final bolting or welding of joints shall be done until the structure has been properly aligned.

17.3.5.4 Instrumental checking of correctness of initial setting out of structures and adjustment of alignment shall be carried out in sequence and at different stages as required. The final levelling and alignment shall be carried out immediately after completion of each section.

17.3.5.3 The Contractor shall design, manufacture, erect and provide falsework, staging temporary support etc. required for safe and accurate erection of structural steelwork and shall be fully responsible for the adequacy of the same.

17.3.5.4 The Contractor shall also provide facilities such as adequate temporary access ladders, gangways, tools & tackles, instruments, etc. to CLIENT/Inspector for his inspection at any stage during erection.

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17.4 Field Connections

17.4.1 Assembly by permanent bolts.

17.4.1.1 The numbers of washers on permanent bolts shall not be more than two (and not less than one) for the nuts and one for the bolt head.

17.4.1.2 Wooden rams or mallet shall be used in forcing members into position in order to protect the metal from injury or shock.

17.4.1.3 Where bolting is specified on the drawing, the bolts shall be tightened to the maximum limit. The threaded portion of the each bolt shall be project through the nut by at least one thread. Tapered washers shall be provided for all heads and nuts to achieve uniform bearing on sloping surface.

17.4.1.4 To prevent loosening of nuts, spring washers or lock nuts shall be provided as specified in the design/shop drawings.

17.4.1.5 All machine fitted bolts shall be perfectly tight and the ends shall be checked to prevent nuts from becoming loose. No unfilled holes shall be left in any part of the structures.

17.4.2 Assembly by welding.

17.4.2.1 All field assembly by welding shall be executed in accordance with the requirements for shop fabrication. Where the steel has been delivered painted, the paint shall be removed before field welding for a distance of at least 50mm on either side of the joints to be welded.

17.4.2.2 All other requirements in welding shall be in accordance with clauses specified under Section-1 of this Specification

18.0 ACCEPTANCE STANDARD OF WELDING

18.1 Acceptance standard of welding shall be as specified in Section-1 of this Specification.

19.0 BEDDING AND GROUTING

19.1 Base plates shall be set to elevations shown on the drawings, supported aligned and levelled using steel wedges and shims or by other approved methods. Plates shall be levelled properly, positioned and the anchor bolts tightened.

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20.0 PAINTING AFTER ERECTION

20.1 The painting shall be as per painting specification (Section-4) of this Specification) and instruction given on drawings.

20.2 Site painting shall not be done in frosty or foggy weather or when humidity is such as to cause condensation on the surface to be painted.

21.0 ERECTION TOLERANCE

Maximum permissible tolerance in erected steel structures shall be as given in Annexure-C.

22.0 ACCEPTANCE OF WORK

22.1 Acceptance of erected steel structures shall be either after completion of erection of all the structures or in blocks.

22.2 Preliminary Acceptance will be done in the following cases:

- i) Any steelwork or part thereof embedded in concrete.
- ii) Steel structures which are to be covered in the process of carrying out further work.

23.0 DOCUMENTATION

23.1 The following documents shall be prepared at the time of acceptance of erected structures:

- i) Documents showing actual deviations made during execution of erection work and approval of competent authority.
- ii) Documents showing acceptance of embedded structures.
- iii) Certificate/documents on control checking and test of materials (if any) and weld.
- iv) Data and result of geodetic measurements obtained while checking the erection of the structures.

23.2 Copies of "As-Built" drawing showing thereon all additions and alternations which took place between approval of drawing and erection of structures.

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SECTION 3- FABRICATION AND ERECTION OF MISCELLANEOUS STRUCTURES

24.00 Roof and Side Cladding with Zincalume high tensile sheets. .

24.01 The scope of work shall cover:

- a. Preparation of drawings showing layout and size of sheets used, details of connections and flashing, Bill of Materials, etc.
- b. Procurement and supply sheets of all sizes, flashing and fittings like corner pieces, apron pieces, ridges, cutting and bending of sheets, wherever required, drilling of holes all as per Specification and Drawings.
- c. Procurement and supply of all fixtures and accessories such as self drilling, self tapping fasteners (galvanised with EPDM seals), washers, sealants, neoprene fillers etc.
- d. Procurement and supply of Rockwool insulation along with its fixing accessories such as cleats for fixing wire mesh, aluminium foil, metal/wire mesh etc(whenever applicable).
- e. Loading, transportation, unloading and delivery of sheeting with/without insulation material from place of procurement to erection site.
- e. Provision of all tools and tackles, equipment, labour supervision and services required for the satisfactory completion of the work specified herein and on the drawings.
- f. Erection in position of sheets and insulation where specified, for roofing, walling, louvers, erection of all flashing, fittings like ridges, valleys, gutters, corners, apron, etc. at all locations all work as per Drawings and Specifications.

24.02 Fixing of sheets

24.02.01 All fixing of the roof and side sheeting to purlins/insulations shall be by means of self drilling, self tapping screws.

24.02.02 Self Tapping screws shall be provided at all crest/valley at purlin locations for roof sheeting and at all valleys of the corrugations for side sheets.

24.02.03 All sheets shall be stitched together by self drilling/self tapping screws at spacing not more than 500mm.

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24.03 Laps

24.03.01 All roofing shall be provided with two corrugations side lap and 200mm end lap.

24.03.02 All side/gable end sheets shall be provided with single corrugation side lap and 100mm end lap.

24.03.03 Overhang of sheets on the roof and side cladding shall not exceed 300mm.

24.04 Erection

24.04.01 Erection is to be carried out with the lay of the side laps such that under the prevailing wind, rain is not driven into the lap. The sheets shall be laid so that side lap in any two consecutive rows is staggered.

24.04.02 Broken or otherwise damaged sheeting shall not be erected.

24.04.03 Cutting, framing and trimming of all openings required shall be carried out at site.

25.0 CHAIN LINK FENCING

The scope of work shall cover:

- Procurement and supply mesh, line wire, stretcher bar, barbed wire (if shown in the drawings) and other accessories for chain link fencing and gate all as per specifications and drawings.
- Loading, transportation, unloading and delivery of material for fencing and gate from place of procurement to erection site.
- Provision of all tools, tackles, equipment, labour, supervision and services required for the satisfactory completion of the work specified herein and on the drawings.
- Erection in position of the fencing and gate at all locations, all work as per specification and drawings.

25.1 Erection

25.1.1 The height of chain link fencing shall be 3.0/2.5m top of vertical post. Punch Tap Concertina coil is to be provided over chain link fencing.

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- 25.1.2 Straining posts shall be provided at all ends and corners of fences, at changes in direction or acute variations in levels and at intervals not exceeding 66m on straight lengths of the fence. Intermediate posts shall be spaced at regular intervals not exceeding 1.5m.
- 25.1.3 Struts shall be fitted to all straining posts behind the chain link fabric in the direction of the fence.
- 25.1.4 There shall be four evenly spaced rows of line wire. The top wire shall be doubled, making five line wires in all. The bottom wire shall be close to the ground. Each line wire shall be strained lightly by means of eyebolt strainer at each straining point. The eyebolt strainer shall consist of bolt with welded eye. The bolt shall be sufficiently threaded and fitted with a nut and washer. Each line wire shall be secured to each of the intermediate posts by a wire stirrup passing through holes in the posts and secured to the line wire by three complete turns on each side of the post. Two-way eyebolt strainers shall have suitable ring nuts fitted after wires have been strained on one side.
- 25.1.5 The mesh shall be strained between each pair of straining posts and shall be secured to each straining post by means of a stretcher bar. One of the top line wires shall be threaded through the appropriate adjacent rows of mesh, care being taken that no meshes in the rows are by-passed by the line wire except where deviation is necessary at the straining posts. The second top line wire shall be strained in front of the fencing. The mesh shall be attached to top and bottom line wires by wire ties spaced 150mm apart and to other line wires by wire ties spaced 450mm apart. Bottom row of the mesh shall be threaded to the foundation concrete using staples spaced 500mm apart and set in concrete to a depth of 150mm. The top of concrete shall be 50mm above G.L. and 50mm below the fencing.
- 25.2 **Chain link fencing Gate**
- 25.2.1 A gate of suitable width shall be provided in the direction of the chain link fabric. The mesh and barbed wire used for the fabrication of gate shall be identical in all respects to that of chain link fencing. The gate may be single leaf or double leaf depending on the width of the gate.
- 25.2.2 The gate frame shall be a pipe frame with stiffeners at mid-height and mid-width.
The mesh shall be welded to the gate frame/stiffeners.
- 25.2.3 Each leaf of the gate shall be supported on a pivot in the foundation for the straining post and shall be laterally held at two points, one near the top of the straining post and second near the middle of the straining post. The free end of each leaf shall be provided with a tower bolt at the base of the frame. An aldrop shall be provided at the mid-height of the frame.

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SECTION-4: PAINTING OF STEEL STRUCTURES

26.0 SURFACE PREPARATION FOR PAINTING

26.1 General

The steel surface which is to be prepared shall be cleaned of dirt and grease and the heavier layers of rust shall be removed by grinding prior to actual surface preparation to a specified grade.

Surface preparation to be followed prior to painting shall be based on the requirement of a particular painting system as per Clause 28.0.

26.2 Mechanical Cleaning

Manual/ power tool cleaning shall be done as per grade St-2 or St-3, of Swedish Standard Institution SIS 055900.

- i) Grade St-2: Thorough scraping and wire- brushing, machine brushing, grinding etc. This grade of preparation shall remove loose mill scale, rust and foreign matter. Finally the surface is to be cleaned with a vacuum cleaner or with clean compressed air or with clean brush. After preparation, the surface should have a faint metallic sheen. The appearance shall correspond to the prints designated St-2.
- ii) Grade St-3: very thorough scraping and wire brushing, machine brushing, grinding etc. The surface preparation is same as for grade St-2 but to be done much more thoroughly. After preparing the surface, it should have a pronounced metallic sheen and correspond to the prints designated St-3.

26.3 If no grade of surface preparation is specified, Grade St-2 shall be followed.

27.0 PAINTS AND PAINTING

27.1 For use of specific painting system as mentioned in the Specification, the paint manufacturer's specification shall prevail.

27.2 General compatibility between primer and finishing paints shall be established through the paint manufacturer supplying the paints.

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- 27.3 Before buying the paint in bulk, it is recommended to obtain sample of paint and establish "Control Area of Painting". On control area surface preparation and painting shall be carried out in the presence of manufacturer of paint.
- 27.4 In order to ensure that the supplied paint meets the stipulation in design drawing/specification, if required, samples of paint shall be tested in laboratories to establish quality of paint with respect to viscosity, adhesion/bond of paint in steel surfaces, adhesion/simulated salt spray test, chemical analysis (percentage of solids by weight), normal wear resistance as encountered during handling & erection, resistance against exposure to acid fumes, etc.
- 27.5 Whole quantity of paint for a particular system of paint shall be obtained from the same manufacturer.
- 27.6 Thinners, wherever used, shall be as per recommendation of the paint manufacturer.
- 27.7 Areas which become inaccessible after assembly of structures shall be painted before assembly, after cleaning the surfaces as specified.
- 27.8 Wherever shop primer painting is scratched, abraded or damaged, the surfaces shall be thoroughly cleaned using emery paper and power driven wire brush wherever warranted, and touched up with corresponding primer. Touching up paint shall be matched and blended to eliminate conspicuous marks.
- 27.9 If more than 50% of the painted surface of an item requires repair, the entire item shall be mechanically cleaned and new primer coats shall be applied followed by finishing coats as per painting specification.
- All field-welded areas on shop painted item shall be mechanically cleaned (including the weld area proper, adjacent areas contaminated by weld spatter or fumes and areas where existing primer. intermediate / finishing paint is burnt). Subsequently, new primer and finishing coats of paint shall be applied as per painting specification.
- 27.10 Application of paint shall be by spraying or brushing as per IS:487-1985 and in uniform layers of 50% overlapping strokes. Painting shall not be done when the temperature is less than 5°C or relative humidity more than 85%, unless manufacturer's recommendations permit. Also painting shall not be done in frosty or foggy weather. During application, paint agitation must be provided wherever such agitation is recommended by the manufacturer.
- 27.11 Paint shall be applied at manufacturer's recommended rates. The number of coats shall be such that the minimum dry film thickness (DFT) specified is achieved. The dry film thickness

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of painted surfaces shall be checked with elcometer or measuring gauges to ensure application of specified DFT.

- 27.12 All structures shall receive appropriate number of primer and finishing coats in order to achieve overall DFT as per design drawings/specifications. First coat of primer paint shall be applied not later than 2-3 hours after preparation of surface, unless specified otherwise.
- 27.13 The finishing paint as specified shall be of approved colour and quality. The under coat shall have different tint to distinguish the same from the finishing coat.
- 27.14 Edges, corners, crevices, depressions, joints and welds shall receive special attention to ensure that they receive painting coats of the required thickness.
- 27.15 Parts of surfaces embedded in concrete shall be thoroughly cleaned of grease, rust, mill scale etc. and shall be given a protective coat of Portland cement slurry immediately after fabrication. No paint shall be applied on this part.
- 27.16 Zinc-rich primer paints, which have been exposed several months before finishing coat is applied, shall be washed down thoroughly to remove soluble zinc salt deposits. In similar circumstances, the surfaces of paint based on epoxy resin should be abraded or lightly blast cleaned to ensure adhesion of next coat.
- 27.17 Surfaces which cannot be painted but require protection shall be given a coat of rust inhibitive grease according to IS:958-1975 or equivalent international standard.

