Tender for Providing Comprehensive Operations & Maintenance Services for CGD Network of SGL

Project No.: P.012659

Tender / Bid Document No. P.012659 R 11050 001

Sabarmati Gas Ltd, Gandhinagar
Gandhinagar, Gujarat | INDIA

25 June 2018

PUBLIC

TENDER
Volume II of II, Revision No.: 0
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TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

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1.0. INTRODUCTION

Sabarmati Gas Limited is promoted by BPCL & GSPC for developing City Gas Distribution Network in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

SGL is a system driven, procedure oriented, customer centric organization progressively enhancing volume of business, sales turnover, profits and market share year after year.

SGL predominately serves 4 segments in its whole spectrum of retailing of Natural Gas. These four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets.

PNG is a mixture of hydrocarbon gases and vapors consisting of principally methane in gaseous form. The PNG network consist of receiving natural gas from suppliers at city gate station (CGS), steel mains, pressure regulating installations (PRI), poly ethylene (PE) mains and supply system to end users.

Natural Gas (NG) is today increasingly gaining popularity over as alternate auto fuel primarily because it is environment friendly, economical and more efficient as compared to other conventional auto & kitchen fuels. Emission of harmful oxide and other polluting particulates is minimal in case of CNG.

SGL intends to appoint contractor for the comprehensive “Operation & Maintenance” of City Gas Distribution Network, PNG Installations, Equipments and associated facilities in the region to provide uninterrupted supply with due compliance of all the prevailing statutory & HSE norms keeping in view of the customer satisfaction. Operation & Maintenance contract for CGD Network will consist but not limited to:

- Operation and maintenance of PNG distribution network / City Gas Distribution System including Steel pipeline valve chambers from downstream of City Gate Station (CGS) to the consumer (domestic commercial, Industrial and automobiles) for uninterrupted Gas supply.
- Operations management
- Arrangement Control Room for O & M office (Main Base, Sub Base including Space required for storage of Consumables, Inventory etc) as per bid requirement. O & M office location(s) shall be finalized based on mutually agreed by SGL & Contractor.
- Administrative operation, meter reading, Customer bill distributions, cash collection at SGL customer office and all associated operations.
- Contractor’s scope shall be limited up to appliance valve in customers premise.
- Manpower supply, Equipments, tools & Tackles.
- Modification / shifting / dismantling / alteration / Reconnection of existing PNG service connection.
- Modification / shifting / de-commissioning / repairs and alteration work of existing charged PE network.
- Attending of Customers compliance on intimation from OWMER
- Compliance of statutory and safety requirements.
- Reporting management information system (MIS) and communication systems / training to O & M team including SCADA if available.
- Emergency handling.
- Bidder should fit the vehicle Tracking System (VTS) for monitoring the vehicle movement.
- Procurement and supply of spares and consumables inventory management etc.
- Any other jobs / work relating to PNG O&M work shall be included in the contractor’s scope of work.
- Health safety and Environment including compliance of regulatory measures shall be a part of the responsibility of the Bidder.
- Monitoring of Cathodic protection.
- BIDDER shall meet the requirements of operation and maintenance of facilities and equipment, as practiced by the OWNER, and as covered in this tender. When conformity with any of these requirements is impractical or not cost effective, a waiver will be sought by the OWNER.
- Operation and maintenance of industrial connections upto Metering skid and its safety, meter reading etc. shall be included in the bidders scope of work.
1.1. Operation & Maintenance Policy & Statements

SGL is committed to carry out management of operation & maintenance of its city gas distribution systems, at all location, with the prime objective of ensuring safe and reliable gas supply to its customers, integrity of network, prevention of accidents to minimize loss of life or bodily injury to contractors’ and his own employees and damage to company’s physical assets.

In fulfilling this commitment, which is as essential and equally important as sales objectives, SGL will provide and maintain a comfortable, safe and healthful work environment and protect environment and public against foreseeable hazards resulting from operations.

SGL believes that, apart from achieving the desired intent, Good O&M management can also minimize the loss in production and property resulting from accidental occurrences.

Well designed O&M management is one aspect of the company’s main policy, and is the direct responsibility of line management and contractors. All management functions, and contractors, will comply with ‘SGL’ requirements applicable to the operation and maintenance. When conformity with any of these requirements is not practicable or cost effective, an amendment to such a requirement will be considered. Reviews for compliance with this policy will be performed on a selective basis.

OPERATION & MAINTENANCE POLICY OF SGL

SGL Goal is `Exemplary’, `ACCIDENT FREE’, `Uninterrupted’, `Economic Operation and Maintenance Services’, `NO HARM’ to People/Society and `NO DAMAGE’ to the Environment.

We are committed to:

- Deploy Best Practices to improve performance, benchmarking against Superior Performance.
- Develop an Architecture defining Performance Drivers for Effective Management of O & M Practices.
- Operate our business in a manner that is sustainable in the long term, serving the best interest of SGL, esteemed customers and associates.
- Aim to go beyond Compliance of Legal, Statutory & Regulatory Requirements.
- Consciously work towards minimizing Risk to People / Society and Environment.
- Demonstrate in practice that O & M is an integral part of our Business with defined Roles, Responsibilities and Accountability with performance standards, measures at every level.
- Work towards building a Generative Organization Culture, Creating harmonious Work Environment that fosters Team spirit and process of continual learning.
- Do Right Things in First place and adopt Proactive practices rather than Reactive.
- Sensitize O & M Team to the value rather than the cost in the Emerging Business Environment.
- Promote O & M culture through clear and effective communication with all the stake holders.
- Evolve a system of recognition & reward those who contribute to improvements in O & M performance.
- Review O & M policy periodically.
1.2. O&M Policy Implementation Statements

1.2.1. Compliance with operation and maintenance requirements

The application of the best operation and maintenance practices, for the city gas distribution system, to ensure safe and uninterrupted gas supply, integrity of network, minimizes risk to personnel and property. The contractors will meet requirements of operation and maintenance of facilities and equipment, as practiced by SGL, and as covered in this manual. Including the company's other engineering standards. When conformity with any of these requirements is impractical or not cost effective, a waiver will be sought from the manager SGL.

1.2.2. Operating Standards and Instructions

Compliance with O&M standards and instructions will be consistently enforced for both SGL operations personnel and contractors alike, as it is proved that flaws/ risks that cannot be eliminated through design are controlled by operating standards and instructions.

1.2.3. Deployment of Contractor

The company will engage the competent contractor for O&M management of city gas distribution system to ensure safe operations, integrity of network and protection of those involved, protection of environment and public at large. The contractor selection will be solely based on BQC / experience in the similar job and have required resources and capabilities.

1.2.4. Inspection

Inspections to detect and correct unsafe practices and conditions will be conducted periodically by SGL and / or contractor.

1.2.5. Education and Training

All employees shall be provided with ongoing education and training as well as helping to develop those skills that are required to perform, supervise and manage assigned tasks without mishap. The training will be exhaustive including various job skills and HSE management, especially, on the job and off the job safety, emergency handling, PPEs, etc.

1.2.6. Resources, Basic facilities, infrastructure and motivation

The company will provide required resources, basic facilities and infrastructure as per contract term, to enable contractor and its employees to carry out O &M activities in a safe environment. The company understands that good communications, a viable suggestion system and the recognition of good O&M performance, encourages contractor / employee in participation, in effective O &M management program.

1.2.7. Job Placement

The company will ensure that contractor and employees will only be assigned tasks that are consistent with their capacities and job skills; this enable employees / contractor to work safely and effectively.

1.2.8. Response to Accidental Occurrences

The site specific effective emergency will be handled as per ERDMP and as per the guidelines given in this manual. These should include measures to contain or control an emergency or disaster when an accident occurs to minimize the loss of resources, a reporting and investigation system to determine the cause of the accident, and the adoption of corrective actions to avoid a recurrence.

1.2.9. Contractors’ Employee Safety
The company's personal, will monitor operation and maintenance management, to ensure that activities are performed in conformity with this O&M policies, statements and practices and do not violate the set safe practices and procedures.

1.2.10. **Accountability**

Contractor and all his employees shall be held accountable for personal and functional O&M performance. An important factor in a contractor and employee's overall job performance valuation will be, how well the contractor / employee meets his skill and safety responsibilities.

1.2.11. **Compliance Reviews**

On a selective basis, compliance reviews will be conducted by teams that include people with related expertise to determine compliance with this policy. In order to ensure the credibility and effectiveness of the review, the team members must be detached from the operation being reviewed.

1.3. **Natural Gas Composition & Properties**

1.3.1. **General**

When handled properly Natural Gas is a safe fuel. It is a non-poisonous, non-toxic combustible source of energy.

Natural Gas is composed essentially of methane with minor quantities of ethane, propane, carbon dioxide and traces of higher hydrocarbons and oxygen. It has a specific gravity of 0.6, which means it is only 60% as heavy as air and it will rise under normal atmospheric conditions. Thus, it disperses in to air very easily, if leaked.

Natural Gas within the distribution system will be given a distinctive odour, which will be designed to be detectible by the nose at concentrations of less than 0.1% of gas in the atmosphere.

Natural Gas will burn within the range of 5% and 15% of gas in air (by volume), and it is readily ignited by spark or other forms of ignition within this range. Thus, it is safer due to wide flammability limit.

1.3.2. **Natural Gas can be hazardous in the following ways**

From Asphyxiation - through over exposure to natural gas, usually in a confined space, caused by inadequate ventilation or mechanical or accidental failure of equipment.

From Explosion - through an accumulation of escaping gas, also usually in a confined space, being ignited when mixed with air.

From Fire - through the uncontrolled burning of gas, usually after an explosion.

From Over Pressure - through submitting gas facilities such as regulators, valves, gauges, etc, to pressures in excess of their maximum working pressure.

The typical Natural Gas composition & properties are given below

**Normal Gas Composition**

<table>
<thead>
<tr>
<th></th>
<th>Mole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>82%-99%</td>
</tr>
<tr>
<td>Ethane</td>
<td>1% - 5%</td>
</tr>
<tr>
<td>Propane</td>
<td>1% - 5%</td>
</tr>
</tbody>
</table>
Butane | 0.1% to 2% Mole
---|---
Pentane | 0% to 1% Mole
Hexane | 0% to 1% Mole
**CO₂** | 0% to 1% Mole
Nitrogen | 0% to 1% Mole

**Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity (air – 1.0)</td>
<td>0.56% to 0.67%</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>-161deg C</td>
</tr>
<tr>
<td>Melting Point</td>
<td>-182deg C</td>
</tr>
<tr>
<td>Flash Point</td>
<td>-161deg C</td>
</tr>
<tr>
<td>Auto Ignition Temperature</td>
<td>560deg C</td>
</tr>
<tr>
<td>Flammable Limit</td>
<td>5% to 15% by volume in air.</td>
</tr>
</tbody>
</table>

**Note:** Gas composition / characteristic may vary subject to source available from time to time

MATERIAL SAFETY DATA SHEET – NATURAL GAS & ETHYL MERCAPTAN (Refer Material Safety data Sheets enclosed in the tender.)

**2.0. SCOPE OF THIS TENDER DOCUMENT**

The scope of this tender document is to set down the minimum day to day operational and maintenance requirements for City Gas Distribution Network. The adoption of prudent operation and maintenance practices shall facilitate delivery of a safe and secure gas supply to end users.

This document lays down the minimum safety requirements for PNG distribution in cities / towns. It covers the equipment, pipelines, accessories etc. installed between Up-stream inlet isolation valve of city gas station (CGS) to end users customers.

City Gas Distribution Network is limited to downstream of 30 bar(g) pressure steel network commissioned from city gate station which includes district regulating station, 4 bar(g) PE 100 polyethylene pipe network, associated facilities like Service Regulators and industrial, commercial and domestic consumers.

Operating conditions given herein are indicative and may be rectified during actual operation depending on site conditions, experience gained during commissioning, operation and system requirements / design conditions for detailed O & M instruction for equipment, vendor’s / manufacturer manuals for respective equipment should be required in the event of any discrepancy between this tender document specifications and the vendor’s / manufacturer’s recommendations the latter shall take precedence.
SABARMATI GAS LTD.

Tender for Providing Comprehensive Operations & Maintenance Services for CGD Network of SGL

PTS - HEALTH, SAFETY AND ENVIRONMENTAL ASPECTS
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1.0 HEALTH, SAFETY AND ENVIRONMENTAL ASPECTS (HSE)

1.1 HEALTH, SAFETY & ENVIRONMENT POLICY OF SGL

Our goal is "NO ACCIDENT", "NO HARM" to People/society and "NO DAMAGE" to the environment.

We are committed to:

- Maintain HSE as a 'First Priority' and display in decision making processes and chain of command.
- Aim to go beyond Compliance of Legal, Statutory and Regulatory Requirements.
- Develop Comprehensive and Compulsory Action plan to fulfill our Commitments.
- Deploy 'Best Practices' to continually improve HSE performance, and Benchmark with Superior Performance.
- Establish system and controls to correct 'AT RISK' behavior of our Employees, Contractor and Associates to eliminate potential risk.
- Demonstrate in practice that HSE in an integral part of Business with defined Roles, Responsibilities and Accountability with performance standards, measures at every level.
- Strive to minimize Environment Impact of our business and work towards regenerative processes.
- Work towards building a Generative organization Culture, where everyone adopts Safe Practices rather than Reactive.
- **Do Right Things in First Place**, Rather than correction of Deviations and Defects.
- Provide and Channelize resource for implementation of HSE policy.
- Imbibe work culture to improve togetherness in Team Behaviour.
- Create Work Environment that fosters harmony in Work life balance.
- Evolve a system of competency building, recognition and reward to those who contribute to improvements in HSE performance.
- Promote HSE culture through clear and effective communication with all the stake holders.
- Review HSE policy periodically.
1.2 Scope / General Specific to the Bidder

1.2.1 This specification establishes the Health, Safety and Environment (HSE) management requirement to be complied with by the BIDDER throughout the tenure of the contract by stipulating the relevant Act(s) / legislations and technical specifications.

1.2.2 The safety policy and guideline is prepared to direct & appraise BIDDER’s personnel about the safety aspects involve in the job. The document deals with basic rules to be followed therein. However, BIDDER shall comply the HSE plan that addresses the HSE risks specific through mobilization, execution and demobilization at each location, where the work to be performed (Office, Factory, Fabrication Yard, Construction Site, inside the House, Kitchen (customer premises), Vessel, etc.), and the management of controls to eliminate / reduce or mitigate these risks.

1.2.3 OWNER reserves the right at all the time to audit and review the BIDDER’s facilities, services, and / or performance of its activities in respect to the compliance of his HSE plan.

1.2.4 OWNER reserves the right to suspend the work or any part thereof, if BIDDER does not comply with HSE policy. Before any work is suspended OWNER shall liaise with BIDDER to allow him the opportunity to rectify any non-conformances within an acceptable timescale. BIDDER may at any time suspend the work for HSE reasons; in such event, however, he shall immediately inform OWNER in writing of those reasons, and details of actions taken.

1.2.5 Leadership & Accountability

   a. It is OWNER’s policy to protect the health, safety and security of its employees, to minimize the risk to the public from them and to protect the natural environment. BIDDER shall ensure that all his employees are briefed in, understood and strictly adhere to the OWNER’s policies and directives on Health, Safety and Environmental aspects.

   b. BIDDER shall demonstrate leadership and commitment through actively participating in all aspects of HSE, supporting open dialogue and by allocating sufficient resources.

   c. BIDDER shall ensure that HSE responsibilities, authorities, accountabilities and competencies are clearly defined, documented, communicated and exercised at all levels.

   d. BIDDER shall ensure that individual and team contributions to HSE performance are recognized and considered during performance appraisals. Also, shall set clear goals, objectives and targets and performance are evaluated against them.

1.2.6 Organization, Responsibilities, Resources and Documentation

   a. Organization

       BIDDER shall provide sufficient and appropriate manpower and supervision in his organization; with clear responsibilities and reporting structure to ensure that HSE performance is not compromised.

   b. Employee Orientation Program

       i. BIDDER shall provide, for all his personnel involved in the work, an orientation training program to the site and all requirements of the HSE plan.

       ii. BIDDER shall ensure that no individual works unless he has been fully inducted.

   c. HSE Competence Requirements

       BIDDER shall ensure that his personnel are:

       i. Medically, physically and mentally fit to carry out the duties to which they are assigned in respect of the work for all hazardous jobs as informed by Owner. Medical fitness test shall be done by contractor of his workforce & reports shall be submitted to Owner HSE team.

       ii. Aged eighteen years or above.

       iii. Technically competent and experienced in the tasks assigned to them.
d. **HSE Training**

BIDDER shall be responsible for, and implement, competency based HSE training of his personnel as may be organized / advised from time to time. Training if not given by contractor shall be done by Owner and attached actual amount will be deducted from his bills.

e. **HSE Promotion and Awareness**

BIDDER shall establish a mechanism for communication and feedback of HSE issues and performance among his personnel on the site and to OWNER’s representatives.

f. **Sub-Contractors**

BIDDER shall ensure that all his sub-contractors, if any, receive a copy of, and comply with the requirements of the HSE plan and are provided with a copy of this document.

g. **HSE Communication**

i. BIDDER, where applicable, ensure before commencing operations pursuant to the contract that all companies, organizations and communities that could potentially be affected by such operations have been notified. At the work site, BIDDER shall also ensure that effective toolbox talks are undertaken.

ii. Where applicable, BIDDER’s arrangement for emergency communications shall be integrated with the requirements of the work.

h. **HSE Meetings Program**

BIDDER shall establish an effective structure and schedule for HSE meetings involving all personnel assigned to the work, to promote communication and involvement in HSE matters. Contractor shall be responsible to attend all HSE meetings without fail.

i. **HSE Legislation**

BIDDER shall comply with, and shall be able to demonstrate compliance with;

i. Relevant and applicable Health, Safety, Environmental legislation for all places, where work is performed,

ii. OWNER’s Policy, Procedures and Standards,

iii. BIDDER’s corporate and project specific policies and procedures.

iv. Contractor shall be abide by the statutory & legal compliance matrix which shall be handed over to him during the execution of the job by Owner HSE Team/ Owner’s Representative.

1.2.7 **Evaluation & Risk Management**

a. BIDDER shall ensure that, for all activities, a documented risk assessment procedure and risk register is in place and operating. This risk assessment procedure shall be suitable and sufficient to appropriately assess the health, safety and environmental risks involved. A copy shall be issued to the OWNER.

b. BIDDER shall be responsible for ensuring timely delivery of the risk assessment of all activities, covered in the scope of work, in order to meet the work schedule, the OWNER HSE plan and regulatory requirements.

1.2.8 **Planning & Procedures**
a. HSE Procedures
   i. BIDDER shall provide written HSE procedures to cover hazardous operations. Method statements in case of major erection, construction and O&M work to be prepared in advance and approval obtained from the Owner or Owner Representative. These will be available to all personnel in their working language. A copy shall be provided to the OWNER.

   ii. BIDDER shall abide by the OWNER permit to work system at sites.

   iii. As Owner would be getting certified for ISO 14001 & OHSAS Standard, contractor shall be liable / responsible to abide by its requirement

b. Emergency Response Procedures
   i. BIDDER shall be responsible for the establishment and implementation of emergency procedures related to the work. BIDDER shall consult with OWNER to ensure appropriate interface with the procedures.

   ii. BIDDER shall submit OWNER, within 30 days from the date of commencement of contract, the details of its provisions and procedures for proposed actions in the event of:
      - An incident involving serious injury or death to any member of the team.
      - A major incident involving third party equipment.
      - Any release of chemicals or hydrocarbons to the local environment.

   iii. BIDDER shall ensure competency of his personnel in its emergency response procedures through a programme of drills and testing and shall submit the report to OWNER.

   iv. BIDDER shall participate in an emergency response exercise, whenever required.

c. Equipment & Inspection

   OWNER shall at any time during the tenure of the contract conduct the audit for all the tools, appliances, machines, vehicles, equipments, etc... for their safe working condition includes documents. Also, BIDDER shall ensure that they should be used only by authorized and competent persons and inspected periodically.

   Prior start of job, Contractor shall offer his equipment / tool / tackles for inspection to Owner HSE Team.

d. Environment

   i. BIDDER shall protect environmental resources by applying best available techniques not entailing excessive cost, to preferably eliminate or minimize any direct or indirect impact from operations.

   ii. BIDDER shall ensure that all activities are planned in a manner that will not create unnecessary danger, disturbance or effects on the environment or to other users.

   iii. BIDDER shall minimize nuisance, disturbance or interference to the community, their activities, and other users of the environment.

   iv. BIDDER shall unless otherwise directed by OWNER, avoid conducting activities in protected areas or where there is an unacceptable risk of damage to sensitive environmental resources.

   v. BIDDER shall ensure that fishing, hunting and gathering of flora and fauna or any other environmental resources are strictly prohibited within the area impacted by the work.

   vi. BIDDER shall where applicable be responsible for restoration of any land used or affected by BIDDER’s activities under the Contract (Restoration of top soil in case of major excavation jobs
is a must). This will include removal of BIDDER’s equipment, surplus materials and waste to the satisfaction of OWNER’s representative.

vii. BIDDER shall coordinate & carry out the disposal of any waste (Hazardous or otherwise) produced or occurring as a consequence of its operations pursuant to the contract, all such disposals shall be in accordance with all legislation, OWNER’s norms and best practices, whether that shall be for hazardous waste or non-hazardous waste. BIDDER shall ensure that all necessary approvals or licenses are obtained and that any subcontractors utilized for this purpose fully comply with such requirements. BIDDER shall record & provide OWNER with a copy of each waste transfer / disposal report / note.

viii. BIDDER shall prepare & notify OWNER in writing of the method for managing disposal of all hazardous waste and gain approval therefore before commencing such disposal. The water de-watered from the valve pits shall not be discharged hitherto and thitherto. Used transformer oil shall be collected in a container and submitted to OWNER’s stores.

1.2.9 Implementation & Performance Monitoring

a. General
i. BIDDER shall establish an HSE performance monitoring programme and provide reports as per MIS to OWNER. Contractor shall submit monthly report as per Owner Guide line
ii. BIDDER shall report all incidents in accordance with the requirements.
iii. BIDDER shall provide a report of fatal accident, Lost Time Injuries (LTI), Restricted Work Day Cases (RWDC), Medical Treatment Cases (MTC), Medical Evacuations, First Aid Cases (FAC), Near Miss Reports and Frequency of Hazardous Occurrence (numbers of hazardous situations without details) for the entire work, if required by OWNER from time to time.
iv. We shall, where applicable, maintain a waste / disposal log book.

b. Incident Investigation
i. BIDDER should report all incident or near miss etc to Owner at site.
ii. BIDDER shall interface with OWNER’s Incident Investigation and Reporting requirements.
iii. BIDDER shall document and report immediately to OWNER for any incidents or event, which could have led to environmental damage, uncontrolled release or hydrocarbons, breaches or potential breaches of environmental regulations or complaint from local groups, organizations including enforcement agencies or individuals.

1.2.10 Auditing & Review

a. BIDDER shall establish a schedule for HSE audit / inspection for its activities & submit to OWNER.

b. BIDDER shall provide all input and support as OWNER deems necessary to ensure all HSE activities that OWNER’s initiates are successfully carried out and the actions arising are closed out to OWNER’s satisfaction. OWNER’s personnel shall be available for interview as part of audits and reviews.

c. Before commencement of the work, OWNER may conduct an audit to satisfy itself of BIDDER’s arrangements regarding Health, Safety and environmental aspects. BIDDER shall co-operate fully with the audit team and rectify / correct any agreed deficiency observed without undue delay and in any event before work commences.

d. BIDDER shall submit / provide a report on HSE performance during the contract, as part of the contract close-out documentation.
1.3 Instructions / Guidelines

Following recommended safe practices / instructions should be observed when performing operations and maintenance activities;

1.3.1 Work Permit / Cold Permit (Owner permit to work & Minimum supervision Guide line)

Prior to starting the work, BIDDER must have a valid work permit issued by authorization entity of Owner;

i. Either in the form of an order or work assignment supplemented by written work permits of the OWNER for operations in natural gas stations / site.

ii. Or in the form of an order or work assignment for work at or in the vicinity of existing installations and pressurised pipelines, which are not located in natural gas stations.

iii. OWNER’s work permit must be issued / obtained for a well-defined working area and to be requested prior to commencing the work. All special instructions stipulated in the permits must be strictly observed.

iv. Contractor shall submit list of competent persons who shall be responsible to receive the permits.

Carrying out work without a valid work permit or outside the working area as described in the permit will be considered as a serious breach of the safety rules.

1.3.2 Fire Permit / Hot Permit

Prior to starting work with a naked flame, BIDDER must ensure, if Fire / Hot work permit in areas, where the risks of fire and explosion cannot be ruled out / likelihood or having severe consequences;

a. Either in the form of a written fire permit issued by the OWNER for work with a naked flame in operational natural gas stations / sites.

b. Or in the form of continuous supervision by OWNER’s representative for work with a naked flame at or in the vicinity of an underground pressurised gas pipeline / station.

c. Prior to obtaining a fire permit, BIDDER must have at least a valid work permit.

d. Work with a naked flame is defined as,

i. All welding, grinding and cutting work by electrical or thermal means. All work with burners for, among other things, cladding or pre-heating of welds.

ii. All work with electrical hand tools which are not explosion-proof.

iii. In general, all work whereby a naked flame or a spark may be created.

iv. All machines or vehicles with an internal combustion engine.

v. OWNER’s fire work permits are issued for a clearly defined working area and must be requested and renewed daily. All particular instructions stipulated in the permit must be strictly followed.

vi. The issuance of a fire work permit does not preclude the need for a ban on smoking.

vii. Performance of work with a naked flame without a valid fire permit or outside the working area as described in the permit will be considered as a serious breach of the safety rules.

viii. BIDDER must in all cases install essential and suitable fire-fighting equipment in the immediate vicinity of the works, when work with a naked flame is being carried out.

1.3.3 Ban On Alcohol And Drugs

Employees must not bring on to site or consume any liquid substance containing narcotics substances or alcohol beverages between the hours of starting and finishing work and must not drive a company vehicle, if affected by alcohol or drugs. A total ban on alcoholic beverages and drugs applies on all sites belonging to OWNER. Non-observance of the ban on alcohol & drugs shall be considered as serious breach of safety rules and will result in the immediate expulsion of the person enlisted from their job.
1.3.4 Ban On Smoking

Smoking is prohibited at any of OWNER’s facilities or vehicles. Smoking is also prohibited within a work site (i.e. within public warning signs), including the right of way. Specific site conditions and rules must be always observed and due recognition given to any gas leak. Non-observance of the ban on smoking at work site shall be considered as serious breach of safety rules.

1.3.5 Speed Limits For Vehicle On / Near Worksite

As per statutory / Safety requirement.

1.3.6 Safety Torches

Only approved / fire proof / intrinsically safe torches shall be used for pipeline patrolling / gas leakage survey / any operation & maintenance related activities.

1.3.7 Two-Way Radios / Wireless Phones

Two-way Radios should be left turned on during all normal operations. However, if there is a significant gas leak in the vicinity, the user shall remove the radio to a safe location.

Note: intrinsically safe walkie-talkies can be used within stations.

Mobile Phones shall not be used within the Stations or within the vicinity of a live gas operation.

1.3.8 Incidents / Accidents

a. All accidents involving injury to a person or damage to property must be reported immediately to the OWNER’s representative, within specified time limits / norms.

b. Incidents involving an unusual occurrence, failure of a procedure or equipment must also be reported. Any apparent fault in a safety system or equipment must be reported even if the incident was not considered significant at that time.

1.3.9 Checking For Leaks

a. Checking for leaks may only be carried out visually, by use of a gas detector or with soapy water. Naked flames must never be used / allowed to locate gas leaks. The natural gas in the transmission pipeline / system does not contain odorant and can therefore not be detected by smell.

b. Before removing plugs, caps or blind flanges from vents, drains and other connections, etc…, ensure all necessary valves are closed.

c. Care must be taken when removing plugs or caps from vents, drains and other connections, etc…, in case there is a build-up of pressure behind it.

1.3.10 Precautions To Be Taken Before Gas Venting (Contractor to follow Owner venting, purging & commissioning procedure for all GAS works)

a. Before venting of gas from a section, the isolation of the section should be confirmed and the all isolation valves involved should be greased and roused to prevent minor passing of the valve.

b. Ensure that no source of ignition like overhead live electrical cables, sparks, etc…are not present at least within 15 Mtrs. radius. Depressurising should be confirmed by opening another vent (if any) or pressure gauge, if fitted. No smoking or open flame should be ensured in vicinity of the nearby area.

c. The vent pipe should be of proper length (minimum 3 Mtrs.) for the protection to person operating valves in the chamber and for easy dissipation. Wind direction & velocity should be ensured & monitored continuously.

d. Venting area should be cordoned off and person with adequate PPE’s (Methnometer / Pulsecometer) should be posted at the cordoned boundary in down wind direction to monitor the percentage of methane in the atmosphere, which should not concentrate as per specified limit / range or increase more than 2.0%. If indicates more than 2.0 % then venting should be stopped intermittently to give more time for gas dispersion.
e. Gas venting should be stopped intermittently when the vehicle passes near the spot, while venting operation is being done on traffic roads.

f. Whenever NG is required to be vented, the venting shall be done in a controlled manner as specified by the engineer in-charge to ensure minimal release of the gas to the atmosphere.

1.3.11 Human Failures

The major factors of human failures reasonable for an accident are the following:

a. **NEGATIVE OR INDIFFERENT ATTITUDE:** This is the neglect or carelessness by a person towards considering and eliminating all major and minor factors leading to an unsafe condition or unsafe act. The negative or different attitude of a person may be the result of overconfidence & lack of safety awareness.

b. **LACK OF SKILL:** If a person doing a job is not having the required skill for performing that job; it can be lead to an accident. Hence selecting the best skilled person for particular job is a must.

c. **LACK OF KNOWLEDGE:** the person doing a job is expected to have enough knowledge of the job and safe condition to be preserved while performing that job.

1.3.12 Bypassing Safety Equipment

No person shall interfere with, remove, displace or render ineffective any safeguard, safety device, personal protective equipment or any other appliance provided for health and safety purposes, except when necessary as part of an approved maintenance or repair procedure.

1.4 Protective Measures

Personnel performing any gas or health hazardous operation must wear Safety Helmets, Safety / Gum Shoes, Approved Clothing, Protective Footwear and Safety Goggles, Safety Harness, Ear Protection, Nose Masks, Hand Gloves, Breathing Apparatus, High visibility vest or reflective bands on coverall, Safety Guard / Belt / Fall Arrester, Face Shield, Special Equipment for Hazardous / Unusual activity, etc…in adequate numbers & suitably. Personnel must observe the safety rules for on-site and off-site operations as well.

It is mandatory requirement for contractor to follow and compliance of the PPE matrix issued by Owner at site.

1.4.1 Ignition Sources

Match boxes, cigarette lighters, calculators, cameras or other sparking devices must not be carried on for all facilities (refer Table - 1 given below);
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Ignition Source</th>
<th>Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Internal combustion engines of buses, cars, tractors, digging equipment, pumps,</td>
<td>Only diesel powered internal combustion equipment to be used in the vicinity of an escape of gas and the following precautions are recommended;</td>
</tr>
<tr>
<td></td>
<td>generators, welding equipment, etc…</td>
<td>Fit a spark arrestor to the engine exhaust. Do not operate the engine starter in a gaseous atmosphere.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Generally, vehicles should not be taken near to an escape of gas.</strong></td>
</tr>
<tr>
<td>2.</td>
<td>Passing motorists or pedestrians carelessly throwing lighted matches boxes,</td>
<td>Properly display warning signs and place barricades around the work area to prevent such an occurrence.</td>
</tr>
<tr>
<td></td>
<td>cigars or cigarettes into the work area, and pedestrians smoking in the work area</td>
<td>If necessary divert traffic and / or place a watchman to warn pedestrians against smoking in the area.</td>
</tr>
<tr>
<td>3.</td>
<td>Cigarettes, cigars, pipes, match, open fires</td>
<td>Do not allow smoking, match boxes, cigarette lighters and open fire, in the hazardous work area.</td>
</tr>
<tr>
<td>4.</td>
<td>Sparks from hand tools, removal of manhole covers, etc…</td>
<td>Work carefully, removing sources of such sparking (stone, paving blocks, etc…) from the work area as job progresses. Use proper tools when removing manhole covers. Use tools carefully to avoid glancing blows on minerals and concrete. Area to be dampened and maintained damp. Grinders and friction cutting tools shall not be used in the presence of live gas.</td>
</tr>
<tr>
<td>5.</td>
<td>Sparks from electrical switches, relays, telephones, electric motors, power</td>
<td>In potentially explosive atmosphere, do not operate any electrical device. If a switch is on do not switch off, unless there is no other quick means of isolating a sparking device such as an electric motor.</td>
</tr>
<tr>
<td></td>
<td>generation, cameras, and calculators, mobile phones</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Stray electrical currents on main or service when damaged of cut ends of pipe are</td>
<td>Never cut or separate ends of pipe unless proper bonding is done with jumper leads across the point of separation.</td>
</tr>
<tr>
<td></td>
<td>separated</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Static electricity</td>
<td>Where gas is escaping from a plastic pipe, wet down the plastic pipe and surrounding work area. Discharge static charge by grounding metal main on service pipe. Discharge the static charge on the person by touching an earlier state, or alternatively provide protection by wearing rubber gloves. Avoid impingement of gas stream on clothing.</td>
</tr>
<tr>
<td>8.</td>
<td>Traffic lighting control boxes, power cables, railway and telephone cables, etc…</td>
<td>Request appropriate authority to temporarily disconnect, or shut down, if these structures are causing a hazardous situation.</td>
</tr>
<tr>
<td>9.</td>
<td>Appliance pilot lights</td>
<td>Shut off service valves.</td>
</tr>
<tr>
<td>10.</td>
<td>Welding torches, arc welding, and heater torch</td>
<td>This equipment is not to be used until the area has been declared safe.</td>
</tr>
<tr>
<td>11.</td>
<td>Lighting, lanterns, flashing lights</td>
<td>Only suitable equipment should be used in a hazardous area.</td>
</tr>
<tr>
<td>12.</td>
<td>Other potential ignition sources inside structures, building, and confined areas</td>
<td>Request appropriate Authority to temporarily disconnect or shut down, and take other action as necessary.</td>
</tr>
</tbody>
</table>
1.5 **First Aid**

1.5.1 Information Support Services / Hospitals / Doctors / First Aid

a. BIDDER must include in his HSE plan a detailed list with the particulars of the eye specialists, general practitioners and hospitals nearest to the site.

b. Prior to the start of the work, BIDDER must agree with these persons and services on the fastest ways to treat emergency cases.

c. At least one competent first aider must be available at site. This person must be easily accessible through an efficient communication channel of which the particulars are included in the list of support services.

d. All OWNER’s / BIDDER’s vehicles and worksites shall be provided with a first-aid kit. The kits are to be kept clean and properly stocked as per the prescription and nature of business at BIDDER’s cost / risk. A record must be kept of all injuries, no matter, how minor. All injuries must be reported to the OWNER’s representative without delay.

1.6 **Fire Safety**

a. BIDDER must ensure the installation and maintenance of adequate equipments, material and devices for fire-fighting. However, periodic refilling, testing & calibration of such equipments owned by OWNER shall be carried out at his cost & risk.

b. On each site, there must be sufficient fire-fighting equipment, both in the central construction site installations and on the site itself. Particularly in places, where work is being carried out with an increased fire hazard, such as welding and grinding work, cladding work or the use of inflammable products, particular attention must be given to installing fire-fighting equipment beforehand.

c. All fire-fighting equipment must be in good condition and must always bear a valid inspection stamp. Any fire-fighting equipment that fails to meet these conditions must be removed immediately from the site. The approval of fire-fighting equipment is to be renewed each year, unless otherwise indicated by the Recognised Inspection Organisation.

d. All fire-fighting equipment must always be located at immediately accessible place in case of incident. The storage of material and equipment or the parking of vehicles or placing of installations in front of fire-fighting equipment is therefore strictly forbidden.

e. All vehicles shall be fitted with an approved (and regularly serviced) fire extinguisher. Fire extinguishers are located at OWNER’s strategic points. All personnel must ensure that they have access to a suitable fire extinguisher before beginning an operation. All personnel must be familiar with the use / operation of fire fighting equipment. No vehicle must be allowed in vicinity of the hazardous area, and if so, suitable spark / flame arrester must be ensured.

f. In fire-hazard areas, all detonation sources must be avoided, unless, specifically agreed by OWNER and / or its representative, the use of radios, cameras and video cameras is expressly forbidden.

g. At the end of work, the site must be checked for possible fire-hazard situations.

h. BIDDER shall ensure that a trained fire fighting personnel is available at site.

1.7 **Scaffoldings / Ladders**

a. Before using any scaffoldings / ladders, BIDDER must submit a copy of the valid inspection certificate. Scaffoldings / ladders to be built on the site must be inspected by the Recognised Inspection Organisation prior to use on the construction site and at the cost of the BIDDER. They must also be checked periodically in conformity with the prevailing regulations; a copy of the inspection report must be submitted to the OWNER without any remarks.

b. All scaffoldings must be checked by the BIDDER for their stability before they are used. At least once a week the scaffolding must be checked by a qualified representative of the BIDDER.

c. Mobile scaffoldings must be anchored before they can be used. Moving mobile scaffoldings is strictly forbidden if any persons, material or equipment are present on the scaffoldings.
d. Scaffoldings must not be constructed in the vicinity of electrical installations, they must be properly earthen prior to use.

1.8 Construction / O&M Site

a. The construction site plan must be included in the HSE plan and must contain at least an overview of the access roads, traffic direction and parking lots and the location of utility pipelines, first-aid unit, stores, site offices, canteens and sanitary installations.

b. Such structures may only be installed on the construction site in accordance with the provisions of the construction site plan.

c. For storing large quantities of fuel, gas bottles and small hazardous waste, a permit must be obtained from the competent authorities.

d. BIDDER must place the legally provided health installations in conformity with the prevailing norms at the disposal of his personnel and maintain them daily. Meals may only be eaten in buildings specially provided for this purpose.

1.8.1 Warning Signs (Contractor to follow Owner’s Standard on warning signs and information norms)

Site must have a warning sign at entrances, exits and at any crossings with public, main / private roads, premises, stations, etc…, bearing the words “ENTRY STRICTLY PROHIBITED / RESTRICTED” or “NO ENTRY”, “NO SMOKING”, “ASSEMBLY POINTS”, “NO PARKING”, “WORK IN PROGRESS”, “NO OPEN / NAKED FLAMES”, etc…. Wherever practically possible, BIDDER must fence-off / cordon-off the site with a physical enclosure, where necessary with entrances that can be locked, such as at the natural gas stations / chambers / sites and isolation valve chambers.

1.8.2 Access Roads And Escape Roads

a. Construction site must be provided with a sufficient number of access roads and escape roads. Each physically enclosed site must have at least two diagonally opposed entrances and exits.

b. The access roads and escape roads must remain completely free and adequately accessible under all circumstances. Therefore, any storage of materials or parking of vehicles in these areas is strictly forbidden.

1.8.3 Means of Communication

Site must have sufficient means of communication to allow the OWNER and / or support services to be immediately informed in case of incident.

1.8.4 Lighting / Illumination

If works have to be carried out under circumstances of insufficient daylight, such as during overtime or in winter, BIDDER must furnish and maintain the required adequate lighting on the site in conformity with the prevailing legislation (Lighting should be intrinsically safe, flame proof type).

1.8.5 Stability of Equipment

All equipments such as site sheds, material containers, generators, distribution cabinets, dewatering pumps, welding machines, electrical equipments / installations, etc… must always be erected in such a way as to ensure maximum stability.

1.8.6 Noise Pollution of Equipment

a. All construction machines, including welding units, compressors and generators must comply with the prevailing enforced standards (db level monitoring) on measures to fight noise pollution caused by equipments / machines.

b. For this reason, in the vicinity of residential centres, machines will be used that are connected to the electrical mains.
1.8.7 Signposting and Pegging-Out

a. BIDDER must submit in his HSE plan a copy of the signposting plan approved by the local authorities.

b. Work may only start after following approval by the OWNER and / or its representative of the signposting plan and after installation of the signposts described in the plan.

c. BIDDER is responsible for the installation and the maintenance of these signposts throughout the duration of the works as well as for all damage and problems arising directly or indirectly from shortcomings in the signposting. The approval by the OWNER of the signposting plan does not in any way diminish the BIDDER’s responsibility.

d. BIDDER must place a sign at each local signpost with the particulars of the person responsible who must be reachable 24 hours a day. This sign must be placed in the direction of traffic and preferably at the end of the working area.

1.8.8 Monitoring of Site

BIDDER must guarantee the monitoring of the construction site 24 hours a day in order to be able to intervene immediately and efficiently in any situation which may arise. During pipeline works, he must put together an emergency team and keep them at the ready with sufficient resources / material to be able to attend any emergency / problems.

1.9 Cleanliness / Housekeeping

a. BIDDER shall ensure the discharge of the various waste waters in accordance with the prevailing norms.

b. BIDDER shall upkeep & maintains the facility of Toilets, Offices / Premises, Stations, Sites, Water storage tanks, etc…in hygiene condition on daily basis.

c. Depending on the type of waste materials (household waste, industrial waste, small hazardous waste, etc...), BIDDER shall submit the documentary proof for the removal of these materials to an authorised / recognised dumping / disposal site in accordance with the prevailing norms.

d. The disposal / dumping of waste materials of any kind in the trenches / working pit is strictly prohibited. All environmental pollution must be prevented and BIDDER will take all the measures necessary to avoid polluting the soil, the air and the water in accordance with the stipulations of the prevailing norms.

e. BIDDER shall be responsible for the cleanliness of any public and private roads, which become soiled because of the work. They must at all times be free of obstacles and hindrances.

f. All damages and costs resulting either directly or indirectly from the non-observance of these stipulations, or failure to observe them sufficiently, shall be borne by the BIDDER.

1.10 Excavation Work

1.10.1 Pegging-Off, Trial Trenches And Soundings

Prior to starting excavation works, a detailed investigation must be carried out into the possible existence of underground installations / utilities, etc...This investigation must be carried out taking into account surface indications, available plans, soundings of the subsoil and manual excavation of trial trenches.

1.10.2 Type, Condition, Nature And Equipment Of Machines

Each excavation machine brought to the site must,

i. Be suitable for the work envisaged,

ii. Be in impeccable condition,

iii. Have the correct size / capacity for the work to be performed,

iv. Be fitted with the necessary equipment to make the use of the machine as safe as possible.
In order to reduce to a minimum risk of damage to BIDDER’s / OWNER’s property, the capacity of the machines for operation in the vicinity of the installations must be limited according to the mechanical strength of the installation.

1.10.3 Machine Operators

a. BIDDER should ensure that all machine operators have sufficient knowledge, experience and ability to be able to drive / perform on the machines / equipments safely & efficiently.

b. If the OWNER deems that the operator of an excavation machine / equipment does not have the necessary abilities, BIDDER must, upon simple request by the OWNER, assign the person in question to another task or, where necessary, remove him from the site. The OWNER’s representatives do not need to justify their decision in the matter.

1.10.4 Minimum Distance To The Working Pits

a. Prior to the excavation of pits and trenches, a safe distance must always be maintained between the edge of the excavation and the support surfaces of the machine. This distance must be adjusted to the stability of the subsoil and must, under optimum conditions, be at least equal to the depth of the excavation.

b. BIDDER is fully responsible for observing the instructions and the evaluation of the prevailing conditions. Any deviations from this rule may only be permitted if the BIDDER can prove safety by means of the necessary calculations.

c. Contractor shall follow the Owner’s standard for excavation safety norms.

1.10.5 Margin To Existing Installations

Mechanical excavation up to a safe / appropriate distance from existing installations during excavations in the vicinity of such installations is only permitted after determining the exact position by means of soundings. Any excavations within the distance must be carried out entirely manually.

Exceptions to this rule may be made when;

i. OWNER has given his explicit approval,

ii. The capacity of the machine is suited to the mechanical strength of the OWNER installation,

iii. The machine is equipped with a non-toothed shovel,

iv. The excavation machine is accompanied by a labourer in the trench or pit,

v. For each excavation of a layer manual soundings are carried out,

vi. There is continuous supervision by OWNER’s representative.

Any non-observance of these rules will be considered as a serious breach of the safety instructions and will result in the immediate exclusion of the persons concerned.

1.10.6 Support And Enclosure Of Existing Installations

Existing installations that become visible during the performance of the excavations must be properly supported and enclosed for the entire duration of the works in order to avoid sagging or damage.

1.11 Working Pits and Trenches

1.11.1 Shoring Up and Forming Banks

a. Earthworks, both for raising and excavating, must be carried out in such a way that collapsing is prevented.

b. The stability of the pit or trench walls should be ensured by installing a bank profile or shoring, as the excavation work demands. A construction drawing with calculations shall be submitted to the OWNER and / or its representative upon simple request.
c. The condition of the walls and any shoring must be checked on a daily basis, in any case on every occasion before work activities begin in the pit or the trench.

d. Suitable materials must be used for the shoring of walls with regard to both mechanical strength and resistance to seepage. The use of compressed fibre plates is strictly forbidden for the shoring of excavation walls.

e. It is also strictly forbidden to use the trestles of the shoring walls for hanging or supporting equipment or material.

1.11.2 Opportunities for Escape

a. Any excavation of a pit or trench with a depth of more than 1.5 metres and in which work will be carried out should be provided with a sufficient number of ladders to offer the personnel working in the excavation the possibility of rapid evacuation.

b. In working pits and trenches that are deeper than 4 metres, no work may be carried out without continuous supervision from outside the pit or trench. In these cases, continuous measurement of oxygen levels and harmful substances is required.

1.11.3 Minimum Dimensions of Working Pits

Each pit, in which people have to work, will comply with the minimum dimensions defined in the OWNER’s Particular Technical Specifications. As a thumb rule, pit size shall be 800 mm X 600 mm X 1200 mm for work up to 1200 mm depth.

1.11.4 Pegs and Railings

a. Throughout the work, excavation openings will be screened off by means of pegs and black / yellow warning tape, railings or covering plates around the edges to warn or protect personnel.

b. Also, strong railings will be erected on the edges of working pits with a depth of more than 1.5 metres and in all hazardous areas and maintained in good condition.

1.11.5 Sand Buffer for Working Pits on Main Roads

a. In the event that digging work is carried out on or next to the main roads and on private roads, a sand buffer shall be placed in the direction of the traffic prior to the digging work so that no vehicle can fall into the pit.

b. This sand buffer can be made either with excavated material or with imported sand that is then used as backfill.

1.11.6 Catwalks Over Pits And Trenches

a. BIDDER shall install the necessary catwalks in all places where people have to cross over the excavations. The strength of these walkways must be calculated in accordance with the loads they will be used to carry and will be equipped with regulation railings.

b. In places, where work will not be performed immediately, pits and trenches will be solidly screened off with strong fences or, better still, covered over with plates that are of sufficient strength.

c. BIDDER shall submit the necessary calculations for the stability and strength of these catwalks and covering plates upon simple request by the OWNER and / or its representative.

1.11.7 Water Evacuation And Working Floor

Any excavation, in which, people will be working should be kept dry and provided with a working floor of sufficient hardness. Where necessary, dewatering equipment will be set in place for this purpose and the working floors may be covered with gravel or wooden boards. BIDDER shall ensure that rainwater and water
coming from the dewatering equipment is removed according to regulations and that no erosion is caused thereby.

## 1.12 Electricity

### 1.12.1 Inspection

a. Every electrical installation on the site, including generators, distribution cabinets, etc., will be inspected on site by a Recognised Inspection Organisation, before it is brought into service. Any defect must be reported immediately.

b. BIDDER will attach a copy of the inspection report to his HSE plan and hand it over to the OWNER and / or its representative.

### 1.12.2 Cables And Connections

a. Distribution panels must remain closed at all times during use. The connection to distribution panels may only be made using approved and waterproof plugs.

b. The electrical cables for connection to the various users of site electricity shall be in impeccable condition and shall be protected in a sufficient manner. In places where traffic must run over the connecting cables, they must be buried with a protective sleeve. The same rules apply for the connections of the cables. Furthermore, they must be watertight.

c. All connections must be at least suitable for use in humid conditions.

### 1.12.3 Earthing

a. Both the central electrical site installation and any stand-alone generators will be fitted with proper earthing of which the earthing resistance will be checked before use as well as periodically.

b. Metal site sheds and material containers will each be properly earthed to rule out the possibility of the structure becoming live.

c. The central electrical site installation will be equipped with a suitable earth switch with circuit-breaker. Also, the pipeline to be earthed to prevent the static effect.

### 1.12.4 Electrical Tools

a. Electrical hand-tools must conform to the stipulations of the regulations of the prevailing norms, be in impeccable condition and be suitable for the work to be carried out. They must be properly earthed or double-insulated.

b. Welding transformers, generators, machine must be equipped with a power limiter that will guarantee the prescribed safety current.

c. In closed areas, tunnels, deep construction pits and damp crawling spaces, only tools with safety current may be used.

d. Only explosion-proof electrical equipment shall be used in classified hazardous area. BIDDER shall ensure to adhere to the hazardous area classifications.

### 1.12.5 Protection Against Electrical Hazards (RGB enabled boards must for site electric supply)

Followings are some of the keys for protection against electrical hazards such as Insulations Ground Wires, Fuses and Circuit Breakers, Double Insulated Tools, Ground Fault Circuit Interrupter, Recognition of Hazardous Situations and Preventive Maintenance;

a. Fire may arise from faulty or over load electrical installation or as a result of accidental short circuits. Result flash over may ignite combustible material.

b. The above dangers can be prevented in respect of electrical system by paying attention to the following points;

i. Proper design including current specifications of all components.

ii. Correct installation, Recognition of Hazardous situations..
1.13 Hoisting Work (For all lifting work a lifting plan is must as per Owner requirement)

1.13.1 Hoisting Gear and Hoisting Material

a. All machines brought to the site and which can be used as hoisting gear must be provided with a valid certificate (Third party Inspection) of approval. If no certificate is available, BIDDER will have an inspection carried out before bringing the machine onto the site. All certificates of approval for machines on the site will be listed by the BIDDER in his HSE plan.

b. Each hoisting device must be suitable for the work to be carried out, both as regards the type and the characteristics. Hoisting devices must be properly maintained and exhibit no obvious defects.

c. Hoisting equipment such as hoisting straps, chains, steel ropes, hooks and clamps must be suitable for the work to be carried out, as regards both the type and the characteristics. Furthermore, all hoisting equipment must bear a valid inspection stamp, be in impeccable condition and exhibit no obvious defects. The inspection certificates for the hoisting equipment will also be listed in the HSE plan.

d. When hoisting work is being carried out, special attention will be paid to the placing and stabilisation of the hoisting gear. If a hoisting device is provided with stabilising feet, these must be used for every hoisting operation. If the stability of the subsoil is insufficient, supporting feet or plates will be used to ensure the safe installation of the hoisting devices.

e. Hoisting buckets will always be used for hoisting loose materials and gas cylinders. The hoisting of persons will only be permitted by means of an approved hoisting cage. All hoisting equipment will be stored in a clean, dry place immediately after use.

1.13.2 Personnel and Organisation

a. All personnel involved in carrying out hoisting work - in particular the operators of the hoisting gear and the riggers - must be properly trained to carry out this work in a manner that is efficient and safe. Crane operators must be in possession of a certificate of qualification issued by an authorised institution.

b. For large and difficult loads, such as loads with an awkward shape, a hoisting plan will be drawn up before carrying out the hoisting operation. This hoisting plan will define the centre of gravity of the construction and the hoisting equipment to be used.

c. For very large loads a calculation will be submitted upon simple request by the OWNER and / or its representative.

d. Wherever necessary, such as in hoisting operations in existing installations above ground, the load must be guided by one or more persons and the circuit along which the load may be moved will be determined beforehand in consultation with the OWNER and / or its representative.

e. During hoisting, no-one may stand under the load-bearing arm or the load itself.

f. Moving a load with more than one crane is only permitted after permission has been obtained from the OWNER and provided a hoisting plan has been submitted.

1.14 Material Storage and Handling

1.14.1 General

a. A clear storage plan will be drawn up in advance, both for the central site equipment and the storage areas along the perimeter of the site. For storage areas along public or private roads, this plan must be approved beforehand by the parties involved.

b. BIDDER is responsible for drawing up and adhering to these storage plans. He will ensure that the storage areas are always left in a clean and orderly condition and that they are clearly marked out and signposted.

c. All materials must be stacked in a stable manner and protected against the weather.
1.14.2 Hazardous Products

a. All hazardous products such as Gases, Odourant, Fuels, Paints and Poisonous and aggressive products will be stored in clearly separated areas and provided with leakage trays as required. The storage of such products will be specially indicated on the building site plan listed in the HSE plan. A copy of the safety and health cards (MSDS) for the products used must be attached to the HSE plan.

b. Gas Cylinders should be stored separately on a firm base and provided with a suitable protective cover over the connector tap during storage and transport. They may never be left unattended or laid flat on the ground. Cylinder shall be handled with trolleys with properly.

c. Products must never be siphoned over into Cylinders / Bottles / Vessels / Canisters that were originally used for foodstuffs.

d. All products on the sites must be labelled according to regulations. Each label must describe the properties and risks of the relevant product, the precautionary measures to be taken and the actions to be taken in case of accident (MSDS).

e. When storing hazardous products, sufficient and suitable fire-fighting equipment must be on hand. The location of this fire-fighting equipment must be such that it can be used immediately in the event of an incident.

f. The storage of hazardous products must be arranged in such a way that the various products can easily be isolated.

g. Relevant / necessary statutory approvals should be obtained for the storage, removal / handling, transfer / transportation, disposal, etc…in accordance with the prevailing norms.

h. In works, where harmful or poisonous vapours are released / generated, measures must be taken to remove them efficiently.

1.14.3 Handling Of Hazardous Materials

a. All personnel must be familiar with the Material Safety Data Sheet (MSDS) for a particular material like odorant (Ethyl Mercaptan) before handling the same.

b. Container should be kept tightly closed and stored in well ventilated cool & dark area. To prevent, the physical damage to the container protective container shall be used.

c. The person handling the hazardous material like Ethyl Mercaptan should wear suitable & adequate personnel protective equipment (PPE’s) such as rubber gloves, filter respirator guard, plain goggles & self contained breathing apparatus, etc…

1.15 Acetylene Welding And Cutting Equipment, Butane And Propane Burners

a. The welding vehicles for acetylene welding and cutting equipment must be constructed and set up in a stable manner. The oxygen and fuel gas cylinders will be placed vertically or at an angle of at least 35° during use. They must be mounted on a stable trolley.

b. Gas cylinders for butane or propane burners and for heating devices for site sheds must be set up in a stable manner. They will be properly secured to prevent them from tipping over.

c. Any installation for acetylene welding and cutting must be equipped with a sufficient number of blow-back protection devices. These devices should preferably be located as close as possible to the tools.

d. The gas hoses and manometers must be in impeccable condition and of the correct type. They will always be protected against damage and immediately stored again after use.

e. After use, the cylinders should be closed and the pressure shall be released from the hoses. When working with a naked flame, adequate / suitable fire extinguishers must be available on site as per work permit. Proper & necessary caution should be marked. After completion of work, house keeping should be carried out at site.
1.16 **Compressed Air / Gas Installations**

1.16.1 Equipment

All Compressed Air / Gas Equipments, such as Compressors, Hoses, Couplings, Tools/Tackles, etc… will be kept in impeccable condition. Equipment with visible defects or which is unsuitable / non-compatible for the work will be immediately replaced.

1.16.2 Use

Only authorised personnel may use Compressed Air / Gas Equipments. After use, the pressure will be released from each installations / equipments.

1.17 **Radioactive Sources**

1.17.1 Use

Only personnel from the Recognised Inspection Organisation are authorised to use or transport radioactive sources for testing purposes.

1.17.2 Warning Signs

When transporting or storing such sources, standardised warning signs must be posted in the vehicle or in the storage room. These signs must be removed when there are no longer any radioactive sources in the vehicle or in the storage premises.

1.17.3 Marking Out Of The Test Area

The areas where radioactive sources are being used must be clearly marked out by means of yellow / black warning tape and standardised pictograms with the words “No Entry - Radiation Hazard”.

1.17.4 Safety Guard at The Test Area

Throughout the duration of testing with radioactive sources, a safety guard will be posted, in addition to the warning signs. The decisions and orders of these safety guards must be strictly adhered to at all times.

1.18 **Pressure Tests**

1.18.1 Inspection of Test Equipment

All the equipments to be used for carrying out pressure tests, such as hoses, couplings, testing heads, etc…, will be inspected in advance by a Recognised Inspection Organisation. A copy of the inspection certificates shall be enclosed with the HSE plan by the BIDDER.

1.18.2 Marking Out And Screening Off The Test Area

   a. The areas, where pressure tests are to be carried out will be clearly marked out by means of black / yellow warning tape and a warning sign with the words “No Entry - Installation under Pressure”.

   b. Where possible, the areas where the likelihood of pressure escaping is highest will be screened off by means of boards / plates or an earthen wall. While tests are being carried out on pipelines / cylinders or vessels / installations / equipments, all activities at and in the vicinity of the same will be brought to a halt.

1.18.3 Presence of Personnel

All the personnel, who are not strictly needed for carrying out pressure tests, will be evacuated from the test area. The personnel responsible for monitoring the pressure tests will be responsible for refusing admittance to the test area to unauthorised persons.
1.19 Personnel Behavior

a. Every person working on the site must behave correctly and with the necessary courtesy towards his colleagues, employees of other contracting parties / subcontractors, representatives of the OWNER and third parties. Any improper conduct may be restrained by the OWNER by removing the persons involved from the site.

b. All unsafe situations and actions must immediately be reported to the OWNER and / or BIDDER. The instructions given by OWNER’s representative must be complied with strictly and immediately.

c. The use of the available means of protection is compulsory and must be strictly adhered to at all times.

d. It is forbidden to operate the existing installations of the OWNER or of third parties; such operations may only be carried out only by authorised persons.

e. Entry into existing installations / premises / sites owned by the OWNER or third parties is completely forbidden unless this is strictly necessary for carrying out work and the permission of the OWNER has been secured.

1.20 Safety Precautions For Gas Distribution / O&M

1.20.1 General / Industrial Safety

a. Human beings and all living creatures have an in-built consciousness of safety. This consciousness tempts them to protect themselves from accidents in general life. The level of this consciousness varies from person to person and creature to creature. This variation has much effect on the causes and number of accidents. Usually, this consciousness is being used incidentally when we face any unexpected physical trouble in general life.

b. Apart from the general consciousness of safety, a planned programme is required to preserve and upgrade the safe conditions and safe activities at Industries. This is because, here the human beings has to work with machines, materials and environment, which involve different type of risks and hazards which are not common in general life. This planned programme of safety recommends the type / quality of man, machines / materials to be used, working / operating procedures, condition to be observed, precautions to be taken and methods of handling emergencies. This programme also covers training on these wide areas, to develop the employees to operate the Industry in ultimate Safety. The result of this programme is termed as Industrial Safety.

1.20.2 Safety Precautions While Doing Jobs In Valve Chambers / Pits

a. Leak Test / Cleaning / Painting

i. Extra care to be taken while lifting the sleepers from chamber.

ii. Detect Gas leak (if any) in the chamber, before starting any activity in the chamber / making entry in the chamber.

iii. Do not start any job, if there is any gas leakage in the chamber. Arrest / Repair the leak first and check again by the detector / soap solution.

iv. In no case smoking and naked flames shall be allowed near the open valve chamber.

v. Minimum one person must be posted outside the chamber for keeping watch inside the chamber.

vi. Open valve chamber must be cordoned off and warning sign boards placed.

vii. Keep contact with wireless communication with nearest Control Room.

viii. Before closing valve chamber, do final check inside the chamber. Do not leave paper rag and other combustible.

b. Demolishing of Valve Chamber & Removal of Valve Assembly for Live Network Demolishing
i. Install caution boards at both sides of valve chamber at safe distance of minimum 5 Mtrs. each from valve chamber.

ii. Locate Fire Extinguishers at a suitable place with a trained person, to operate on emergency.

iii. Shift the chamber covers to a distant and suitable place.

iv. Check the inside of valve chamber for any sharp materials or creatures. Pump out water, if there in water inside.

v. Take care test and ensure no leakage.

vi. Clean / remove all unwanted materials from 2 Mtrs. surroundings of the valve chamber.

vii. Only one worker should get inside the chamber at a time, to break the chamber. Pipe valve to be protected and should be covered.

viii. Break the walls from inside the chamber to outside so that the bricks would not fall inside and bit / damage the valve assembly.

ix. The bricks nearer to the pipeline should be taken out one by one to avoid any damage to the pipeline.

x. Remove all the broken materials from the chamber and surroundings.

xi. If the concrete / cement floor of the chamber is required to be broken, it should be done only after isolating and venting out NG from the pipelines section.

Removal

i. Isolate the section including the valve assembly by closing nearest isolation valves or squeezing at nearest point.

ii. Vent out NG from the section using vent pipes after ensuring no source of fire at the surroundings. Take case of traffic / vehicles.

iii. In case of MS network, do purging with Nitrogen / inert gases and ensure the Methane content is less than 2%.

1.20.3 Safe Route Selection Procedure For U/G Pipeline Work

a. The Safety and life of a gas distribution network is highly depending upon the selection of the route of the network. A proper route selection;
   i. Facilitates easy laying of the pipeline,
   ii. Eliminates hazardous areas / identifies the type of protection to be provided.
   iii. Minimizes the changes of damage to pipeline by other U/G utility agencies.
   iv. Confirm proper location of valves / venting / LPT & Maintenance can be safe and unpopulated area.

b. Following are some of the guidelines for route selection of U/G pipeline network;
   i. A visual survey of the alternative route should be made and note down all apparent physical obstacles, natural or constructed, that may affect the conduct or the work.
   ii. Details should be obtained from concerned agency / ROU holder that may affect the conduct of the work.
   iii. Local authorities should be contacted to obtain any available information on the construction of adjacent buildings and other structures and future planning / proposals. Account must be taken of any stray current that may exist in the vicinity.
   iv. Wherever possible the route should be chosen so as to avoid locations where the proposed pipelines could be subjected to abnormal mechanical loading or other adverse condition which may lead to accelerated deterioration.
c. Avoid laying in the following areas;
   i. Areas already congested with underground plant / utilities.
   ii. In proximity to unstable structures or walls retaining material above the ground level.
   iii. Areas, where there has been recent infill especially within the last two years.
   iv. Ground liable to subsidence or side slip.
   v. Areas of known or suspected corrosion activity.

d. Following additional care should be taken for laying;
   i. If the pipes are laid in areas, where future maintenance would result in no damage to structures or plant of third party.
   ii. Main pipes should be laid as far away from a building as is practicable and in any event not closer that would subject the pipes to structure loads from the building.
   iii. Ensure that branch lines dedicated to direct supply to customers are preferably routed in land for public use.
   iv. Trial pit may be necessary, particularly at road crossings, culverts and bridges to prove the route and the type of ground.
   v. Special drawings will be required for certain crossing e.g. Culverts, bridges, etc...
   vi. A plan of the proposed route of the main must be prepared. Design of the pipe size should be considering future extensions.
   vii. Use proper pipes which has proper diameter and thickness.
   viii. Lay pipes in open areas so that in case of gas leakages it would easily disperse in the atmosphere.
   ix. Ensure no source of ignition close to the pipeline from surrounding.
   x. Location of isolation valves should be in unpopulated / isolated areas and be at a reasonable distance from the roads, so that it would not be damaged by vehicles and maintenance / testing jobs could be carried out safely.
   xi. Take care that isolation valves should not be in parking areas and just under electrical cable / nearby electrical installations like transformer, etc...

1.20.4 Safety in Commissioning / Charging Industry / Commercial

Safety checks / precautions to be observed before and during commissioning of Gas inside an Industry are as follows;

a. Ensure that all items like pipes, valves, fittings are of standard Quality supplied / certified by OWNER. Also, ensure approval of PRS & its installation / equipments including vent line prior to commissioning.

b. Ensure that standard fabrication, welding inspection and installation methods are followed.

c. Check the layout of gas train and equipment / valves used in gas train.

d. Check the electrical items used in gas train are of flame proof type.

e. After pre-commissioning check, all pipeline section / equipment should be Nitrogen purged to minimize the Oxygen percentage below 2.

f. After successful purging, charge the pipeline and equipment in following sequence;
   i. Gas charging in the supply line.
   ii. Gas charging in PRS.
   iii. Gas charging in Internal Piping.
   iv. Gas charging in Gas train / Burner.
g. Before charging the burner, take dry-run of the burner, i.e. switch on the burner without gas and check the sequence controller as well as flame failure safety interlocks.

1.20.5 Precaution Before Doing Hot Work On Gas Line

a. Ensure that a work permit is taken for the job to be executed well in advance.
b. Ensure all Safety Equipments adequate & suitable Fire Extinguishers, Personnel Protective Equipments, etc…are available at the site of work.
c. Establish wireless / telecommunication with the control room before starting the job.
d. Grease the main Isolation valve at Valve chamber / Metering platform before job.
e. Pre-purge the section for hot work with nitrogen and check methane percentage at any of the tapping point / pressure gauge point with suitable analyzer / detector, it should be zero.
f. Repeat the pre-purge operation if methane percentage is detected until zero percentage is achieved.
g. Do the actual gas cutting / welding work on the line once zero methane percentage is achieved.
h. Use Personal Protective Equipments while doing the Gas Venting, Cutting, Welding and Grinding Operations.
i. After finishing of the job test pipeline section with Nitrogen at recommended test pressure with soap solution and lock pressure test.
j. After confirmation of testing, Post purging of the section should be done and Oxygen percentage should be checked at the farthest point which be minimum 2%.
k. Before charging NG following pre-commissioning checks should be done;
i. Inspection of the job done.
ii. Ensure all drain valves, Pressure gauge tapings are in closed condition.
iii. All tools tackles & equipment not required should be removed from the site.
iv. All activities should be stopped.
v. Only required personnel should be present at the site.
li. Inform all concerned before charging NG in the section including control room.
m. While recharging, always crack & gradual open the inlet valves.
n. Vent the gas from all farthest points to remove Nitrogen percent if present. Check that Methane percentage is more than 5%.