28.0 PAINTING SYSTEM

The recommended painting system for general service requirement of steel structures covering surface preparation, application of primer coats, intermediate coats (if necessary) and final coats to develop the required minimum dry film thickness on steel surface is indicated as below

- a. Surface preparation: St 2 according to Swedish Standard SIS055900.
- b. Primer paint: Two coats of zinc phosphate in phenolic alkyd medium (DFT 35μ/coat).
- c. Finishing paint: Two coats of synthetic enamel (DFT 25μ/coat) conforming to IS: 2932-2018.

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29.0 MEASUREMENTS

29.1 Structural Steel

Structural steelwork will be measured by the metric tonne and as per IS:1200(Part-8)-2017 and IS:1200(Part-9)-2017 subject to provisions outlined below:

- a) The calculation of quantities shall be based on unit weights for structural sections as given in IS Handbooks. In the case of mild steel plates, the calculated weights shall be based on 78.5 kg/m²/centimeter thick plate. The payments will be made on the basis of weights of members as per drawings. However, any changes on the above weights during fabrication erection, payment shall be based on sketches approved by CLIENT.
- b) In the event the IS does not specify any mode of measurement for a particular item of work, the same shall be measured as per any other relevant international standard or as directed by CLIENT.
- c) The weight of all plates and sections shall be calculated from the approved drawing using the minimum overall square or rectangular dimensions and theoretical weight, no deduction being made for skew cuts, holes etc. In the case of plates, other than gussets, the actual dimensions shown on approved drawings will apply unless approved otherwise by the purchaser based on cutting diagram of mother plates.
- d) The weight of all welding runs, bolt, stanchion base packing, cuttings to waste and rolling margins, and coatings of paint, will be excluded from the measured weight and shall be deemed to have been allowed for in the rates for structural steelworks quoted by the Contractor.
- e) Temporary works and all other materials not included in the permanent works shall be excluded from any measurement for payment.
- f) Chain link fencing shall be measured in running meter basis, as specified and shown on the drawings.

29.2 Sheets

29.2.1 Sheets for roofing and side cladding shall be measured by lump sum or the square meter of net laid area, as specified and shown on the drawings or scope of work.

29.2.2 No allowance shall be made for wastage, cutouts, overlaps, etc., in the measurement.

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- 29.2.3 The unit rate shall include all fasteners, flashing and fitting such as ridges corners, aprons and other accessories.
- 29.2.4 No deduction will be made for openings for area less than a single sheet. Also no extra payment will be made for making openings.
- 30.0 ACCEPTANCE OF WORKS
- 30.1 After completing the erection of a unit or portion thereof, the Contractor shall give a notice in writing stating that the job is complete in all respects and ready for preliminary acceptance. The job shall be jointly inspected visually by representatives of Contractor and CLIENT. All observed defects and omissions as per drawing and specification shall be noted down.
- 30.2 The Contractor shall make good all these defects, deficiencies and omissions and shall inform in advance CLIENT/Inspector for inspection. The Engineer-Incharge shall satisfy himself that all the defects, deficiencies and omissions noted down during preliminary acceptance have been rectified.

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Annexure-A

Permissible deviations in pitch and gauge of holes for bolts of normal accuracy

Sl. No.	Description	Hole Diameter (mm.)	Permissible deviations in spacing (mm.)	Permissible deviations in each group of holes	
				Carbon steel	Low alloy steel
a.	Deviation in hole diameter.	Upto 17	+1.0	No limits	
		Above 17	+1.5		
b.	Ovality (Difference between the biggest and the smallest diameters).	Upto 17	+1.0	No limits	
		Above 17	+1.5		
c.	Curves exceeding 1mm. and cracks on the hole edges.	-	-	Not permissible	
d.	Non-coincidence of holes in separate details of the assembled unit:				
	Upto 1mm.	-	-	Upto 50%	Upto 50%
	Above 1mm. upto 1.5mm.	-	-	Upto 10%	Upto 10%
e.	Slope of axis.	-	Upto 30% the thickness of unit.	No limits	No limits

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Annexure-B

Tolerance of Assembled Components of Structures

Sl. No.	Description of components in structures	Deviation ($\pm$) mm. for elements of structures						
		Upto 1m.	1m. to 5m.	5m. to 10m.	10m. to 15m.	15m. to 20m.	20m. to 25m.	Over 25m.
1.								
i.	Deviations from the dimensions assembled. Length and width of the details cut:							
a.	Manual gas cutting as per marking	3.0	3.5	4.0	4.5	5.0	-	-
b.	With shears or with saw as per marking.	2.0	2.5	3.0	3.5	4.0	-	-
c.	With shears or with a saw with a stop.	1.5	2.0	2.5	3.0	3.5	-	-
d.	Machine gas cutting.	2.0	2.5	3.0	3.5	4.0	-	-
ii.	Length and width of planed processed on edge planing machine.	1.0	1.5	2.0	2.5	3.0	-	-
2.								
i.	Distance between centers of the end holes:							
a.	Drilled according to marking.	2.0	2.5	3.0	3.5	4.0	-	-
b.	Drilled according to a gauge with bushing.	1.0	1.5	2.0	2.5	3.0	-	-
ii.	Distance between centers of adjacent holes:							
a.	Drilled according to marking or a gauge..	1.5	-	-	-	-	-	-
b.	Drilled according to a gauge with bushing.	0.5	-	-	-	-	-	-

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Annexure-C

Tolerances in Erected Steel Structures

Sl. No.	Description	Tolerance
1.	Deviation of structure at foundation top level w.r.t. true axis	
a.	in longitudinal direction.	$\pm 5\text{mm.}$
b.	In lateral direction.	$\pm 5\text{mm.}$
2.	Deviation in the level of bearing surface of structures at foundation top w.r.t. true level.	$\pm 5\text{mm.}$
3.	Out of plumb of structure from true vertical axis and measured from structure top.	$\pm \frac{H}{1000}$ or $\pm 25\text{mm.}$ Whichever is less.

Note: 'H' above is the structure height in mm.

Notes:

- The tolerances do not apply to steel structures where deviations from true positions are intimately linked or directly influenced by technological processes. In such cases, tolerances on erected steel structures shall be as per recommendations of process technologists/equipment suppliers.
- The observed or calculated values of deviations of steel structures from their true positions shall be rounded off in accordance with IS:2-1960 for comparison with permissible tolerances specified in this table. The number of significant places retained in the rounded off value shall be the same as that specified in this table.

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Annexure-D

Material of construction (as applicable)

- 1.0 Unless otherwise specified in the drawing, all rolled sections and plates shall conform to IS: 2062-2011.
- 2.0 Steel sheets shall conform to IS:1079-2009.
- 3.0 Steel tubes for structural purposes shall conform to IS: 1161-2014 (Grade YST-310).
- 4.0 Gutters and down comers shall be of copper bearing steel conforming to IS: 2062-2011.
- 5.0 Crane rails shall conform to IS: 3443-1980.
- 6.0 Roof Covering/ Sheetting: Canopy roof sheeting shall be of 0.6mm Zincalume/ galvalume colour coated sheets and shall have trapezoidal profile with 28-32 mm deep crest and 186-250 c/c profile width with minimum two ribs at centre for stiffening. The sheet shall be of minimum $f_y = 345$ MPa and shall be coated with hot dip metallic Zinc aluminum alloy @ 150 gsm coating mass total on both sides.
- 7.0 Providing, cutting, fabrication and installation of canopy false ceiling with TRAC 150 F (of Interarch or equivalent as per Approved makes) coil coated (Pre-painted) steel false ceiling system comprising of 150 mm wide x 17 mm deep roll formed out of 0.50 mm thick polyester coated galvanized steel panels, fixed on steel runner of 34.5 mm width x 48 mm deep manufactured out of 0.60 mm thick precoated galvanized steel with rigid suspension of 20x20x0.5 mm fixed with steel brackets/clips etc. The suspension system should be meant of exterior use. The carrier shall be suspended at 1mtr c/c supported from purlin and suspension angle at 500 mm c/c. panel shall be factory cut to provide minimum joints. The longitudinal joints shall have additional special G.I. Splice in between two panels. The carrier joint shall have a carrier splice maintaining a module of 150 mm. The ceiling shall be clipped on to the suspended carriers after they are aligned and leveled. Cutting for fixing of light fittings shall be done as per the cutout required to fit the fixture. The work shall be carried out under a specialized and experienced supervisor.
- 8.0 All black hexagonal bolts, nuts and lock nuts shall conform to IS: 1363-2002 and IS: 1364-2002 (for precision and semi-precision hexagonal bolts). Washers shall conform to IS: 1148-1982.
- 8.0 Covered electrodes for arc welding shall conform to IS: 814-2016. Coding of electrodes shall be as follows:
 - a. ER 421 'C' x for mild steel of Grade A and Grade B as per IS: 2062-2011.
 - b. EB 542 'C' x H3X for:

BRIDGE AND ROOF CO.(I) LTD. REGD. OFF: KOLKATA	STRUCTURAL SECTION.	STANDARD SPECIFICATION	
FABRICATION, ERECTION AND PAINTING OF STEEL STRUCTURES	BR/TS/063 (Rev.-0)		Page 28 of 29

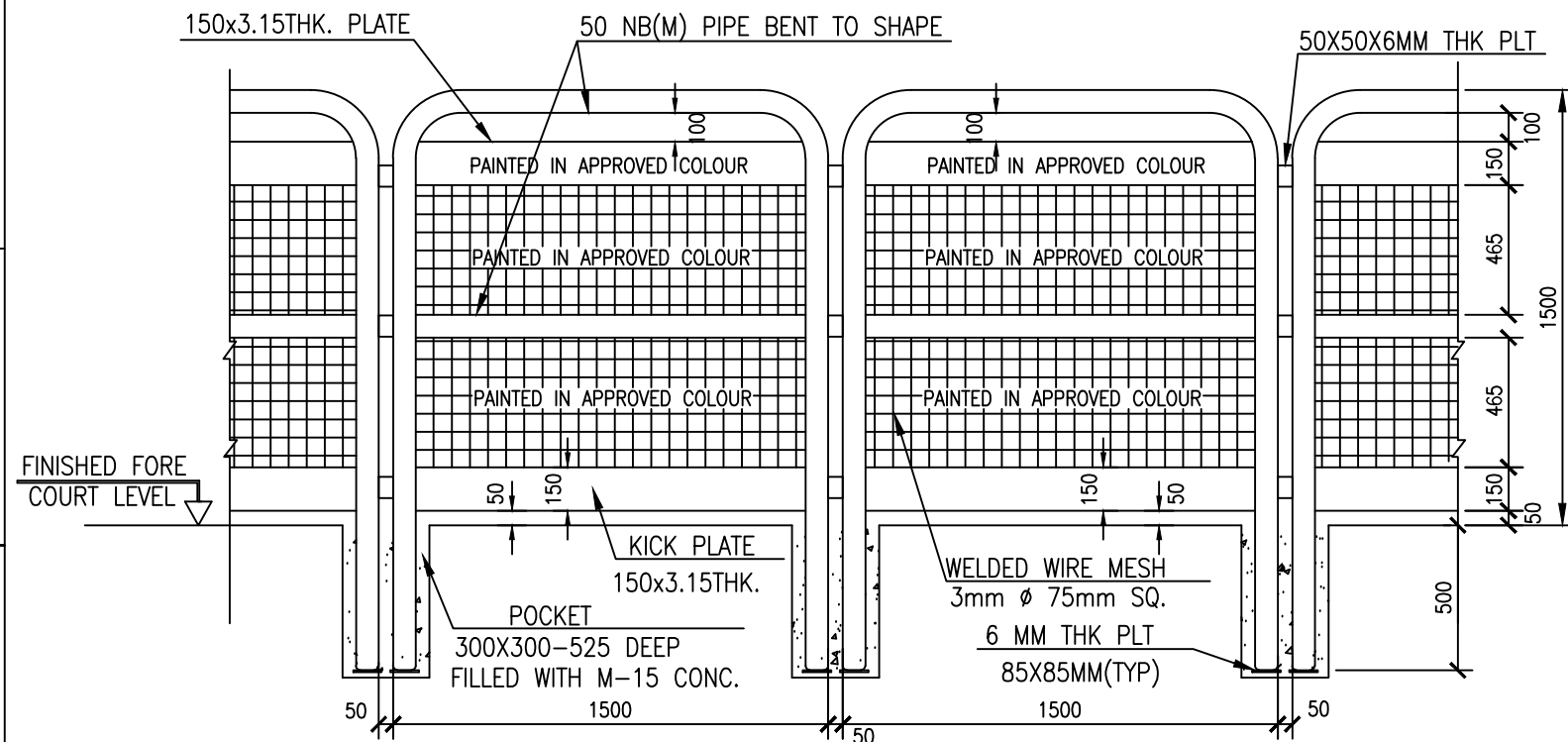
mild steel of Grade B as per IS: 2062-2011 for dynamically loaded structures (arising out of crane, vibratory screen, equipment, etc.),