1.20.6 Safety Guideline For Plumbing Installation

a. Route Selection

i. Underground Tapping Line.

ii. Location of tapping saddle should be at a free place away from other utilities, electric posts, septic tanks etc.

iii. Length of U/G piping in customers’ premises should be as minimum as possible. The U/G pipeline should not cross any U/G tanks or open trenches.

iv. Riser pipe should be provided on a wall having enough space to install Audco valves, Pressure regulator, Meter etc.

v. In parking area / boundary wall A/G piping should be avoided or minimized.

vi. Height of the A/G horizontal pipe should be in such a way that children cannot use it for climbing or jumping. Wherever possible; initial rise / elevation to the piping should be given inside the boundary wall to avoid any vehicular accident / foul play by outsiders.
vii. Pipeline routing should be in such a way that door / window / any similar moving parts should not hit the gas pipe, valve, meter and regulator.

viii. Ensure that electric cables do not come in physical contact with gas line. It is recommended to keep a minimum distance of 1.5 feet between gas pipeline and electrical lights, cables / installation.

ix. Isolation / Control valves, meter, regulator and any other joint should not be provided nearest to electric lights, switch boards etc. install single pipes without joints as a minimum distance of 1.5 feet at these points.

x. Location of gas tap should be at enough distance from the hot plates / burners so that the gas tap & rubber tube do not get heated up.

xi. Gas tape should be at convenient height not less than 4 feet. In special cases, if the gas taps are to be installed further below an extra isolation / control valve should be provided on the tapping pipe. Gas taps should not be provided in closed cabinets.

xii. Individual control valve should be installed for each connection outside the house at a height of 6 feet. For apartments one main control valve should be installed at a convenient height on the main riser pipe; in addition to individual valves.

b. Installation

i. RCC guard should be provided where A/G & U/G piping join each other.

ii. Clamping should be provided at both sides of gas meter.

iii. Proper & firm supports should be provided for riser and branches to avoid direct load on fittings, valves, regulators, etc...

iv. Minimize the number of joints as much as possible inside the house.

v. Avoid the A/G gas pipe crossing other pipelines, wires, etc...

vi. Pipeline should not be installed hanging between pillars of any projections on walls.

vii. No gas tap should be left without connecting to a burner. In such cases the gas point should be kept closed by and hollow hex plug.

c. Ground Connection

i. Pressure test for A/G installation to be confirmed before giving ground connection.

ii. Do the ground connection after charging of PE network.

iii. Before ground connection; check all plumbing installation. Entire installation should be completed up to gas tap with proper supporting work.

iv. All extra gas taps should be plugged with hollow hex plug.

v. Soap solution test of the Ground Connection should be done up to Saddle / Tee joint.

d. Testing

i. Only inspected / calibrated Pressure Gauges should be used.

ii. Pump cylinder to be dismantled and line should be plugged after achieving required pressure. At farthest end i.e. at gas tap; pressure to be checked and confirmed for at least 1 hrs. All joints should be checked with soap solution.

e. Conversion

i. Pressure test report to be confirmed.

ii. Uncompleted work should be checked (i.e. any open ends, gas taps, plugs, etc...)
1.20.7 Conditions To Be Observed Prior To Start Work On Gas Installation

a. All required sizes of valve keys, wheels are available and placed nearest to their application place.
b. Minimum 2 nos. suitable (DCP) Fire Extinguishers should be available at each site.
c. Continuous wireless communication between site and control room and between sites must be established, immediately on reaching the sites and before staring any activity.
d. No smoking should be done in the 15 Mtrs. radius of site.
e. Only intrinsically safe / flame proof / explosion proof electrical equipments / items should be used.
f. No source of ignition / spark should be present within 15 Mtrs. radius of site.
g. Check wind direction and position the diesel fired / electrical items accordingly keep it 15 Mtrs. away from the site.
h. Wherever possible work should be done during the slack hours of traffic and gas consumption.
i. Measuring instruments must be in good working condition (Oxygen Analyzers, Gas Detectors, Gas Surveyor, Flame Ionization Detector, etc…)
j. Use calibrated Pressure gauges only.
k. Only 24 volt D.C. supply is to be used for transmitter calibration work.
l. For Venting out gas locate / choose safe place considering;
   i. Open ventilated place available.
   ii. Overhead Electrical Wires / Installations.
   iii. Vehicular Traffic.
   iv. No smoking zone – non populated area.
   v. Always vent – Gas at height by providing minimum 3 Mtrs. long pipe to vent pipe.

1.20.8 Guideline For Working In Confined Space

a. Definitions

In general industry terms a confined space means a space in any vat, vessel, tank, container, silo, valve pit / chamber, trenches, odorant storage, receptacle, underground sewer, shaft, well, tunnel or other similar enclosed or partly enclosed structures, when the space is;

i. Intended or likely to be entered by any person, and
ii. Has a limited or restricted entry and exit, and
iii. Intended to be at normal atmospheric pressure while a person is in that space, and

iv. Contains, or is intended to contain, an atmosphere that has a harmful level of contaminants or an unsafe oxygen level.

b. In terms of gas distribution, defined spaces may include regulator or valve pit, meter rooms, trenches or excavations, odorant facility, drainage or other pits of other utilities.

c. Hazards in Confined Spaces
A hazard is a potential source of harm or injury. A risk is the likelihood of being affected by a particular hazard. Thus “hazard” and “risk” have different meanings. Hazards encountered in confined spaces include oxygen deficiency, oxygen enrichment, flammable gases, toxic gases, noise, dust, smoke, fumes, heat stress, and mechanical hazards.

**Oxygen - Deficiency or Enrichment**

i. The minimum oxygen content in air should be 19.5% by volume under normal atmospheric pressure. The usual oxygen level in outdoor air is 20.9%.

ii. Oxygen enrichment, greater than 23.5%, is associated with increased fire hazards in that lower than usual concentrations of flammable gases or other combustible materials will burn because of the higher oxygen level.

**Flammable Gases**

i. The presence of a flammable gas in concentrations between its lower (LEL) and upper (UEL) explosive limits can produce a potentially explosive atmosphere. A source of ignition, such as a flame or spark can cause an atmosphere to explode causing injury, death and property damage.

ii. Other flammable gases and vapors include petrol, kerosene, ammonia, benzene, toluene and xylene. There are hundreds of other compounds which could be included in this list.

**Toxic Gases**

Exposure to toxic gases can result in widespread effects ranging from local irritation of the airways and eyes through to wide ranging effects throughout the body including death. The following provides information about two commonly found toxic gases;

**Carbon Monoxide**, is a colorless, odorless gas which is impossible to detect by the normal senses. It is a product of incomplete combustion. This can be in an internal combustion engine, whether petrol, diesel or LPG, such as chain saws, motor mowers, or petrol driven pumps, etc. Nearly all fires produce some carbon monoxide. Carbon monoxide inactivates the oxygen carrying compound of the blood preventing sufficient oxygen reaching the brain. It takes about three to five minutes for an Oxygen starved brain to suffer irreversible damage and death results in about ten minutes.

**Hydrogen Sulphide**, commonly known as “rotten egg gas” for an obvious reason, results from the action of microbes in a variety of conditions, e.g. in sewage and rotting animal and vegetable matter. While hydrogen Sulphide is easily recognized by its smell, anyone exposed to even low levels of the gas will soon develop “olfactory fatigue”.

This means that although it is still present in the air the sense of smell becomes less sensitive. This could result in death if the concentration suddenly increases to a toxic level, as the person exposed will not notice this increase. Hydrogen Sulphide may irritate the eyes and airways and affect many body functions.

**Dust, smoke and fumes**

Some dusts, once they become airborne, can result in an explosive atmosphere but this is not common in confined spaces. Airborne dust, also referred to as particulates, is measured in milligrams per cubic meter (mg/m³) of air sampled. Dust has a health consideration as well. Breathing of dust particles, depending upon the material from which they came and their size can cause any or a combination of;

i. Pneumoconiosis

ii. Emphysema

iii. Silicosis asbestosis

1.20.9 Precautions For Geyser

**Installation**
The balance flue type gas geyser is the safest one, but as it is not available in India and it will take some time to develop the same. We can continue using flue type gas geyser safely by taking following precautions;

i. As far as possible install gas geyser in well ventilated bathroom only, and this ventilation should remain effective even after the bathroom door is closed.

ii. If you are in a bathroom, with a gas geyser on, and if you start feeling certain abnormalities like, deep breathing. Fast breathing, headache, etc…open the door immediately and come out of the bathroom at once.

iii. To be sure safe, store the hot water by switching on the gas geyser, but keeping bathroom door and ventilators open. After storing the required hot water, shut off the geyser and take a bath even after closing the door.

**Four Steps for Safe Operation of a Gas Geyser**

i. First open the gas tap.

ii. Ignite the pilot flame—either with inbuilt ignition system or with a match-stick.

iii. Observe the pilot flame and make sure it is stable.

iv. Lastly open the water valve.

**Never Open Water Valve Prior To Opening of a Gas Tap**

i. This will open the main gas regulator, resulting in to gas coming out of the geyser combustion chamber, which may cause fire flames outside the combustion area of geyser. And in this condition, if ignition is delayed by any reason, than good amount of gas may accumulate in the bathroom, which may cause explosion.

ii. Never encourage children to operate the geyser; gas tap should be located at 6” height, beyond the reach of children.

iii. Never keep clothes and hair loose, while operating geysers, and never operate geysers, very closely.

1.20.10 Others

a. **VENTILATION:** Before installing the gas connection / gas geyser, adequate & proper (cross) ventilation should be ensured. Generally, a standard bathroom, kitchen does not comprise any cross ventilation. Hence, all the installation must be carried out based on the OWNER’s / statutory norms. Since, the natural gas replaces the air contains oxygen very quickly & so oxygen required for human being deficits, cause human fatality, too. Also, it the likely hood of fire & explosion increases. Every person working on the site must behave correctly and with the necessary courtesy towards his colleagues, employees of other contracting parties / subcontractors, representatives of the OWNER and third parties. Any improper conduct may be restrained by the OWNER by removing the persons involved from the site. Also, in the bathroom, there are chances of producing Carbon dioxides & monoxides from geyser & human taking bath therein, which are also having potential hazards of an accident.

b. **ROAD SAFETY:** Considering, Indian road conditions & human tendency, road safety is required during performing the work on the main roads, pipeline routes, patrolling, monitoring, complaint attendance, emergency call, etc…Defensive driving plays major role in this issue, hence, driver should be well trained, accountable towards the specified responsibility, having valid licence for the particular vehicle, renewal from time to time, should be trained for hazardous goods transportation (TREM CARD is required in such cases). Emergency Vehicle should be given utmost importance in terms of operability, statutory aspects, maintenance, spark arrestor (exhaust muffler), etc…The work to be carried out in dark / night hours should also be given substantial importance by following best engineering practices.
2.0 DOCUMENTS OF PRECEDECENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.
SABARMATI GAS LIMITED.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

CGD SYSTEM FACILITIES / NETWORK
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1.0. CITY GAS DISTRIBUTION SYSTEM (CGDS)

1.1. General / Introduction

City gas distribution network is a facility or set-up for piped natural gas, mainly as a fuel to domestic, commercial and industrial customers, in city and town. The system receives high pressure and unodorized gas from gas transporters / Suppliers, through transmission line and supplies the same to the customers after filtration, pressure reduction/ regulation, odorization and check metering.

The pressure reduction/ regulation may be in four stages depending upon the network design selected. The first pressure reduction is carried out at CGS by Transporter, second at CPRS / DRS, third at Service Regulator and fourth and final at customer premises. The odorization for imparting smell to gas is installed at City Gate Station (CGS). The system has major assets like, city gate station (CGS), underground steel pipeline distribution network, (4” to 12” size), CPRS / DRS, MP PE pipeline network, service regulators, LP PE pipeline network, and customer connections. The size, rating and type of the major and sub assets are selected based on the pressure rating, capacity and other applicable criteria considered for whole city gas distribution system for meeting the current and future customer potential, health and safety of employees, customers and public at large, environment protection, and complying the statutory, legal requirements, national and international technical and safety standards/practices. The main objective of the distribution company is to ensure safe and uninterrupted gas supply to customers for 24 hours, 365 days by manning the control room, round the clock, by deploying the team of competent engineers and technicians, for handling various customer complaints about gas leak/ escape, customer queries and carrying out planned operation and maintenance activities, as per annual operation and maintenance plan for ensuring safe and uninterrupted gas supply and integrity of network.

Basic CGD system flow diagram (schematic) is enclosed in the annexure of this document.

1.2. Glossary / Definitions

City Gate Station or CGS (refer T4S)  “City Gate Station” means the point where the custody transfer of natural gas from natural gas pipeline to the CGD network takes place.

Consultant  Shall mean Tractebel Engineering pvt. ltd., New Delhi which has been awarded the contract to prepare an O & M tender for PNG operations (PNG).

Transmission Line  Carrying high pressure gas at above 49 bars it is under scope of Transporter.

Primary Network  “Primary network” means a part of CGD network that operates at pressure above 100 psig (7 bar) and below 711 psig (49 bar) and pipelines forming part of this network called Gas Main or Distribution Main or Ring Main shall be designed to ensure uninterrupted supply of gas from one or more City Gate Stations to supply gas to the secondary gas distribution network or service lines to bulk customers through service lines

Secondary Network  “Secondary network” means a part of CGD network that operates at a pressure below 100 psig (7 bar) and above 1.5 psig (100 mbar) and pipelines forming part of this network shall be called Low-Pressure Distribution Mains which shall be designed to ensure uninterrupted supply to tertiary network or to industrial consumers
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tertiary Network</td>
<td>“Tertiary network” means a part of the CGD Network that operates pressure less than 1.5 psig (100 mbar) and pipelines forming a part of this network to service pressure distribution mains shall be designed to ensure uninterrupted Gas supply to service lines.</td>
</tr>
<tr>
<td>MGP</td>
<td>Minimum Guaranteed Pressure that is contractually guaranteed at individual design point to customer.</td>
</tr>
<tr>
<td>SDR</td>
<td>Standard Dimension Ratio it is the ratio of nominal OD to nominal wall thickness of PE pipe as define in IS-14885, with latest edition.</td>
</tr>
<tr>
<td>No – dig</td>
<td>Means Trench less</td>
</tr>
<tr>
<td>Trench less</td>
<td>Such method of construction that does not need an open trench.</td>
</tr>
<tr>
<td>Consumer meter</td>
<td>A meter that measures gas delivered to a consumer at the consumer’s premises.</td>
</tr>
<tr>
<td>Creep relief valve</td>
<td>A relief valve installed to relieve over pressure caused by creep in the downstream system and having maximum 1% flow capacity.</td>
</tr>
<tr>
<td>Electro fusion joint</td>
<td>A joint made in thermo plastic piping by passing the current through the electrical coil provided in the fitting and heating the parts sufficiently to permit adequate flow and fusion of the materials between the two surfaces put in contact.</td>
</tr>
<tr>
<td>Steel Distribution Network</td>
<td>Carrying gas upto 49 bar from CGS and taking up to IPRS, CPRS, DRS and CNG station.</td>
</tr>
<tr>
<td>PE Distribution (MP)</td>
<td>Carrying gas at 4-5 bar from CPRS, DRS and taking up to service regulator (SR) / customer.</td>
</tr>
<tr>
<td>PE Distribution (LP)</td>
<td>Carrying low pressure gas at 110 mbar and supply to customer connections.</td>
</tr>
<tr>
<td>CPRS, DRS</td>
<td>It receives gas through steel distribution line and carries out filtration, pressure reduction to 5 bar g and dispatches to PE distribution network.</td>
</tr>
<tr>
<td>Domestic Customer Connection</td>
<td>Consist of regulator, meter, GI / copper pipeline and armoured rubber tube. Gas flow at 21-24 mbar and consumed at hot plate.</td>
</tr>
<tr>
<td>Commercial Customer Connection</td>
<td>Consist of regulator, meter, GI / copper pipeline and armoured rubber tube. Gas flow at 75-100 mbar and consumed at hot plate.</td>
</tr>
<tr>
<td>Industrial Customer Connection</td>
<td>Consist of filter, regulator, meter, PE / CS pipeline and consumed at Gas equipment like boiler, furnace, etc…..</td>
</tr>
</tbody>
</table>
Transition Box / Service Regulator
receives 0.5 to 4 bar pressure gas through PE network and supply 110 mbar pressure gas to downstream PE network after pressure reduction.

Odorising Unit / Facility
adequate odour / smell is imparted to piped natural gas by continuous dozing controlled quantity of odorant chemical, in the flowing gas supply.

Office / Control Room
for manning the control room for carrying out round the clock for 24 hours and 365 days operational activities of CGD.

Other Utilities
office equipment, furniture, UHF wireless communication, emergency vehicle, condensate pits, fire protection / fighting & leak detection equipment, telephone connection, etc…as per enclosure.

Portable Gas Detectors
for detecting / measuring gas presence during leaks / escape / maintenance jobs.

Maintenance van
a vehicle for attending regular and emergency activities / maintenance.

Tools / Tackles
for repair / maintenance of leaking / damaged PE pipes / fittings on PE network, on line functional testing of PE valves and service regulators and customer connection.

Personal Protection Equipments (PPE)
for personal protection during normal and critical jobs.

Fire Extinguishers
for extinguishing fire accident during routine job.

Signage / Caution / Information Boards
and mobile phones / wireless sets
for display of information / caution, quick and effective transmission of information, even when away from control room.

Public Announcement System
for making public announcement to customer during gas supply stoppage, resumption, disaster, earthquake, fire hazards etc.

Computer System / Printer / log Books
for record / reports and logging daily information’s and parameters / customer complaints handling and status per shift including attendance.

2.0. LAWS – CODES – RULES & STANDARDS
2.1. General

BIDDER shall carry out operation and maintenance of CGD-PNG network based on following Codes / Standards, but not limited to;

- Laws, Codes, Rules & Standards as mandatory under the legislation of Gujarat and India
- ASME B 31.8, OISD STD 141 & T4S and other relevant regulations issued by PNGRB with latest edition.
The complete set of which are part of the present technical volume.

The “Rules of good Practice” commonly used by the worldwide gas industry.

The “Rules of Art” and “Sound Practices” of the engineering.

IS- 14885 “Buried polyethylene pipe for the supply of gaseous fuels – metric series – specification, has applicability in area of material specification.

Original equipment manufacturer’s installation, operation & maintenance manual.

3.0. DESIGN PHILOSOPHY

General

In a typical City Gas Distribution network, Underground Carbon Steel (CS) network is major asset / component of total installation. It can be categorized as Transmission Pipeline and Distribution Pipelines. Transmission lines are operated and maintained by GSPL. Distribution pipelines are further divided into

- Primary Network
- Secondary Network
- Tertiary Network.

Primary Network are operated generally at about 7 bars and maximum upto 49 bar. They start after City Gas Station (CGS) spreads in city up to inlet of CPRS, DRS and CNG Station and it operates at pressure range from 7 to 49 bars.

Carbon Steel pipelines are normally of API-5L Grade – B, X42 or X-52 material and sizes varies from 4” to 12” in distribution network. They are first coated with 3 Layer PE coating and then they are welded, NDT tested, laid underground at normally 1.2 m cover and finally hydro tested to 1.5 times Max operating pressure. The underground steel network is protected against corrosion by coating the pipes and applying impressed current Cathodic protection. Special care is taken during installation and operation maintenance for rail, road and nala, canal crossings.

The fundamental design objective is the provision of a safe and reliable gas distribution system.

The design philosophy of City Gas Distribution system is based on three pressure levels till the gas reaches the end consumer. These pressure levels are given in the following section.
4.0. **BRIEF DESCRIPTION OF CITY GAS DISTRIBUTION NETWORK**

Construction, including testing and commissioning, generally carried out in accordance with the requirements of ASME B31.8. The typical CGD network comprise of one or more or all of the following: criteria is mentioned below:

4.1. **Natural Gas Pipeline Network**

- Primary Network - 7 to 49 bar g
- Secondary Network - > 0.5 bar g < 5 bar g
- Tertiary Network - < 0.11 bar g
4.1.1 High-Pressure Network

This applies to the pipelines connecting the Gas transmission to the “City Gate”.

The inlet pressure for the City Gate was taken as 49 - 95 barg.

4.1.2 Primary Network

Steel Network with MAOP = 40 barg

Operating Pressure fluctuating between 7 barg said MAOP depending on actual demand, operating pressure and pressure drops.

4.1.3 Secondary Network

PE (Medium Pressure) Network : MAOP = 4.6 barg

Operating pressure fluctuating between 0.5 barg and MAOP based on the minimum pressure (Pmin) necessary at the inlet of End-Users / guaranteed MGP to end-users.

Major industrial consumers and CNG mother stations are as directly fed through connection in Primary network. Large and Small Commercial consumers will be fed through connections in either Primary or Secondary network.

4.1.4 Low Pressure Network (Pressure below 0.11 bar g/ 110mbar g) / Tertiary Network

LP network caters gas from central DRS stations to individual commercial or domestic consumers. The design presented relies on a low pressure network operated at 5 barg until the ultimate customers whether commercial or individual.

However, in a context of low individual consumption of most of the users (small individual users for domestic consumption only), the use of simpler pressure reducing system in the 21 mbarg at end-user connection is provided.

For both steel & PE network, looping of network is used, wherever possible in order to optimise pipeline size & provide uninterrupted supply in the event of major line break. The pipeline design & network looping has been carried out taking into account City Gas Distribution Project.

5.0. 

City Gate Distribution System

5.1.1 CITY GATE STATION

“City Gate Station” means the point where the custody transfer of natural gas from natural gas pipeline to the CGD network takes place.

CGS generally comprises of Filters, Pressure Regulating & control devices, metering & Odorization system, Pressure Gauges, Heating system (if any), Canopy (may or may not be) & other allied accessories. A control panel with instrumentations is also provided / installed for data acquisition, back-up & monitoring purpose.

5.1.1. Distribution Mains & Services

Medium density grade PE 100 polyethylene (PE) pipelines in various sizes from 32 to 180 mm OD has been laid for all distribution mains with all jointing by the electro fusion process for mains & services as well.
Details of total length of the mains are specified in the statistics & enclosure. PTS is a part of the bid, in which all the technical specifications are described.

Distribution services running from the PE mains to the customers appliance(s) are constructed of polyethylene for their underground section (from main to a PE / GI transition fitting, situated adjacent to the outside of the customers premises), and then installed galvanised iron (GI) pipe thereafter. The size of services pipes is standardised to 32 mm and 20 mm. details of total length of the mains are specified in the statistics & enclosure. PTS is a part of the bid, in which all the technical specifications are described.

5.1.2. District Regulating Station (DRS)

DRS consist of filtration system, regulator system & metering system. Generally DRS is designed & supplied as a single compact skid with 2 X 100%, Active, Monitor, Pressure Regulation and Slam Shut device for external safety which ensure 100% reliability of the unit. Flow capacity ranges from 1500 to 10000 SCMH pilot operated are generally used. DRS reduce the gas pressure from 19 – 26 barg to 5 barg and also works as gas measuring facility if required.

5.1.3. Industrial Metering Skid (IMS)

IMS consists of filtration system, regulator system (if required) & metering system. Generally IMS is designed & supplied as a single compact skid. All piping is rigidly supported and adequate pipe supports are provided for the filters, meters & regulators. These are bolted to the skid structure, designed and located with due regards to weight distribution and operational pipe stress.

5.1.4. Transition Box / Service Regulator

Transition Box is a pressure regulating station that interfaces a MP network with a LP network. Presently transition boxes/ Service Regulator are fitted in CGD system of Owner having capacity varies from 50 m³/hr to 200 m³/hr. Transition boxes/ Service Regulator are continuous operating type for natural gas conditioning and regulating system. It regulates / reduces inlet pressure of 0.5 bar g to 5 bar g at to 0.11 bar g. This skid is having single stream pressure control valves for over pressure safety shut off, under pressure safety shut off & pressure relief valves at the outlet of the transition boxes.

5.1.5. Network Isolation Valve (SV)

In the operation of a PE pipe system gas flow can be stopped through the use of valves, plugging devices, squeezing in an emergency situation with a manual or hydraulic device to form a seal, where it is imperative the flow be stopped and where it cannot be achieved in another manner. PE Ball valves are provided / installed as per PNGRB Guidelines and also looking to the parameters such as population density, critical locations, etc…The sizes of such valves varies from 32 to 180 diameter. Details of total length of the mains are specified in the statistics & enclosure. PTS is a part of the bid, in which all the technical specifications are described.

Necessary valve pits / chambers are constructed to protect / safe guard the isolation valve, which is made of RCC Precast chamber with Slippers. Details are specified in the enclosed drawing.

5.1.6. PNG Installation

The existing PNG installation system consists of the following equipments/ components:

- UNDERGROUND PE: It is pipe generally laid at one meter depth to ensure its safety / security. This line carries PNG at about 110 mbar g.
- MAIN CONTROL VALVE: It is installed normally outside the consumer’s house and before the regulator and meter at safe and easily accessible location but not reachable by children.
- REGULATOR: It is an important component of PNG installation which regulates the natural gas pressure coming to the consumer’s kitchen at about 24 mbar g. For industrial consumers the natural gas pressure at their consummation points is as per requirement of the end users.
- GAS METER: It measures the quantity of gas consumed by the customer.
5.1.7. Cathodic Protection

Cathodic protection is a method of inhibiting corrosion to steel pipes. The technique is to connect the pipe line to anode bed and to make the pipe behave as cathode by impressing a direct current voltage so that the anode bed corrodes and not the pipe. Cathodic protection is particularly important for coated pipes to overcome the effect of pinholes or accidental breaks in the coating which would permit local corrosion cells to form which are highly active and can rapidly penetrates the pipe line.

Cathodic protection system consist of –

- Impressed current system: Impressed current systems are generally installed where alternating current is available for the rectifier unit.
- Permanent (direct) current system: Permanent Cathodic systems are generally installed where alternating current is not available for standard rectifier units. For this system direct current is provided by a transformer-rectifier combination.
- The existing cathodic protection is utilised for the protection of carbon steel pipeline from corrosion.

5.1.8. Odorant System & Storage Facility / Odorant handling Management

General

The natural gas being odorless, it is recommended by various international gas engineering and safety standards and as per safe practices, the natural gas supplied to customers through, the City Gas Distribution System should be odorized for facilitating the early detection of gas, when it leaks, before it causes hazards like fire / explosion and asphyxiatiion. Adequate odor / smell is imparted to piped natural gas by continuously dozing controlled quantity of odorant chemical, in the flowing gas supply.

Generally Ethyl Mercaptan chemical is used as odorant. The dozing rate may vary with fluctuation of gas supply to achieve the required smelling sulphur content to adequate enough to smell the gas. The adequacy of sulphur content in dozing can be periodically verified by Dragger tube test, at the remote active consumption points.

Similarly the adequacy of smell of odorant in gas supply has been regularly checked by equipment / standard nose method, by trained and competent persons by smelling gas at various points in the network, by carrying out special smell survey or during attending customer complaints, and declaring / deciding and recording the sufficiency of odorant smell in the gas at a particular dozing rate.

The Ethyl Mercaptan, being noxious smell nuisance producing chemical, the GPCB, local authorities and public in general, are very sensitive, for various odorant related activities like, Import, Transportation, Storage, Dozing and Waste disposal of the empty odorant barrel. Hence to meet the statutory requirements and to eliminate / handle the related problems, it requires a comprehensive odorant handling management. Especially the activities which comes in our purview like, Storage, Local / internal transport, Dozing and Waste Disposal.

A typical odorant facility will comprise of a gas metering device, storage tank, metering pumps (duty and standby) and control system to achieve the desired concentration of odorant in natural gas. The pumps are often powered by natural gas, which is exhausted to atmosphere via a carbon canister.

In this odoriser, a very small amount of mainstream natural gas is by-passed through the odorising unit. In its journey through the odorising unit, the by-pass gas absorbs enough odorant to provide the desired odour intensity for the entire gas stream. Subsequently the resulting odorant laden gas is returned to the
mainstream. (For more details, refer Particular Technical Specification (PTS) / General Technical Specification (GTS) of this document).

Bulk storage facility for gas Odourant, as per the norms & optimum resources available, includes, Hazardous Chemical & waste storage separately, PPE’s, RCC rooms, Lifting tackles, Security fencing, Pneumatic Transfer pump, collection arrangement, etc…

6.0 Utilities / Others

The CGD PNG distribution system is having Signages facilities along the pipeline route, which mainly comprises of:

- Warning Marker
- Direction marker
- Workers Ahead
- Danger Gas No Smoking
- Pipe Line Warning Sign
- Aerial Marker
- Road Closed
- K.M.Post

City Gate Stations above equipped with Fire Fighting equipment at the site for saving CGS from preliminary fire hazards. This mainly comprises of fire extinguishers, sand buckets, PPE’s etc.
SABARMATI GAS LIMITED

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

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1.0. OPERATION & CONTROL

The main operation area for the bidder would be to monitor gas receipt, odorisation and pressure reduction (including heating of gas, if required) and managing the district regulating station, field regulators and gas metering for uninterrupted gas supply to all kinds of customers such as domestic, commercial and industrial. The gas measuring including energy balance shall be a part of operation.

1.1. Glossary / Definitions

“PNG” Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated / controlled, odorized & distributed through pipelines for various applications, i.e. for industrial, commercial, domestic, etc…as a Fuel.

“OWNER” The Principal Requesting the Works to Which the Agreement relates i.e. “SGL”.

“BIDDER” The Party / Person, who are bidding for obtaining the O & M Job / Contract.

“Equipment” Gas Transmission Pipelines (Steel), Distribution mains (PE), City Gate Station, DRS / CPRS / MRS, Transition Box / service regulator, GI Installations, Meter / Regulators, Safety / Regulating / Control valves & associated facilities includes Flow Meter, Filters, Odourizer and accessories owned by OWNER for PNG distribution.

Control Room It is a Main Base, Sub Base & Maintenance Base as specified by OWNER. The Main base & Sub Based shall be arranged by BIDDER as per bid requirements and Maintenance Base shall be established as per bid requirements by BIDDER in the premises allocated by OWNER.

“Safety Procedures” The Procedures, Direction, Guidelines and Measures as communicated from time to time by OWNER to the BIDDER for safe / reliable handling, distribution & usage of PNG.

“Vehicle” A Light Motor Vehicle (Cars & Three Wheelers) and Heavy Motor Vehicle (Bus) as defined under the Motor Vehicle Act, 1988.

“MIS” “Management Information System”

“AOMP” “Annual Operation & Maintenance Plan”

“CGS” “City Gate Station”, is a skid of equipments / installation, where gas is filtered, metered, regulated and odorised.

“HSE” “Health, Safety, Environment”

“PPE” “Personal Protective Equipment”

“TB / SR” “Transition Box / Service Regulator”, is a skid of small equipments such as filters, regulating & safety valve, accessories, for reducing pressure from medium to low level.

”DRS/CPRS” “District /Common Pressure Reduction Station”
1.2. Contractor's scope of work

In order to provide uninterrupted services, BIDDER shall make necessary personnel available (including manning of control room) to operate the facility as per specified scope in shift operations. For all the installations / equipments / associated facilities / uninterrupted consumer services at the direction of OWNER & by applying best engineering practices, so that the facility runs most economically and efficiently without adversely affecting the life of the facility, to enhance productivity with due adherence of HSE aspects, T4S regulations and statutory compliance thereof.

Broadly the bidder’s / contractor’s scope of work shall include but not limited to:

“SRV” “Safety Relief Valve”
“CRV” “Creep Relief Valve”
“SSV” “Safety Shut-off Valve”
“PRV” “Pressure Reducing Valve”
“LDT” “Leak Detection Test”
“LPT” “Lock Pressure Test”
“TR Unit” “Transformer Rectifier Unit”
“MDPE” “Medium Density Polyethylene”
“MS” “Mild Steel”
“BA Set” “Breathing Apparatus Set”
“CP” “Cathodic Protection”
“IJ” “Insulating Joint”
“AJB” “Anode Junction Box”
“TLP” “Test Lead Point”
“CJB” “Cathode Junction Box”
“MP” “Medium Pressure”
“QAP” “Quality Assurance Plan”
“SOP” “Standard Operating Procedure”
“LP” “Low Pressure”

“References” to a person shall include natural person, companies, bodies corporate and associations, whether incorporated or not.

References to Articles, Clauses, Schedules and Annexure are to Article, Clauses of, Schedules and Annexure to this bid.
A. SCOPE COVERED IN SCHEDULE : A

- Supply of Manpower, Emergency Vehicle & Equipment, tools & tackles, Administrative operation, Inventory Management.
- Development & Arrangement of Control Room for O & M office (Main Base, Sub Base including Space required for storage of Consumables, Inventory etc.) as per bid requirement. However, O & M office location(s) shall be finalized based on mutually agreed by SGL & Contractor.
- Operations & Maintenance management including Emergency handling of PE distribution network / City Gas Distribution System including Steel pipeline valve chambers from downstream of City Gate Station (CGS) to the consumer (domestic commercial, Industrial and automobiles) for uninterrupted Gas supply.
- Meeting the requirements of operation and maintenance of facilities and equipment, as practiced by the OWNER, and as covered in this tender. When conformity with any of these requirements is impractical or not cost effective, a waiver will be sought by the OWNER.
- Supply & Fixing of Vehicle Tracking System (VTS) in Emergency Vehicles & two-wheelers for monitoring the vehicle movement.
- Operation and maintenance of industrial connections up to Metering skid and its safety, meter reading etc. shall be included in the bidder’s scope of work.
- Daily meter reading of all industrial Consumers / Connections.
- Monitoring of Cathodic protection system.
- Reporting to SGL as per Management Information System (MIS) and communication systems / training to O & M team including SCADA if available.
- Attending of Customers compliance on intimation from OWMER
- Have knowledge of minimum service level standard issued by PNGRB and shall comply the requirements of Owner.
- Health safety and Environment including compliance of regulatory measures shall be a part of the responsibility of the Bidder.
- Compliance of statutory and safety requirements with obtain necessary licences/permissions from Central Labour Commissioner.
- Any other jobs / work relating to O&M will also be a part of the contractor’s scope of work.

B. SCOPE COVERED IN SCHEDULE : B

- Supply of Material & services for Alteration / Modification / shifting / dismantling / alteration / Reconnection of commissioned Commercial & Industrial PNG service connection only.
- Supply of Material & Services for Modification / shifting / de-commissioning / repairs and alteration work of existing charged PE network.
- Supply of Material & Services for Preventive Maintenance of commercial installations.
- Supply of Material and Services for Painting of fencing, route markers, old spool pieces, support structures, above ground piping, installations etc.
- Supply of Material & Services for Civil work including brick work, PCC and RCC etc.
- Hiring of JCB, Hydra, Rock breaker, Air compressors, dewatering pump etc.
- Services for Earthing Pit repair & maintenance with Curing by Water as per AOMP of OWNER.
- Procurement and supply of spares and consumables inventory management etc.

C. SCOPE COVERED IN SCHEDULE : C

- Customer’s Meter reading, bill distributions, cash collection at Owners CCC and all associated operations.
- Meter reading of Temporary disconnected customers
1.2.1. **Operation management**

Bidder shall provide manpower in three shift operations on round the clock basis to perform Planning, scheduling, progress monitoring, coordination, documents management including drawings/ sketch / work permit etc.

BIDDER shall attend Weekly / Monthly review meetings and all other meetings called by the OWNER and submit monthly summary & performance review to OWNER.