SAIL-MA micro alloyed steel 350 HYA/HYB and

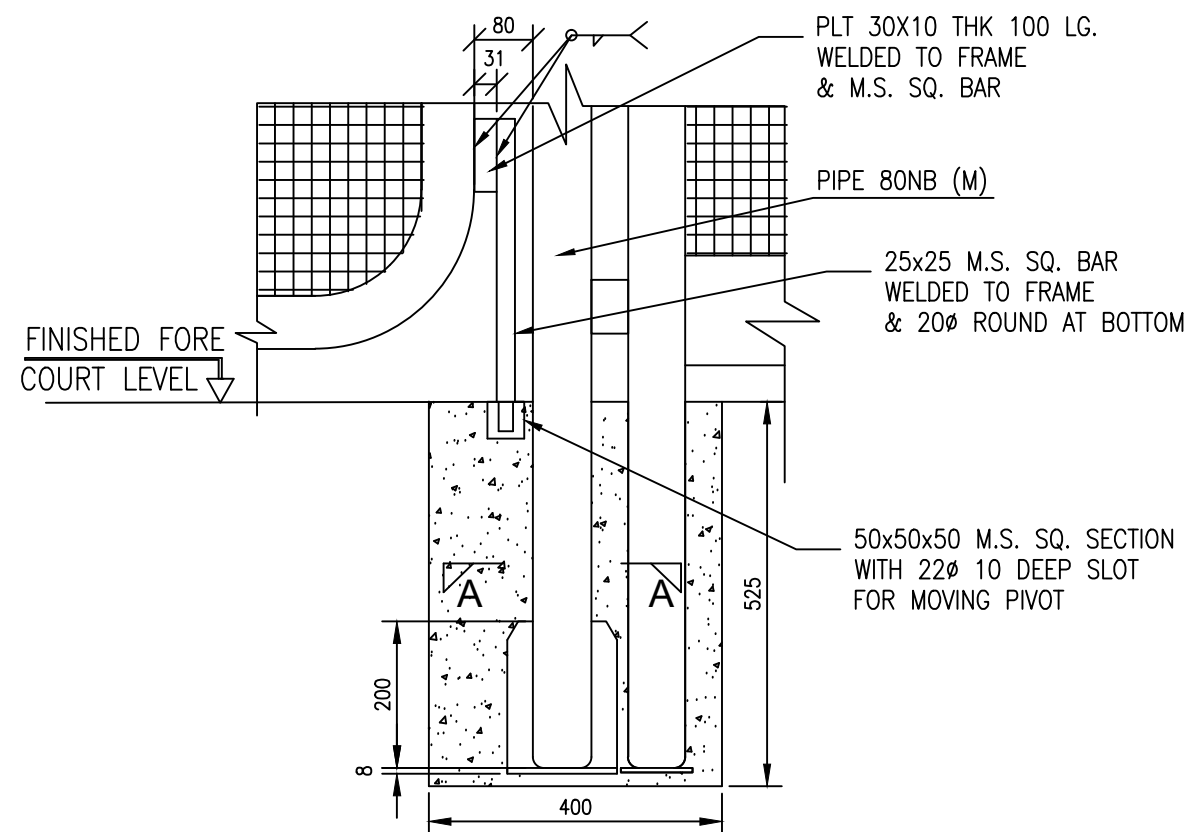
when combined thickness (CT) for steel conforming to IS:2062-2011 exceeds 40mm.

where 'C' is the value of current as recommended by the electrode manufacturer.

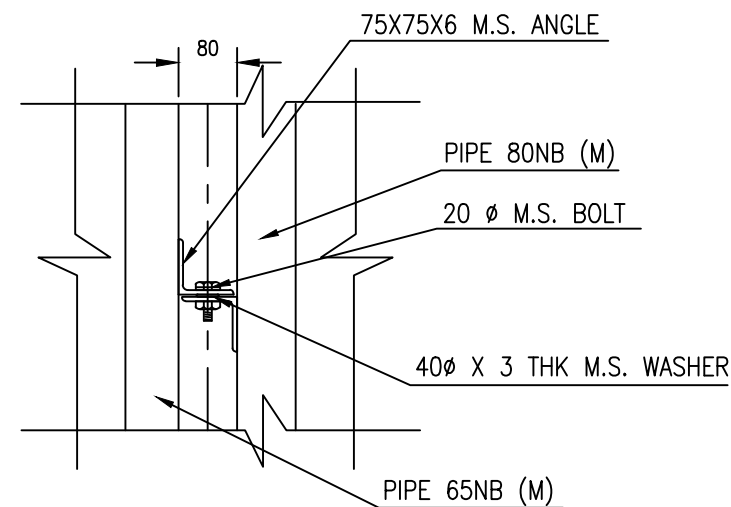
- 9.0 Material for chain link fencing shall conform to IS:2721-2003. Mesh for chain link fencing shall be of 3.15mm hot dip galvanized steel mesh wire, the diameter being measured over zinc coating. The diameter of mesh wire shall not vary from the specified diameter by more than 0.05mm. The material for mesh wire and line wire of chain link fencing shall conform to IS:280-2015. Stretcher bar for erection of mesh shall consist of mild steel flats 25mmx4.75mm. The stirrup wire for securing the line wires to the intermediate post shall be of 2.5mm mild steel wire. Hairpin staples for fastening the bottom line wire to the foundation concrete shall be of 6mm mild steel wire with ends of staples bent outwards for adequate anchorage. The cleats for eyebolts shall be of mild steel plate 10mm thick.
- 10.0 Material for barbed wire shall conform to IS:278-2015. Line wire for the barbed wire shall be made from two strands of galvanized steel wire of nominal dia 2.5mm twisted together. Barbs shall be made of point wire of galvanized steel of nominal dia 2.5mm in such a way that four points of the barbs are set and located or locked as far as possible at right angles to each other. Droppers for barbed wire shall be of mild steel flat 25mmx4.75mm with 38mmx4.85mm half round staples for fastening the barbed wire.



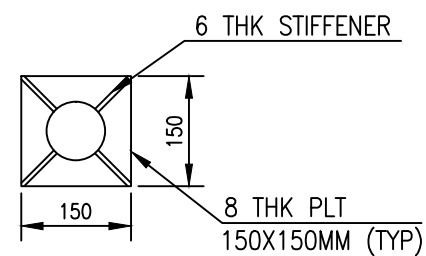
TYPICAL FENCING DETAIL
(1500 HIGH)



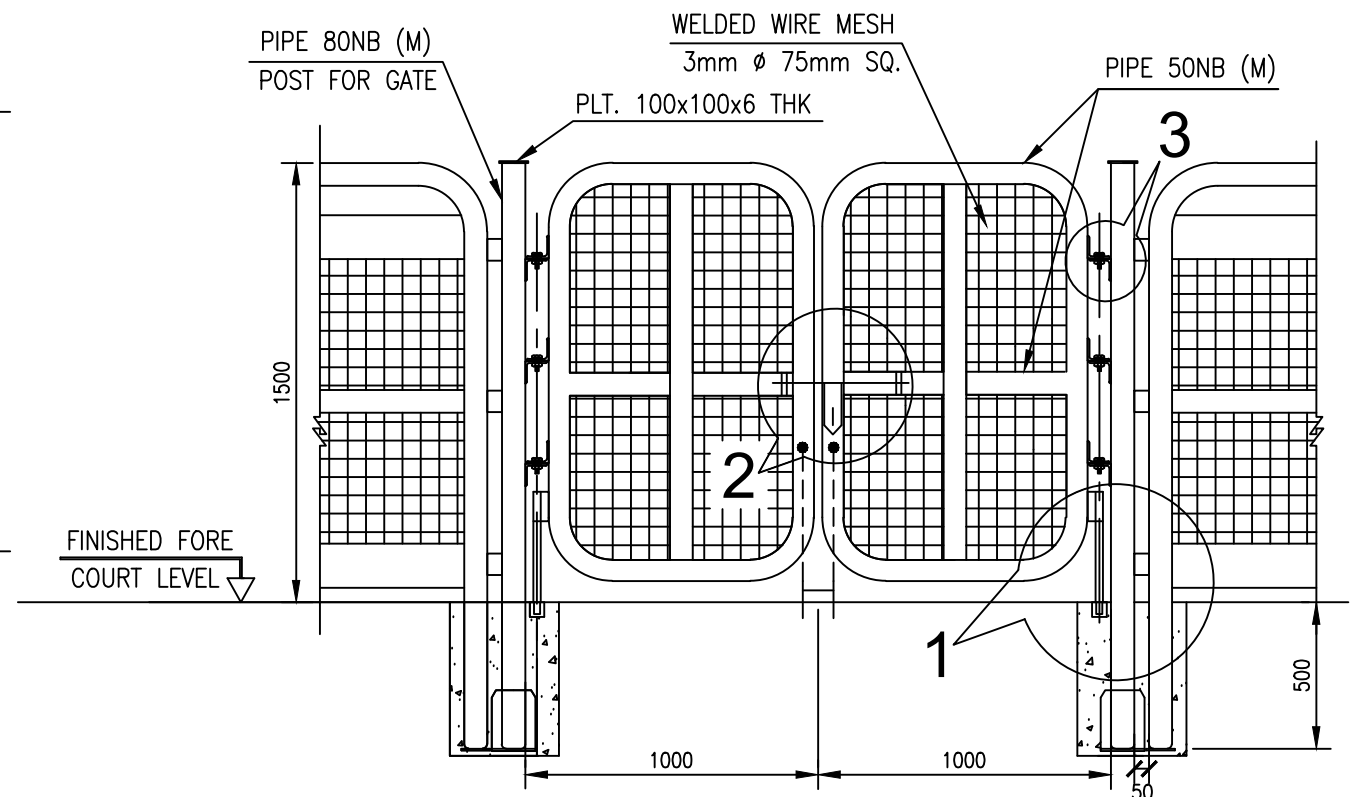
DETAIL 1



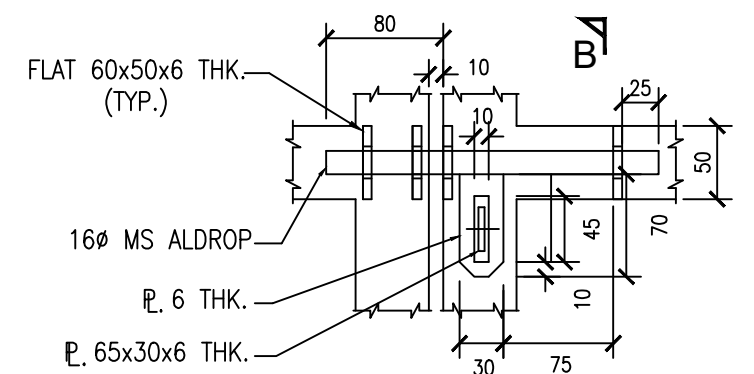
DET. AT. 3
(Detail of Hinge)



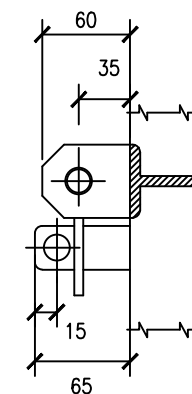
SECTION A-A



2.0M WIDE GATE DETAIL



DETAIL-2



SECTION B-B

FOR TENDER PURPOSE ONLY

REV	NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD
REVISIONS						
REFERENCES						
DRG. NO.						
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SECTION STRUCTURAL				
	NAME	DATE	CHKD	DATE
DSGN				
DRWN				
APPROVED				
Page 656 of 689				
H.CHANDNANI				

CNG DISTRIBUTION PROJECT

**TYPICAL DETAIL OF
GATE & FENCING
(1500 MM HIGH)**

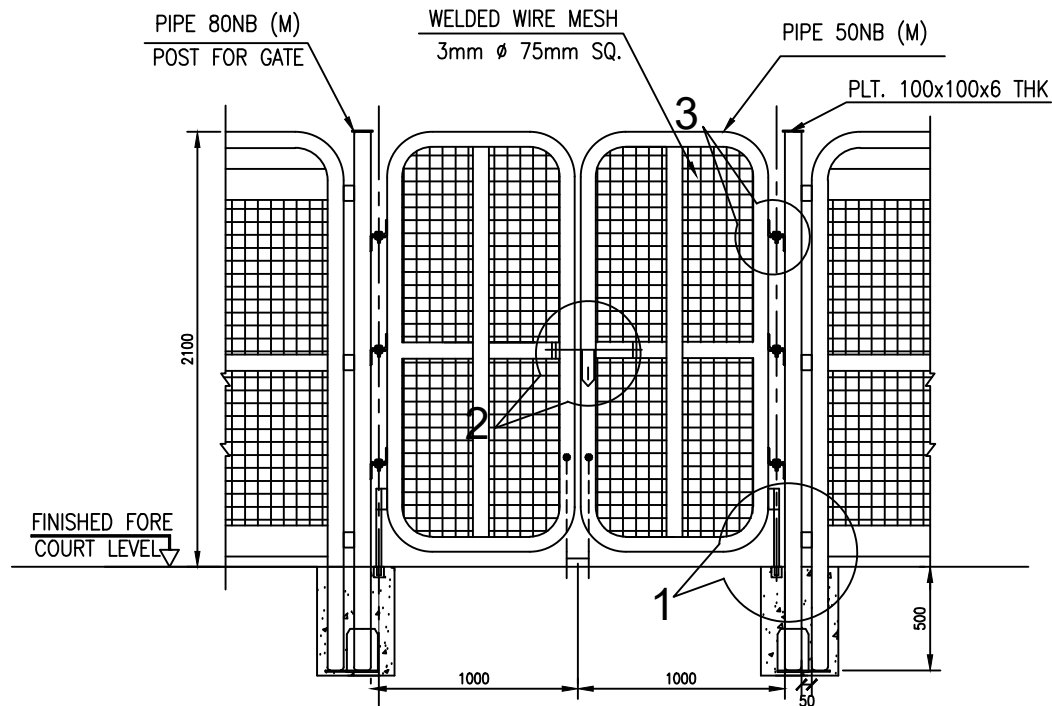


ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड
BRIDGE AND ROOF CO.(I) LTD.