BIDDER shall provide relevant training to the personnel deployed for the operation & maintenance of CGD Network (Steel, PE & PNG) including Patrolling of charged Steel pipeline network, PE Distribution mains & services (comprising Isolation Valves chamber including steel & PE network, GI installation, Gas Meter & Regulator, Other accessories), Transition Box / service regulator, Interconnecting Piping / Tubing, Valves, Fittings, associated facilities and accessories. The training will be exhaustive including various job skills and HSE management, especially on job and off job safety, emergency handling, disaster / risk management etc.

Liaisoning for installation / Shifting of PE Pipeline along roads shall be under the scope of contractor, however SGL shall assist contractor in every possible manner. No separate Liaisoning charges with local authorities shall be paid to the contractor.

All material under contractor scope - GI Pipe, PE Pipe, GI & PE fittings etc. has to periodically reviewed for their quality by EIC/TPI.

Contractor shall acquire necessary documents like ESIC, WC Policy, Transit Insurance, Group Personal Accident Insurance, CAR Policy before the start of the contract and submit a copy to SGL.

Bidder shall perform preventive maintenance of equipment installed in Steel & PE network like PRS/DRS/CPRS, Sectionalizing valves, SR Module, Odorant system etc.

Bidder shall assist in Joint meter reading of industrial and commercial customers as per the frequency set by the Owner.

Bidder shall perform Functional testing of Service Regulator module / Transition Box, LPT / LDT of steel pipeline network/ PE pipeline network as per approved AOMP of OWNER.

Bidder shall maintain all O&M related documentation in line with statutory requirement as per instruction of Owner.

Bidder shall Co-ordinate with Gas suppliers and consumers for gas supply & distribution as per instruction of Owner.

Bidder shall Co-ordination with Statutory, Local authorities, other Service Provider etc as per instruction of Owner.

BIDDER shall adhere to implement Health, Safety and Environment (HSE), Emergency handling & Security Management for the entire operations as per the specification of this tender document.

BIDDER has to ensure the safety of Man and Machine all the times. The BIDDER shall remain at all times liable to OWNER for any loss or damage caused to any building, plant, machine, installations of OWNER / Consumers due to carelessness, negligence, inexperienced act of default of the BIDDER, his agents, representative or employees. OWNER shall be the sole judge as regards the quantum of loss or damage and shall be deducted from the amount of payable hereunder to the BIDDER the cost of repairs or the amount of loss or damages.

BIDDER shall make his own arrangement to provide all facilities like Accommodation and Transport, Canteen, Tea / Refreshments, Food, drinking water etc…to his employees.
BIDDER shall not carry out any business at the premises / establishment / consumer base of the OWNER other than that mentioned in the Bid. BIDDER will safeguard the OWNER’s property and any damage will have to be reimbursed to the OWNER.

1.3. Administrative Management

1.3.1. General

BIDDER shall establish O&M control room; provide adequate office space with seating arrangements and required furniture / office equipments at main base and sub base. **For main base, It shall consist of two rooms with minimum 350 sq. ft. space area.** (Also called control room, change room & store room for emergency spares). **For sub-base, a small office setup of one room with minimum 150 sq. ft. space area shall be provided.**

**BIDDER SHALL PROVIDE SEPARATE SITTING ARRANGEMENT I.E. TABLE, CHAIR, INTERNET, ETC FOR SGL ENGINEER IN-CHARGE AT SANTEJ & NANDASAN LOCATION.**

BIDDER should have their office equipped with computer, printer, scanner, required stationeries, telephone/mobile, internet facility, Cupboards, Racks for stacking free issue materials, notice board, white board, CGD network drawing, other consumables etc.

The emergency control room shall be located within 1 km radius of SGL operated CCC’s and shall be manned accordingly for shift operations, emergency handling of complaints, preventive maintenance, breakdown maintenance and other O&M functions as required for Steel/MDPE network, industrial, commercial and domestic gas distribution system.

BIDDER shall provide emergency vehicle (Two/ wheeler / Four wheeler as per bid requirement) for attending emergency maintenance, customer complaints, site work prescribed in the mandatory scope of work/ AOMP, fuel & driver, preventive / breakdown maintenance of vehicle. This vehicle will be equipped with required tools and tackles that are in the scope of the Bidder, wireless communication equipment along with public address system. Any accident occurred to the vehicle shall be repaired by the BIDDER at his cost & risk including insurance claims.

BIDDER must maintain timely attendance, Performance of duty, Dress Codes, ID cards and Personal Protective Equipment to all workers. No worker shall be allowed without uniform.

BIDDER shall ensure proper upkeep of utility system / services, such as, Emergency Vehicle, SGL’s supplied Tools / Tackles, water tanks, drinking water, other accessories, etc…

BIDDER shall ensure and manage the tariff especially vehicular at worksite during the work & in case of emergency as well.

BIDDER shall provide materials at site at its own cost, but not limited to; Log Book, Registers, Files, Note Book / Pad, Eraser / Ink, Sketch Pens, Tag / Stickers, Hole guard, Stamp Pad, Envelope, Rubber Band, Amount / Cash Counting Pad, Amount / Cash Safe Box, Staplers / Staples, Punch, Pen, Pencil, Refill, Highlighters, Photocopy / Xerox, B&W Printer etc…
Since, this is a comprehensive contract, no overtime, conveyance, food, commission; incentive, etc…shall be paid by SGL, except in approved case.

BIDDER shall provide First-Aid medicines, Equipments / Tools & Tackles such as, Bench-vice, Electrical Extension Board with accessories, Instrument for measuring earthing resistance, Multi-meter, Dragger, Emergency Light, etc as per tender document. Also, consumables like Araldite, M-Seal, Grease, Emery Papers, Cutting / Cleaning Fluid, Staff welfare like pantry Service (Tea / Coffee refreshments), drinking water, etc…

BIDDER shall be responsible to acquire and hold adequate quantities of Spares/ Consumables/Tools/Tackles as per Annexure-I.

1.3.2. House Keeping

BIDDER shall be responsible for the house keeping of Office / Control Room, Store Room, Odorant Storage Facilities, Change Room, CGS’s, DRS / CPRS / MRS, SRs / TBs, Valve Pits (Steel & PE Laying of pipeline network), Equipments / Accessories, drain pit, canopy, premises and all under his scope / battery limit at his risk and cost for the furnished office provided by OWNER includes maintenance of the same.

BIDDER shall provide housekeeping materials at site at his own cost, but not limited to; Detergent, Water, Phenyl, Hand Soap, Sanitary Items, Bucket, Cotton Waste, Broom, etc… Disposal of waste material / effluent should be carried out as per the environmental norms.

1.3.3. Communication

OWNER shall provide UHF wireless communication system with all accessories to BIDDER. Wireless tariff charges shall be borne by the OWNER, including maintenance of the radio. BIDDER shall also provide mobile telephone set (suitable for the region) for shift In charge and other staff and its tariff charges / maintenance cost shall be managed on their own. BIDDER shall ensure the proper & minimum usage of this facility and up keep in reasonable condition. Any loss / damage / malfunctioning of equipment due to negligence of the Bidder’s staff shall be recovered from the invoices of Bidder.

1.3.4. IT

SGL will provide only Mobile SIM card to the Bidder. However, Cost for Mobile Hand set along with accessories & uses charges for Calls/Internet shall be borne by Bidder. BIDDER shall provide the personnel to operate & up keep the system handed over to them for the entire activities. OWNER shall provide one time training to the BIDDER’s personnel, including software. The necessary maintenance of the system shall be taken care by OWNER or OWNER’s representative. BIDDER shall ensure the security of the Data (information & electronic).

a. BIDDER shall provide IT related materials at site at his own cost, but not limited to; CDs, Floppies, Computer Stationery, Printer Cartridge, etc…

b. BIDDER shall up keep all the data pertaining to O&M including billing and submit the data backup in Soft copies (preferably on CDs), as per MIS.

c. BIDDER should not shear contact details which Mobile SIM will provide by OWNER to any customer for customer complaint.

d. OWNER may provide Internet connection facility for day-to-day reporting.

e. BIDDER shall ensure optimum usage of the facility and not misuse, for any other objective.
f. BIDDER shall provide the security password given on the system to the OWNER representative for any official / vigilance objective.

g. BIDDER shall provide smart mobile Phone at each base for reporting to Owner with site related activities (if any).

h. Smartphones shall have SGL provided GIS SOFTWARE installed in it, for Closing Line damages generated from GIS / SAP.

i. BIDDER shall provide separate Laptop to Data Entry operator PLUS a Separate Desktop will be there at contractor office for daily data emails as per our format.

1.4. Reconciliation / Gas Supply Management

a. Gas Reconciliation

BIDDER has to assist Owner for reconciliation of gas purchase and sold and shall assist in analysing if allowance of gas reconciled is beyond the permissible tolerance - due to leakage, venting loss & other allowances.

b. Spares & Consumables / Asset / Equipment

BIDDER shall be responsible for safe handling of Spares / Consumable items / Assets / Equipments handed over by the Owner. Any loss / damage / malfunctioning of equipment due to negligence of the Bidder’s staff shall be recovered from the invoices of Bidder.

c. Spares / Consumables under Bidder’s scope:

BIDDER shall maintain at least spares / 80% inventory of each consumables at any time against the list provided in this tender document. In addition, Bidders should identify the needs for Equipment, Tools / tackles and Spares and procure after reviewing the availability against list provided. The BIDDER shall submit reconciliation statement of all Spares / Consumable / Equipments / Tools & Tackles to OWNER once in every month.

d. Uninterrupted Supply

The management of the CGD operations covers, Quantity of Gas supply management without interruption, effective patrolling / monitoring of network for any excavation, damages, etc…by authorities, ROW, control on leakage including PNG service connections.

1.5 Others / Miscellaneous

i) BIDDER shall maintain and upkeep of the facility as per the prescribed OWNER’s requirement and ensure that the site / ROU is at all times kept free from any encroachment.

ii) BIDDER shall not make any modifications within the facility / premises or layout of the CGD without prior approval of OWNER.

iii) BIDDER shall at his own cost, provide & maintain the additional facilities to consumers, if any with prior approval of OWNER.

iv) BIDDER must maintain timely attendance, Performance of duty, Dress Codes and Personal Protective Equipment to all workers. No worker shall be allowed to work without proper uniform and PPE’s.

v) BIDDER shall be responsible for the security at Control Room (Main, Sub & Maintenance Base, and Consumables & Inventories Storage) under his scope, Installations / Equipment, worksite, etc.
vi) BIDDER shall ensure proper upkeepment of utility system / services, such as, Emergency Vehicle, OWNER’s supplied Tools / Tackles, water tanks and other accessories.

vii) BIDDER shall co-ordinate & assists for the services related to the Operations, e.g. electricity, telephone, water supply, IT, billing, testing & calibration, statutory issues, etc…and visit from time-to-time.

viii) BIDDER shall ensure and manage the traffic especially vehicular at worksite during the work & in case of emergency as well.

ix) Since, this is a comprehensive contract, no overtime, fuel & conveyance, food, commission, incentive, etc… shall be paid by OWNER, except in approved case.

x) BIDDER shall intimate to the OWNER for any statutory problem, supply stoppage / interruption, breakdown / emergency shut-down, etc… for better planning & functioning of the facility.

xi) In any event of manpower idle, if required, OWNER reserves the right to utilize the personnel to any other site of the OWNER or Group Company within their working hours. In such case, OWNER will provide the transportation facility or reimburse the cost at actual. No additional charges or overtime shall be entertained.

xii) Since, the entire Premises, Installations, Facility of CGD is a restricted zone; BIDDER shall ensure that no through fare will be entertained without OWNER’s written permission that including Plant visit, Photography, Video Shooting or any Interview.

xiii) BIDDER shall facilitate new enquiries pertaining to PNG, Consumer services from time-to-time. However, he should not provide any specific information to such enquiry and not accept any payments or whatsoever on behalf of OWNER or its representatives without consent. OWNER reserves the right to take necessary actions in this regard, if found.

xiv) BIDDER shall provide materials at site at his own cost, but not limited to; Log Book, Registers, Files, Note Book / Pad, Eraser / Ink, Sketch Pens, Tag / Stickers, Hole Guard, Stamp Pad, Envelope, Rubber Band, Amount / Cash Counting Pad, Amount / Cash Safe Box, Staplers / Staples, Punch, Pen, Pencil, Refill, Highlighters, Photocopy / Xerox, etc.

xv) BIDDER shall provide adequate First-Aid medicines, Equipments / Tools & Tackles such as, Bench-wise, Electrical Extension Board with accessories, Instrument for measuring earthing resistance, Multimeter, Emergency Light, etc…from time-to-time. Also, consumables like Araldite, M-Seal, Grease, Emery Papers, Cutting / Cleaning Fluid, Staff welfare like pantry Service (Tea / Coffee refreshments), drinking water, etc.

xvi) BIDDER shall ensure the availability of sufficient water (Potable / Drinking purpose) at site at his cost.

2.0. CONTROL PHILOSOPHY

2.1. General

The Emergency Control Room (Main Base, Sub Base & Maintenance Base) located in all the areas of CGD functioning shall be manned accordingly for day-to-day operations, nominations(if any), emergency handling of complaints etc, planned maintenance (AOMP) as per the schedules, breakdown maintenance and other O&M documentation as required for total PE and domestic gas distribution System.

2.2. Philosophy of Control room in an operating area

The following activities have to be covered mandatorily as per the AOMP by the bidder with the manpower supplied by him. Non-performance of any of the activities will be liable for penalties specified in the tender including termination of the contract if needed. All these activities will be henceforth considered as “Basic Services”.
1. Patrolling of Steel & PE network
2. Emergency Response / Network damage repair
3. Lock Pressure Test (LPT) / Leak Detection Test (LDT)
4. Leak Detection & Housekeeping of CGS/DRS/CPRS/MRS/SR
5. Leakage repair of PE, PNG, DRS/CPRS/SR/Valve Chamber PE
6. Monitoring/Readings of CGS, DRS, CPRS, Odorant skid, TR unit
7. Support services during any other maintenance / shutdown activities taken up by other OEM/Agency in area
8. Shifting / replacement of existing PE line (In case if length is more then SGL will inform contractor in writing for execution of work i.e shifting of PE Pipeline. charges in line with the applicable projects rates will be applicable).
9. Cleaning and Maintenance of steel and PE Valve chamber
10. AMC for commercial Connection
11. Hiring of equipment such as JCB etc as per Owner requirement
12. AOMP – Monitoring

Note:

Increase or decrease of the control rooms or Satellite offices will be at the discretion of OWNER depending upon the site geographical areas and other emergency requirements.

2.3. Control Room Requirement

a. In general, the contractor Main base & Sub Base office carpet area shall have Minimum of 350 Sq. Feet at least 2 rooms & 150 Sq. feet area respectively.

b. The contractor office i.e. Main Base & Sub Base stations shall be situated within 1 KM radius of OWNER’s Customer Care Centre (i.e. CCC).

c. Contractor O & M location office shall be finalised with mutually agreed by both, Contractor & OWNER.

d. The CONTRACTOR shall provide and maintain an office and at the site for the accommodation of his Engineer and staff and such office shall be open at all reasonable hours to receive instructions, notice or other communications.

e. The contractor shall provide and maintain stores at site with sufficient covered area and lock & key arrangement for receiving, rack for proper stocking and issue/return of all material under his scope of work as defined in the tender document. Further, the contractor shall maintain proper documentation of stocks and receipt & issue of material and update the same on daily basis by deploying dedicated resources as specified by the Engineer-In-Charge. The space so provided shall be in addition to and distinctly separate from the free-issue material by the Purchaser for proper identification and verification of both types of stocks at any time.

f. All Main Base and Sub Base must have a Computer (Desktop), Printer, Scanner and Internet Facilities

g. All Main Base and Sub Base must be equipped with basic Amenities for the manpower like Drinking Water, Electricity, Hygenic Toilets/Washrooms etc
h. Project office operational should include computers, printer, telephone, storage for documents, fax and e-mail facilities and all necessary furniture and fixtures and other utilities (water, toilets) necessary for a fully functional project office for effective communication and documentation.

i. Contractor shall provide Uniform (Seasonal)/ID Card/PPE's to the manpower allotted at Main Base & Sub Base

j. Contractor office should have sufficient seating space for people for day to day meeting and discussions with TPI’s, Construction supervisor and Engineer In charge

2.4. Manned/ Unmanned

(a) Manned Facilities

All the control room stations Except Maintenance base will be manned (refer manpower deployment chart given in this tender) 24X7 by teams operating in shift to perform all the activities of operations and maintenance, emergency handling for an uninterrupted gas supply to all industrial, commercial and domestic customers.

(b) Unmanned Facilities

All other Stations viz., CGS, DRS, CPRS, IPRS, TB/SR and MRS at Industrial customers (End-users Facilities) are Unmanned but are controlled from the control room as per the scheduled visits, planned maintenance, patrolling and on emergency requirement.

2.5. Manpower in a Control room

BIDDER shall deploy adequate numbers of skilled / unskilled personnel, to carry out the entire work effectively in scheduled time, under the scope. BIDDER will submit the CV of personnel’s to OWNER for approval of recruitment on his role till the end of the tenure.

2.5.1. Indicative Qualification & Experience of the manpower deployed for CGD O&M should be as follows

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Manpower</th>
<th>Qualification</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Overall In charge</td>
<td>BE / DE (Mech. / Elect.)</td>
<td>2 / 5 Years</td>
</tr>
<tr>
<td>b.</td>
<td>Shift In charge / Supervisor</td>
<td>DE (Mech. / Elect.) / ITI (Fitter / Elect.)</td>
<td>2 / 4 Years</td>
</tr>
<tr>
<td>c.</td>
<td>Computer Operator / Data Puller / Data Entry operator</td>
<td>Graduate</td>
<td>2 Years</td>
</tr>
<tr>
<td>d.</td>
<td>Technician cum PE (welder)</td>
<td>ITI</td>
<td>2 Years</td>
</tr>
<tr>
<td>e.</td>
<td>Helper / Labour</td>
<td>Literate</td>
<td></td>
</tr>
</tbody>
</table>

Shift Timings:  
- Shift-General - 9:30 to 17:30 Hours  
- Shift-I - 07:00 to 15:00 Hours  
- Shift-II - 15:00 to 11:00 Hours  
- Shift-III - 11:00 to 07:00 Hours

Note:

- Reliever to the shift personnel to be provided.
- Overall In-charge will work in general shift.
• The Manpower shown in SOR is only directional and actual requirement of Manpower (Increase / Decrease) would be communicated by OWNER from time to time.
• BIDDER to consider reliever for planned leave / absence of manpower in addition to the reliever mentioned in tender against leave relief / Weekly Offs and Holidays as per standard Labour Laws.
• No Overtime shall be paid by the OWNER.
• BIDDER to prepare monthly shift schedule well in advance and submit for approval by OWNER.
• Public Holidays shall be entertained and approved by OWNER from time-to-time. However, BIDDER shall ensure that operations are not affected.
• Separate manpower to be provided for Add on Services like annual maintenance contract (AMC) work / Riser maintenance / Alteration & Modification.

2.6. Job Description / Responsibilities

BIDDER shall deploy the above specified manpower, with relevant educational qualifications & professional experience in similar field to perform their duties, as described below (but not limited to);

2.6.1. Overall In-charge

O&M In-charge shall be overall In-charge of entire O&M activities. He shall be qualified engineer / Diploma Holder with relevant experience. He will be a coordinator to interact / interface with the OWNER / its representative. O&M In-charge will be responsible for execution of all relevant work such as Manning / establishment of control room activities, Patrolling & monitoring of Operation, Maintaining Record, Reporting and periodic / emergency maintenance. O&M In-charge has to ensure the smooth & trouble free operation of all the equipments, installation & associated facilities, gas supply, administrative functions, HSE, consumer service, Liaisoning, etc…includes assisting OWNER in Gas Reconciliation. Also, he shall be responsible for stores / assets management, co-ordination for major job with OWNER / its representatives. O&M in charge shall plan all the activities according to approved AOMP and shall monitor the same. He will be responsible for inventory management, especially for essential spares / assets management.

2.6.2. Shift In charge / Supervisor

Shift In charge / Supervisor should have adequate knowledge / skill to supervise / monitor day-to-day shift duties effectively pertaining to emergency handling, Alteration and Modification of PNG installation. O&M activities, consumer complaints / services with relevant experience in city gas distribution operations & maintenance. Apart from above, he shall be responsible for day-to-day reporting, data logging for the activities performed as per MIS. He shall also be responsible for liaisoning with local authorities, etc.

2.6.3. Technician cum PE Welder

Technician should have adequate qualification with an adequate experience in the gas distribution field for PNG Plumbing, installation, Erection, leak detection, commissioning, operation & maintenance of all equipment / installations / utilities for gas distribution. He shall be responsible for periodic / emergency / break down maintenance and day-to-day reporting to the Shift Engineer / In-charge. By regular check, he should ensure working of tools, tackles, essential for his job, similarly should also ensure the availability of minimum stock of GI pipes and fittings as per minimum inventory level of each consumable for emergency repair / maintenance. He should respect / follow the company’s HSE signage’s and use the PPEs as per job.

He shall be responsible for the electro fusion jointing of PE pipes for Distribution mains / Services. He is responsible for execution of LPT / LDT and should have good working knowledge on execution of LPT / LDT. He should have relevant work experience and necessary qualification certificate from recognized agency for PE welding / Electro fusion. PE Welder shall have the trouble shooting knowledge of EF welding machine / LPT / LDT. He should always carry his competency card and should produce the same on demand and ensure the validity of his competency certificate after attending required training for the same. He should respect / follow the company’s HSE signage’s and use the PPEs as per job. He will also perform patrolling activities of CGD network as per OWNER’s requirement.
2.6.4. **Driver**

Driver should have necessary valid driving license for LMV from regional transport office. He shall be responsible for driving the emergency vehicle in shift operations situated from control room. He should have basic knowledge of automobile for maintenance. He shall be responsible for driving of vehicle & assistance to Technical group in case of any emergency arises. He shall clean & upkeep the vehicle in good working condition. He will be responsible for driving the emergency vehicle, situated at control room. He should ensure the ever readiness of maintenance van, public announcement system and wireless equipment and mobile phone according to check list on daily basis. Apart from driving of vehicle, he will provide assistance to technical group, at site and in office.

2.6.5. **Helper cum Labour**

Literate & physically fit helper / labourers shall be deployed for the activities. He shall be responsible for excavation of trenches, pits, cutting of excessive grass / housekeeping in vicinity of SR/TB/, DRS/CPRS,MRS, CGS, Valve Pit, Vehicle, etc…in case of gas leakage, emergency. He shall also carry out the housekeeping, office assistance and assistance to Technician / Shift Engineer for any job pertaining to control room / O&M.

2.7. **General requirement**

BIDDER must comply and carry out entire scope of work as per O & M manual of OWNER as well as Original Equipment Manufacturer’s (OEM) manual.

BIDDER shall have knowledge of minimum service level standard issued by PNGRB and shall comply the requirements of Owner

BIDDER must ensure that his personnel deployed for O&M are well behaved, consumer oriented, non-alcoholic or prohibited drugs addict. Any misbehave with consumer as well as OWNER’s representative shall be liable to be punishable and even to the extent of removal of that personnel from duties. BIDDER shall not engage or employ any person with a criminal record / background.

BIDDER’s personnel shall be educated, trained and experienced in Gas Distribution operation & maintenance with due aware of the prevailing codes / standards applicable to the activities from time to time. BIDDER’s personnel should possess good communication for consumer call attendance, site communication (Tele or Wireless), etc…

BIDDER shall provide relevant & adequate safety & personnel protective equipments / appliances (PPE) like Ladder, Safety Belts, Fall Arrester, Hard Helmets, Safety / Rainy Shoes, Ear Plug / Muffs, Rubber / Cotton Hand Gloves, Electrical Shock proof Hand Gloves, Protective Goggles, Respiratory Protectors, Nose Mask, Gas Mask, Face Shield, Welding Glass, Flame proof Coverall, Reflectory traffic Jacket, etc… to personnel deployed for the job.

BIDDER shall provide relevant trainings (Technical / Fire & Safety, etc…) to his personnel from time to time for better functioning of the O&M at its cost and risk, without affecting Operations. OWNER may provide special training, to be required; hence, BIDDER shall deploy his personnel for such trainings.

BIDDER shall, at its own cost, provide uniforms and identity card to its employees deployed at the station and shall ensure that such uniforms / identity card are worn by his employees while on duty for all the personnel & especially for consumer services / site works. To enable OWNER to maintain the identity, the BIDDER shall follow the identity card & dress code prescribed by OWNER.

BIDDER shall be responsible for maintaining harmonious relation with his employees, OWNERS representative, Customers etc and shall inform OWNER of any stoppage of work or other labour dispute whether actual or threatened and which is likely to affect the supply / operations. In the event of any strike or stoppage of activities, OWNER shall have an unconditional right to depute and deploy its personnel / representatives and BIDDER shall not have any right of objection for entry of OWNER / OWNER’s representative. In such case, OWNER shall recover the cost from BIDDER at actual to be payable therein.
BIDDER’s personnel, who will be working on site, should have thorough knowledge of gas line & geography of the area so that any spot / customer house can be quickly located.

Above mentioned manpower shall be responsible for the mandatory activities only as defined in this document. Other than specified, can be performed by separate skilled personnel as per Owner’s norms.

BIDDER shall train his man power for reporting HAZARD and NEARMISS if any happened in their working area.

BIDDER shall deploy the manpower as per statutory norms.

### 2.8. General information

Apart from specific job related responsibilities and requirements, there are certain general rule and regulations that must be followed by all working persons with O&M team of Bidder.

i) Smoking is strictly prohibited and use of any match, lighter or other means of producing, flames, spark or articles of similar nature is prohibited, at terminal, control room, everywhere on gas network and installations of OWNER.

ii) Report promptly any situation affecting the safety of self or fellow employees or property and public in general.

iii) Employees should train themselves to be on the lookout for regulatory safety signs and should observe them all the time.


v) Horseplay or fooling around while on duty is strictly forbidden.

vi) Jumping on or off the trucks, automobiles or other vehicles are prohibited. Employees should wait until vehicles stop before attempting to board or alight.

vii) Employees must stay within their working zone and shall not roam around the other installation of or any other area.

viii) Running, jumping or throwing material on job site is prohibited.

ix) Where walkways are provided use them. Don’t use short cuts or make pathways through equipment.

x) Drive cautiously near the gas installation and gas rich area. Stick to speed limits and other instructions, e.g. No parking, Vehicle Entry Prohibited, etc. vehicles shall be parked in parking places only.

xi) Employee should never use compressed air to clean the clothing they are wearing.

xii) Personnel doing hot job or working near open fire shall not wear clothes made of highly combustible synthetic fibers such as nylons, polyesters etc.

xiii) Wearing of jewellery ornaments should be avoided while working at site.

xiv) Only authorized persons may turn valves or operate any equipment or machinery on any installation.

xv) No employees should interfere with, remove, displace, damage or destroy any safety devices or other appliances installed for protection of personnel and plant equipment.

xvi) Cleanliness is necessary for a safe plant. Wastage like used papers, plastic etc. should be deposited in proper receptacles.

xvii) Every employee should study safety orders thoroughly and make proper use of all safety devices and equipment furnished for his protection and the protection of others.

xviii) Every employee must familiarize himself with location and usage of safety devices and fire fighting system.

xix) Be sure you understand emergency instructions. Anticipate what you will do in case of emergency. Above all, be clam and alert for instructions.

xx) Report on work incurred injuries or illnesses immediately to your supervisor and to safety department.

xxi) It is prohibited to light agarbatti in office.

xxii) Report immediately to control room or safety department, if there is any abnormal burning smell from A.C. system or electrical system.

### 2.9. Competency & Training
The term competency is synonyms to capability, ability. Similarly the training is the teaching, giving guidance, instructions and exercises, either in classroom, or in-plant, by oration, written test or simulation is carried out to develop the competency. Thus both the terms are interrelated. Every job in a business is carried out to get some specific end result, in scheduled time with safety and quality requirements. Hence the Bidder shall employ person who is to perform this job must have certain qualifying requirements in terms of qualification. Knowledge, skill, behaviour to achieve the job end results. After recruiting the new person for proposed job / duty, he should be trained, educated, tested, certified and made and declared competent to perform the job effectively, in scheduled time with safety, quality and statutory compliances. Competency training and test should be regularly conducted to ensure that the certified person still posses the required competency to perform the job with specific requirements as with the lapse of time the sense of the human gets weaker due to aging effect or sometimes the sense gets affected before age, due to ill health or wrong lifestyle. There is a direct effect of human senses on his / her competency for job performance. Similarly any change in operating procedure, process, change in equipment and layout also need retraining, competency retest and certification. The training may be in-house or out-house and it starts with the induction, for new recruits, and refresher or need based training for existing employees, to check, maintain their competency level. The training may be in class room for understanding theory and in plant training or simulation for practical purpose. Competency training needs for employees are identified considering the following factors; Criticality of the activity, Knowledge / Awareness level of employees, measured through competitions, Audits findings, Joining of new comers, Opening of new areas of jobs, Accident / Incident investigation findings.

In operation maintenance, of city gas distribution system, many activities are critical as the persons are working on highly flammable natural gas charged installation and network. Critical activities need more stringent competency. Here for our understanding, main activities which are also repetitive in nature are selected for competency development criteria, based on job evaluation. They are (1) Handling gas escape / fire and explosion in upstream and downstream of service control valve (2) odorant handling.

2.10. **Basic responsibilities of bidder**

BIDDER shall be responsible for manning of control room, patrolling & monitoring of steel & PE network / ROW, Gas Leakage survey (LPT/LDT)/ repair, preventive / emergency maintenance, installation (if required), modification / replacement, operation & control of the entire CGD activities in shifts as mentioned in Bid requirements. The successful BIDDER shall submit schedule for meeting AOMP before commencing the O&M activities as per O & M manual of OWNER O&M monitoring of Distribution network consists of the following major activities.

- Patrolling of steel & PE network
- Emergency Response / Network damage repair
- Laying /Shifting of PE Network.
- Monitoring Operations / Readings of CGS, DRS, CPRS, Odorant skid, TR unit
- Lock Pressure Test (LPT) / Leak Detection Test (LDT)
- Leak Detection & Housekeeping of PRS/CGS/DRS/CPRS/MRS/SR
- Leakage repair of PE, PNG, DRS/CPRS/SR/Valve Chamber PE
- Support services during any other maintenance / shutdown activities taken up by other OEM/Agency in area
- Cleaning and Maintenance of Steel & PE Valve chamber
- Laying /Shifting of PE Network.
- Painting of Route Markers for steel & PE Network / OWNER’s assets
- AMC for Commercial Connection
- Hiring of equipment such as JCB etc as per Owner requirement
- AOMP – Monitoring
- Report and Recording Systems.

**Add on Services (Separate team to be deployed for execution of following activities)**

- Dom. AMC / Riser maintenance
- Painting of Route Markers for steel & PE Network / OWNER’s assets
3.0.  PATROLLING OF DISTRIBUTION / SERVICE LINE

a. On receipt of O&M contract, BIDDER shall take specification / detail of steel & PE distribution network, as-built drawings, testing reports and other construction records from OWNER
b. Villagers / public along the right of way shall be adequately made aware of the possible consequence of gas leaks and this shall be included as a part of regular audit.
c. BIDDER shall visit overall site along with related staff members to make themselves aware about route, type of laying, special crossing, and size of pipeline
d. BIDDER shall take As built drawings / schematic etc of network from OWNER or from its contractor in soft copy and shall be updated regularly with repairs / modifications carried out over the time period
e. BIDDER shall identify Emergency and interconnection valve chambers in consultation with OWNER as per requirement of flow curtailment / emergency stoppage of Gas supply. The one copy of same is handed over to control room for information and coordination.
f. Emergency vehicle shall be equipped with all necessary valve keys to operate valves, pipe piece for leverage, leak clamps, tools tackles and consumables to handle the gas leak or fire emergency on gas network
g. Based on the findings of monitoring and patrolling activities, necessary actions BIDDER shall plan in consultation with OWNER and same shall be implemented / executed to maintain the overall safety and integrity of network.
h. In case of breakdown of valve chamber or valve of PE, BIDDER shall repair / recondition.
i. BIDDER shall arrange patrolling staff to inspect the areas of construction activities & physical deterioration if any of exposed pipes and supports, which could cause damage to the pipe & result in gas leakage & subsequent hazard to public safety.
j. BIDDER shall divide the total network route in sub-route / section such that total network can be patrolled as per the instruction of OWNER EIC.
k. The patrolling team members shall inspect pipeline at critical sections / locations / chainage, such as rail crossing, waterways road crossing, etc...at periodicity advised by OWNER EIC in order to ensure good, no leaks condition, general construction activity, or any other factors, which may affect the safe / uninterrupted operation of gas distribution system.
l. BIDDER shall depute manpower separately as advised by OWNER EIC in order to safe guard gas pipeline against any kind of third party excavation threat & other utility / ROW work.
m. BIDDER’s scope shall also include patrolling of PE Pipeline / Distribution Mains (network) for entire CGD network established in various villages / townships, main roads including MP and LP Pipelines.

3.1  General

Pipeline patrolling and leak survey are carried out along the ROU on the road, street or open fields. The patrol is carried out to find and keep track of damaging activities, mostly by other utilities, customers, public and some time by nature. Similarly leak survey is carried out to find out the hidden / unnoticed underground gas leaks. Thus both the activities of patrol and leak survey are important for preventing reducing the damage to the network and gas leaks on the network which in turn prevent / reduces potential hazards of gas leak like, asphyxiation, fire and explosion. This activity has direct effect on company’s operation, network integrity & safety management

3.2  Activity Steps for Patrolling

- For planned patrol, to decide the network patrolling area and frequency based on the past experience and records, criticality of network, activities carried out by other utilities
- To prepare the annual and monthly patrol plan for actual execution.
- To identify the person and train / educate them for network geography, effective patrolling procedure, emergency communication for leakage and preparing report & record
- To carry out emergency patrol, for the section / network vulnerable to damage due to sudden development of activities by other utilities.
- To check the condition of vehicle like, fuel, tyre pressure, breaks, light, oil level, side light...etc before starting patrolling
3.3 Role of a Patrol Person

- A patrol person plays an important role and is the front line defence against hazards which the safety and security of the system. This important role should be recognised by management and care taken to ensure patrol persons are provided with the appropriate skills and facilities to perform their duties.
- One of the basic skills required by a patrol person is the ability to read plans. It is also important the patrol person can communicate in a verbal and written form, and accuracy is to be encouraged as an essential feature. It may be necessary for training courses to be held for the development of patrol persons.
- Mentioned above is the likelihood that the appointment of specific patrol persons will not be necessary until the distribution system reaches a later stage of development.