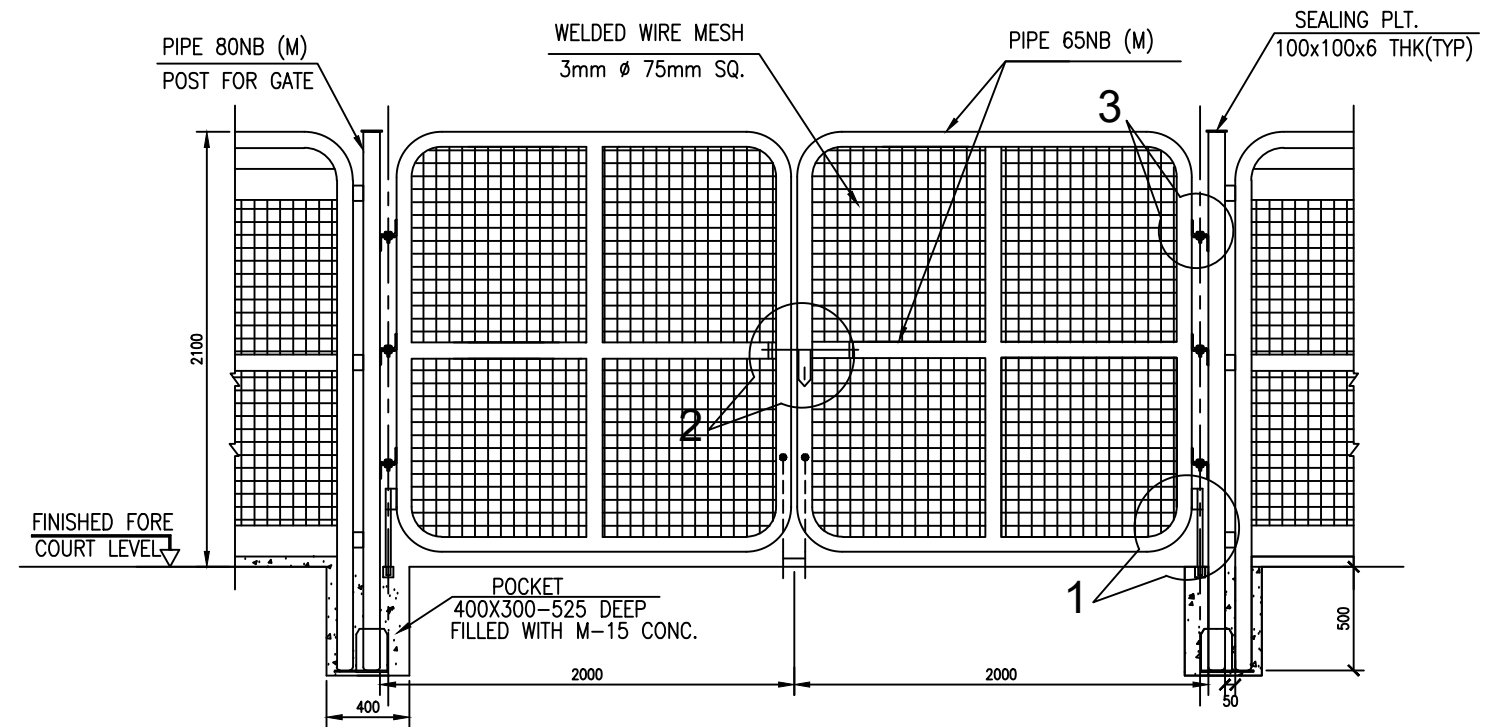
SCALE:- NTS

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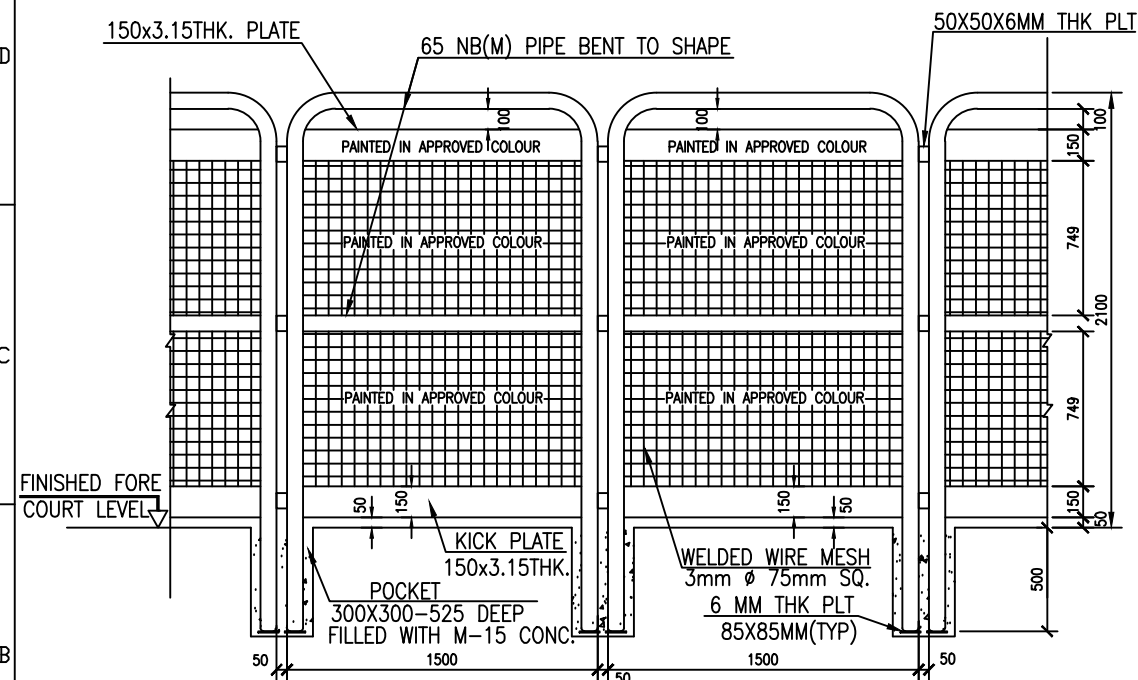
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1



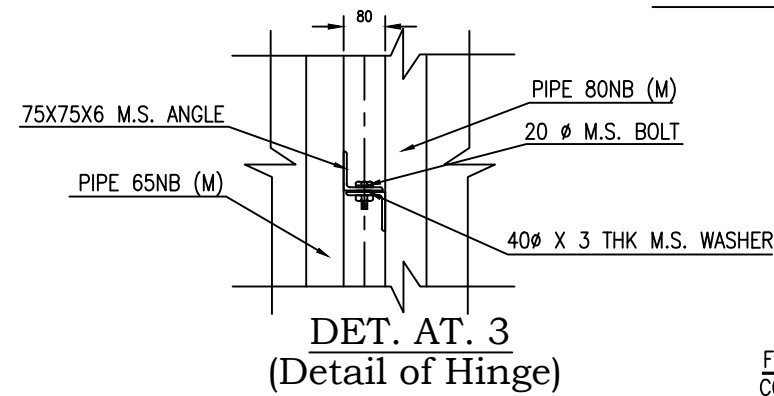
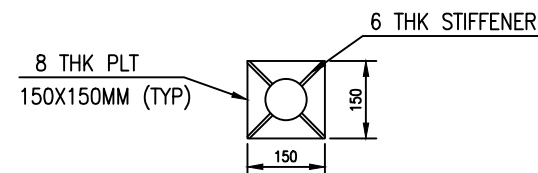
2.0M WIDE GATE DETAIL



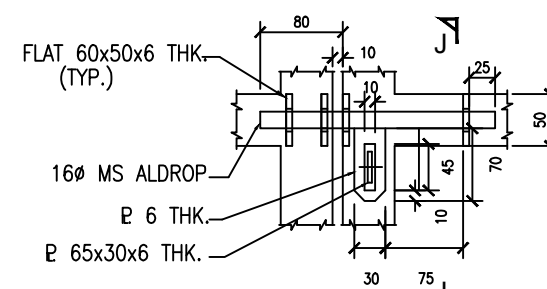
4.0M WIDE GATE DETAIL



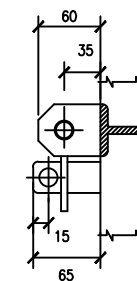
TYPICAL FENCING DETAIL

DET. AT. 3
(Detail of Hinge)

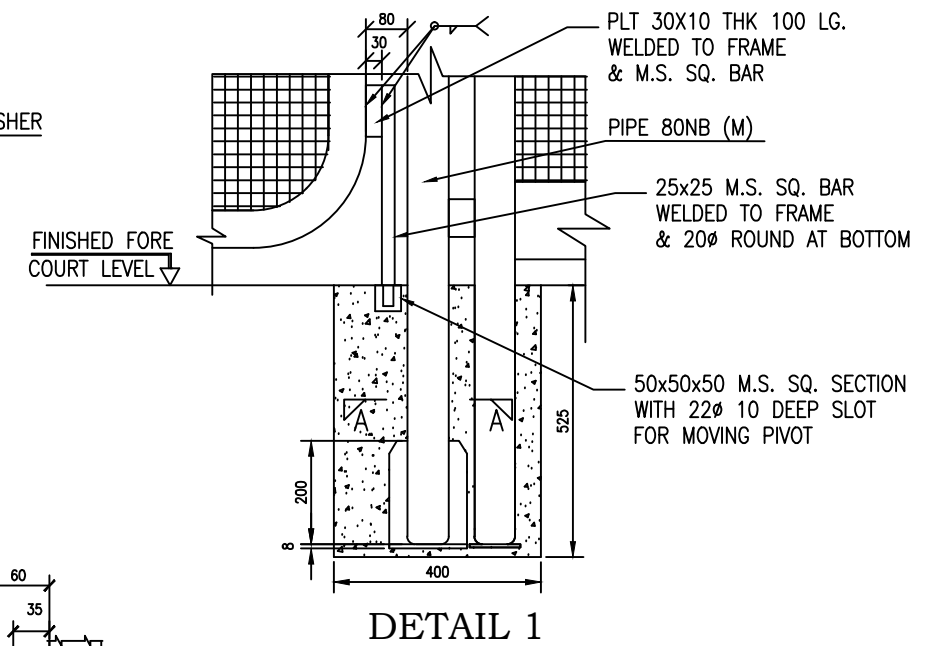
SECTION A-A



DETAIL-2



SECTION J-J



DETAIL 1

FOR TENDER PURPOSE ONLY

REV	NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
				REVISIONS				
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SECTION STRUCTURAL				
	NAME	DATE	CHKD	DATE
DSGN				
DRWN				
APPROVED				
Page 657 of 689				
H.C				