3.4 Duties of a Patrol Person, not limited to

- Inspect the work of other authorities and private organisations carrying out work in the vicinity of a transmission/distribution pipeline.
- Report immediately any unusual developments or occurrences along a pipeline route which may have some affect on the normal operation or maintenance of the pipeline.
- Supervise any maintenance personnel under his control.
- In case of encroachment on / near gas pipeline, report it to concerned authority.
- Maintain liaison with other authorities and bodies who are concerned with works which could affect pipelines. Further, maintain good relations with the owners of properties traversed by pipelines. Good communications and in particular keeping people informed on the location and importance of pipelines, is a primary defence against interference being caused by third parties.
- Prepare and forward routine reports, as required by OWNER.

3.5 Items to be Checked, not limited to the followings;

The following items are required to be inspected on a regular basis or as per AOMP. Many of the items listed do not require daily inspection, and judgement is required as to the regularity of inspection of each individual item. The patrol frequency will be daily or weekly depending on the location, size of the pipeline, operating pressure, general construction activity, and other factors;

- Excavations close to pipelines and associated facilities.
- Service Regulator enclosures and vaults / canopy.
- Valve enclosures and vaults / canopy.
- ROW fences and gates.
- Evidence of erosion.
- Evidence of any subsidence.
- Crossings of waterways.
- Railway crossings, including vents.
- General surface conditions.
- Cathodic Protection units, anode beds, test points, etc...
- Pipeline markers.
- Any permanent survey marks.
- Any bridge crossings.
- Pipe coating, when a pipeline is exposed.

3.6 Operational Requirements and Frequencies;

The frequency and operational / maintenance work required for each function included in the Plan is set out below;

The frequencies and the extent of the work are based on requirements set down in ANSI / ASME B31.8, PNGRB, operational experience and good engineering practice. Based on past experience, some of the frequencies may be adjusted.

3.7 Liaison with Other Authorities. Frequency - as required / once a year

- BIDDER along with OWNER should develop a co-operative relationship with other Authorities, particularly Authorities responsible for public construction work. Other Authority personnel should, where practical, be provided with District Plans, and be regularly reminded of the location of strategically important mains.

- They should also be acquainted with the hazardous properties of gas and the potential effect of escaping gas on the safety of the public. It should be emphasised and encouraged that in the event of an emergency that prompt co-operative action would be required.

- Apart from the essential day to day contact with other Authorities, BIDDER / OWNER shall formally correspond with the appropriate other Authorities on a yearly or periodically.

3.8 Leakage Surveys on Transmission / Distribution / Service Lines

- Leakage survey to be done as per AOMP / O & M manual of OWNER’s.

- A leakage survey, using suitable gas detection apparatus, shall be conducted annually / as per AOMP in principal business districts and the area surrounding schools, hospitals and similar community installations. The survey shall include tests of the atmosphere at utility manholes, other collection points and at openings (cracks) in pavement.

- Leakage survey, and leakage investigation and action should be carried out as specified in ASME B 31.8, together with procedures for the pinpointing of leaks and other useful / proven techniques.

3.9 Leakage Surveys on Transmission / Distribution / Service Lines

- The purpose of the patrolling activity is to ensure that no damage occurs to the pipeline network, for this the contractor/lc shall maintain close coordination with the utilities and authorities at all times. No Separate charges will be paid for any liaisoning activities. The patrolman/contracted manpower shall possess a valid driving license. The patrolman shall have a minimum qualification of SSC and shall effectively communicate in Gujarati, Hindi and English.

  - If any patrolman is found not patrolling then an amount of Rs 500/- per instance will be deducted in monthly invoice.

  - If the provided mobile/ hand set is not in working condition, then an amount of Rs 500/- per day shall be deducted from the monthly bills.
• If the manpower is found not wearing the PPE’s/uniforms/carrying I Cards, then a penalty shall be imposed to the contractor for each instance at the rate of Rs 500/-.

• Before starting and after completion of patrolling/emergency vehicles/2 wheelers, the patrolman/contracted manpower shall maintain the record of odometer readings in each shift (Log Books) and same shall be verified by EICs randomly.

• Frequent changing of patrolman/manpower during the course of the contractor tenure shall not be allowed. If necessary proper notice (1 Month) is to be given or after recruitment & proper training of next appointed patrolman/manpower.

• The vehicle to be used for patrolling/Emergency service shall not more than 1 year old at the time of deputation. The contractor shall ensure that the patrolling vehicles/Emergency vehicles are adequately fuelled at all the times.
  o Penalty - Absence of fuel / Nonworking conditions of any vehicles / Van at the time of patrolling/emergency work shall attract penalty of RS 500 per instance.
  o If any contractual staff found in malpractices, a penalty shall be imposed to the contractor of RS 1000 per instance.
  o Wrong / Delay in Meter Reading, JMR (Industrial & Commercial) - Resolve within 2 hours or shall attract penalty of RS 500 per instance.
  o 10) If the provided VTS system is not in working condition, then an amount of Rs 1000/- per instance shall be deducted from the monthly bills.

4.0. EMERGENCY RESPONSE / NETWORK DAMAGE REPAIR

a. Gas Leak Classification and Action Criteria

Activity Steps for Leak Survey

• To prepare annual and monthly leak survey plan for covering the whole network in line with the AOMP for actual execution.
• For planned Leak Survey, to decide the network leak survey area and frequency based on the past experience and records, Post LPT data, criticality of network, activities carried out by other utilities
• To identify the person and train / educate them for network geography, effective leak survey procedure, emergency communication for heavy leakage and preparing report & record
• To carry out emergency leak survey, for attending smell complaints and for the section / network vulnerable to damage due to sudden development of activities by other utilities.
• To ensure that the gas detector with at least 1% LEL least count is working, calibrated & with fully charged batteries. To keep the spare batteries depending on the job to be carried out
• To wear PPEs like safety shoes, cotton dress, reflective jacket and I-card and ensure your personal safety from vehicle and building under construction, electrical installation, stray animal like dog
• If leak is observed during LPT, then to carry out leak survey by walking along the pipeline route as per as-built drawing, markers and valve chamber position with gas detector keeping probe just 2" above the ground
• To observe / hear the detector findings carefully and record the same.
• To monitor the gas leak in drainage manhole or other such chambers / vaults also
• Survey surrounding area, manholes, vaults for measuring extent of leakage. To record the leak % and area / location
In case of gas leak more than 20% LEL, to cordon the area and call emergency team to attend it immediately.

To switch the gas detector when not in use and ensure the security of detector.

To prepare survey report in standard format

**b. Handling PE damages**

- LPT / LDT
- Leak Detection & Housekeeping of CGS/DRS/CPRS/MRS/SR
- Leakage repair of PE, PNG, DRS/CPRS/SR/Valve Chamber PE

**c. Emergency / Breakdown / Shutdown**

BIDDER shall be responsible to arrange sufficient manpower to attend emergency / breakdown maintenance works at any time with the shortest resolution time as and when required round the clock & seven days of week to be operated from control room based & established at OWNER’s premises.

BIDDER shall be responsible to arrange adequate & suitable & materials / spares / / items / consumables required for carrying emergency maintenance works, including equipments, vehicles, generator set, welding machine, labours, fire fighting apparatus, PPE’s, communication sets, etc…at site stores for all the time. A list of minimum tools tackles & spares required is enclosed in this bid.

BIDDER shall be fully responsible for emergency management with full attention and correct and effective measures / remedies for breakdowns / emergencies.

BIDDER shall provide necessary training to his emergency response team members on first aid for injuries, damages, fire extinguishing methods and equipments / appliances, operations & maintenance action plans, etc...

The damages & leakages shall be first attended by squeezing the pipelines and in case of unsafe conditions as per the assessment of shift engineers, pipeline network will be isolated.

BIDDER’s personnel should be well experienced and trained to handle the emergency maintenance of natural gas distribution pipelines (mains and services lines). They should always be very much vigilant in monitoring the process condition on SCADA or field instrument and they should be very much open to any calls / information from field personnel natural gas consumers or any third parties relating to any emergency of major leak, damage of pipe line or fire / explosion in the pipe lines gas distribution system, which forces the Emergency Shut Down (ESD) of the distribution system.

In case of any accident on CGD Network or at the consumer’s premises, the site supervisors / technicians should immediately rush to the affected site, assess the situation, coordinate with BIDDER / OWNER Incharge and initiate the ESD signals in their relevant area, if required. They should close / shut off the up stream isolation valve / control valve installed on the network or from CGS / TB / SR if essential.

BIDDER shall also be responsible for coordination with other utilities or agencies like police, fire brigade, and hospital / dispensaries etc. in case of emergency break down for emergency/ breakdown help / rescue.

BIDDER shall train their personnel in Owner approved emergency handling procedures and guidelines. However, OWNER has a full fledged ERDMP approved by the competent district authority, which can be useful for any emergency arises on the CGD Network including consumer premises.

BIDDER shall plan bi-monthly meeting for improvements / suggestions through learning from experiences. This meeting will also be attended by OWNER representatives / coordinator for review of emergency handling / management.
BIDDER shall shut down the pipeline inlet system at block valves of the all stations in case of fire and major gas leak, excess odorant smell, stoppage of supply from gas source or supplier. However, OWNER shall be intimated & consulted in such shut down / emergency.

BIDDER shall not neglect even a small leak, if detected. He shall immediately act upon to check / arrest the leak, which may result into disaster, if the gas catches fire. In case of heavy leakage or burst pipes the exposed gas jet becomes potentially hazardous; hence, the area should be isolated, vent safely and replace the affected portion of the affected area. They should also inform to all the concerned.

BIDDER shall be very much vigilant in monitoring this type of situation. If this kind of situation arouses then BIDDER shall inform to the OWNER. Only one thing must be kept in mind while taking any emergency action that human life has the top most priority, followed next by safety of the permanent installation.

BIDDER O&M team member should immediately inform to the responsible authorities (BIDDER’s or OWNER’s representative, police, fire brigade, etc…) to take immediate and proper action to control the emergency accident hazard / fire / earthquake or blast and save man and machine / gas distribution pipelines, and public utilities in vicinity of the affected area.

The contractor shall prepare call note for each complaint, which will be kept & preserved as record.

In the event of stoppage of supply or shutdown or breakdown, CGS may be affected and in such situation, emergency plan shall be activated by OWNER. BIDDER’s personnel must be prepared for handling of such scenario.

In case of excess odorization / dosing, action shall be initiated as per the plan by BIDDER’s personnel, includes effective public / mass announcement, control of situation, safe venting of gas, attending consumer complaints door to door.

The operator shall protect the CGS and pipelines by monitoring extra high and low pressure of gas through the operation of gauges, indicators, switches, alarms and trips by taking corrective action to bring the line / equipment to safe condition. The operator should inform the other terminals and consumers of this emergency condition in order to allow them to take a safe action.

In case of power failure, the BIDDER’s operator should ensure alternate arrangement of power supply at site, if required. However, for OWNER’s premises, this should be solved in coordination with OWNER / its representative.

BIDDER shall strictly adhere to the ERDMP of OWNER to tackle any emergency arising out of any Accident / Mishaps / Leak / Fire & Explosion / Heavy Rain / Earthquake / Floods, etc… BIDDER must follow the On-site Emergency Plan. This document must be thoroughly read, understood and practiced during mock-drills. Every individual’s role must be clear to all concerned. All the personnel must remember that.

- 15% natural gas in air creates dry feeling.
- 17% natural gas in air gives oxygen deficiency.

5.0. MONITORING OF OPERATIONS

MINIMUM GUIDELINES FOR OPERATION AND CONTROL OF CGS / DRS / SERVICE REGULATOR / TRANSITION BOX :

a. Each Station shall be visited as per AOMP of OWNER and a check / recording made of the following

- Site security
- Condition of supports
- Check the condition of all gauges and ensure they are all operating as normal
- Drainage and general cleanliness
• Check the differential pressure across the filters
• Inspect painting for damage and rectify where required
• Check vents for clearance and correct operation of flap provided on the venting line.
• Critical parameters such as inlet and outlet pressures, flow, etc...
• Evidence of any odorant escape

b. In addition to above the following also need to be observed and recorded

• A check on site security
• A check on access
• A check on drainage and general cleanliness
• Inspection of condition of gauges
• Assessment of the condition of protective paint
• A check on CP installations
• A check on supports
• Inspection of control and sensing lines for conditions which could lead to failure
• The operation of the regulating streams, i.e. the Active / standby stream are operating as per the settings made during last AOMP and vice-versa
• Inspection of condition of Odorant storage, monitoring and injection equipment.
• Testing for leaks on fittings, piping, accessories, valves, etc...using soap and water solution

c. Pressure Variation

To accommodate load changes downstream of regulating system, testing requirements or pressure reduction for mains work, it is necessary to alter outlet pressure as and when required as per the OWNER policy.

d. Performance Monitoring

Performance monitoring is a continual process over all aspects, for the life of the distribution system. Records are to be kept, and these are to be summarised and published at periodic intervals. The elements monitored shall include the items listed below. The Performance Indicators listed in the following table will require careful review after each full year of operating experience, and modified as necessary to enhance both the monitoring process and performance of the O&M Plan;

• Number of times supply has been interrupted due to City Gate / DRS / Service Regulator / Transition Box malfunction,
• Number of Gas escapes due to corrosion,
• Number of Gas escapes due to causes other than corrosion,
• Number of times gas supply to customers have been disrupted due to supply problems,
• Number of times OWNER or its representative has failed to respond to a gas escape / emergency situation,
• Number of times customers have experienced inadequate pressure for reasons other than City Gate / DRS / SR / Transition Box malfunctions.

5.1. City Gate Station (CGS)

BIDDER shall be responsible for the safe, trouble free & uninterrupted operation of City Gate Station, which includes monitoring of parameters (pressure, temperature, gas flow etc...), leak detection, customer meter reading, data logging, visual inspection, odour / gas smell, etc...on following major equipments / installations;

The skid at CGS comprises of knock-out drum/filter with accessories like safety relief valve for release of pressure in case of over pressure.

• The Shift Engineer shall maintain all relevant records and activities (testing, inspection, calibration, operation & monitoring) carried out on the CGS.
- Generally, following work activities / events / incidents are noted in the log book:
  - Reports of unsafe fittings, conditions & appliances.
  - Data pertaining to the parameters as per AOMP / MIS.
  - Flow meter readings, composition of gas as per source available & updating with the help of flow computer and gas chromatograph.
  - Inspections performed.
  - Checks and surveys performed.
  - Failures & defects found & rectification actions taken by the concerned.
  - Incidents involving the failure of any fittings and control valves of CGS installation.
  - Any incident relating to fire or break down of the equipment and their maintenance / correction procedures in details.

- Bidder must coordinate with Owner to ensure the safe, reliable & uninterrupted gas supply, installation and operation of all the equipments, pipelines, fittings, valves, etc.

- While venting the pipelines, the bidder shall strictly adhere to the HSE norms specified in the bid.

5.2. **Filtration (Cartridge Filters) at CGS:**

- BIDDER’s operator shall monitor the pressure and liquid level in the filter periodically with the help of vent / pressure safety relief valves / differential pressure transmitter and drains and / or differential level transmitter.

- If the on line filter is choked and the pressure reading indicated by the differential pressure transmitter across the filter is more than normal, the operator shall advise EIC about the choked filter for planning cleaning / maintenance.

5.3. **Metering Unit**

- BIDDER shall be responsible for the monitoring of custody gas flow meter assembly (turbine / orifice type / RPD meter) installed at CGS or on other skids as well as various industries for their functioning.

- Necessary calibration shall be carried out by the Owner / its representatives. However, BIDDER shall assist in the entire process. In no case, BIDDER shall open, reset / adjust, overhaul the flow meter.

5.4. **Heating Skid (If installed at CGS)**

- Heating system shall be installed after filtration unit by owner, (if required) to prevent the gas to get converted in to condensate.

- BIDDER shall be monitor proper operation, visual inspection & monitoring of heating skid assembly installed on skid as well as various industries for their functioning.

5.5. **District Regulating Station (DRS) / Common Pressure Reduction Station (CPRS)**

Pressure regulating skid is installed with pressure control valve (active-monitor type), for reducing high supply pressure ranging between 7 – 49 bar (g) in the primary network to 1 – 5 bar(g) in the secondary network upstream of SR / PNG connection. This unit is provided with pressure safety valve to relieve excess pressure in case of contingency along with safety shut-off devices. Regular Pressure monitoring on the skid is very much essential for uninterrupted supply of gas.

District regulation station located at various demand centres for domestic / commercial / Industrial users typically consist of:

- Gas filter at inlet of DRS.
- Pressure reduction skid comprising active and monitor combination with 100% redundancy with stream discrimination arrangement, including slam shut valve for over pressure protection.
- Inlet and outlet isolation valves.
- metering system (if required)
venting facility

BIDDER shall carry out the operation of DRS/CPRS skids as per O & M manual/AOMP of OWNER

BIDDER shall also ensure & carry out the housekeeping, visual inspection, security measures, caution boards, etc…from time to time.

Some major components & their technical specification is described in the below mentioned table;

<table>
<thead>
<tr>
<th>(i)</th>
<th>DRS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Capacity</td>
<td>1500 SCMD &amp; 10000SCMD</td>
</tr>
<tr>
<td>B</td>
<td>Inlet Pressure</td>
<td>19-30 barg</td>
</tr>
<tr>
<td>C</td>
<td>Design Pressure</td>
<td>Before PRV 49 barg (300#), After PRV 19 barg (150#)</td>
</tr>
<tr>
<td>D</td>
<td>Outlet Pressure</td>
<td>0.5-4 barg</td>
</tr>
<tr>
<td>C</td>
<td>Design Temperature</td>
<td>-20 to 60°C</td>
</tr>
<tr>
<td>D</td>
<td>Operating Temperature</td>
<td>0 to 40°C</td>
</tr>
<tr>
<td>E</td>
<td>No of streams</td>
<td>2 (1 working + 1 Hot standby)</td>
</tr>
</tbody>
</table>

### 5.6. Transition Boxes / Service Regulators

BIDDER shall be responsible for the uninterrupted supply of Gas to PNG customer by monitoring operation, & maintenance of various Service Regulators / Transition Boxes installed on CGD Network. Range / Capacity of Service Regulators / Transition Boxes vary from 50 M³/Hr to 1000 M³/Hr. Service Regulators / Transition Boxes are provided with regulating systems for reducing secondary network pressure ranging between 1-5 bar (g) to 110 mbar (g) in the tertiary network and are provided with in-built safety relief & shut-off devices.

a) This skid is having single stream pressure control valve provided with over pressure safety shut off (OPSO), Under Pressure Safety Shut off (UPSO) and pressure relief valves at the outlet.

b) BIDDER shall be responsible for inspection and monitoring of smooth operation & maintenance of Service Regulator / Transition Boxes, which is very critical as it has no redundancy.

c) Bidders should carry out Functional tests at periodic frequency as per the approved procedure.

d) BIDDER shall also ensure & carry out the housekeeping, visual inspection, security measures, caution boards, etc…from time to time.

### 5.7. Odorisation Unit

A typical odorant facility will comprise of a gas metering device, storage tank, metering pumps (Active and standby) and control system to achieve the desired concentration of odorant in natural gas. The pumps are often powered by natural gas, which is exhausted to atmosphere via a carbon canister.

BIDDER’s scope of work shall include but not limited to the following:

- The sulphur based odorant Ethyl Mercaptan (C₅H₁₀SH) or equivalent shall be added to the outlet of the CGS by OWNER or OWNER’s Representation and shall ensure that sufficient/required odorant smell is existent up to farthest network end. Sample to be collected and checked as per the frequency defined in AOMP and record.

- If OWNER asked to BIDDER, BIDDER shall only assist to OWNER for carry out odorant operation and monitoring, etc… and odorising management system for the natural gas to ensure a safe, adequate dosing in natural distribution system.

- OWNER shall obtain consent from concerned statutory authorities as & when required for the system at its cost & risk.

- Bidder shall be responsible for the routine checks of odorising unit / items, which require regular inspection to ensure that it is operating in a safe manner. Bidder shall carry out the following specific
operations, maintenance procedures in addition to the routine checks as per and O & M manual of OWNER but not limited to;

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Housekeeping</td>
<td>Check for flammable materials, paper, rubbish or equipment lying around. Check for position of fire extinguishers. Check for signs of tampering by unauthorized person. Check for signs of corrosion or equipment deterioration.</td>
</tr>
<tr>
<td>Leaks</td>
<td>Check all gas and odorant connections for leaks.</td>
</tr>
<tr>
<td>Valves</td>
<td>Check all valves are in their normal operating position.</td>
</tr>
<tr>
<td>Tanks / Vessel</td>
<td>Check blanket pressure is correct. Check odorant level.</td>
</tr>
<tr>
<td>Pressure gauges</td>
<td>Check all gauges are reading normal operating level as per the set pressures on the design P&amp;ID.</td>
</tr>
<tr>
<td>Odorant Filters</td>
<td>Check for pressure drop across the odorant filter.</td>
</tr>
<tr>
<td>Statutory</td>
<td>Check &amp; intimate OWNER for any compliance for consent, audit, monitoring, etc…is required.</td>
</tr>
</tbody>
</table>

- Odorant levels should be monitored on a regular basis.
- Bidder shall ensure that sufficient/required odorant smell is existent up to farthest network end. Sample to be collected and checked as per the frequency defined in AOMP and record.

5.8. Valves

The various types of valves are installed on U/G & A/G Network for CGD mainly comprises of Ball valves, Globe valve, check valve shall perform according to their function. BIDDER shall be responsible for the proper operation of the valves installed and the BIDDER’s shall inspect / check all valves installed at periodic intervals.

- BIDDER shall be responsible to provide training to his technical personnel with correct procedure of valve operations.
- BIDDER’s operator shall open the valves gradually and cautiously stopping after every two or three turns to observe any unusual effect before opening it full. Valve shall not be forced opened so that it cannot be closed easily.
- All valves in piping circuit in natural gas conditioning skid, M.S. / PE Pipeline, Network PE valve assembly shall be checked before putting into operation.
- BIDDER shall be responsible for the valve security to prevent service interruption, tampering, etc…as required. BIDDER should also ensure tagging of valve such as “ON”, “OFF”, “DO NOT DISTURB”, “UNDER MAINTENANCE”, etc…For the precautions, as & when required.

5.9. Metering & Regulating Skid (MRS) for Industrial Consumers / Connections

Metering & regulating station is located at the premises of an individual industrial customer. Regulator may or may not be part of MRS .

BIDDER is responsible to take & convey of daily meter reading of all industrial Consumers / Connections.

Bidder shall carry out operation & maintenance of MRS as per OWNER O & M manual/AOMP.

BIDDER shall also ensure & carryout the housekeeping, visual inspection, security measures, caution boards, etc…from time to time.
6.0. MAINTENANCE

6.1. General

The purpose of maintenance of CGD Network & its facility is to optimise the productivity with due adherence of HSE aspects / norms and facilitate easy availability / uninterrupted supply so as to delight consumers. Maintenance also minimise the hazards on the network, equipments, etc…that results in to station utilization, revenue, increase the life of equipments, etc.

The bidder shall develop a detailed maintenance procedure for entire pipeline system considering the recommendations given by the original equipment manufacturer keeping in mind the local conditions and as per O & M manual of OWNER. To facilitate the maintenance services to be rendered in a planned manner, a preventive maintenance schedule covering necessary work to be done, mentioning the periodically i.e. daily, weekly, monthly, half yearly and yearly schedule shall work out as per AOMP of OWNER and adhered. This should also include procedures for repair, by clamping, removal and replacement of pipe and stopping etc. adherence to work permit system in line with approved Work permit system shall be followed.

The maintenance of CGD network shall be carried out by the Bidder according to the original equipment manufacturers installation, Equipment operation & maintenance manual / O & M manual of OWNER

The maintenance activity shall cover the maintenance and upkeep of the city gate stations, district regulating stations, field pressure regulating stations and end consumers facilities. This inter-alia will evolve regular maintenance, route patrolling to contain third party damages and maintenance of safety provisions including offsite emergency plan, mutual aid and disaster management plan.

The successful BIDDER shall submit the “Operation & Maintenance Plan” in line with AOMP of OWNER to the OWNER. The major scope of work for maintenance includes but not limited to the following:

6.2. Distribution Mains / Service Lines (PE Pipeline) Network Maintenance

BIDDER shall be responsible for any maintenance on PE mains & service lines such as pipeline damage, gas leakages, fire & explosions, failure of joints, ROW maintenance & associated maintenances as well by applying best engineering practices & with due adherence of prevailing norms. BIDDER shall carryout the periodic Leak detection / Lock Pressure Tests (during non-peak hours or night hours) to ensure “ZERO” leakages as per AOMP. Some of the typical maintenance to be performed on PE network is as follows (not limited to);

6.2.1 Procedure for attending Gas leakage / Gas Escape on PE distribution network :

6.2.1.1 Repairs for Pipe Damage / Gas Leakage or Escape

• For the leakages from the PE pipe lines either through damages or from any other source which includes,
  • Damage of PE pipe lines,
  • Unknown leakage from PE pipe lines through leak detection survey or / and lock pressure test, if required.
• Making the pipe lines, installations repair and recharging the gas supply as per the as per O & M manual of OWNER.
• Following is a guidelines for rectification of unknown leakages from the PE pipelines through leak detection survey or / and lock pressure test (if required) and following steps to be carried out, however BIDDER shall submit his plan to be approved by OWNER for performing rectification;
  • To prepare pit as per site requirement.
  • To squeeze PE line at both ends.
  • To cut and scrap of existing line.
  • To check with soap solution for passing of squeeze on charged network.
  • Connection of new pipe with charged PE line & installation of electro fusion fitting. Electrofusion welding & cooling of joint as per PTS.
• Removal of squeeze tools / charging of new laid line and checking the Electro fusion welding the help of soap solution / gas detector equipment.
• In case of concealed GI, will be replaced by PE line as per instruction from OWNER.
• To backfill, compact and remove excess soil.
• BIDDER shall arrange Excavation / Pits or trenches, PE Electrofusion fittings, Consumables items like Teflon tap, PE Welder (approved by OWNER), Tools & Tackles, Pulsecometer, Dewatering pump, Generator set, PPE’s, Fire Extinguishers, Electrofusion Machine, etc…OWNER shall provide Gas Detectors, PE pipes, PE Ball valves.
• BIDDER shall ensure that his dedicated supervisor having required experienced is present at site, till completion of work, as per planning given by OWNER.
• BIDDER shall be responsible to arrange water and electricity at his cost for the execution of scope of work entrusted to him. Lighting arrangement at site in BIDDER’s scope.
• BIDDER shall arrange the transportation of his manpower to and from the site.
• BIDDER shall ensure effective communication from site to OWNER office through Mobile phone.
• BIDDER shall make the PE pipelines, install, repair and recharge the gas supply as per OWNER’s approved maintenance procedures.
• BIDDER shall ensure such maintenance as per ERP. All relevant reporting for the same should be submitted to OWNER along with photographs at the earliest.
• BIDDER shall recover the cost of such damages from the responsible, if occurred during Third Party excavation.
• BIDDER on behalf of OWNER shall issue a notice & take a deposit amount for such occurrences. Final bill should be issued / settles as per Owner’s SOR / norms.

6.2.1.2. Handling Gas Leak / Network Damage

Handling gas leak / network damage is the activity carried out for quickly and safely arresting the gas leak and pipe damage and restoration of gas supply to the customers. The gas leak on the underground network poses the potential hazard of asphyxiation / fire / explosion and environment concern. Hence timely and safely attending the gas leak and restoration of gas supply to the customers are very important as the task has direct effect on company's operation, safety, quality, production, customer satisfaction and environment.

6.2.1.3 Activity Steps for Handling Gas Leak / Network Damage

• Bidder To reach site, quickly, observing law full driving and traffic safety
• To assess the situation and quickly take the following steps Cordon and secure the affected area
• Check the surrounding properties for ingress of gas. if gas concentration is found to be 20% LEL or above inside any of the properties then evacuate the said property. Close off access roads
• Eliminate possible sources of ignition. Switch off electrical switches if readings do not exceed 70% LEL. If the LEL is greater than 70% then leave the electrical switches in as it is position.
• Identify or locate suitable squeeze point on main line and valve chambers for isolation purpose.
• Make public announcement for affected customers for stoppage of gas supply
• To excavate pit for squeezing, ensure zero gas percent in trench, and prevent further damage to gas line and other utilities. Pit should be of adequate space. Remove stones etc. which may create an accidental spark
• For PE pipe of 20MM TO 180 mm dia.: To isolate the gas supply in section by squeezing the PE pipe, Use optimum squeeze pressing. Too hard pressing will damage the pipe and too light press will cause gas passing through squeeze, for 125mm dia. & above size hydraulic squeezing tools may be preferred to avoid excess / light press. PE pipes shall be squeezed at a distance of 300mm from fittings / welds on previous squeezed location.
• To isolate the gas supply in section by closing the nearest valves.
• Ensure positive shut off condition of valve by indicator and reducing Residual gas venting pressure.
• To allow venting of residual gas, measure the gas percentage, 3 times. It should be zero.
• To prepare pit at leak / damaged point, after complete venting of residual gas, as measured by detector, take care not to further damage the gas line and other utilities. Pit should be of adequate space. Remove stones etc. which may create accidental spark.
• To provide earthing on both sides of the pipe, from where the pipe is to be cut, for draining the built up static charge on the PE pipe. Earthing may be provided by wrapping wet cloth, around the pipe and contacting positively to the soil. Or special earthing wire and grip clips may be used from pipe to soil.
• To cut the pipe after making, initial small cut mark on pipe, recheck the gas presence again, it should be zero
• To ensure clean working place before opening new coupler from its packing and further working then after, by placing clean paper or rubber sheet on the pit bottom
• To check fuel, earthing and wires / cables of the power generating set for prevention of shock and fire. Qualified / experienced wireman should be engaged for all such electrical jobs.
• To start, run and observe the power generator performance. Check the output voltage and current. Voltage b/ current and frequency figures should match with Electrofusion welding machine. Also output should be constant.
• To post one responsible person, at gen. set power board, for emergency shut off of the electric supply, in case of an incident.
• To ensure that competent and certified PE welder is engaged for PE welding
• To mark and carry out the scrapping / degreasing / cleaning area of pipe ends, by inserting coupler on the ends and using proper scrapping tool and liquid cleaner. Ensure cleanliness of coupler ends. Prevent damage to the heating coils of EF coupler
• To insert the coupler / couplers on pipe ends and connect the leads wires / cables. Check the proper and safe connections. To remove PE cap from the fusion terminal of the fittings. To check proper functioning of power generator and EF welding m/c. condition of fusion cable, power cable, before connecting the fusion cable. To keep EF m/c minimum 1 meter away from the joint spot. To ensure proper ratting of gen. set
• To fix alignment clamp on the above mentioned set up. Do not disturb the set up.
• To start the Electrofusion welding machine and carry out the welding as per the procedure and check list supplied by EF machine and coupler supplier. Prevent over / under heating and interruption of welding. Do not disturb the set up.
• To allow adequate cooling time for welded joints. Do not touch / move any parts during the cooling time. Do not disturb the set up.
• To open downstream low pressure squeeze / isolation valve, by initially crack opening, and once it is pressurized carry out leak check by gas detector and soap solution. Use soap solution on joint only after confirming the complete cooling. Do not use ice cold water for soap solution
• If joints are ok, to inform all concerned about readiness of resumption of gas supply, especially to the customers by public announcement.
• To slowly open the upstream squeezes or upstream isolation valve and allow the pressure to rise to normal working pressure. The squeeze or valve should be crack opened initially, observing the overall integrity of section at new joints, vents, drains. After completion of work squeeze tools should be removed from pipe line and PE pipe line should brought to its original round shape with the help re-rounding tool. Squeeze area of the pipe should be wrapped with warning tape "Do Not Squeeze" to avoid re-squeezing of the same area / spot of the pipe
• To continue public announcement to customers for resumption of gas supply.
• To attend the customer complaints in the area, if required to visit the customer door to door, remaining in contact with control room for customer complaints / other emergency
• To pay special attention to the complaints of gas smell / leak, especially from closed houses of the affected area.
• To back fill and compact the pits excavated for squeeze and weld. To restore the original site soil layer and to remove the excess soil. To clean / clear the site.
• To observe / monitor the condition of the section for at least one hour after resumption of gas supply and before leaving the site
• To prepare reports and update the records. Especially, Near miss, hazard and lesson learning, if any should be reported and shared with others.
6.2.2. **Routine Maintenance on PE Network**

- PE distribution network is safe against corrosion unlike steel network however they are prone to damage by third party and rat bite. Hence the bidder shall carry out vigilant and vigorous patrolling of network and effective coordination with other utility agencies to prevent damage to pipeline.

Following regular attention and activities shall be carried out by the bidder as per suggested frequencies for maintenance of PE network.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Activity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>Awareness to all concerned persons about network and it's extension / modification</td>
<td>Regular</td>
</tr>
<tr>
<td>03</td>
<td>Patrolling and Third Party Coordination if work is going on or near gas pipeline route</td>
<td>As per AOMP Daily - If third party work is going on or near gas network</td>
</tr>
<tr>
<td>04</td>
<td>Valve Chamber Maintenance (Steel &amp; PE Laying)</td>
<td>As per AOMP</td>
</tr>
<tr>
<td>05</td>
<td>Surface Gas Detection Survey</td>
<td>As per AOMP</td>
</tr>
<tr>
<td>06</td>
<td>Pressure Drop Test (Lock Test) of Network</td>
<td>As per AOMP</td>
</tr>
<tr>
<td>07</td>
<td>Dial Before Dig letter</td>
<td>As per AOMP</td>
</tr>
</tbody>
</table>

- The frequencies and the extent of the work are based on requirements set down in ANSI/ASME B31.8, operational experience and good engineering practice. Based on past experience, some of the frequencies may be adjusted.
- Subsidence at crossings and with trenches generally.
- The painting of marker posts enclosures and gates.
- Clearing of grass from around installations including enclosures, corrosion protection unit’s markers, etc...
- Replacement of stolen or damaged markers, test points, gates, etc.
- Bidder shall carry out the maintenance work of PE distribution network as per tender specification / detail of distribution network, as-built drawings, testing reports and other construction records from OWNER.
- Bidder shall visit overall site along with related staff members to make themselves aware about route, type of laying and size of pipeline

**Procedural Steps for Routine Maintenance on PE Network**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Activity</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>On receipt of O&amp;M contract, bidder shall take specification / detail of distribution network, as-built drawings, testing reports and other construction records from OWNER</td>
<td>O&amp;M Contractor In charge</td>
</tr>
<tr>
<td>02</td>
<td>Bidder shall visit overall site along with related staff members to make themselves aware about route, type of laying and size of pipeline</td>
<td>O&amp;M Contractor In charge</td>
</tr>
<tr>
<td>03</td>
<td>As built drawings / schematic etc of network shall be taken over from OWNER or from its contractor in soft copy and same shall be updated regularly with repairs / modifications / extensions carried out over the time period.</td>
<td>O&amp;M Contractor In charge</td>
</tr>
<tr>
<td>04</td>
<td>All above listed maintenance activities shall be commenced immediately after taking over as per approved work instruction by OWNER.</td>
<td>Work In charge</td>
</tr>
<tr>
<td>05</td>
<td>Post surface gas detection survey, the action/s, shall be initiated &amp; ensured as per Leak Classification and approved Action Criteria.</td>
<td>O&amp;M Contractor In charge</td>
</tr>
</tbody>
</table>
6.2.3.  **Safe Practices / Guidelines for Below Ground Network**

The operation and maintenance of a gas distribution is a specialist function, which requires a high level of operator and supervisory experience and substantial management support. The In-charge, O&M shall be responsible for ensuring there is adequate experience available to ensure the safe and secure functioning of the distribution system. Job planning is an essential part of safe practices and should be applied to all jobs by Supervisory personnel. Safe procedures must always be incorporated in the planning of any job.

- **Supervision by an experienced Supervisor in the planning and field execution of the following activities is essential,**
  - All emergency situations
  - All major gas escapes
  - On unusual or complex jobs

- **On site supervision is preferable when,**
  - Training of inexperienced field personnel in the use of specialised is necessary
  - Welding under gas is necessary
  - Shutting down of gas supply or bypassing a main is involved in the work
- Work is being performed in deep trenches
- Work involving major disruption of traffic
- Specialised equipment is being used to effect a tie-in, cut out or temporary repair
- A large number of consumers could be affected by the work

While working on Gas Escape, ensure followings,

- When working on gas escapes, suitable masks are to be worn in addition to normal personal protection such as helmets, gloves, etc.
- Where gas is evident a dry powder fire extinguisher must always be on the work site in a safe and handy position, upwind of escaping gas.
- Consideration is to be given to the safety of the public especially in the provision of adequate safety barriers and safe access for pedestrians. Control of vehicular traffic must also be considered depending on the site conditions.
- Assess the volume of escaping gas, and what means is available to bring it under control.
- Check to see if the gas is entering buildings, pits, drains, etc...
- Decide what material and equipment is required to bring the escape under control.
- Assess how long it will take to effect temporary or permanent repairs.
- Check proximity of overhead power lines, underground cables and any other possibility which may cause ignition.
- Ensure that no smoking is allowed on the work site.
- Place the dry chemical extinguisher approximately six metres from the work site in a safe position and upwind from the proposed area for excavation. If a second fire extinguisher is considered necessary it is to be placed adjacent to the excavation.
- Check all points of possible ignition such as,
  i) Vehicular traffic
  ii) People burning off rubbish
  iii) Electrical installations such as switch and transformer boxes
  iv) Passing pedestrians whom may be smoking

6.2.4. General Instructions while handling Gas escape / Leakage:

- BIDDER shall take care to prevent damage to or interference with the proper functioning of all underground utilities like the property of the telephone departmental or any statutory undertaking / private for the transmission of gas, water or electricity and all cables, pipes, ducts, drains and tunnels whatsoever BIDDER will at his own cost repair or replace damaged portion of utility or pay to concerned department for getting it repaired.

- BIDDER shall ensure safe handling of gas detecting instrument from OWNER.

- If BIDDER desires to use mechanical appliances for excavating trenches, he shall submit his proposal for approval of OWNER. This not relieves BIDDER from responsibility for any type of damage to existing services. Any complaint regarding damage must be repair as per the instruction given, failing which, the OWNER has right to impose penalty, as it deems fit.

- All top soil road metal or other surface material and hard-core shall be kept separate from other excavated material over the width of the trench and good soil should be use for Back-filling over the pipeline (i.e. without any store pieces, brick, garbage, sharp edged particles, etc...). The maximum possible care should be taken while Back-filling the trench over the pipeline. The pipeline should not have any tension while Back-filling. Also, ensure warning tape in place along / over pipelines.

- BIDDER shall obtain permit for maintenance work in Townships, Consumer premises, industry and commercial establishments, prior to start the work.

- BIDDER shall carry out extensive patrolling, monitoring & educate the authorities, especially on “HOLI”, “DIWALI”, etc…when the ignition sources & hence, fire potential is maximum.
6.3. Work Instructions for Cleaning / Replacement of Filter Elements of PRS/ CPRS / DRS

- Ensure that filter body is depressurised by opening drains and top gauge connection. Venting is done under controlled condition with all safety precautionary measures as per work permit system.
- Before starting venting operation, ensure that PRS/CPRS / DRS inlet and outlet valves are closed.
- Unbolt bolts of Top cover of filter & Remove Filter top cover, carefully.
- Remove filter element carefully, after removing the nut on element guide rod.
- Observe / check the inside of filter body and element fixtures for any abnormality, and finally clean inside of the filter body.
- Clean the faces of faces of filter cover and body
- Similarly clean and reuse the old element, if possible.
- If required, replace the element with new element.
- Refit the element by screwing down the nut, washer and rubber packing, on guide rod.
- Use the old gasket if the condition of the same is good. If not replace the same, by new gasket.
- Refit the top cover by bolting down equally on all sides.
- Carry out the leak check of cover joint by soap solution, when the filter is pressurised after completion of all other jobs on CPRS / DRS.
- Check and record the final DP, if available.
- Prepare the report and update the record including, spares / material consumption statement and submit to OWNER in charge for material reconciliation and inventory management.

6.4. Work Instruction for Routine Maintenance of PRS/ CPRS / DRS

- Check CH4 % with gas detector and carry out leak test with soap solution & Cosmos meter, of all pipe, valve and tube joints.
- Clean externally all valves, drains vents, pressure gauges, pipe spools and pilot regulators and filter, with dry clean cloth.
- Operate all valves in clock-wise/anti clock-wise direction frequently to make all them free in operation.
- If found necessary paint all valves and other valves with blue colour, pipe, vent pipe with yellow colour, Filter with silver colour , S.R.V. with red colour , P.R.V. & S.S.V. with sky blue colour. (Work to be executed only on receipt of WO)
- If Regulator No. / Equipment No. is not visible, required marking is done with appropriate paint.
- Collect and deposit the scrap / garbage from above activities, at designated scrap yard.
- Close the cabin and fencing gate and lock it.

6.5. Metering and Regulating Station (MRS) /

In a city gas distribution business, gas connection to industry is a major activity and it consists of variety of gas equipment from simple furnace to complex thermo pack or boiler. PE pipeline carrying pressure at 4 -5 bar, is laid underground from downstream of CPRS and connected to MRS which is installed in industrial premises for metering and regulating purpose. The selection of site for installation of Metering and Regulating Station (MRS) in the premises of industry is key to safety & integrity of gas installation and public. It should be installed in well ventilated area away from buildings or major installation having easy approach and access.

The contractor’s scope of work will include but not limited to the following:-

Bidder representative has to visit customers premise at periodic intervals as per OWNERS instruction for ensuring proper housekeeping, Monitoring/recording operative parameters and submit it to same to EIC. Also if observed any hazardous activity around the MRS, same has to be intimated to EIC.

6.6. Network Isolation Valve (Steel & PE Ball Valve)

For Operations & Maintenance of underground Distribution mains & Services network, isolation valves are provided as per the norms to isolate the gas supply in pipeline for any emergency or operational purpose. The Valve is made of steel as well as PE material vary from 20 to 180 mm sizes. Valve assembly comprises purge connection assembly installed in a special pit / chamber as per enclosed drawings, covering with slippers.
BIDDER shall be responsible for providing labours, tools & tackles, equipments, taking work permits, etc...To maintain this facility in order, preventive maintenance is required to be carried out periodically as follows;

a. Preventive / Periodic Maintenance of Valve Assembly / Pit

**Inspection of steel & PE Valve Pit / Chamber**

Valve pits / chambers provided on pipeline shall be inspected / checked periodically by BIDDER & submit the report of the overall status of valve assembly, valve pit condition as per AOMP. BIDDER shall excavate buried valves, and restore the same.

**Water Removal / Housekeeping in the Steel & PE Valve Pit**

BIDDER shall carry out general housekeeping inside & outside the valve pit & water removal from the valve pit. This activity should be carried out at least twice in a year (i.e., pre & post monsoon) for the entire network / all valves or as per AOMP. BIDDER shall take due care of safety in terms of any creature, sharp edge of any material during the activity. Proper security & safety must be ensured.

**Maintenance of PE Valve Assembly / Pit (APPLICABLE ONLY FOR PE NETWORK)**

- Leakage to be attended / arrested, if any on valve assembly.
- Repair of any damage to other utility during excavation will be under BIDDER’s scope.
- BIDDER shall visit the site for shifting of valve pit, along with OWNER’s representative.
- Contractor shall arrange all required material, consumable items like Teflon tap and others except PE Ball Valve, if any. He shall be reimbursed charges, if any on submission of Invoice.
- The BIDDER shall prepare as laid drawing in AutoCAD with soft copy in A3 size with material consumption for the necessary changes and the same will be submitted along with DPR to concerned OWNER’s representative on very next day, duly signed by both representatives.
- BIDDER shall ensure that his supervisor is present at site, till completion of work.
- BIDDER shall arrange the cording tape and signboard for cording of work place.
- BIDDER shall be responsible to arrange Water and Electricity / Generator at his cost for execution of scope of work entrusted to him.
- BIDDER shall be responsible to collect all the materials related to his scope from OWNER’s stores (free issue material) and bring them to the site at his risk and cost.
- BIDDER shall arrange the transportation of his manpower to and from the site.
- BIDDER shall return the old material removed from site to OWNER’s stores and maintain the record of same.
- BIDDER shall ensure the supply of gas is not affected and / or resumed after completion of maintenance.
- Proper housekeeping & disposal of waste material should be carried out as per HSE norms.
- BIDDER shall ensure that slipper / enclosure is in place after the completion of work.

**Procedure**

- Pit preparation as per OWNER’s / site requirement & specifications.
- Squeezing of PE line at both ends.
- Connection with charged PE line.
- Electrofusion welding for different sizes of pipes and fittings.
- Installation of valves & purge assembly on supports, if required.
- P.C.C., Structural, Reinforcement, Brick masonry and civil construction of valve chamber as per specifications.
- Backfilling, Compacting and removing excess soil.
- Demolitions of old chamber after removing old valve and assembly, Backfilling the same includes compaction.
- BIDDER shall check the valve chamber for any leakage through leak detection equipment.
- Check and repair any damages inside and outside the chamber.
- Check and repair the sleepers as well as the hooks welded on sleepers.
• Check and plastering work inside and outside.
• Check and repair the chamber frame.
• Replacement of sleepers, if any.
• Painting / White washing / Stencilling, if required.

Conditions / Stipulations

• Excavation of valve chambers / Pit shall be carried out in all kind of solid, excluding soft / hard rock.
• If water, mud observed during excavation, shoring and dewatering by bailing or normal pumping shall be carried out by BIDDER.
• BIDDER shall obtain required statutory / ROU-ROW permits for the concerned authorities as & when required. BIDDER to coordinate for the same.
• For any deviation, BIDDER shall obtain approval from OWNER.
• BIDDER shall use all suitable PPEs’ at site.
• BIDDER shall ensure the condition of pit & follow norms for confined space.
• BIDDER shall ensure water curing for the new pits.
• BIDDER should ensure that the PE Ball valve is covered with fine sand to prevent any damages.
• BIDDER shall supply the slipper of proper weight that can be lifted with a normal man, in case of emergency.
• BIDDER should not clean the valve pit in dark / night hours.

6.7. Attending Gas Smell / Leak Complaint in Domestic Connection

General

Attending gas smell / leak complaints in domestic connection is the activity carried out for quickly finding the cause / source / place of smell and safely repairing / arresting the gas leak, and restoration of gas supply to the customer. The gas smell creates panic to the customer for probable gas leakage and associated potential hazards. Similarly the obvious gas leak in the domestic customer connection may pose highest potential hazards of asphyxiation / fire and explosion, depending up on the volume, time of gas escape and ventilation of customer premise during the gas escape. Here in the domestic connection the risk is still higher as all the family members, from child to aged and weak and sick and formally untrained persons are exposed to the hazards. Hence it is very important that the gas smell and leak complaint in domestic connection is attended at the earliest. This task has direct effect on company's operation and reputation, customer safety and customer satisfaction.

Activity Steps for Attending Gas Smell / Leak Complaint in Domestic Connection

To receive the emergency call, to give important safety instructions to the customer, like ensuring, closing the control valve / no Smoking, / not to operate electrical appliances / opening the doors and windows / keeping people away, after noting his address and telephone nos. Initial instructions to customer are very important in controlling the hazards and mitigating the consequences, hence check list type ready format should be always available with control room call receiver, for such communication

• To reach site, quickly, observing law full and traffic safety
• To assess the situation, for taking the following steps Cordon and secure the affected area, keep the other persons away. Open the door and windows.
• To open the control valve, if the valve is closed by customer previously, ensuring that valve opening does not create any hazard.
• To identify the smell / leak spot, by carrying out, smell / noise and gas detection survey in the various parts of premise in consultation with customer. If the smell / leak spot is not found in the customer premise, then, To carry out the survey in toilets, bathrooms and surrounding area of drainage, gutters etc. as some times the leaking gas from underground PE network, travel back in the toilets, bathrooms of customer premise, thru. drainage and gutters
• To close the control valve, after identification of leak spot. Measure should be taken for prevention of accidental opening of control valve.
• To arrest the leak by repair / replacement of the component / piping, as per established procedure, and engaging a trained and certified persons only
• To open the control valve, and pressurize the connection, watching smell and noise, from any obvious opening left unattended.
• To carry out the vigorous leak check by detector and soap solution, on and around the piping and components opened and refitted.
• To witness the leak detection tests by an engineer in charge.
• To ask the customer to operate his stove, to show him that now it is safe to operate. If possible to explain the customer about what we did and what might have caused the smell / leak.
• To take customer Signature on call note as a conformity of attending the job and handing over the safe operating connection to customer.
• To prepare reports and update the records. Especially, Near miss, hazard and Lesson learning, if any, should be reported and shared with others.

6.8. STEEL VALVES

• BIDDER shall be responsible to inspect the control valves, sensing and locking devices and supply lines for operation to avoid any situation that may result in a failure.
• BIDDER shall also provide training to familiarize his personnel with the correct procedures of valves maintenance.

However, testing & calibration of safety valves for entire network, installations shall be carried out by OWNER from approved agency, BIDDER’s personnel to assist for the same. Such testing, calibration, maintenance work should be carried out during non-pick hours (preferably in night hours) and at installation site only, especially where redundancy does not exist.

• BIDDER shall assist OWNER’s O&M personnel / safety officer in carrying out the safety audit during installation, maintenance & servicing the gas distribution system.

• Bypass of any valves should be done only after taking prior approval of OWNER.

6.9. Emergency O & M Vehicle

• Model of the Emergency O&M vehicles (4 Wheeler) to be provided by the Bidder should not be older than one year & not over run more than 15000 KMs at the time of mobilisation at site. The vehicle to be inducted should be standard, tested and established models or equivalent (preferably Mahendra Bolero CAMPER for MUV, 4 + 1 Seater ) , TATA ACE ( CHHOTA HATHI, 4 + 1 Seater) for Small 4 wheeler and New 2 wheeler preferably Bajaj / Honda / Hero etc .

• BIDDER shall provide emergency vehicle along with Accessories and the vehicle shall be used and must be kept in a good working conditions all the time. Driver to be deployed on this vehicle must be well trained / experienced, non alcoholic or drug addict & dressed in approved uniform. Necessary manpower, machine / equipments, spares / materials & consumables shall be arranged by BIDDER for any emergency.

• For handling emergency calls and carrying out various planned operation and maintenance activities, of the city gas distribution system, availability of well equipped vehicle called normally as maintenance van is very important.

• Standard reasonable load carrying vehicle, with open truck type body and good manoeuvrability that can be converted into maintenance van, after building customized body for storage and security of various tools tackles, pipes and fittings, fire extinguishers etc. generally required for handling gas leak / escape emergencies and routine and break down maintenance of network and installations, from city gate station to customer connections, located near and far.
• For highlighting the company identity, the van is painted with company logo, name, and contact telephone numbers & special colour approved by OWNER in special colour and pictures, beautifying it with aesthetic look.

• For monitoring the vehicle movement, Bidder should mandatory fit into the Emergency vehicle Tracking System (VTS). If VTS is not working properly, the same shall be informed by BIDDER to OWNER immediately.

• Any detour away from the scheduled route / route to be followed for attending maintenance activities cannot be considered as a part of the additional KM charges to be paid.

• Maintenance van is also fitted with public announcement system and wireless equipment (UHF base station provided by OWNER). The public announcement system is required for making announcement for stoppage and resumption of gas supply, during pipe line damage / gas escape, or equipment failure and for festival safety. The UHF wireless equipment is for contact with control room from remote areas.

• As stated above, ever readiness of maintenance van with all required items is very important, and hence should be operated and maintained with utmost care. The van should be used only for intended purpose. Ensure diving of the van with lawful and traffic safety, taking care of the damaging bumps on the road. The regular checks and inspection procedure should be established, assigning responsibility to particular shift engineer. The vehicle should be checked daily in the morning, as per the check list, having checks for, tire pressure, engine oil, fuel level, other abnormalities like over temperature, vibration, noise etc. including announcement and wireless system.

• The vehicle should be regularly serviced in a good equipped garage. Similarly the tools tackles should be checked every month end to ensure the availability and working condition of each item. The effective material reconciliation procedure and check list should be prepared to ensure the availability of pipes and fittings and replacements for the consumed pipes and fittings. The replacement for the use / lost items should be done immediately otherwise there are chances of forgetting the replacement. Owner shall penalise the Bidder as per the penalties defined in the tender in case of shortage of inventory below Minimum Inventory Level i.e. 80% of the Inventory level given in the tender.

• The fire extinguisher and pressure gauges, torches, stored in the van, should be periodically checked and calibrated for their working. For overall security of all items, the van should always be locked and guarded, when not in use.

• At site van should be parked at safe and secured place, keeping watch. Take out the required items only, do not remove / take out unwanted items, from the van. Return back the items in van immediately after completion of job. Ensure that all items are collected and returned back in the van to their respective place, after repeatedly looking outside, here and there.

• BIDDER shall maintain the day-to-day records as per MIS & submit it along with monthly reports.

• Vehicle should be maintained in proper working conditions throughout the tenure of the contract by carrying out preventive, periodic & breakdown maintenance as per Manufacturer’s recommendations. BIDDER shall submit the report on such scheduled or breakdown maintenance performed from time to time. All the inspection & maintenance should be carried out by authorized dealers only.

• BIDDER shall make an alternate arrangement in case of Routine, Periodic maintenance to be carried out or for RTO purpose, required from time to time at his own cost & risk. OWNER shall ensure that in such case the O&M is not affected.

• Any penalty for non-compliance or delay in compliance of statutory matters shall be realized / recovered from BIDDER.

• BIDDER shall ensure the validity of driving licence for the driver deployed on vehicle at his own cost.
BIDDER shall be solely responsible for any accident of vehicle & caused damages to vehicle or the property of third party or the human (injury or death). Such cost shall be recovered from BIDDER & any complaints in police or competent authorities in this regard shall be taken up at his cost & risk including insurance claim, repairing of vehicle, damage to third party, etc…

Vehicle Inspection

Periodic vehicle inspections shall be ensured by O&M Contractor as per O&M manual of OWNER. A well planned vehicle inspection will assist in detecting defects, faulty equipment and violations of safety or legal regulations. Identification and correction of these hazards will reduce the potential for accidents, minimize vehicle downtime and reduce overall maintenance costs.

- Each vehicle should be checked and reported should be submitted to concerned person / In-charge for further action.
- Headlights
- Tail lights
- Turn signals
- Windshield wipers, washers and washer fluid
- Horn & Spark Arrestor
- Reverse Tune / Horn
- Brakes
- Vehicle emergency lights
- Emergency brake
- Seats & it’s covers of Vehicle are in clean and Good condition
- Seat belts and shoulder straps
- Side mirror
- Tires (It should be checked Periodically)
- Windshield Condition
- Vehicle body condition (scratches and dents)
- First Aid kit
- Fire extinguisher
- Communication equipment
- Wheel chocks

7.0. METER READING, BILLING & PAYMENTS

7.1. METER READING AND BILLING

7.1.1. GENERAL

BIDDER shall be responsible to carry out meter reading, bill distribution at customer premises and payment collection at SGL’s Customer Care Center and depositing the collected money in the OWNER’s designated office. Under no circumstances the meter reader/bill distributor will be allowed to collect bill/any other payment directly from the customers, except at the CCC. SGL’s Customer Care Centre (CCC). Cashiers shall give a SAP generated receipt to each customer for any payment made.

7.1.1.1. BIDDER shall collect the bills generated through SGL’s system and distribute it to customer premises. Revision in Gas price, if any shall be intimated, updated by the Owner in software. BIDDER has to distribute Price Increase/Other General Instruction intimation along with the invoices without any extra cost. Any unauthorized change in the software is subject to penalty to BIDDER.

7.1.1.2. BIDDER shall depute his Cashiers at the CCC of OWNER to obtain specific/advanced/refresher training in billing software (SAP). Such training will be provided only once for a new operator during the tenure of contract. For the sake of continuity and better operations, the BIDDER shall endeavor to retain the Cashiers/Meter readers and ensure that there is no unwanted change in the team of Cashiers/Meter readers. If in future
SGL decides to stop cash collection at CCC, than also BIDDER has to provide cashier for acceptance of other mode of payment collection at CCC.

7.1.1.3. Without prejudice to the right of OWNER to adjust the amount deposited and / or invoke the bank guarantee referred to in relevant clause in case of any delay by BIDDER in the payment of the aggregate retail price collected by him, BIDDER shall pay to OWNER the delayed payment with interest at the rate of 18% (eighteen percent) per annum.

7.1.1.4. All the paid national/weekly holidays shall be observed closely as per OWNER'S instructions. However, the billing schedule/cycle should not be affected/disturbed/delayed for any of these reasons.

7.1.1.5. BIDDER'S Cashier shall strictly follow the rules regarding the software. Will not provide/disclose protected password to anybody (except OWNER/its representative). No data/details regarding collection will be disclosed to anybody except OWNER/its representative.

7.1.1.6. If in any case, OWNER / its representative find any error or shortage in collection money / amount, then OWNER may ask for clarification from BIDDER. Outstanding amount / amount not reconciled, then the shortage / deficit will be recovered from the BIDDER on the same or next day, if BIDDER will refuse to pay the amount then recovery shall be done from the monthly running bill of BIDDER or by invoking the bank guarantee.

7.1.1.7. BIDDER shall maintain the quality workmanship and ensure the accuracy (zero error) and reliability of data contained in the gas billing systems.

7.1.1.8. In any case, no subletting of contract shall be permitted. If BIDDER is found to sublet the contract for any of the schedules A, B and C than the owner will have right to take appropriate action against BIDDER which could also result in termination of contract.

7.1.1.9. Any complaint / query related to the billing, which is not resolved by any reason will be carried forward in next billing cycle. Necessary adjustment will be made in subsequent billing cycle.

7.1.1.10. BIDDER shall intimate OWNER for cases such as meter malfunctioning, tampering, malpractices, manipulation, theft or any other complaint pertaining to meter reading / billing / installation. In such cases, penalty & action shall be taken in consultation with OWNER.

7.1.1.11. BIDDER shall proceed as per the guideline / instruction of OWNER for the bill changes in the following cases or any other case:

- Minimum gas bill, when house is continuously closed.
- Minimum gas bill, when meter is faulty or malfunctioning and showing incorrect readings.

7.1.1.12. BIDDER shall take prior permission of authority of co-operative societies, apartment, townships, villages, corporate, etc. for visiting / attending the consumer complaints of wrong meter reading/bill distribution at his premises / house. Also, he will have signature of the consumer on the complaint book / card after attending it. He shall also have signature of the authority, if required.

7.1.1.13. BIDDER’S personnel, while on duty shall wear approved uniform and keep Identity card approved by OWNER from time to time, especially when visiting consumer premises / house. Personnel, directly involved
in such activities must be well behaved, answerable, customer oriented. Also, he should not be addicted to drug, alcohol, chewing tobacco, smoking, etc.

7.1.1.14. Bill shall be dispatched on house-to-house basis. BIDDER shall ensure that no bill remains pending in the letterbox or by any such common means.

7.1.1.15. One connection = one house, one family / consumer, one meter, using PNG. Meter reading and bill distribution of one consumer shall be treated as one unit as per SOR of schedule C

7.1.1.16. The manpower for schedule C should be separate and shall be of same company. In no case, schedule A and B manpower of O&M contract shall be used for meter reading, bill distribution and/or payment collection and vice versa. Schedule A and B manpower shall not be allowed for schedule C jobs even in overtime and vice versa.

7.1.1.17. If it is found that the cashier/ meter reader is engaged in any kind of malpractice that hampers SGL image, BIDDER on recommendation of OWNER will change that cashier/ meter reader immediately from SGL’s CCC/ workplace etc.

7.1.2. **BIDDER’S SCOPE OF WORK**

The scope in this contract consists of minimum requirements and activities, but not limited to, for Meter Reading & Bill Dispatch Services.

7.1.2.1. The BIDDER shall deploy a person who will be a single point contact for Schedule C activities. He will be responsible for timely meter reading and bill distribution of domestic customers. He will prepare society wise/ area wise/roadmap sheet for meter reading and bill distribution as convenient to meter readers. He will manage the team of meter readers and will get report from them on daily basis. He should have adequate knowledge of computer skills especially of MS Excel. He will report to PNG In charge at site and will send weekly mails regarding progress of billing cycle. He will provide soft copy of meter reading sheet after entering physical meter reading taken in excel file as and when required by PNG In charge.

7.1.2.2. BIDDER shall submit the authorization letter of his deployed cashier/billing officer and meter readers with contact details like name, ID proof, contact number, e mail ID etc.

7.1.2.3. BIDDER shall, with due care & diligence, execute the work in compliance with all laws, by laws, ordinances, regulation etc. and provide all services and labour inclusive of supervision thereof. The cashier/meter reading staff while interacting with customers at CCC, customer premises will not indulge in any activity that is not permitted by law. Notwithstanding if a situation arise where if BIDDER personnel is found to have indulged in any unlawful/illegal activity the responsibility of dealing with govt. authority/police/judicial authority etc. shall be that of the BIDDER only.

7.1.2.4. All the materials, equipment, appliances or other things of whatsoever nature required in or about the execution of the work, whether of temporary or permanent nature shall -be provided by the BIDDER. This will include mobile device and portable printer as per specifications provided by the Owner (applicable in case of implementation of automation of meter reading and/or spot billing).
7.1.2.5. Before starting of work at site, BIDDER shall himself familiarize for the work having obtained approval/clearance from Owner.

7.1.2.6. Without limiting the generality thereon, BIDDER shall do all work necessary at each of the job which is complete in all respect with site restoration.

7.1.2.7. BIDDER shall not allot subcontract for any or part of the above job.

7.1.2.8. All the responsibility for the completion of job will be in the BIDDER’s scope.

7.1.2.9. BIDDER shall arrange for insurance of manpower engaged in the Meter Reading related work.

7.1.2.10. BIDDER's personnel shall not smoke or resort to misuse of drugs, medicines or alcohol while on duty.

7.1.2.11. BIDDER's personnel shall observe proper behaviour with customers.

7.1.2.12. BIDDER shall ensure that assigned work shall not be disturbed, due to deputed manpower.

7.1.2.13. BIDDER shall deploy manpower during whole year for the job. Frequent change in manpower shall not be permitted without prior consent of the Owner.

7.1.2.14. BIDDER shall ensure availability of its personnel as required by the Owner.

7.1.3. METER READING & BILL DISPATCH

7.1.3.1. This scope of work comprises of, but not limited to, the following activities

- Meter Reading on paper or mobile device, as the case may be including capturing of meter photograph (periodic meter reading and re-visit in case of doubtful meter reading or customer complaint received).

- Bill Dispatching (periodic bill dispatch and re-visit in case of customer complaint received).

- In case of spot billing capturing of meter reading on mobile device (with meter photograph), spot printing and delivery of bill.

- Re-visit to customer in case of any complaint received, for analysis and resolution of the complaint.

- Submission of updated area/walk sequence along with meter reading, if required.

- Reporting of meter related issues along with photographs e.g. Meter at height, Meter digit issue, Meter glass broken, Mud/Water in meter index etc.

- In continuous “House Closed" cases re-visit customer premises for verification and actual reading.
7.1.4. **REQUIREMENT / SPECIFICATION OF WORK METER READING**

7.1.4.1. Meter reading for domestic connections shall be taken once in a period of 60 days (same is liable to change in future at SGL’s discretion).

7.1.4.2. All data of meter reading shall be recorded in meter reading sheet or mobile device (as the case may be) with full accuracy.

7.1.4.3. BIDDER shall inform the customer while taking the meter reading.

7.1.4.4. BIDDER shall take signature of customer as acknowledgement of bill receipt.

7.1.4.5. In case of house/premises found closed, BIDDER shall put specific remark in the card for the same. However if meter is outside the premises, BIDDER shall take the meter reading.

7.1.4.6. BIDDER representative shall remove his shoes before entering the customer premises.

7.1.4.7. If BIDDER representative observes any mischief with meter, Gas installation, broken meter/meter glass and any illegal modification/ extension in pipeline installation, he shall immediately inform the company representative.

7.1.4.8. BIDDER representative shall wear uniform and Identity card during taking meter reading & bill dispatch. Meter Reading for Domestic Connections shall be taken as per Frequency specified and instruction from Owner representative.

7.1.5. **REQUIREMENT OF BILL DISPATCH**

7.1.5.1. All printed bills shall be dispatched within 3 days from the date of printing.

7.1.5.2. Bills shall be dispatched on house to house basis. BIDDER shall ensure that no bill is dispatched in common letter box or handed over to security or by any such common means.

7.1.5.3. BIDDER shall strictly follow the billing cycle fixed for each area, place & society.

7.1.5.4. BIDDER shall submit the POD with signature of customer in specified format for meter reading and bill distribution. SGL will not release payment without submission of POD at CCC.

7.1.5.5. BIDDER shall not charge extra amount/charges, if OWNER asks to distribute dispatch hand bills/pamphlet etc. along with the gas bill for the means of marketing, safety campaign or for other purpose.

7.1.6. **SPECIFIC CONDITIONS OF BIDDER'S SCOPE**

7.1.6.1. BIDDER shall carry out Meter Reading and Bill Dispatch for Domestic Customers at Owner's area of operations.
7.1.6.2. The frequency of meter reading and bill dispatch will be as follows:

7.1.6.3. For Domestic customers: Bimonthly or as decided by the OWNER

- The meter reading will be carried out on paper or mobile device, as the case may be. Additionally, meter photograph to be captured and up-loaded in case of mobile meter reading. For hazardous meter cases, an extra photograph to be uploaded showing the hazard clearly.

- In case of spot billing, the scope will include capturing and up-load of meter reading (along with meter photograph) and printing and delivery of bill/invoice on the spot to the customer.

- BIDDER will be responsible for procuring and maintaining the hardware and network requirements as under:

  o Mobile Phone

    - Operating System : Android OS
    - Display : 4.5” TFT (320 X 420)
    - Memory : 4 GB Internal
      1 GB RAM – Micro SD up to 32 GB, 2 GB Included
    - Camera : Primary 5MP, 2592 X 1944 pixels, Autofocus, LED flash
    - GPS : Yes, with A-GPS support
    - Battery : Standard Battery, Li-Ion - 2000 mAh
    - Extra battery : 1 portable charger for mobile and portable Bluetooth printer
    - Battery : Standard battery, Li-Ion 5200 mAh

  o Printer

    - Bluetooth Printer - 3 inch, Bluetooth enabled, Dot Matrix
    - Print cartridge # As per specifications provided by Owner. Print should be legible. (Stationery will be provided by the Owner).

  o Network
7.1.6.4. BIDDER shall carry out repetitive meter reading if required for any reasons.

7.1.6.5. BIDDER shall carry out repeat visit for bill dispatch for duplicate bills in case of customer complaints received or any other reason.

7.1.6.6. If meter reading can't be taken due to house close or any other issue, proper evidence to be provided for meter reading not taken.

7.1.6.7. BIDDER shall resolve any complaint received from Owner.

7.1.6.8. BIDDER shall resolve customer complaints related to meter reading and bill dispatch within 48 hours of intimation of complaints.

7.1.6.9. BIDDER shall take signature of customer as acknowledgement of bill receipt, as and when required.

7.1.6.10. During Meter Reading, BIDDER shall observe the condition of Owner's installation around meter as per check list provided and report any abnormal condition/operation to Owner engineer.