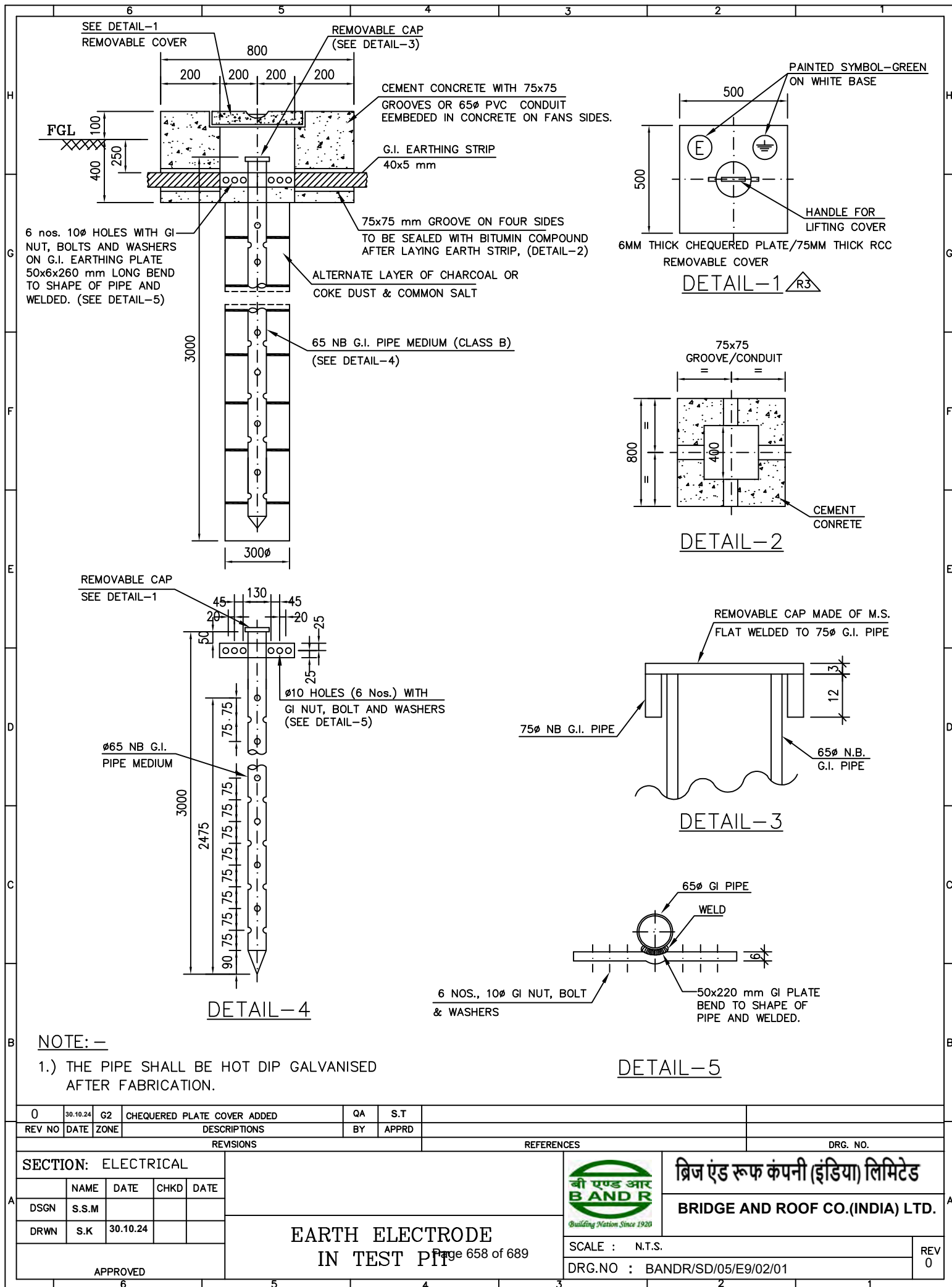
CNG DISTRIBUTION PROJECT

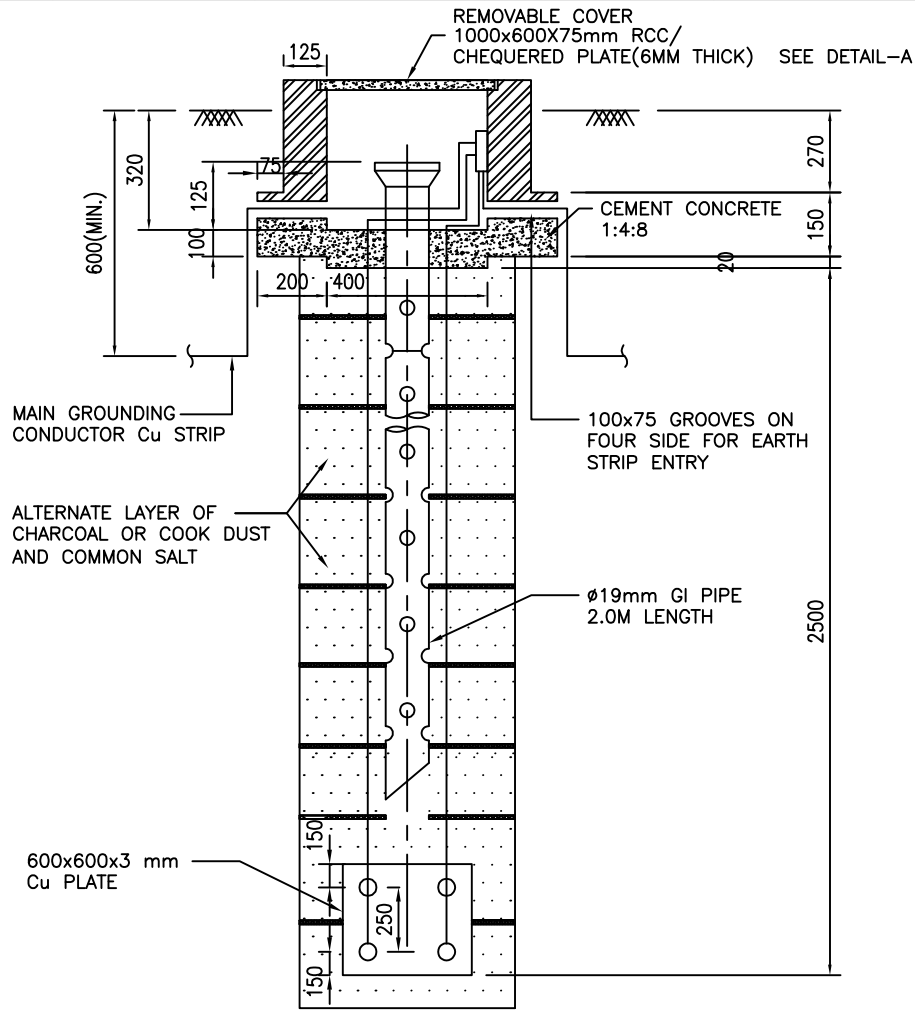
TYPICAL DETAIL OF
GATE & FENCING
(2100 MM HIGH)ब्रिज एंड रूफ कंपनी (इंडिया) लिमिटेड
BRIDGE AND ROOF CO.(I) LTD.

SCALE:- NTS

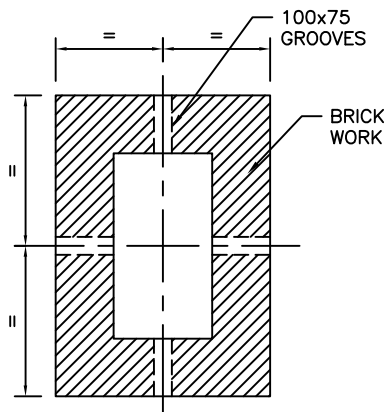
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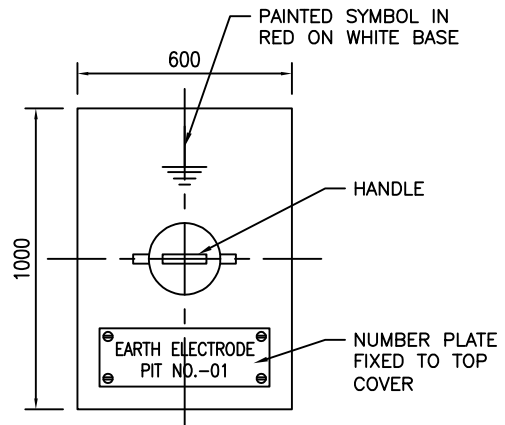




COPPER PLATE ELECTRODE WITH TREATED EARTH PIT



DETAIL-B



DETAIL-A

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GAIL (India) Limited

GAIL_Internal



BRIDGE AND ROOF CO. (INDIA) LTD.

CHARGING PLAN/PROCEDURE**Project:** City Gas Distribution Projects**Client:** M/s GAIL (India) Limited**Consultant:****Date of charging:** -

S. No.	Description	Details			
1	N ₂ Purging Detail	Purging Date: -			
		Number of nitrogen cylinder consumed: -			
2	Length of PE P/L Pneumatically Tested and flushed as well as cleaned (m)	Date of Pneumatic testing: -			
		Type/size	ø125	ø63	ø32
		Revived PE Pipe			
		New PE line			
		Total (meter)			
3	No of PE Isolation Valve Chamber (in Nos.): -				
4.	Check List: -				
a)	Isolation valve plugged	Yes / No /NA			
b)	Any Exposed Pipe	Yes / No			
c)	RCC/Plate/Pole Markers installation	Yes / No			
d)	Charging Tools available	Yes / No			
e)	As-built Drawing	Yes / No			
f)	Certificates confirming nitrogen available	Yes / No			
g)	Fire Extinguisher / Gas Detector	Yes / No			
h)	Sleeves / half round filled with sand	Yes / No/NA			
i)	Valve Chamber construction done	Yes / No/NA			
j)	Safety equipment /First Aid available	Yes / No			
k)	Emergency Nos.provided to the society	Yes / No / NA			

ACTIVITY/PROCEDURE FOR CHARGING

Sr. No.	Steps to be followed	Activity Description
1.	Integration of PE network to be charged	Ensure that 125mm primary/main line is integrated with 63mm secondary line and further integrated with 32mm/20mm service line. If step-1 is ensured then proceed to step-2.
2	Pneumatic testing	Final pneumatic testing at 6.2kg/cm ² of all PE pipe network to be charged and the same pressure will be held up for at least 4-6 hrs. Ensure no leak is observed throughout the network to be charged. If step-2 is ensured then proceed to step-3.
3	Purging procedure	Purging will be done with the help of Nitrogen medium of 99.96% purity. Proper vent to be provided at specified safe location. If step-3 is ensured then proceed to step-4.
4	Gas charging	1. Ensure all the PE valve on the network to be charged is in closed position. 2. DRS outlet valve to be open and pressure point to be set at 2kg/cm². 3. Valve of 125 mm main line will be plugged in / open position. Now the pressure will be checked at the tail end of the main pipeline with the help of pressure gauge and reducing arrangement made at the tail end. 4. If all is ok then valve of 63mm secondary line will be plugged in/open position and ensured that there is no any pressure drop on the gauge of the main line. 5. If all is ok then valve of 32mm tertiary/service line will be plugged in/open position and ensured that there is no any pressure drop on the gauge of the main line and gauge of the tertiary line at different locations.

CHARGING PHILOSOPHY IN DETAIL**1. Intent**

It is intended to apply this guideline for the purpose of safe purging, commissioning and de-commissioning of City or Local Natural Gas Distribution Network, which has been constructed and tested conforming to specifications laid down in the PNGRB Technical Standards for CGD Networks (T4S).

2. Pre-Commissioning checks

Prior to commissioning, the entire pipeline system shall be checked with respect to the “as built drawings” and other design specifications.

The pre-commissioning checks should include, but not limited to, following, namely:-

(a) Tightness test The tightness test (pneumatic) should be completed at a pressure of at least 2 bar(g) with air after completion of all mechanical activities including pneumatic test, cleaning and flushing process. For low pressure network tightness test should be done at least at operating / working pressure. Once the pipeline is connected with live line for purging/ gas-in, it should be commissioned immediately and completed as a continuous process.

(b) Function test of field equipment and system The supports, route markers, valves, instruments, controls, interlocks etc. are adequately installed and physically checked along the pipeline. All the valves / equipments are checked for intended applications by simulating the operation condition before the gas is introduced to ensure that each valve is operating correctly.

The pipeline and allied systems, including safety systems shall be fully function-tested. The pressure and temperature gauges shall be calibrated prior to use before installation.

(c) Survey of the pipeline—A detailed survey (preferably through line walk) of the pipeline route shall be carried out to confirm that no leakage is observed along the pipeline alignment and at the associated equipment & installations and also to ensure that proper fittings / supports, route markers etc. have been installed along the network. Ensure all points other than purging & venting are in closed condition.

(d) Purging in the Pipeline—The entire primary network, which is ready and proposed for commissioning, shall be purged with air or Inert Gas at positive pressure of not less than 2 bar(g). Reading of Pressure Gauge installed at each Inlet point, Exit point and other specific points shall be noted in a specified format.

Displacement method to be adopted for purging activity. Purging stack, Flame-trap and purging adapter to be arranged at site.

(e) Checking of Communication System—Availability of proper communication system should be checked and confirmed to the Commissioning In-charge.

3. **Safety Clearance**— Before start of commissioning works, the Safety Officer of CGD entity shall carry out a Safety clearance, the relevant details of which shall be recorded on the Safety Checklist in accordance with the Technical & Safety Guidelines as per Technical standards.

They shall verify that:

- a) All Commissioning personnel have been made aware of the safety hazards of the operations to be undertaken.
- b) Procedures & Documents including those for possible emergencies shall be developed and followed.
- c) Communications are working satisfactorily.

4. **Safety Measures**— Adequate no. of Safety gadgets, personal protective equipments, emergency handling facilities, sign boards, do and don'ts etc as required in the commissioning document should be positioned and available at designated place before start of commissioning activities. A minimum of following shall be ensured at all purging sites.

- a) A minimum of 2 dry powder type extinguishers (5 kg) should be available on all purging /venting sites.
- b) Smoking, naked light or other sources of ignition should be prohibited. Warning signage/ pictograms like “NO SMOKING” and “NO NAKED LIGHTS” should be prominently displayed around the work site, including at vent points.
- c) Electrical continuity bonds (copper) need to be fitted across separated metallic pipes prior to purging operation.
- d) Adequate hearing protection should be available, where required.
- e) It should be emphasized that purged gas other than air is potentially dangerous leading to asphyxiation and information to prevent asphyxiation should be provided in procedure.

5. Responsibilities during the commissioning operations-

The CGD entity authorized for a GA shall have the overall responsibility for the implementation, record and control of all procedures, forms & formats contained in this Technical Document. The Commissioning In-charge along with the team of Supervisors/Technicians, involved in the Main Line (ML) network commissioning shall have the direct responsibility for following all the procedure(s) and generating all the records as per the formats prescribed in this Technical Document.

6. Commissioning Process-

As a part of procedure, the entity should ensure specific checklist prior to pipeline commissioning based on type of purging method adopted by them i.e. complete displacement as discussed herein. However, illustrative check lists are annexed to this guideline for reference.

- (a) Valves are checked for respective opening / closing positions.
- (b) Check Line Pressure.
- (c) Nitrogen flow rate shall be controlled by opening / closing the inlet purging valve.
- (d) Record the line pressure at every 30 minutes interval.
- (e) Ensure Positive Pressure (not less than 2 kg/cm²) for Nitrogen Purging in the entire Pipeline.
- (f) After ensuring the nitrogen purging, close purging valve.
- (g) Remove the Nitrogen Purging Connection and install a Blind / Plug and Close the Valve.
- (h) Gas-in to be started after confirmation of readiness at all valve stations with closed valves in closed position.
- (i) Gas Inlet valve to be opened for 50 angle (crack open) and simultaneously nitrogen shall be vented. With further valve opening, Pipeline shall be pressurized up to 4 kg/cm². Gas availability shall be ensured at this point by LEL / Methane detector and shall be communicated back to DRS station.
- (j) Subsequently, each section of Pipeline shall be pressurized so that entire ML network is free from Nitrogen and is pressurized with Natural Gas at a pressure of 2 kg/cm² up to end of the pipeline.
- (k) Hold the pressure of 4 kg/cm² for a minimum of 04 hour and check the entire ML network for No Leakage.
- (l) If any leakage is observed, it shall be recorded and arrested properly.

7. Commissioning Records- The commissioning records should as a minimum include, but not limited to, following, namely: -

- a) Pneumatic test report.
- b) Functional-testing of pipeline.
- c) Completed pre-start checklist.
- d) Purging report.
- e) Commissioning report.
- f) As-built Drawings.

Remarks If any:		
SIG:	SIG:	SIG:
NAME:	NAME:	NAME:
CONTRACTOR	M/s (CONSULTANT)	M/s GAIL PROJECT / (O & M)

 BRIDGE AND ROOF CO. (INDIA) LTD.		 GAIL (India) Limited	
COMMISSIONING REPORT (P.E. LINE) BR/WP/003			
Client	M/S GAIL (INDIA) LIMITED	Area Name:	
Consultant Name		Locality Name	
CONTRACTOR			

Details :

1	Length of the Pipe :		5	Date of commissioning :	
2	Size of Pipe:		6	Number of nitrogen cylinders consumed:	
3	Purging Medium:	Nitrogen	7	Line Pr. after gas charging:	
4	Date of Pneumatic testing :				

Check List:

1	Isolation valve plugged	Yes / No /NA	7	Fire Extinguisher / Gas Detector	Yes / No
2	Any Exposed Pipe	Yes / No	8	Sleeves / half round filled with sand	Yes / No/NA
3	RCC/Plate/Pole Markers installation	Yes / No	9	Valve Chamber construction done	Yes / No/NA
4	Charging Tools available	Yes / No	10	Safety equipment /First Aid available	Yes / No
5	As-built Drawing	Yes / No	11	Emergency Nos.provided to the society	Yes / No / NA
6	Certificates confirming nitrogen available	Yes / No			

Contractor

Consultant

GAIL



BRIDGE AND ROOF CO. (INDIA) LTD.



GAIL (India) Limited

Contractor's Logo

Fusion welding Checklist

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT

Dia. Of Pipe _____ Loop No. _____ Joint no. _____
 Coupler Type _____

Project : CITY GAS DISTRIBUTION

Client : M/s GAIL (India) Limited :

PMC M/s

Contractor :

Location :

Joining Details:

Sr. No.	Description	Requirement	Remarks
1	Fusion Machine	Bar coded electro-fusion machine (Automatically Readable)	
2	Whether Fusion Machine verification format available		
3	Coupler Type		
4	Whether material inspection report available		
5	Whether Pipeline is free from dust, water, mud etc.		
6	Whether Alignment Clamp available		
7	Whether approved pipe cutting tool available		
8	Availability of DG set		
9	Whether Jointer is having ID card signed by GAIL/B AND R		
10	Whether Removal of oxidized surface (0.1 to 0.4 mm from outer surface of PE pipe)		
11	Whether Pipes Securely fasten		
12	Whether Pipes Faces are parallel & aligned through proper alignment clamp		
13	Whether bar code reading done		



BRIDGE AND ROOF CO. (INDIA) LTD.



GAIL (India) Limited

Contractor's Logo

Fusion welding Checklist

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT

14	Fusion completed as per required time through automatic bar code reading		
15	Joint hold immobile under fusion force for 5 minutes		
16	Avoided of any activity near or on joint for 30 minutes		
17	GPS coordinates for joint/joint no. with location		

Contractor	Consultant
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CGD PE PIPE REPORT

GAIL Internal



BRIDGE AND ROOF CO. (INDIA) LTD.



GAIL (India) Limited

Vendor Name												LOA NO : ----- Dated : -----										Date													
MachineNo/Name		Shot Length (M)								Site Location								LinkName:				Report No.-----													
No.ofDuct		DuctLength (M)																																	
EntryPitGPS Cord.						Latitude/Longitude						ExitPitGPS						Latitude/Longitude																	
Rod	Pitch	Depth	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Rod	Pitch	Depth							
1			24																							26									
2																										27									
3																										28									
4																										29									
5																										30									
6																										31									
7			24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	32									
8																										33									
9																										34									
10																										35									
11																										36									
12																										37									
13																										38									
14																										39									
15			Rod Length (M) =3 M										SCALE : X axis = 1CM = 3M										SCALE : Y axis = 1CM = 1M										40		
16			OFFSETDRAWING																									41							
17																												42							
18																												43							
19																												44							
20																												45							
21																												46							
22																												47							
23																												48							
24																												49							
25																																			
			Contractor										Ltd										GAIL												
Signature																																			
Date																																			

Standard Work Procedure (SWP) PE Laying

Specification of PE Pipes

1	PE Pipes as per IS code- 14885
2	Grade: PE 100 SDR 11

3	PE Carrier Pipe Size (mm)	Thickness (mm)	Length m	HDPE Casing Pipes Min. Dia (mm)	HDPE Casing Pipes Max. Dia (mm)
	20	3	200	50	50
	32	3	150	50	90
	63	5.8	100	110	160
	125	11.4	50	200	250
	180	16.4	12	250	315

ROUTE SURVEY

1	PE Route for assigned area shall be finalized by CMC/EIC and accordingly sketch will be prepared by contractor.
2	Sketch prepared by contractor to be approved by CMC/ EIC and same shall be used for laying of PE network.
3	Sketch shall have following information/data:-
a.	Total route length
b.	Type of Method for laying like Open cut, HDD or Moling
c.	sizing detail

TRENCHING

DEPTH OF TRENCH

1	Minor water body crossing/Canal	2.5 meter
2	Uncased/Cased Road Crossing	1.5 meter
3	Rail/Road Cased Crossing	1.5 meter
4	Normal Areas	1.5 meter

Minimum depths may change depending on requirement of approving authority.

CLEARANCES

1	150 mm Where the gas pipe Crosses other assets/utilities
2	300 mm Where the gas pipe Crosses (or along) Electrical Cable
3	300 mm Where the gas pipe is laid along other assets /utilities

TF PROTECTION

1	GI sleeve IS 1239 (Heavy Duty) L 300 mm x Dia 2.5 inch (3 inch dia in case of commercial connections)
2	Making of Pedestal GI Sleeve (min Size 150 x 150 x 150 mm)
3	Half round concrete sleeve (min size 250 x 250 x 150 mm)
4	Material M-20 1:2:4
5	T F Pits Will be must restored siz 0.5 x 0.5 (L X W)

PE WARNING MAT

1	Specification of Warning mat shall be as per Approved QAP.
2	Warning Mat is to be placed after pedding of about 300 mm on the top of carrier pipes.

PE Laying

1	Before starting of PE laying written permission (From concerned Authorities) should be provided by Owner/EIC/CMC to contractor
2	All the machinery & adequate manpower should be available at site (by contractor) before commencing of the job. Extent of mobilisation is to be finalised by EIC as per availability of work front.
3	Safety measure like Sign board, barricading ,PPE is to be taken up as specified in Technical Specification during PE laying.
4	After PE laying, jointing & before backfilling ,top cover of PE pipe is to be witnessed by EIC/CMC.

Flushing

1	Flushing of PE network is to be done by Air from 4-6 kg/cm ² pressure.
2	Proper flushing is to be ensured before testing.

Testing

1	PE network is to be tested by Air at 6.2 Kg/cm ² pressure.
2	Pressure is to be hold for the duration as given below:-
a.	PE Length <=500 M ,4 hours.
b.	PE Length >=500 M ,24 hours.

Purging

1	Purging is to be done using Nitrogen at 2 kg/cm ² pressure.
2	Pressure Holding is to be ensured by contractor till gas charging.

Commssioning

1	Before Gas charging in PE network following points are to be complied:
a.	Completeness of valve chamber along with valves.
b.	installation of Pole, and RCC marker.
c.	As built drawing
d.	Also refer Annexure-1

VALVE SIZE

	Dia	Length	Valve Chamber Size
1	180 mm	650 mm	As per tender
2	125 mm	600 mm	
3	63 mm	450 mm	
4	32 mm	300 mm	

Note:-

- 1 This Procedure is to be read along with PNGRB and T4S Guidelines.



BRIDGE AND ROOF CO. (INDIA) LTD.



GAIL (India) Limited

Contractor's Logo

PNEUMATIC TESTING REPORT PE Line

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT

Project: City Gas Distribution at Dakshin Kannada

Client: M/s GAIL GAS LIMITED

Consultant:

Contractor:

Location:

Details :-

1	Size of PE Pipe :	6	Holding Time:
2	Total Length of the pipe:	7	Pressure Gauge Make & No.:
3	Testing Medium: Compressed air (oil free):	8	Gauge calibration valid upto:
4	Testing Pressure:	9	Result:
5	Start Date:	10	Line Pr. after release :

Observation Chart:

S.No.	Time	Reading (Kg.f/cm ²)	S.No.	Time	Reading (Kg.f/cm ²)
1.			13.		
2.			14.		
3.			15.		
4.			16.		
5.			17.		
6.			18.		
7.			19.		
8.			20.		
9.			21.		
10.			22.		
11.			23.		
12.			24.		



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PNEUMATIC TESTING REPORT PE Line

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT

Check List :-

Flushing

Pipe cleared from water & debris: - Yes/ No

Witnessed by :

1. GI Sleeves/ Half round concrete sleeve properly installed : - Yes/ No
2. Isolation Valve plugged: - Yes/ No
3. Regulator piece properly clamped: - Yes/ No
4. Sand filling in GI/ Half round concrete sleeve and non exposure of PE pipe/ Transition fitting – Yes/ No
5. Isolation Valve in open condition with open end plugged- Yes/ No

Contractor	Consultant	GAIL
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GAIL (India) Limited



BRIDGE AND ROOF CO. (INDIA) LTD.

STANDARD WORK PROCEDURE FOR PE LAYING AND GI WORKS

Project: City Gas Distribution Projects

Client: M/s GAIL (India) Limited

Consultant:

Contractor:

Date: -

Standard Work Procedure (SWP) For PE Laying

Specification of PE Pipes

1	PE Pipes as per IS code- 14885
2	Grade: PE 100 SDR 11

3	PE Carrier Pipe Size (mm)	Thickness (mm)	Length m	HDPE Casing Pipes Min. Dia (mm)	HDPE Casing Pipes Max. Dia (mm)
	20	3	200	50	50
	32	3	150	50	90
	63	5.8	100	110	160
	125	11.4	50	200	250
	180	16.4	12	250	315

ROUTE SURVEY

1	PE Route for assigned area shall be finalized by CMC/EIC and accordingly sketch will be prepared by contractor.
2	Sketch prepared by contractor to be approved by CMC/ EIC and same shall be used for laying of PE network.
3	Sketch shall have following information/data:-
a.	Total route length
b.	Type of Method for PE laying like Open cut, HDD or Moling.
c.	Sizing detail
d.	Break-up of Katcha and Pakka Road

TRENCHING

DEPTH OF TRENCH

1	Minor water body crossing/Canal	2.5 meter
2	Uncased/Cased Road Crossing	1.5 meter
3	Rail/Road Cased Crossing	1.5 meter
4	Normal Areas	1.5 meter



GAIL (India) Limited



BRIDGE AND ROOF CO. (INDIA) LTD.