7.1.6.11. BIDDER shall provide uniform to meter readers (2 pairs/twice in a year) and ensure that the meter reader/bill dispatcher wears the same all the time while on duty.

7.1.6.12. BIDDER shall also provide rain coat to meter readers so that meter reading process is not hamper during rainy season.

7.1.6.13. For Meter Reading activities, BIDDER shall ensure uninterrupted manpower supply, in case of fresh recruits, necessary formalities to be carried out like checking of competency level, training, safety awareness etc. with the help of engineer-in-charge.

7.1.6.14. BIDDER shall recruit qualified and experienced manpower for the various activities. The qualification criteria for different manpower shall be as follows:

- For Meter Reading & Bill Dispatch Activity - At least 8th pass and having legible handwriting with relevant experience.
- For Supervision: Minimum Graduate with relevant experience and computer knowledge.
- For Cashier: At least 12th pass and having computer knowledge (MS excel etc.) with relevant experience.
- BIDDER shall carry out Police Verification of the persons deployed for executing this contract.

7.1.6.15. Reconciliation of cash, data backup, final reporting as per MIS shall be done by Cashier on daily basis.

7.1.6.16. Daily cash collected amount in full at respective CCC’s shall be reconciled on daily basis and handed over to SGL’s representative.

7.1.6.17. BIDDER shall be responsible for Safe handling of cash collection at CCC. In the event of theft, robbery, misappropriation by Cashier, FRAUD etc. right from the collection of amount from Customers at Collection Centre, Transportation/Transit, etc. up to the handing over of cash to SGL designated official/CMS Agency appointed by SGL before leaving office at the time of closing of CCC on daily basis /deposition in the...
account of OWNER in designated premises, OWNER has the right to recover the amount from BIDDER’s performance bank guarantee / monthly bill in case such malpractice is observed from BIDDER or its employees. After depositing the money to the OWNER’s designated centre/Bank/CMS, the copy of the joint acknowledgment from OWNER’s designated person shall be recorded on daily basis and maintained for reconciliation.

7.1.6.18. SGL reserves the right to take action as deemed fit including termination of contract, if the BIDDER is found to have indulged/guilty in theft of gas by manipulating of meters/or any such mischievous activities of the PNG consumers network or by any other foul means.

7.1.6.19. The rate quoted in SOR and approved for the activity is FIRM & FINAL irrespective of number of consumers.

7.1.6.20. Since, this is a comprehensive O&M contract, BIDDER shall mobilize/demobilize cashier within one month of written intimation of SGL, as per SGL’s requirement

7.1.6.21. BIDDER shall also maintain attendance register for cashiers at CCC. If cashier remain absent for some days/period then BIDDER shall provide his alternative for those days/period so that daily payment collection activity does not get affected.

7.1.6.22. BIDDER shall not claim any amount towards meter readers/dispatchers cost, fuel, conveyance, transportation, collection centre facility, vehicle, over time, accommodation, communication, maintenance, commission, food, PPE’s, etc. for performing the entire activity.

7.1.6.23. Cashiers/meter readers/bill distributors/O&M BIDDER is/are not authorized to disclose any information regarding rebate / refund / discount / compensation. Rebate / refund / discount / compensation shall not be allowed to any consumer without technical proof and written certification from OWNER / its representative.

7.1.6.24. BIDDER shall not modify / change the format or its contents in the bill.

7.1.7. **OWNER’S SCOPE OF SUPPLY**

7.1.7.1. Owner shall provide Area wise Schedule for Meter Reading and bill dispatch.

7.1.7.2. Owner shall provide the details of the newly added customers to be updated in the walk sequence.

7.1.7.3. OWNER shall provide the pre-printed bills / invoices bearing the name of OWNER.

7.1.7.4. OWNER shall coordinate with concerned official of BIDDER for trouble shooting in billing through SAP, if any.

7.1.7.5. OWNER shall provide computer with Cash Collection software with required printer and stationaries to BIDDER for the collection activities. OWNER shall also provide space / sitting arrangement for Cashier with required fixtures/ furniture etc.
7.1.8. **MODE OF PAYMENTS**

7.1.8.1. Payment towards PNG bills shall be collected in Cash or by Cheque/DD/Card (or by any other mode as decided by OWNER) payable at local nationalized or scheduled bank in favor of OWNER. Also, the payment should be collected / received in full.

7.1.8.2. BIDDER shall not accept any part payment against the amount of bills from the domestic consumers at CCC. Post Dated Cheque (PDC) should not be accepted. If the bill amount is not paid by due date then consumer shall pay surcharge / penalty / delayed charges as per OWNER's policy.

7.1.8.3. If any mistake / error in the meter reading or / and in billing is observed / brought to the notice, the BIDDER shall be responsible for fresh reading and distribution of corrected bill to consumer without any additional cost to OWNER. However, OWNER shall recover / deduct the cost against such failure by means of penalty.

7.1.9. **BILLING CYCLE SCHEDULE**

7.1.9.1. Preferably the BIDDER shall adopt the following schedule of billing cycle

7.1.9.2. Prior to 3 days of start of billing cycle, BIDDER shall be provided the list of consumer in from the OWNER i.e. total number of consumer to be billed. The list of same will be provided in the form of soft copy / email and bidder will print the same after sorting the list for meter reading and bill distribution purpose. Bidder shall not use owner’s stationary for printing of Meter Reading sheets. The cost of printing meter reading sheet shall be borne by the BIDDER.

7.1.9.3. BIDDER shall strictly adhere to the billing cycle schedule from meter reading till bill distribution, reconciliation and reporting to the OWNER.

7.1.9.4. BIDDER will strictly follow the area-wise/portion-wise schedule for meter reading, bill dispatch and collection of bill amount at various collection centers. He will not change any billing schedule without the permission of OWNER. However, OWNER reserves the right of amending / modification in the billing cycle / schedule. Bidder shall not take any payment from customer after specified cash collection timings of SGL.

7.1.9.5. Area of CGD Network is divided preferably into four portions depending upon city and bimonthly billing cycle activities for PNG consumers shall be performed in SAP in four Portions, one portion during a fortnight.

7.1.9.6. For all billing related complaints two days shall be provided for rectifications pertaining to the billing. All complaint should be recorded in SAP.

7.1.9.7. After successfully completion of entire process of each billing cycle, update the billing software for each consumer with payment record, receipt number, history card, etc.

7.1.9.8. Area of CGD Network is divided preferably into four portions depending upon city and bimonthly billing cycle activities for PNG consumers shall be performed in SAP in four Portions, one portion during a fortnight.

7.1.10. **DIS-CONNECTION (DC) / RE-CONNECTION (RC)**

7.1.10.1. BIDDER shall be responsible for disconnection and re-connection procedure of all PNG consumers. However, it should be performed in consultation with the OWNER / its representative. The charges for DC / RC shall be levied / paid as per OWNER's tariff plan and policy.
7.1.11. DIS-CONNECTION

7.1.11.1. Disconnection procedure can be categorized into two following type, volunteered or forced disconnection. BIDDER shall carry out following activities;

7.1.11.2. VOLUNTARY DIS-CONNECTION

- Billing officer/cashier shall receive the consumer application and request charges only if the consumer has no dues with OWNER. If above condition is satisfied then the request charges as decided by OWNER shall be taken and details of same shall be forwarded to SGL representative on daily basis.

- BIDDER’s technical group on successful disconnection shall intimate / provide the details (CVR) to SGL representative for necessary entry / update in the billing software (SAP). In case the house is found locked, then bidder shall submit CVR of House locked status and reattempt will be made after few days or by taking suitable time from customer on phone.

7.1.11.3. FORCED DIS-CONNECTION

Forced disconnection shall be carried out in following cases:

- Non-payment of gas consumption bill for more than two (2) billing cycle (i.e. more than 4 months), or as instructed by OWNER.

- Non-payment of installation cost, penalty, contract renewal charges for various reasons.

- Using gas with unsafe installation / circumstances or tempering / manipulation of installation / equipment or for any other technical / non-technical reason.

- Disconnection will be carried out with prior authorization / instruction of OWNER.

- After successfully carrying out such disconnection, necessary report / CVR shall be made and submitted to SGL representative. The charges and modes-operandi shall be decided by the OWNER.

- BIDDER should ensure that no such consumer shall be reconnect without clearing the matter, collecting the outstanding amount along with the penalty and re-connection, charges, as per the policy.

- Forced disconnection shall be carried out as and when required or as instructed by OWNER.

In Case of Forced Disconnection to be carried out in High rise buildings or Flats, Bidder has to arrange for PETZAL (Julha) to perform the activity. The Bidder can raise bill for same based on SOR of SGL.

7.1.11.4. RE-CONNECTION

- On receipt of consumer request for re-connection, billing personnel should ensure that the disconnection was done volunteered or forcefully.
7.1.12. SCHEDULE GENERATION, DATA ENTRY, MONITORING MIDDLEWARE & INVOICE GENERATION

7.1.12.1. GENERAL

7.1.12.1.1. BIDDER shall carry out Data Entry and handle customer complaints including but not limited to following activities:

- Activity from Schedule generation to Invoice process.
- Meter reading data entry.
- Schedule Generation and Maintain.
- Meter Reading Order generation and printing
- Tracking and monitoring of MRO
- Clearing of implausible meter reading and bill outsort.
- Billing and Invoicing.
- Area changes and walk sequence updating in system.
- Attending House Close reading phone calls.
- Printing and dispatch of bills
- In case of manual meter reading (If required) Meter reading data entry
- Ensure completion of meter reading and billing as per schedule.

7.1.12.1.2. Handling and resolution of meter reading & billing related customer complaints

- Attending customer complaints related to meter reading & billing.
- Resolution of customer complaints as per guidelines within specified time frame.
- Explain the calculation of billed charges to customers, if required.
- Preparation of or provide inputs for approval notes for resolving customer complaints.
- Co-ordination with Mktg. and O&M teams for resolution of customer complaints.
7.1.12.1.3. Generation and printing of work bills

7.1.12.2. **BIDDER's SCOPE OF WORK**

7.1.12.2.1. General

- The scope/specification covers the minimum specified requirement for the various activities to be carried out by the BIDDER toward the Data entry and related work at the aforesaid site.

- BIDDER shall, with due care & diligence, execute the work in compliance with all laws, by laws, ordinances, regulation etc. and provide all services and labour inclusive of supervision thereof.

- All the materials, equipment, appliances or other things of whatsoever nature required in or about the execution of the work, whether of temporary or permanent nature shall be provided by the BIDDER.

- Before starting of work at site, BIDDER shall himself familiarize for the work having obtained approval/clearance from Owner.

- Without limiting the generality thereon, BIDDER shall do all work necessary at each of the job which is complete in all respect with site restoration.

- BIDDER shall not allot subcontract for any or part of the above job.

- All the responsibility for the completion of job will be in the BIDDER's scope.

7.1.12.2.2. Specific Terms & Conditions

- **In case of manual meter reading**
  - BIDDER shall carry out Meter reading data entry, Schedule Generation and Maintain, Meter Reading Order generation and printing, Tracking and monitoring of MRO issued to meter reading BIDDERs, Clearing of implausible meter reading and bill outsort, Billing and Invoicing, Area changes and walk sequence updation in system, Attending House Close reading phone calls, Printing of bills and handing them over to BIDDER/courier for dispatch for Domestic customers at SGL area of operations.

- **In case of spot billing**
  - BIDDER shall carry out Schedule Generation and Maintain, Meter Reading Order generation and printing, Tracking and monitoring of MRO issued to meter reading BIDDERs, Clearing of implausible meter reading and bill outsort, Billing and Invoicing, Area changes and walk sequence update in system, Attending House Close reading phone calls, Printing of bills and handing them over to BIDDER/courier for dispatch for Domestic.

- BIDDER shall attend the customer complaints related to meter reading & billing received either on phone or letter or email or through walk-in-customers.

- BIDDER shall resolve customer complaints including taking necessary actions for resolution.

- BIDDER shall explain the calculation of bill and various charges to customer, if required.

- BIDDER shall prepare approval note or provide data/inputs for preparation of approval note for resolution of customer complaints.
o BIDDER shall co-ordinate with other departments such as Mktg. or O&M for resolution of customer complaints.

o BIDDER shall generate and print work bills.

o BIDDER shall ensure uninterrupted manpower supply. In case of a new recruitment, necessary formalities to be carried out like checking of competency level, training, safety awareness etc. with the help of concerned reporting manager in SGL.

o BIDDER shall arrange for insurance of manpower engaged in the Data Operators related work.

o BIDDER's personnel shall not smoke or resort to misuse of drugs, medicines or alcohol while on duty.

o BIDDER shall ensure that assigned work shall not be disturbed, due to deputed manpower.

o BIDDER shall deploy manpower during whole year for the job. Frequent change in manpower shall not be permitted.

o BIDDER shall ensure availability of its personnel s required by the SGL Supervisor.

o While carrying out the job all deputed persons shall follow safety rules & regulation of SGL.

o BIDDER shall deploy number of Cashier as per SGL’s requirement at the OWNER’s designated office for collection of PNG Domestic Bill payments. The meter readers should be appointed such that there should be no delay in bimonthly billing cycle of domestic customers. The meter reading and bill distribution of each portion should be completed within 15 days of providing portion wise list of customers.

7.1.12.3. Permits & Authorizations:

o BIDDER shall carry out the work normally with in the official duty hours of Company. The Concerned Supervisor must ratify any deviation from the normal working hours. No Work shall be carried out without permission of Company representative beyond the official duty hours.

o BIDDER shall submit the list of qualified experienced manpower along with pass port size colour photograph to the SGL Supervisor In charge before starting of work. Only listed manpower shall be allowed for said work.

o BIDDER's Representative should not be without Identity Card at Owner sites I office as well as sites. The I Card shall be provided by BIDDER.

o BIDDER shall apply and obtain all necessary permission related work to be performed. After completion of work a joint inspection shall be done at concern work place

7.1.12.3. SGL SCOPE OF SUPPLY

7.1.12.3.1. SGL shall provide basic safety induction training and competency training related to their work to BIDDER employees.

7.1.12.3.2. SGL shall provide Computer and printer at company's premises for data entry and bill Generation.

7.1.12.4. SPECIFICATION OF WORK

7.1.12.4.1. As per list of activities mentioned above in technical scope.
7.1.13. **HSE REQUIREMENTS**

7.1.13.1. BIDDER shall strictly adhere to the environment norms as per the existing local rules and Owner's environment management system.

7.1.13.2. Very high standard of Owner's health, safety & environment management system shall be observed in the connected services by the BIDDER and workman engaged by the BIDDER.

7.1.13.3. All activities shall be carried out as per Owner documented procedure and HSSE requirement and deviation from it shall be dealt with very strictly.

7.1.13.4. BIDDER shall ensure that all tools, appliances, machines, vehicles or other equipment, are in safe working condition at all times and comply with current regulations and, where appropriate, are used only by authorized and competent persons. This provision includes all emergency response life-saving equipment.

7.1.13.5. The work site would be on case to case basis, but no additional transportation charges/miscellaneous charges would be paid apart from the rate agreed upon.

7.1.14. **COMMUNICATION**

7.1.14.1. BIDDER shall provide mobile phone to his staff/meter readers, so effective communication from site to Owner office can be done.

7.1.14.2. Communication to Owner as per contingency plan in case of any accident during execution of job.

7.1.14.3. BIDDER shall submit information regarding work-in-progress and details about deployment of his working teams to the Owner Supervisor in-charge as per the frequency decided by the Supervisor in-charge.

7.1.14.4. BIDDER shall observe all prevailing labour laws (including minimum wages to its staff) applicable to them during the period of contract.

7.1.14.5. BIDDER shall accomplish the designated job within the specified time duration for fulfillment of the target.

7.1.14.6. All persons engaged by the BIDDER shall be the BIDDER's own employee and they will claim no privileges from Owner. The BIDDER will directly responsible for the administration of his employee as regard general discipline and courteous behaviour.

7.1.14.7. In case of any hazard like fire, leakage etc. due to gross negligence of the BIDDER, Owner reserves the right to impose penalty up to actual damage cost and or termination of Work Order depending upon the gravity of the situation.

7.1.14.8. If the works are not done as per Owner Satisfaction level then BIDDER shall do the necessary rework at his own cost.
7.1.14.9. **BIDDER** must refer medical emergency management policy of Owner to handle any medical emergency on site.

7.1.15. **PRE-EMPLOYMENT CHECKS:**

7.1.15.1. **BIDDER** shall ensure thorough pre-employment checks on the conduct and ethics of all its employees and staff to avoid inappropriate hiring of contract employee/staff.

7.1.15.2. Following activities will be part of the scope of work for performing the above main activities and **BIDDER** will depute required manpower at SGL premises (to SGL’s satisfaction) for the same:

7.1.15.3. Activity from Schedule generate, Middleware monitoring and Invoice process of Schedule Generation and maintain

7.1.15.4. MRO generation and uploaded to middleware

7.1.15.5. Tracking/monitoring of meter reading through middleware

7.1.15.6. Clearing of implausible meter reading and bill out sorting

7.1.15.7. Bill and invoice generation and printing in case of manual reading.

7.1.15.8. Area changes and walk sequence updation in system.

7.1.15.9. Attending House Close reading or zero consumption complaints.

7.1.15.10. Resolution of customer complaints

7.1.16. **SLA AND PENALTY TERMS**

7.1.16.1. **BIDDER** shall take the fresh meter reading without claiming any extra charges in case of any incorrect / wrong meter reading found.

7.1.16.2. If consumer complaints for non-receipt of bills and ask to waive the interest/penalty being levied on account of non-payment of bill in time then amount equal to interest/penalty waived or applicable penalty will be recovered from the **BIDDER**.

7.1.16.3. The Contractor shall be responsible for the scope of work to the satisfaction of the Owner within stipulated time period. On Account of Contractor's failure to adhere to the Company's requirements, Owner shall impose various penalties on the Contractor as described in the below Penalty Matrix
### PENALTY MATRIX

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Complaint</th>
<th>Penalty Per Complaint</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Wrong/incorrect meter reading in current/previous billing cycle.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current/Previous bill not received</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Late/Delayed dispatch of bills</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data entry mistake</td>
<td>Rs. 75/-</td>
</tr>
<tr>
<td>2</td>
<td>Delay in schedule of billing cycle</td>
<td>Rs. 500/- per day</td>
</tr>
<tr>
<td>3</td>
<td>Delay in submission of Proof of Delivery of domestic invoice</td>
<td>Rs. 200/- per day</td>
</tr>
<tr>
<td>4</td>
<td>Non-authorized absence of cashier</td>
<td>Rs. 200/- per day per cashier</td>
</tr>
</tbody>
</table>

7.1.16.4. Penalty - Rs. 75/- for every wrong meter reading complaint except for following:

- Alternate meter reading due to wrong meter no in system.
- Meter digit issue.
- Index jumping.
- Reading is correct & high consumption complaint.

7.1.16.5. In case of any invalid/wrong reading found, Contractor shall take the fresh reading without any extra charge immediately on call.

7.1.16.6. If consumer complaints for non-receipt of bills and ask to waive the interest/penalty being levied on account of non-payment of bill in time then amount equal to interest/penalty waived or applicable penalty will be recovered from the BIDDER. The OWNER decision to levy penalty in this matter will be final.

7.1.17. **SERVICE LEVEL AGREEMENT:**

7.1.17.1. Invalid Meter Reading found : Service Level Agreement - Resolve immediately.

7.1.17.2. Wrong Meter Reading : Service Level Agreement - Resolve within 48 hours

7.1.17.3. Mistake in Data Entry : Service Level Agreement - Resolve within 8 hours

7.1.17.4. Delay in Meter Reading : Service Level Agreement - 100% of Adherence of schedule.

7.1.17.5. Bill not dispatched / late dispatch of bill : Service Level Agreement - Dispatch within 16 hours of receipt of complaint
Note: The maximum penalty levied to the bidder shall not be more than 30% of the total monthly bill. In case, the bidder fails to abide by the terms and conditions, SGL reserves the right to take action as deemed fit including termination of comprehensive O&M contract as per the clause.

8.0. CONSUMER SERVICES / COMPLAINT HANDLING

8.1. General

The purpose of extending consumer services & complaints handling is to manage / facilitate the day to day operations in such a way to enhance the satisfaction of PNG consumer at optimal level with due adherence of HSE / Statutory aspects, which will be related to technical & non-technical issues. The services shall be handled as per the service levels specified by OWNER.

OWNER shall provide only Mobile Sim card to the Bidder. However, Cost for Mobile Hand set along with accessories & uses charges shall be borne by Bidder. BIDDER should not shear contact details which Mobile sim will provide by OWNER to any customer for customer complaint

BIDDER shall, at its own cost, provide uniform and identity card to all his employees deployed for the O&M work and shall ensure that such uniforms / identity card are worn by his employees while on duty especially for field activities being performed at consumer premises / at site. To enable OWNER to maintain the identity, the BIDDER shall follow the dress code for the uniforms & identity card duly endorsed prescribed by OWNER.

BIDDER shall take due care of the equipment and shall ensure that the same are operated by properly trained staff in a prudent manner. In case of breakdown in or damage to or defect in the equipment / installation, the BIDDER shall immediately notify the same to the OWNER’s representative. The BIDDER shall also take due care of and take appropriate measures for the protection of the consumer & OWNER’s assets as well.

BIDDER shall ensure and follow the guidelines / norms for performing the consumer services laid down by OWNER / Statutory authority for all the technical & non-technical natures. The necessary records should be maintained for the same on day to day basis as per MIS.

It has been expressly and unambiguously agreed that, no additional cost, commission, fees of whatsoever nature, shall be payable by OWNER to the BIDDER in respect to performing the entire scope of work, except optional criteria or to be levied from consumer or to be recovered from third party, if any.

BIDDER shall maintain / log in the data register of PNG complaints, customer service call notes, damages reports, as per the format approved by OWNER and OWNER shall have the right to examine all relevant records, charts and calculations of BIDDER relating to the operation and maintenance of the CGD.

BIDDER shall ensure / arrange for effective operation, complaints handling for consumer services every time.

Effective consumer support and handling of all consumer grievances including law and order situation handling filing / register the complaint or FIR, if required as per OWNER’s direction.

OWNER reserves all the right to demand for change of any personnel found not satisfactory without assigning any reason.

BIDDER must not use the premises or consumer base / data for any other purpose / business other than specified in the scope of work. Also, the stay of any persons will not be permitted in the OWNER’s premises unnecessarily without any official work.

BIDDER shall indemnify OWNER / CONSUMER to compensate for any liability or losses incurred by the BIDDER or his personnel by virtue of unauthorized carried on by the operator.

BIDDER or his personnel shall not carry out any unauthorised work directly to the consumer. Consumer should always be asked to consult concerned representative of the OWNER at designated office on working
days & time for any activity to be carried out except emergency. If Bidder is found to deviate from the process given, OWNER reserves the right to terminate/penalise BIDDER against the noncompliance.

BIDDER’s personnel should follow all instruction being issued by OWNER from time to time regarding operations, maintenance, billing, services, complaints handling, etc.

Before starting activity, prior permission must to be taken from the consumer. Job shall be executed with proper tools & tackles.

After completion of job, BIDDER personnel shall inform consumer / OWNER’s representative regarding the actives carried out & acknowledgement for satisfactory completion of job thereof.

Ensure there is no leakage after job completion.

During the execution of work, utmost care must be taken so that no property or part of the property is damaged. If in case the damage is done by whatsoever reason or due to any negligence on your part the damaged property or part of the property shall be repaired / replaced at your own cost or the rectification.

8.2. COMPLAINT HANDLING

The requirement stipulated in this clause shall supplement the requirement of consumer services, where different type of complaint arises looking to the various consumer aspects.

Generally two types of complaints shall be observed, i.e. technical & non-technical as described below;

a. Technical Complaints

- Related to Network, PNG Installation inside consumer premises, i.e. gas leakages in underground / above ground pipeline / installations / equipments, valve chambers, No Gas / Stoppage of supply, fire & explosion, etc…
- High gas smell in kitchen / house, Volunteered dis-connection, re-connection, No Flame (Under pressure), High flame (Over pressure), Meter malfunctioning or showing incorrect value, stove / burner complaints or conversion on NG from LPG, emergency call, survey for alteration / modification in existing installation, connection transfer, etc…

b. Non-Technical Complaints

- Such as New Booking, Meter reading, billing discrepancies, name transfer in case of occupant death, sale of property or other reason, intends to extend / modify the existing installation, agreements, etc…
- Related to BIDDER’s services, information pertaining to the services or installations may be for safe usage, safety, general awareness.

Generally, services shall be categorised looking to its criticality, in terms of, incident occurrence or likely hood to occur, supply interruption, consumers’ services / concerns or may be routine services / activities. Based on the nature, OWNER & BIDDER shall mutually prepare the modus operandi & response time for every complaint after award of the contract.

However, BIDDER must give priority in sequence;

Emergency or Fire & Explosion > Gas Escape > Gas supply interruption > Breakdown Job > Consumer Services for Technical job > Routine or Periodic Operations & Maintenance > Consumer Services for Non-technical job.

However, it should be operated looking to the type of complaints, scenario at site from time to time. OWNER reserves all the right to modify the priority at its sole discretion.
BIDDER shall follow the safety procedures & best engineering & logical practices from time to time, specified by OWNER in operating the same. Specifically, the BIDDER shall comply with and observe code of practice of relevant prevailing statutory / ISO / BIS / OISD / PNGRB / International standards for the safe, reliable & uninterrupted services to the consumer.

OWNER shall conduct the Consumer Satisfaction Survey from time to time pertaining to the operations and services extended by BIDDER. The detailed evaluation shall be made and this is a part of the Performance rating of the vendor.

BIDDER shall follow the policy established by OWNER & take instruction, wherever required related to the consumer services & various complaints handling. Also, educate consumer / local authorities from time to time includes updates / revision, if any.

BIDDER shall essentially conduct & carryout the additional services such as safety campaign, presentation, seminars, pertaining to the safe, reliable usage of PNG & its facility. Such cost towards special events may be reimbursed by the OWNER subject to prior approval in writing.

OWNER shall penalise BIDDER, if the jobs are failing to be attended frequently as per response time framed.

Complaint handling for fast meter also is in the scope of O&M contractor.

8.3. Disconnection (DC) / Re-connection (RC)

BIDDER shall be responsible for disconnection and re-connection procedure of all PNG consumers (Domestic / Commercial / Industrial). However, it should be performed in consultation with the OWNER / its representative. The charges for DC / RC shall be levied / paid as per Owner’s tariff plan and policy.

DISCONNECTION

Disconnection procedure can be categorised into two following type, volunteered or forced disconnection. BIDDER shall carry out following activities;

8.3.1. Volunteered disconnection / Temporary disconnection

- Billing personnel shall receive the consumer application form from Owner’s representative. If all the conditions for executing the Temporary disconnection are satisfied, then the application shall be forwarded to EIC, who in turn will handover the job to Bidder’s technician team for physical disconnection. On completion of TDC as per the instructions of EIC, submit the document to EIC confirming the TDC to update the details in billing software / MIS.

- Bidder’s technical group, on successful disconnection shall intimate / provide the details to billing personnel for necessary entry / update in the billing software. The response time for this activity shall be fixed by the OWNER / BIDDER mutually.

8.3.2. Forced Disconnection

- Forced disconnection shall be carried out in following cases;
  - Non-payment of gas consumption bill as per OWNER’s Policy.
  - Non-payment of installation cost, penalty for various reasons.
  - Using gas with unsafe installation / circumstances or tempering / manipulation of installation / equipment or for any other technical / non-technical reason.

- This activity shall be carried out in close consultation with OWNER / its representative.
- After successfully carrying out such disconnection, necessary report / updating in billing software / MIS shall be made. The charges and modes-operand shall be decided by the OWNER.

8.3.3. **Permanent Disconnection**

- Billing personnel shall receive the consumer application form from Owner’s representative. If all the conditions for executing the Temporary disconnection are satisfied, then the application shall be forwarded to EIC, who in turn will handover the job to Bidder’s technician team for physical disconnection. On completion of Permanent Disconnection (PDC) as per the instructions of EIC, submit the document to EIC confirming the Permanent disconnection to update the details in billing software / MIS. Bills shall be generated on actual basis, if Permanent disconnection is done during the billing cycle.

- Bidder shall disconnect the connection & disconnected materials i.e GI pipes & Fittings, Domestic meter & regulator, Ball Valve & Gas Tap etc shall be recovered from site & hand over to Owner’s representative.

- Bidder’s technical group, on successful disconnection shall intimate / provide the details to billing personnel for necessary entry / update in the billing software. The response time for this activity shall be fixed by the OWNER / BIDDER mutually.

8.3.4. **Reconnection**

- On receipt of consumer request for re-connection, billing personnel shall ensure whether the disconnection was done voluntarily as per customer request or forcefully.

- If consumer satisfies the clearance process, then the application will be forwarded to EIC who in turn will hand over the job to Technician team for re-connection.

- BIDDER’s technician, on successful re-connection shall intimate / provide the details to billing personnel for necessary entry / update in the billing software to enable to issue the bill to the respective consumer. The response time for this activity shall be fixed by the OWNER / BIDDER mutually.

9.0. **STATUTORY COMPLIANCE**

9.1. **Statutory Compliance for Manpower Deployed**

9.1.1. BIDDER shall comply with the Statutory requirements / Rules / Act / Laws, such as, Labour Laws, Minimum Wages Act, Payment of Wages Act, Workmen Compensation Act, Personal Injury (Compensation Insurance) Act, Industrial Dispute Act, Shop & Establishment Act, Employee Provident Fund Act, Gratuity Act, Bonus Act, Family Pension, medical act and Deposit Linked Insurance Scheme or any other act related to the Employee’s welfare.

9.1.2. BIDDER shall be responsible for Insurance coverage of the complete manpower engaged for O&M jobs under the workmen’s compensation Act / Group personal accident policy for the number of persons engaged by him at any point of time. He shall produce necessary documentation for the same to OWNER. He shall not engage any person less than 18 years of age.

9.1.3. BIDDER shall indemnify and keep indemnified the OWNER and its representative / servants and agents from and against all third party claims whatsoever including but not limited to property loss and damage, personnel accident injury or death, etc.

9.1.4. BIDDER shall at his own expenses comply with all labour laws and keep the OWNER indemnified in respect thereof. The OWNER shall be entitled to deduct directly from the bills to be paid to the BIDDER any sum, fines / penalty payable by the BIDDER and which sum / sums the company is required to pay as the principal employer on account of the BIDDER’s default in respect of all liabilities referred to in above clause.
9.1.5. BIDDER shall pay the wages according to the minimum wage act. The wage of every labourer employed to perform duties under this contract shall be paid to him before the expiry of 10th day of the month in respect of which wages are payable (i.e. wages of the month have to be paid by him of 10th day of the next month) in the presence of OWNER ’s representative.

9.1.6. BIDDER shall be responsible for the payment of all salaries / wages, allowances, emoluments, gratuity and such other payments etc. as may be required to be paid to the employee by the BIDDER under any law or statutory rules applicable to the employee, and the BIDDER shall discharge all such liabilities promptly and keep OWNER indemnified and from same at all time.

9.1.7. BIDDER shall be responsible for the payment of contribution under Employee State Insurance Act, Provident fund and other statutory payment to be made under any law or statutory rules and regulations for the time being applicable to the personnel deployed by the BIDDER for the work at the OWNER’s premises / sites.

9.1.8. BIDDER shall be responsible to comply with all the liabilities and accordingly, BIDDER shall maintain all record and registers and produce before the competent Authorities under the Act or the OWNER as and when demanded.

9.1.9. By way of illustration of various Acts as stated in the contract, the BIDDER thereof shall comply with the following Acts prevailing from time-to-time or any amendments therein;

   The Employee’s Provident Fund Act, 1952
   The Employee’s State Insurance Act, 1948
   The Contract Labour (regulation and abolition) act, 1970
   The Minimum Wages Act, 1948
   The Payment of Wages Act, 1936
   The Workmen’s Compensation Act, 1923
   The Payment of Bonus Act, 1965 & The Gratuity Act
   The Factories Act, 1948

Any other statutory requirements of Local / State Government / Government of India shall be complied by the BIDDER and the same shall be included in his scope of work.

9.2. **Statutory Compliance for O&M**

All the statutory approval / consent & Liaisoning required for entire scope of work shall in the scope of OWNER. However, BIDDER shall coordinate & liaison with the authorities for all such approvals, if required.

BIDDER shall comply with all Health, Safety & Environmental aspects including legal related requirement applicable to excavation / pipeline laying / equipment / manning of control room, vehicles, transportations and other operations & maintenance for entire scope of work.

The Gas Distribution & its equipments / installations / O&M are required to be performed with due compliance of the following, not limited to;

- Storage Vessel / Knock-out Drum: The fabrication, storage, transportation, handling, etc…of vessel are governed by Gas Cylinder Rules IS-7285, 1981, 2004, framed under the Indian Explosive Act-1884 and administered by Chief Controller of Explosives (CCOE).
- Pressure Relief Devices: Pressure relief devices including pressure relief valves. Pressure relief devices are designed to prevent rupture of vessel / container / cylinder by releasing excessive pressure build-up therein.
- Pressure Regulators.
- High & Medium Pressure Steel / MDPE pipelines.
• Safety Relief / Shut-off Valves.
• Pressure / Level / Temperature Gauges.
• Hose Connections, Pumps, Air Compressor Tank.
• Flow Meters.
• All parts under pressure carrying Natural Gas including valves.
• Electrical equipment related to the work.
• Storage, Transfer / Handling, Monitoring, Disposal for Odourant system.

In general, it is the primary duty of the Bidder and his representatives to monitor the performance of the equipments and network in line with the applicable regulations and standards. Any other devices not specified above also must be constructed to provide in-built safety equivalent to that required for other parts of a system and should have required certification / approval as mentioned above.