STANDARD WORK PROCEDURE FOR PE LAYING AND GI WORKS

Minimum depths may change depending on requirement of approving authority.

CLEARANCES

1	150 mm Where the gas pipe Crosses other assets/utilities
2	300 mm Where the gas pipe Crosses (or along) Electrical Cable
3	300 mm Where the gas pipe is laid along other assets /utilities

TF PROTECTION

1	GI sleeve IS 1239 (Heavy Duty) L 300 mm x Dia. 2.5 inch (3-inch dia. in case of commercial connections)
2	Making of Pedestal (PCC pedestal of grade (1:2:4) and size (300mm(L)X200mm(W) X Height (H)), (H>=300mm & will be as per site condition)))
3	Half round concrete sleeve (As per tender)
4	Material M-20 1:2:4
5	T F Pits Will be must restored as per site condition.

PE WARNING MAT

1	Specification of Warning mat shall be as per Approved QAP.
2	Warning Mat is to be placed after padding of about 300 mm on the top of carrier pipes.

PE Laying

1	Before starting of PE laying written permission (From concerned Authorities) should be provided by Owner/EIC/CMC to contractor
2	All the machinery & adequate manpower should be available at site (by contractor) before commencing of the job. Extent of mobilization is to be finalized by EIC as per availability of work front.
3	Safety measure like Sign board, barricading, PE is to be taken up as specified in Technical Specification during PE laying.
4	After PE laying, jointing & before backfilling, top cover of PE pipe is to be witnessed by EIC/CMC.

Flushing

1	Flushing of PE network is to be done by Air from 4-6 kg/cm ² pressure.
2	Proper flushing is to be ensured before testing.

Testing

1	PE network is to be tested by Air at 6.2 Kg/cm ² pressure.
2	Pressure is to be hold for the duration as given below: -
a.	PE Length <=500 M, 4 hours.
b.	PE Length >=500 M, 24 hours.

Purging

1	Purging is to be done using Nitrogen at 2 kg/cm ² pressure.
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GAIL (India) Limited



BRIDGE AND ROOF CO. (INDIA) LTD.

STANDARD WORK PROCEDURE FOR PE LAYING AND GI WORKS

- 2 Pressure Holding is to be ensured by contractor till gas charging.

Commissioning

- 1 Before Gas charging in PE network following points are to be complied:

- a. Completeness of valve chamber along with valves.
- b. Installation of Pole, and RCC marker.
- c. As built drawing
- d. Also refer Annexure-1

VALVE SIZE

	Dia	Length	Valve Chamber Size
1	180 mm	650 mm	1000 (L)X1000 (W)
2	125 mm	600 mm	1000 (L)X1000 (W)
3	90 mm		1000 (L)X1000 (W)
4	63 mm	450 mm	600 (L)X600 (W)
5	32 mm	300 mm	600 (L)X600 (W)

Note:-

- 1 This Procedure is to be read along with PNGRB and T4S Guidelines.



BRIDGE AND ROOF CO. (INDIA) LTD.



GAIL (India) Limited

Contractor's Logo

VALVE CHAMBER CONSTRUCTION CHECKLIST /POUR CARD

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT, _____

Report no: _____

Project	:	CITY GAS DISTRIBUTION,_____	
Client	:	M/s GAIL GAS LIMITED	
Consultant	:		
Contractor	:	-----	
Location	:	-----	
Dia of Pipe	:	-----	Dia of Valve:
Type of Valve chamber	:	-----	Size of Valve chamber:
Date:-	:		

Valve Chamber Details

Sr. No.	Description	Requirement	Witnessed by
1.	Excavation of Pit	As per Drawing/tender requirement	
2.	Inspection of contractor supplied materials	Sand, Corse Sand, Cement, Steel Bar, Concrete	
3.	Concrete Grade		
a)	Aggregate Size	20 MM & Down	
b)	Sand	Coarse sand of approved quality	
c)	Cement	Reputed manufacturer	
4.	Reinforcement Rods	As per Drawing/tender requirement	
5.	Manhole cover	As per tender drawing	
6.	Laying of PCC for foundation (Casting of 100 mm thick PCC for foundation, M10 Grade)	As per Drawing/tender requirement	
7.	Curing of base PCC	At proper interval	
8.	Inspection of Shuttering, Spacing and Dimension of walls	As per Drawing/tender requirement	
9.	Laying of RCC on top of PCC (Casting of 150mm thick RCC on top of PCC (M-25))	As per Drawing/tender requirement	
10.	Concrete casting of pedestal to support of Valve	As per Drawing/tender requirement	
11.	Fabrication of reinforcement along with angle insert as per drawing for wall	As per Drawing/tender requirement	



BRIDGE AND ROOF CO. (INDIA) LTD.



GAIL (India) Limited

Contractor's Logo

VALVE CHAMBER CONSTRUCTION CHECKLIST /POUR CARD

Ref. No.:

Project: CITY GAS DISTRIBUTION PROJECT, _____

12.	Spacing of reinforcement between shuttering	Proper in between and as per Drawing/tender requirement	
13.	Casting of 150mm thick RCC for walls (M-25)	RCC M-25	
14.	Curing of casting (walls) along with base PCC/RCC	At proper interval	
15.	Fabrication of reinforcement as per drawing for top cover	Not Require	
16.	Centering, Shuttering, Spacing and Dimension of top Cover	Not Require	
17.	Casting of top RCC	As per Drawing/tender requirement	
18.	Curing of top cover RCC	As per standard	
19.	Plastering of wall with Cement Mortar with water Proofing (16 mm thk)	As per Drawing/tender requirement	
20.	Coping and sealing of entry and exit of pipe in the chamber	As per drawing	
21.	Sand filling	Coarse sand of approved quality	
22.	Supply and placement of Manhole cover	Heavy duty (with lifting hook) and proper placement	

Contractor	/GAIL
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PETROLEUM AND NATURAL GAS REGULATORY BOARD

New Delhi, the 2nd September, 2020

1. Short title and commencement:

- (1) These guidelines may be called the Petroleum and Natural Gas Regulatory Board (Gas Supplies to Industrial, Commercial Customers) Guidelines, 2020.
- (2) These shall be effective from the date they are issued by the Petroleum and Natural Gas Regulatory Board.

2. Definitions:

- (1) In these guidelines, unless the context otherwise requires, -
 - i. “Engineer In-charge or responsible engineer” means the qualified engineer appointed by CGD entity who will be responsible for the application of all or part of these guidelines;
 - ii. “MRS” means Metering and regulating station or “IPRS” means Individual Pressure Regulating Station used for pressure controlling and metering of natural gas at customer’s premises with or without pressure regulation;
 - iii. “Internal Piping (IP)” means the section of pipeline installed fabricated from the outlet flange of MRS, up to appliances point;
 - iv. “Commissioning” means safe introduction of natural gas into the internal pipeline; and
 - v. “Authorized Personnel” means a competent person of the agency authorized by CGD or PNGRB who is deployed or assigned to carry out a specific job for conducting inspection and testing of the installation in line with these guidelines.
- (2) Words and expressions used and not defined in these guidelines, but defined in the Petroleum and Natural Gas Regulatory Board Act, 2006 or in the rules or regulations made thereunder, shall have the meanings respectively assigned to them in the Act or in the rules or regulations, as the case may be.

3. Applicability:

- (1) These guidelines shall apply to the industrial and commercial customers connected by CGD entity with their city or local natural gas distribution networks as well as customers consuming natural gas other than for domestic use and categorized under non-domestic segment except in transport for automotive use where natural ventilation is not available.
- (2) These guidelines cover the general recommendation for material selection, safe installation, inspection or testing which is to be carried out prior to commissioning of the facilities at the downstream of MRS up to appliance point for new as well as for the cases where alterations are required;
- (3) The customer shall ensure compliance to these guidelines for the health, safety, and integrity of the IP downstream of meter or MRS as well as appliances or equipment throughout the operating period.

- (4) A certificate from PNGRB's approved Third Party Agency, certifying that material selection, planning and designing, installation, inspection, testing and commissioning as well as health assessment of the facilities downstream of Meter or MRS shall be obtained by customer and retained. List of Approved PNGRB Third Party Agencies ("TPA") shall be available in website of PNGRB (www.pngrb.gov.in).
- (5) The customer shall ensure that any alteration in IP line or any addition or reduction of equipment post gas-in shall be done after approval from CGD entity or PNGRB empaneled third party inspection agencies with intimation to CGD entity.
- (6) Wherever underground PE pipeline is laid, PNGRB T4S for CGD network standard shall be complied with.

4. Intent:

These guidelines is intended for ensuring the health, safety and integrity of internal installation within the customer premises including and not limited to its material selection, planning and designing, installation, inspection, testing and commissioning as well as operation and maintenance of the facilities downstream of Meter or MRS conforming to specifications laid down in the PNGRB Technical Standards for CGD Networks (T4S).

The guidelines may be read in conjunction with the following standards (latest editions):

- i. **IGEM/UP/2:** Installation pipework on industrial and commercial premises (for MOP not exceeding 0.5 bar);
- ii. **BS EN 15001-1:** Gas infrastructure. Gas installation pipework with an operating pressure greater than 0.5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations. Detailed functional requirements for design, materials, construction, inspection, and testing; and
- iii. **BS EN 15001-2:** Gas infrastructure. Gas installation pipework with an operating pressure greater than 0.5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations. Detailed functional requirements for commissioning, operation, and maintenance.

Unless otherwise specified, the latest editions of the standards mentioned herein including all addenda and revisions, shall apply. All pressure values mentioned in this specification are in gauge.

Installations shall be in accordance with applicable approvals issued by local authorities.

Installing pipework in commercial and industrial premises is a potential hazardous operation and shall be undertaken safely.

5. Route Selection:

- (1) In case gas burners are connected directly to the regulator supplied by the authorized entity, the line size shall be designed in such a way that adequate pressure is available at burners inlet when all burners (existing as well as proposed) are running on full load capacity.

- (2) The meter and regulator or MRS shall be installed at the entry of the premises.
- (3) In case a separate regulator is to be installed before burners then pressure at the farthest point (before the regulator) should not be less than minimum inlet pressure required at the regulator inlet.
- (4) The route shall be selected so that it shall not create unsafe condition for new installation as well as alteration cases.
- (5) The route shall be chosen in such a way that oil stains, hot applications, electrical appliances, electrical cables, AC Outdoor units etc. shall be at safe distance from gas line path.
- (6) The route shall be approved by CGD entity.
- (7) Customer shall ensure that IP shall not be used for any purposes which can compromise the safety and integrity of installation.
- (8) Due care should be taken during planning stage to accommodate additional equipment or burners adjoining to existing facility without compromising safety and integrity of installations.
- (9) The IP line should be installed aboveground due to reasons attributed to the safety, integrity, ease in inspection, O&M and to avoid corrosion. In case PE pipeline is laid in IP, then, the same shall comply with the requirements of PNGRB T4S regulations.
- (10) Safe route should be selected from where firm structure is available. The structural stability to be ensured by customer prior to installation and ensure fit for intended use.
- (11) Safe distance (as per applicable guidelines) should be maintained from utilities like steam line, oil line and electric HT line, hot zones, etc.
- (12) Passing of IP line should be avoided through less or non-ventilated areas, temporary structure, and drain ducts.
- (13) Installation of pipeline should be avoided at heights where the construction and subsequent inspection of PNG piping becomes unsafe.
- (14) Wherever, adequate natural ventilation is not available at critical public places, customer should carry out risk assessment and implement mitigation measures (one or more of the followings) reduce the risk to ALARP (As Low As Reasonably Practical), namely:
 - i. Ventilation
 - ii. Increase inspection frequency
 - iii. PNG Gas detection system
 - iv. Solenoid and shut off valve
 - v. Any other means to reduce the risk
- (15) The onus and efficacy of installation, operation and maintenance of the systems provided by the customer like gas leak detectors, flame proof forced draft fan, solenoid valves (to shut off supply), audio alarms, etc. and its linkages (if any) to Centralized Management Systems, shall be checked

by the customer annually, and the functioning (during the entire life cycle of the system) of the same shall solely be the responsibility of the customer. No by-pass of the gas solenoid valve shall be provided and such systems shall be monitored or controlled round the clock (24 x 7) by customer.

- (16) The gas detectors shall comply with BS EN 60079-29-1 standard or equivalent and these shall be installed in accordance with BS EN 60079-29-2 standard or equivalent.
- (17) The gas detectors (Ex-D, IIA and IIB, IP 65 protection, approved by ATEX or PESO or CMRI) shall be highly sensitive (duly calibrated by the customer initially as well as periodically) and shall be installed at appropriate locations along the pipeline system in the premises of the customer, and shall be supplemented with hooters which shall be installed at strategic locations to warn all the concerned about the gas leakage. Emergency Shut Down (ESD) devices shall be provided by the customer at strategic locations to facilitate shut down of the supply of gas in the event of any exigencies. Customer shall also ensure that these ESDs are operable (24 x 7) even in the event of power failure, that is to say by providing back-up power supply to such critical devices.

6. Materials Selection:

All materials and equipment forming a permanent part of the IP system shall be constructed according to these guidelines and should be qualified for the conditions in which it is to be used. The materials should be conforming, but not limited to, the standards and specification mentioned in Annexure 1.

7. Installations:

- (1) The installation of IP line shall be ensured as per PNGRB T4S regulations for CGD networks.
- i. All welding should be carried out by qualified welder as per API 1104.
 - ii. Teflon tape should be used for threaded joints. Any sealant agents or chemicals like M-seal, fevikwik, etc. shall not be used.
 - iii. Wherever gas pipeline crosses over other pipes and electric cables or electric points necessary measures to be taken to safeguard the gas line. For pipes passing through walls, sealing should be sleeved and filled with cement or sealant.
 - iv. Flanged joints should not be provided within 300 mm distance of electrical points or junction points, but the service line installed in confined spaces like basement, etc. shall be of welded type only.
 - v. All pipe work should be horizontally and vertically aligned.
 - vi. Pipe should be firmly tightened on support with U bolts or clamps, having adequate strength to hold the piping system.
 - vii. Adequate clamps or pipe supports on the piping system shall be provided such that the safety and integrity of PNG installation is maintained.
 - viii. Pipe support or clamps should be firmly fixed on wall or structure. A safe gap of 1" should be maintained between pipe and wall.
 - ix. Rubber sheet shall be provided between pipe and support so to protect pipe from corrosion. PVC coated "U" clamp shall be provided to support the pipe of size 2" and higher.
 - x. Pipe support should not be mounted on temporary wall or temporary shed or trees or glass or wooden facades, etc.
 - xi. In case provision is made by customer to have alternate fuel source during natural gas supply

disruption, then, the customer should ensure that both the fuels shall not be used at a time using same IP line (i.e. both the fuel should not be mixed). The customer should get the “Changeover operation methodology” and customized site-specific P&ID approved by CGD entity or PNGRB empaneled TPA.

- xii. In case of IP modification or alteration after gas commissioning, the entire pipeline shall be isolated, purged using nitrogen prior to carry out any welding operation.
- xiii. Flanges joint should have nuts or stud bolts. The extra length stud bolts shall be used such that at least 3 pitches are visible on both sides after placement of washers. All stud bolts and nuts should be galvanized as per ASTM A153.

8. Corrosion Protection and Markings:

- (1) Pipes or fittings or valves or supports & other equipment shall be painted.
- (2) Special care should be taken to ensure uniform painting thickness throughout entire pipework.
- (3) Direction of gas flow and PNG should be marked along the natural gas pipeline.
- (4) Self-adhesive anti-corrosion tapes or PE or PVC sleeve shall be used while crossing of walls or slabs or corrosion prone area to protect the pipe from corrosion.

9. Inspection and Testing:

- (1) Entire pipe work should be flushed with nitrogen / air to remove spoils, dust, dirt, welding spatter etc. Meter and regulator should be removed before flushing to avoid any potential damage. Flushing should be done from each end point.
- (2) After flushing, the entire pipework should be pneumatically tested, after removing meter and regulators, as per T4S for CGD networks.
- (3) Testing should be done with all appliances valves open and plugged. Each joint, specifically threaded joint should be checked with leak detection method. All necessary precautionary measures should be taken during testing.
- (4) For IP operating at MOP up to 4 bar, the testing shall be done with 1.5 times design pressure and pressure holding period shall be minimum 60 min.
- (5) After successfully completion of testing, the pressure should be vented out safely, meter and regulators may be kept in place. The testing certificate should be produced and signed by Contractor and Authorized personnel of approved Third Party inspection agency as per the proforma. (Annexure-2 to be filled by TPIA).
- (6) If pressure in Meter or MRS downstream pipeline is operating at the pressure 4 bar (g) or above, Non-destructive Examination (NDE) and soundness testing should be carried out as per T4S for CGD network regulation. All defects identified during NDE shall be repaired.
- (7) For IP operating at MOP up to 4 bar, all welded or threaded joints are inspected, and defects shall be repaired prior to commissioning.
- (8) The leak survey should be carried out annually to ensure safe control of operation by customer.
- (9) All the pressure tests conducted shall be witnessed by authorized personnel of approved TPA issuing a certificate for being fit for use (as per **Annexure 2**). The fit for use certificate shall be submitted to Engineer In-charge of CGD entity for records and prior to commissioning. The customer shall ensure that MRS or IPRS installation has been independently approved by certified TPA before the entity supplies the gas, and the customer shall ensure recertification once in 3 years, as per the requirements of PNGRB T4S regulations.

10. Commissioning:

- (1) Before the start of commissioning works, all the relevant details of pre commissioning checks, safety audits including inspection and testing shall be recorded by TPA in checklist attached in **Annexure 3** (to be submitted by TPA on its letterhead and signed by the customer), so as to ensure that operations are carried out in a safe manner.
- (2) After completion of the pre-commissioning checks, the pipeline networks shall be considered to be ready for the commissioning.
- (3) The relevant records and documents should be made available prior to commissioning, i.e., material test reports, testing reports, equipment test and calibration reports, drawings, etc.
- (4) **Internal pipeline checks**
 - i. Remove blind spade from downstream of isolation valve.
 - ii. Keep the vent valve in the farthest end in open condition.
 - iii. Ensure no open flame and other flammable material is available near the venting area.
 - iv. Commission IP line by gradually opening of isolation valve and ensure more than 90% CH₄ by safe venting of natural gas at farthest vent point. Further for ensuring safety, flame arrestor arrangement to be fitted in Vent pipe.

11. Safety Measures:

- (1) Adequate No. of safety gadgets, personal protective equipment, emergency handling facilities, sign boards, Do's and Don'ts, etc. as required during the installation, testing and commissioning should be in place and available at designated place. The following should be ensured at sites.
 - i. The work area has been cordoned off and required displays are provided;
 - ii. A minimum of one (1) dry powder type extinguishers (9 kg) should be available at the time of purging or venting or commissioning activities;
 - iii. Smoking, naked light or other sources of ignition should be prohibited. Warning signage or pictograms like "NO SMOKING" and "NO NAKED LIGHTS" should be prominently displayed around the work site, including vent points during purging and commissioning;
 - iv. Signage covering Emergency contact number of entity to be affixed on Meter or MRS.
 - v. Electrical continuity bonds (copper jumpers) are fitted across separated metallic pipes prior to purging operation;
 - vi. It should be emphasized that purged gas other than air is potentially dangerous for asphyxiation and information to prevent asphyxiation should be provided in procedure;
 - vii. Proper housekeeping shall be maintained by customer around MRS or metering areas;
 - viii. In any case, no hazardous or inflammable materials shall be placed in vicinity of PNG installation; and
 - ix. All installations must have displayed the Do's and DON'Ts based on those provided by CGD entity.
- (2) In case of any incident, the CGD entity will carry out an investigation of the incident to identify the shortcomings or lapses, root cause of incident, suggestions or remedial measures to prevent recurrence and to fix responsibility

The entity shall discontinue gas supply to customer in the event of unsafe installation or unsafe practices observed by CGD entity at any point of time during and after commissioning.

12. Enclosure

- i. **Annexure 1:** Material Standards and specifications;
- ii. **Annexure 2:** Fit for use certificate; and
- iii. **Annexure 3:** Check list.

Annexure 1
[See Para 6]

Material Standards and Specifications

Sr. No.	Item	Material Type	Specification
1	Steel Pipe or Galvanized Pipe	Mild steel (M.S.) or Carbon Steel (C.S)	ERW GI pipes (Class C) as per IS 1239 Part 1 standard or API 5L Gr. B or ASTM A106 or ASTM A333
2	PE pipes and fittings and valves (underground)	Polyethylene	PE100 or PE80 grade, as per following standards: Pipes: IS 14885 or ISO 4437-2 or EN 1555-2 Fittings: ISO 4437-3 or EN 1555-3 Valves: ISO 4437-4 or EN 1555-4 or ASME B16.40
2	Isolation Valve	Brass/Carbon Steel (C.S)	Up to and including 2": EN 331 More than 2": API 6D
3	Galvanized Fittings	GI Fittings, Mild steel (M.S.) or Carbon Steel (C.S)	IS 1239 (Part-2); IS 1879, ASME B16.9, ASME B16.11, ASTM A234
4	Galvanized Flanges (forged)	Carbon Steel	SORF, 150#, ASME B 16.5, Material as per ASTM A 105 hot dip galvanized
5	Socket weld end fittings	CS Forged, Socket Welding fitting,	ASTM A 234 WPB, Dimensions as per ANSI B16.11, hot dip galvanized
6	PE fittings	Electrofusion Fitting	ISO 4437-3
7	Flexible Hose	Stainless Steel(S.S.) 316L	SS braided bellow pipe with polyolefin sleeve (heat shrinked)
8	Gasket	CNAF- Spiral wound or non-metallic flat	ASME B16.20 or ASME B16.21
9	Galvanized Fasteners	steel	ASTM A193 or A 194 Grade B7 or 2 H
10	Galvanizing	Hot dip Zinc coating	IS 4736
11	"U" clamp	GI Coated and PVC sleeve	1"to 4"
12	Welding Electrodes		AWS E 6010 & E6013
13	Stud bolt, Nut	Galvanized	Stud - ASTM A 193 GrB7M Nut – ASTM A 194
14	Filter	Stainless steel	50 micron mesh and forged body. Internal SS 316 and External ASTM A 106.

15	Self-adhesive Anti corrosive Tape for wall crossing	300 micron, 2.5 cm or 5 cm (1” or 2”)	As approved by CGD entity
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Annexure 2
[See Para 9 (9)]
Fit for Use Certificate
(To be issued by TPA)

Date:

To,

<Name of authorized CGD entity>

<Address >

**Subject: Fit for Use Certificate for Internal pipeline and gas
installation Customer no- _____**

Respected Sir/ Madam,

We have inspected and tested the installation or modification of complete internal gas pipeline (IP) or gas installation from *<Name of the Contractor>*.

The entire gas pipeline (IP) has been tested at _____ bar(g) pressure for _____ hours. The testing was satisfactory, and no leakage was found.

The customer has used all materials and followed the construction procedure as mentioned in specification of authorized entity's guidelines.

The internal pipes (IP) and equipment are inspected, tested, and are safe and Fit for Use to receive natural gas.

We hereby reconfirm that this connection is ready for commissioning and is suitable in all ways for using the safe PNG gas supply.

Regards,

<Name and sign of the authorized person>

<Seal of the Company>

Annexure 3
[See Para 10]

Check list
(for issuance of Fit for Use Certificate)

(To be submitted by TPIA on letter head and signed by PNG customer)

Date:

Customer Number:

Customer Name:

Address:

Date of Inspection:

Name of CGD

Entity: Name of

Contractor: Name of

TPIA

Name of Authorized personal:

Sr. No.	Checklist Items	Yes	No	Remarks
A	Route Selection			
1	Pipe route, which is indicated by the authorized personnel, is followed	☐	☐	
2	Whether the pipeline route selected for IP is safe	☐	☐	
B	Materials			
1	All materials and equipment use in piping system are complied with PNGRB guidelines and relevant regulations	☐	☐	
C	Internal Piping			
1	All welding is carried out as per API 1104. NDE carried out and found satisfactory	☐	☐	
2	Teflon tape is used for threaded joints			
3	PVC sleeve is provided wherever distance between pipe and electric cables/electric points is less than 300 mm			
4	Flanged joints are not provided within 300 mm radial distance of electrical points or junction points			

6	Sufficient permanent support provided for Internal piping	☐	☐	
7	Pipe support or clamps should be firmly fixed on wall with U bolt or clamps	☐	☐	
9	The steel pipeline is not laid across or below the electrical lines	☐	☐	
D	Corrosion protection and Markings			
1	Pipes or fittings or valves or supports & other equipment are painted as per guideline	☐	☐	
2	Direction of gas flow and PNG are marked along the PNG pipeline	☐	☐	
3	Provide self-adhesive anti-corrosion tapes or PE sleeve while crossing of walls or slabs or other corrosion prone area to protect the pipe from corrosion	☐	☐	
E	Inspection and Testing			
1	Inspection and testing are carried out as per approved procedure	☐	☐	
2	The pneumatic test is carried out as per approved procedure	☐	☐	
3	The testing certificate is produced and signed by Contractor and Authorized personnel of approved TPA as per the proforma. (Annexure 2)	☐	☐	
4	For IP operating at the pressure 4 bar or above, 10 % nondestructive examination is carried out and defects are repaired	☐	☐	
F	Records			

Remarks:

1. _____
2. _____

Certificate

We hereby certify that the pipeline installation or laying work have been carried out in accordance with guidelines, specification, approved work procedures, including inspection and testing and the installation is found satisfactory and fit for use or ready for commissioning.

Issued by:

Third party Inspection agency Sign and Stamp:	
Date and Time:	

We hereby confirm that any responsibility beyond the delivery point lies with us in line with the Gas Sales Agreement.

Regards,

<Name and sign of the authorized person>

<Seal of the Company>