The O&M of CGD Network should comply with the following codes / standards;

• Relevant Factory Act / Rules, Relevant HSE norms.
• ANSI/ ASME B 31.8
• ISO- 4437 Buried PE pipes for the supply of gaseous fuels.
• American Gas Association Vol.III
• PE materials are specified to conform to AS/NZS 4131.
• OISD Norms, ASME B 31.8, IGE/SR/16, IGE/TD/1, 3, 4, 9, 10, NEMA, ASTM, ANSI, NFPA-52; 1992, NFPA-37, API-11P.

BIDDER shall not discuss / disclose / inform to the statutory, local authorities during Audit / Inspection in verbal / writing without prior consent of OWNER pertaining to the operations.

BIDDER shall obtain all statutory approvals of concerned authorities for providing various services such as provision of utilities, personnel, etc…for the scope of work.

10.0. REPORTING

BIDDER shall be responsible for reporting as per OWNER’s “Management Information System” (MIS). OWNER shall provide the copy of MIS to the successful BIDDER, according to which BIDDER has to submit the same for perusal & approval of the OWNER. Typically the BIDDER shall prepare the following reports but not limited to:

BIDDER shall prepare General Reports regarding the CGD operations in Daily, Weekly or Monthly and submit the same to OWNER. Soft as well as Hard copy in the format provided to the BIDDER. The general activity report mainly comprising of Daily Progress Report, PE & PNG Updates, Periodic / Preventive / Breakdown / Shutdown job (if any), Flow meter readings, CGS, TB, parameters readings, Patrolling reports, Customer service call, Emergency vehicle records, Gas Purchase Report, Bank Statement, Expenditures, Gas Reconciliation Report, Asset Update, ERDMP update, First-Aid up Keeping, Stores and Inventory.

BIDDER shall submit OWNER the report related to Finance & Accounts such as Bank Reconciliation along with Statement. All these reports regarding Finance and Accounts shall be submitted as per MIS.

BIDDER shall update the data in customer history (soft & hard), my SAP for O&M related data.

BIDDER shall submit the plan based on the AOMP (Annual Operation & Maintenance Plan), duly approved by OWNER. The copy of AOMP will have to be maintained at all times at site by BIDDER for reference. The access of the same will be restricted to authorized personnel only.
The successful BIDDER shall prepare & submit the Quality Assurance Plan, Work Instruction, Standard Operating Procedures, Reporting Formats, etc…& get it approved by OWNER for implementation in addition to Statutory / Manpower documents, List of Tools & Tackles, Equipments, etc…

BIDDER shall submit O&M activity / highlight report with reference to the AOMP. Monthly Shift Schedule will also be a part of reporting.

BIDDER shall upkeep the daily status for the Material In-Out, Odorant inventory, dosing, etc…to the OWNER.

BIDDER shall ensure that all Near Misses occurred during execution of the work are reported time to time to OWNER. Any Hazard spotted while on job shall be reported to OWNER for further mitigation. Any incident / Accident shall be reported to OWNER as per guidelines.

BIDDER’s operator shall maintain logbook / record of the entire operations & maintenance as well and calibration & testing of equipment and instruments, if any.

BIDDER shall maintain the register for the Attendance of manpower, Complaint analysis report, Fire fighting equipment status and submit to OWNER.

BIDDER shall make correspondence in writing with the OWNER.

BIDDER shall prepare the detailed inspection and health check-up report for each equipment / installations and submit the OWNER for the perusal.

BIDDER shall strictly adhere to the work permit system as per OWNER’s specification.

Before taking any shutdown or planned / breakdown maintenance or overhauling, BIDDER shall inform to the OWNER and obtain the approval for the same.

BIDDER shall maintain the data for Dis-connection, Re-connection, New installation, Conversion, etc…& update in the Billing software.

BIDDER shall prepare the analysis reports related to various activities to enable OWNER to carry out the predictive actions therein.

BIDDER shall assist OWNER to prepare statutory or other reports as & when required related to CGD operations.

BIDDER shall monitor & analyze the Cathodic Protection (TR / TLP readings / PSP) to assess the health of the system.

11.0. QUALITY CONTROL / INSPECTION

11.1. General

The Quality Control / Inspection indicate the requirement for various activities pertaining to the scope of work. This is significant requirements to ensure “Safe, Reliable & Uninterrupted” supply of natural gas by delighting customer with due compliance of HSE aspects. BIDDER shall prepare and submit the Quality Assurance / Control Plan based on the activity to be performed through out the tenure and get it approved by OWNER along with AOMP.

11.2. Inspection

All components such as flow meters, safety relief / shut-off valves, fire protection / fighting systems, PPEs’, gas detectors, sensors / switches, pressure / temperature gauges, pressure vessels / cylinders, tubing / piping, valves, etc…as well as should be periodically inspected, calibrated and tested as per the norms laid down by the statutory authorities or by OWNER.
To ensure periodic safety check, test schedule, parameters, such as, inlet / outlet pressures on skid, gas compositions / characteristics, all type of valves, to their serviceability, installation for obvious gas leaks, safe working condition, etc… Also, ensure for visibility and in place of safety / other signs / instructions, gas odorization, display of inspection certificate, tagging, etc.

Testing, calibration, refilling of equipments, components, installations, etc… shall be carried out by OWNER or its representative up on receipt of advance requisition from BIDDER. However, BIDDER shall assist OWNER for the said activity to be carried out as and when required, and also to ensure smooth functioning of the same during their operations.

BIDDER should ensure following minimum concerns for the equipments / instruments / installation for CGD, not limited to:

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRS, Transition Box / Service Regulator</td>
<td>Emergency plan, Pressure / Flow, Leaks, Smell, Fire &amp; Explosion, Damages, Odorization (dosing, level), Isolation / Venting system, Condensate / Free from foreign material / object, Draining, Control Panels / Electricals, witnessing Calibration &amp; Testing (SSV / SRV, PRV, Gauges, Flow meters, Sensors, Detectors, Pressure Vessels), Housekeeping, Damages, Civil Structures, Corrosion, Painting of signage, illumination, Wind sock, Light &amp; Switches, Enclosure secure / fencing - Gate / Lock &amp; Key.</td>
</tr>
<tr>
<td>PNG Installation / Connection (DOM/COM/IND)</td>
<td>Customer services / complaints, Fire &amp; Explosion, Leaks, Smell, Periodic / Preventive maintenance of entire connections (mounting, painting - corrosion, Flexible rubber tube replacement, Leak detection &amp; arresting, Meter / Regulator inspection, Customer education / awareness).</td>
</tr>
<tr>
<td>Odourant Storage Facility</td>
<td>Smell, Leakage / Spillage, PPEs’, Signages, Statutory, Inventory, Level monitoring &amp; assisting in transfer to dosing station storage, First-Aid, Corrosion, Enclosure secure / fencing - Gate / Lock &amp; Key.</td>
</tr>
<tr>
<td>Control Room</td>
<td>Main Base, Sub Base &amp; Maintenance base with Manpower, Communication systems, Signages, PPEs’, Database, Other Resources, Statutory.</td>
</tr>
</tbody>
</table>

OWNER shall carry out the Quality Assurance, periodic safety check and test schedule of all the equipments and instruments at regular interval, includes inspection of spares, material at factory / site / stores, if required.

On completion of the inspection of the installation of equipment being found to comply with codes & standard (National & International), the competent Quality Control Organisation shall issue the inspection / test certificate for records, wherever mandatory & required.

### 11.3. Guarantees and Warrantees

**Performance Guarantee of the Work**
BIDDER shall guarantee the work executed by him against poor workmanship, defective equipment and material, etc…for certain period as decided by OWNER. If any defects are found during the guarantee period, BIDDER shall rectify the same with short notice as informed by OWNER. Otherwise OWNER may get the same rectified through other agencies and recover the cost, so incurred from the BIDDER deposit against performance guarantee or amount due to the BIDDER.

If after delivery, acceptance and installation and within the guarantee period, the operation or use of material or equipment supplied and installed by the BIDDER, prove to be unsatisfactory to the OWNER’s representative, he shall have the right to continue to operate / use such material or equipment until rectification of defects, errors or omissions, or by practical replacement made thereof, without interfering with the operation of the network / installation. This may even require replacement of defective material / components / equipment by new ones whenever found essential.

Equipment and Material / Spares Warranty

- All the equipments and materials, if supplied by BIDDER shall be warranted for trouble free operation for a certain period as decided by OWNER / OEM.
- In case of bought out items, BIDDER shall obtain such guarantees from the sub-vendor in favour of OWNER without prejudice to his liability for the performance of whole system including bought out items. BIDDER shall intimate to OWNER for any defect found in the material supplied by the OWNER promptly.
- In case of any problem arising during guarantee period, BIDDER has to carry out necessary rectification at no extra cost to the OWNER.

11.4. Others

OWNER, from time to time shall carry out the performance evaluation rating of the BIDDER for the entire operations and take appropriate action in this regard.

BIDDER shall ensure the uninterrupted supply of gas to various applications & extended consumer services at all the time. However, major / breakdown maintenance should be carried out in non-peak hours / timings with due coordination with customers / end users.

BIDDER shall provide the material Invoices, Challan, Test Certificates, process / witness / inspection documents & other references for the spares, material, etc…procured for the scope of work.

OWNER / its representative shall inspect / witness the activities to be performed by the BIDDER including Laying, Electrofusion, Preventive / Breakdown maintenance, LDT, LPT, etc…

OWNER shall conduct necessary qualification process for the PE welder to be deployed by OWNER before commencement of work & renewal of the same from time to time. No welder shall be allowed without such qualification / certifications.

BIDDER shall carry out all the job with due care & attitude towards HSE norms, best engineering practice, code of conduct, OWNER norms / specifications, Particular Technical Specifications, OEM guidelines, complying National & International standards, etc…prevails from time to time.

BIDDER shall provide all the equipments, tolls & tackles, measuring devices, etc…duly calibrated, tested for performing any scope of work.

In case any inspection, test fails, re-inspection / tests shall be carried out after necessary rectification / replacement by the BIDDER at his risk / cost.
## ANNEXURE # 1

### LIST OF MINIMUM ITEMS FOR FIRST AID BOX UNDER BIDDER’S SCOPE

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Item Description</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small Dressing Gauze Swab for Finger Wound</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Medium Dressing Gauze Swab for Hand or Feet Wound</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Large Dressing Gauze Swab for Body Wound</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Sofracin Cream Tube, 15 Gram</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Silver Sulphadizene, 20 Gram</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bottle Of Antiseptic Solution 100 ml. Each</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bottle Mercurochrome Solution 100 Ml</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Absorbent Cotton Wool I.P 20 Gram</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Roll of Adhesive Paster 2.5 CM X 1Mt U.S.P</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bandage Rolled (5CM X 2 Mter)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Eye Pad Each in Pkt (Sterile)</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Strip of 10 Tablet Paracetamol I.P 0.5 Gram</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Potassium Permagnate I.P 20 Gram</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Boric Acid I.P 20 Gram</td>
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<td></td>
</tr>
<tr>
<td>15</td>
<td>Band Aid Strip</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Dressing scissor 5” Stainless Steel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Tweezer Stainless Steel</td>
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</tr>
<tr>
<td>18</td>
<td>Polythene Wash Bottle 250 CC For washing Eye</td>
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</tr>
<tr>
<td>19</td>
<td>Tourniquet Cotton Belt &amp; Buckle</td>
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<td></td>
</tr>
<tr>
<td>20</td>
<td>Eye Wash Cup</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Pair Wodden Stick</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Safety Pins</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Spray for Burn Injury (100 ml)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Spray for Muscle Sprain (Relispray) (100 ml)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Spray Antisaptic Bandage (100 ml)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

\[ \Sigma \Sigma \Sigma \]
ANNEXURE # 2

LIST OF MINIMUM MANDATORY SAFETY EQUIPMENTS & PPE’S UNDER BIDDER’S SCOPE

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name Of Material</th>
<th>UOM</th>
<th>Main Base</th>
<th>Sub-Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fire Extinguisher, DCP/CO2 Type 5 &amp; 10 Kg each, ISI mark</td>
<td>Nos</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Safety Helmets</td>
<td>Nos</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Headlamp with LED light</td>
<td>Nos</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Electric shockproof Hand Gloves</td>
<td>Pairs</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Safety Goggles</td>
<td>Nos</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Ear Plug</td>
<td>Nos</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Traffic cone</td>
<td>Nos</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Cordoning Tape</td>
<td>Roll</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Warning Tape</td>
<td>Roll</td>
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<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Folding Stretcher (Thadani)</td>
<td>Nos</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>Fluorescent Jacket</td>
<td>Nos</td>
<td>6</td>
<td>5</td>
</tr>
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<td>12</td>
<td>Flameproof Emergency Torch</td>
<td>Nos</td>
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<td>0</td>
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<tr>
<td>13</td>
<td>Rope with safety belts</td>
<td>Nos</td>
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<td>0</td>
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<td>14</td>
<td>Mega Phone / PA System</td>
<td>Set</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>Gum Boots</td>
<td>Pairs</td>
<td>2</td>
<td>1</td>
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<tr>
<td>16</td>
<td>Rain Coat</td>
<td>Nos</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>Winter safety wear</td>
<td>Nos</td>
<td>To all O &amp; M staffs</td>
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</tr>
<tr>
<td>15</td>
<td>First-Aid Box</td>
<td>Box</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>UHF mobile telecommunication set</td>
<td>Set</td>
<td>To be provided by SGL</td>
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## ANNEXURE # 3

### LIST OF MINIMUM CRITICAL TOOLS & TACKLES UNDER BIDDER’S SCOPE

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<tr>
<th>Sr. No.</th>
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<th>Make</th>
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<td>Main Base</td>
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<tr>
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<td>Drill Machine-24”</td>
<td>Nos</td>
<td>Bosch</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Drill Machine-10”</td>
<td>Nos</td>
<td>Bosch</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Drill Bit 5”</td>
<td>Set</td>
<td>Bosch</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Wire Brush</td>
<td>Nos</td>
<td>Any standard make</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Paint Brush</td>
<td>Nos</td>
<td>Any standard make</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Hack Saw Blade</td>
<td>Nos</td>
<td>Bipco</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Small &amp; Big Hacksaw</td>
<td>Nos</td>
<td>Bipco</td>
<td>1</td>
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<tr>
<td>8</td>
<td>Screw Jack With Tommy Bar – 10T</td>
<td>Nos</td>
<td>Any standard make</td>
<td>2</td>
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<tr>
<td>9</td>
<td>Fusion Machine MSA+300</td>
<td>Nos</td>
<td>Hurner/GF/ Rothenburger</td>
<td>1</td>
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<td>10</td>
<td>Portable Generator Set 5KVA</td>
<td>Nos</td>
<td>Any standard make</td>
<td>1</td>
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<td>11</td>
<td>PE Pipe Cutter 20mm, 32 mm &amp; 63 mm</td>
<td>Set</td>
<td>Any standard make</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Universal PE Scraper with extra blades</td>
<td>Nos</td>
<td>Any standard make</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>Re-rounding tools 20mm</td>
<td>Nos</td>
<td>Any standard make</td>
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<tr>
<td>14</td>
<td>Re-rounding tools 32mm</td>
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<td>15</td>
<td>Re-rounding tools 63mm</td>
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<td>16</td>
<td>Re-rounding tools 90mm</td>
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<td>Any standard make</td>
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<tr>
<td>17</td>
<td>Re-rounding tools 125mm</td>
<td>Nos</td>
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<tr>
<td>18</td>
<td>Re-rounding tools 180mm</td>
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<tr>
<td>19</td>
<td>Hydraulic Squeeze Tool with antistatic grounding attachment</td>
<td>Each Set</td>
<td>Any standard make as per Standard ASTM F1563</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Manual Suitable / Appropriate Squeezing Tool with Antistatic Grounding Attachment</td>
<td>Each Set</td>
<td>Any standard make as per Standard</td>
<td>2</td>
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<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Size</th>
<th>Make</th>
<th>Quantity</th>
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<tbody>
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<td></td>
<td>ASTM F1563</td>
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<tr>
<td>20.4</td>
<td>Tool Size : 90mm</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>20.5</td>
<td>Tool Size : 125mm</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>20.6</td>
<td>Tool Size : 180mm</td>
<td></td>
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</tr>
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<td>21</td>
<td>Alignment Clamp</td>
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</tr>
<tr>
<td>21.1</td>
<td>Size : 180 mm</td>
<td>Nos</td>
<td>Any standard make</td>
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<td>Any standard make</td>
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<td>Size : 90 mm</td>
<td>Nos</td>
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<td>22.2</td>
<td>Size : 90 mm</td>
<td>Nos</td>
<td>Any standard make</td>
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</tr>
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<td>22.3</td>
<td>Size : 63 mm</td>
<td>Nos</td>
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<td>22.4</td>
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<td>Any standard make</td>
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<td>Size : 63 mm</td>
<td>Nos</td>
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<td>2</td>
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<td>Size : 32 mm</td>
<td>Nos</td>
<td>Any standard make</td>
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<tr>
<td>24</td>
<td>Allen Key of all sizes Inch &amp; mm both</td>
<td>Each Set</td>
<td>Taparia</td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td>Acetone (Isopropyl Alcohol)</td>
<td>Ltrs</td>
<td>Any standard make</td>
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<tr>
<td>26</td>
<td>Tissue Paper / Teflon tape</td>
<td>Roll</td>
<td>Any standard make</td>
<td>2</td>
</tr>
<tr>
<td>27</td>
<td>Pipe Wrench (8&quot;, 10&quot;, 12&quot; 14&quot; &amp; 18&quot;)</td>
<td>Each Set</td>
<td>Taparia</td>
<td>4</td>
</tr>
<tr>
<td>28</td>
<td>Side Wrench Wrench (8&quot;, 10&quot;, 12&quot; 14&quot; &amp; 18&quot;)</td>
<td>Nos</td>
<td>Taparia</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>Screw Driver of all sizes</td>
<td>Each Set</td>
<td>Taparia</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td>Fix Spanner (Non Sparking)</td>
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<td>30.1</td>
<td>6x7</td>
<td>Nos</td>
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<td>30.2</td>
<td>8x9</td>
<td>Nos</td>
<td>Taparia</td>
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<td>10x11</td>
<td>Nos</td>
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<td>12x13</td>
<td>Nos</td>
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<td>14x15</td>
<td>Nos</td>
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</tr>
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<td>16x17</td>
<td>Nos</td>
<td>Taparia</td>
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<td>30.7</td>
<td>18x19</td>
<td>Nos</td>
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<td>2</td>
</tr>
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<td>30.9</td>
<td>21x23</td>
<td>Nos</td>
<td>Taparia</td>
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</tr>
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<td>Code</td>
<td>Description</td>
<td>Quantity</td>
<td>Brand</td>
<td>Remarks</td>
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<td>Ring Spanner (Non Sparking)</td>
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<td>36 x42 No Taparia</td>
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<td>Box Spanner Set (Sizes as per Fix &amp; Ring Spanner)</td>
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<tr>
<td>33</td>
<td>Hammer _ Ball Pen Type of 2 LBS, 5 LBS &amp; 10 LBS</td>
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<td>Hammer _ Claw Pen Type of 2 LBS, 5 LBS &amp; 10 LBS</td>
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<td>Taparia</td>
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<td>Plastic Hammer</td>
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<td>Measure Tape – 5mtr &amp; 30mtr</td>
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<td>Pawda</td>
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<td>Water Steel Bucket</td>
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<td>42</td>
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<td>Wall Punch</td>
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<td>45</td>
<td>Nose/Parrot Pliers</td>
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<td>47</td>
<td>Meger for measuring earth pit resistance</td>
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<td>Unit</td>
<td>Make/Model</td>
<td>Quantity</td>
</tr>
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<td>------------------------------------------------------------------------------</td>
<td>------</td>
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<td>Digital Pressure Gauge for LP network</td>
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<td>Sets / Nos</td>
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<td>Multimeter (Range : 00 to 750 VAC)</td>
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<td>Valve Chamber Opener</td>
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LIST OF CRITICAL PE FITTINGS, / GI CONSUMABLE SPARES MATERIALS / ITEMS UNDER BIDDER’S SCOPE

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<th>Sr. No.</th>
<th>Name Of Material</th>
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<th>Sub-Base</th>
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**G.I. Consumable Material list**

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<td>Rubber Hose Clamp</td>
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<td>Neoprene Cap</td>
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<td>RCC Guard with painting and Stenciling</td>
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Note: All PE Fittings shall be PE 100 SDR as applicable and black colour.
# ANNEXURE # 5

**MINIMUM TOOLS & TACKLES, EQUIPMENTS & RESOURCES TO BE MADE AVAILABLE BY THE CONTRACTOR**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name Of Material / Equipment</th>
<th>Specification</th>
<th>UOM</th>
<th>Make</th>
<th>Quantity</th>
<th>Remarks</th>
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<td>1</td>
<td>Mobile Tele Com. Set</td>
<td>Any service provider which having a good coverage in the regional.</td>
<td>Each Nos</td>
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<td>For Communication with O &amp; M In charge, Shift In charge etc</td>
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<td>First Aid Box with Minimum Prescribed Medicines</td>
<td>As per requirement</td>
<td>Nos</td>
<td>ISI Make or standard</td>
<td>As per</td>
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<td>Nos</td>
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<td>Nos</td>
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<td>36x42</td>
<td>Nos</td>
<td>Taparia</td>
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</tr>
<tr>
<td>55</td>
<td>Ring Spanner (Non Sparking)</td>
<td>Nos</td>
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<td></td>
<td></td>
</tr>
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<td>24x27</td>
<td>Nos</td>
<td>Taparia</td>
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<tr>
<td>55.11</td>
<td>25x28</td>
<td>Nos</td>
<td>Taparia</td>
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</tr>
<tr>
<td>55.12</td>
<td>30x32</td>
<td>Nos</td>
<td>Taparia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55.13</td>
<td>36x42</td>
<td>Nos</td>
<td>Taparia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>Box Spanner Set (Sizes as per Fix &amp; Ring Spanner)</td>
<td>Set</td>
<td>Taparia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>Hammer _ Ball Pen Type of 2 LBS, 5 LBS &amp; 10 LBS</td>
<td>Each</td>
<td>Taparia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>Hammer _ Claw Pen Type of 2 LBS, 5 LBS &amp; 10 LBS</td>
<td>Each</td>
<td>Taparia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>Plastic Hammer</td>
<td>Nos</td>
<td>Taparia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Measure Tape</td>
<td>3 Mtrs &amp;</td>
<td>Taparia</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rev.02 – 25.06.2018  Tender for Providing Comprehensive Operations & Maintenance Services for CGD Network of SGL
### PTS- BIDDER’S SCOPE OF WORK (MANDATORY)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
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<tr>
<td>61</td>
<td>Fire Extinguisher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61.1</td>
<td>5 Kg</td>
<td>DCP / CO2 Type, Min. Nos</td>
<td>Any Standard Make</td>
</tr>
<tr>
<td>61.2</td>
<td>10 Kg</td>
<td>Min. Nos</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bidder shall arrange more qty as per site job requirements</td>
</tr>
<tr>
<td>62</td>
<td>Safety Shoes</td>
<td>Compulsory Min. Pairs</td>
<td>Any standard make approved by OWNER</td>
</tr>
<tr>
<td>63</td>
<td>Folding / Flexible Stretcher</td>
<td>Thadani Nos</td>
<td>Thadani or Any Standard Make</td>
</tr>
<tr>
<td>64</td>
<td>Uniform</td>
<td>Each Employee</td>
<td>Approved by OWNER</td>
</tr>
<tr>
<td>65</td>
<td>ID Cards</td>
<td>Colour ID with Laminatio n</td>
<td>Approved Format by OWNER</td>
</tr>
<tr>
<td>66</td>
<td>Emergency Light</td>
<td>Nos</td>
<td>Any standard make</td>
</tr>
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</table>

**Note:** *All pressure gauge shall be calibrated at every three months.*

\[ \sum \sum \sum \]
### ANNEXURE # 6

**MINIMUM OFFICE SETS UP REQUIREMENT**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Details</th>
<th>Quantity</th>
<th>Remarks</th>
</tr>
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<tr>
<td></td>
<td></td>
<td>Main Base</td>
<td>Sub Base</td>
</tr>
<tr>
<td>1.</td>
<td>Personal Computers</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>A4 Printers</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Scanner</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Table &amp; Chair</td>
<td>Adequate</td>
<td>Adequate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nos</td>
<td>Nos</td>
</tr>
<tr>
<td>5.</td>
<td>Cup Board / Almira (Tizori)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Racks</td>
<td>Min. 3</td>
<td>Min. 1</td>
</tr>
<tr>
<td>7.</td>
<td>Mobile phones</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>White Board with duster &amp; Marker( 2 Ft X 4 Ft), Notice Board (2 Ft X 4 Ft)</td>
<td>Each 1</td>
<td>Each 1</td>
</tr>
<tr>
<td>9.</td>
<td>Stationary Items incl. A4 size Papers, Box &amp; Flat files, Registers etc</td>
<td>Adequate</td>
<td>Adequate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nos</td>
<td>Nos</td>
</tr>
<tr>
<td>9.</td>
<td>Facilities Drinking water, Toilet etc.</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
### ANNEXURE # 7

**ENCLOSURE -1 OF SCHEDULE - 1E (T4S ISSUED BY PNGRB)**

#### Reporting Format

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
<th>Time</th>
<th>First Witnessed by</th>
<th>Details of Incident</th>
<th>Action Taken</th>
<th>Reporting Authority</th>
<th>Internal Investigating Authority</th>
<th>External Investigation</th>
<th>Report to PNGRB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type-I</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Operator (O&amp;M)</td>
<td>Head (HSE)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Type-II</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Operator (O&amp;M)</td>
<td>Head (HSE)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Type-III</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Shift I/C</td>
<td>Head (O&amp;M)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Type-IV</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>HSE Officer</td>
<td>Head (HSE)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Type-V</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Section I/C</td>
<td>Head of Station</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

| Location | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Time     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| First Witnessed by | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Details of Incident | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Action Taken | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Reporting Authority | Operator (O&M) | Operator (O&M) | Shift I/C | HSE Officer | Section I/C |
| Internal Investigating Authority | Head (HSE) | Head (HSE) | Head (O&M) | Head (HSE) | Head of Station |
| External Investigation | X | X | ✓ | ✓ | ✓ |
| Report to PNGRB | X | X | ✓ (*) | ✓ (*) | ✓ (*) |

✓ To be filled in/reported
X Not required to be reported
(*) Shall also include the history of Type-I & Type-II incidents
VEHICLE TRACKING SYSTEM

OBJECTIVES:
The main objectives of the system are as follows.

- Ability to track Emergency vehicle & two-wheeler on real time basis.
- Digital Maps to visually represent the geographical locations of the vehicles enabling it to be tracked.
- Ability to provide accurately network-wide location information of the entire fleet.
- Unauthorized halt, deviation from predefined route to be highlighted through exception reports.
- System has to be viewed by users at different locations and also with different set of vehicles (Grouping of Vehicles by user).

SCOPE OF WORK:
The scope of work will include but not limited to the following.

- Supply, Installation and Commissioning of the Vehicle Tracking Devices on the vehicles and report generation on a network of computer after Software Installation.
- Installation of units of vehicle tracking systems, comprising hardware and the software installation and commissioning.
- Real time display of vehicle position and development of effective monitoring system.
- The system should be designed in such a fashion that the following details need to be captured by the unit placed in the vehicle: latitude, longitude, speed, distance travelled and stoppage time.
- The frequency of tracking should not exceed 05 minutes.
- Generation of various reports including exception reports as per the requirement of SGL and as mentioned in the technical Specification above.
- Train the Technical staff on the operation and maintenance of the proposed system hardware and software.
- Co-ordination with SGL for smooth functioning of the system.
- Bidder has to provide all necessary reports at the end of each day through Email to SGL-O&M department for all the vehicles and information of each vehicle will have to be stored in system for one month and afterwards, the information is to be loaded in to CD / DVD every month. The C.D’s each vehicle wise is to be handed over to SGL. All peripherals, stationary required for preparation of reports will have to be supplied by Bidder. The report formats would be as required by SGL and may be in various forms.
- Annual Maintenance of all the vehicle tracking system devices for 3 years (The maintenance will include all kinds of service, repair or replacement of the Spare / Vehicle Tracking Devices for any faults developed due to vehicle tracking units. Technical failures or due to failure of chips (signals etc.); these replacements would be done at no extra cost to SGL.

TECHNICAL SPECIFICATIONS – HARDWARE:
The Tracking device to be installed on the vehicle should be based on the following specifications.

- Satellite GPS (Global Positioning System) receiver for determining the vehicle location, travelling speed, direction and altitude.
- The device should receive the GPS data and send the data via GSM (Global System for Mobile) / GPRS (General Packet Radio Service) wireless network to the web application.
- If no wireless coverage is present, the GPS data is stored and sent to the web application on availability of the wireless network.
- The GPS data is to be recorded and stored in a secure database by the web application.
• The hardware is to be installed inside the cabin of LCV.
• All electrical wiring should/are to be covered through Steel Armored Coils.
• Hardware FCC CE standard approval.
• The unit should have 3(Three) hours battery backup capability.

TECHNICAL SPECIFICATION – SOFTWARE:
• The system architecture should be web technology based. The software should be web application and accessible through the Internet using the logon facility through multiple levels of security.
• The basic features of the software should be:
  • Real Time Tracking – Should provide real time information on vehicle status based on location, speed and time.
  • Online Alerts – Should provide critical alerts such as
    • Over Speeding
    • Acceleration/deceleration
    • Unauthorized stoppages
    • SOS alerts
    • Harsh Braking

TRIP REPLAY:
It should provide replay of the routes travelled by vehicles plotted on the map.

REPORTS:
It should provide reports by Date, Vehicle ID or Driver Name. Generate standard reports on criteria such as Vehicle stoppages, vehicle speeding or trip summary.

COMMUNICATIONS:
It should maintain control of all drivers with two way voice communication. Facility to communicate with the driver and driver can send SMS in case of an emergency.

VEHICLE AND GROUP MANAGEMENT:
Update driver and vehicle profiles, as well as manage vehicle groups and vehicle types.

The following are the detailed requirement form the software:
• The real time location of the vehicle should be available on the MAP
• The route undertaken by the vehicles should be shown on the MAP.
• All the specified points (way points) mentioned by SGL to be shown on the MAP.
• Responding to a poll command.
• Total Distance travelled, distance travelled between stops.
• Total time, time taken between stops, time taken during a trip.
• Server should be capable to maintain historic data for at least 60 months.
• Stoppage reports with Stoppage time.
• Facility to download Direct uploads into a local data base.
• Over Speed alerts on the web application.
• Predetermined (Dynamic) customized trip reports and exception reports
• Various Zoom levels of the MAP at least 05 zoom levels on road vehicles route wise.
• View vehicles / loads by Invoice Number / transporter ID or name / LR number.
• View and track vehicles by place of origin wise or destination wise.
• Six months data should be available.
• View by dispatch date.
• Location accuracy of ± 20 meters.
• Facility to create / modify / delete and view all the above parameters by SGL.
• Facility to Email any of the above reports to other departments / individual within the organization straight from the software.
• 24x7 web support available.
• Service Support in various areas of SGL operation including all five districts of north Gujarat (i.e. in Gandhinagar, Mahesana, Sabarkantha, Patan And Aravalli Districts of Gujarat.)
• Time to be specified for attend to any service complaints.
• One year free warranty.
• Capability / flexibility to change Communication Service Provider at any point of time for better service options.

PENALTY:

• Non adherence to requirement of vehicle tracking system & Reporting or generating as reports as desired by OWNER on daily basis shall be considered as carelessness of BIDDER to the contract, failure to which shall attract a penalty as below.
  
  a) 1st instance per vehicle, Warning letter shall be issued against non-compliance
  b) 2nd instance per vehicle, Rs. 250 / will be deducted from monthly invoice of BIDDER.
  c) 3rd instance per vehicle, Rs. 500 / will be deducted from monthly invoice of BIDDER.

\[ \sum \sum \sum \]
## ANNEXURE # 9

### DETAILS OF O & M CONTROL ROOM LOCATIONS (MAIN BASE, SUB BASE & MAINTENANCE BASE)

<table>
<thead>
<tr>
<th>Sr No</th>
<th>GA</th>
<th>Location</th>
<th>Main Base</th>
<th>Sub Base</th>
<th>Maintena nce Base</th>
<th>Metering Base</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>O &amp; M Control Room</td>
<td></td>
<td></td>
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</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>Area - 1</td>
<td>Area - 2</td>
<td>Area - 3</td>
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<td>Gandhinagar, Palaj, Chiloda Dehgam</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mansa Mubarakpur Vijapur</td>
<td>Mansa Vijapur</td>
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<td>-</td>
<td>-</td>
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<tr>
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<td>-</td>
</tr>
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<td></td>
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<td>Mehsana2 Unjha Jotana Becharaji</td>
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<td>Kadi Chhatral Nandasan Mandali</td>
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<td>Himmatnagar, Idar, Talod Modasa Dhansura Bayad Khedbra mha Vadali</td>
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<td>Himmatnagar</td>
<td>Himmatnagar</td>
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### ANNEXURE # 10

**LOCATION WISE CASHIERS, METER READERS REQUIRED AND TOTAL METER READING QUANTITY ESTIMATED IN NEXT 2 YEARS.**

<table>
<thead>
<tr>
<th>Town</th>
<th>No of Cashiers required</th>
<th>Meter readers required with mobile handset and blue tooth printer</th>
<th>Total meter reading quantity estimated for 2 years</th>
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<tbody>
<tr>
<td>Adalaj</td>
<td>2</td>
<td>4</td>
<td>78418</td>
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<tr>
<td>Dehgam</td>
<td>1</td>
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</tr>
<tr>
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<td>Himmatnagar</td>
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<td>212608</td>
</tr>
<tr>
<td>Idar</td>
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<td>3</td>
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<td>Kadi</td>
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</tr>
<tr>
<td>Visnagar</td>
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<td><strong>1726296</strong></td>
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**Note:** The currently operational towns mentioned above may change in future and two year meter reading forecast mentioned above is just an estimate. The two year forecast is dependent on a lot of factors that are beyond OWNER control and not possible to anticipate currently i.e. future price rise, changes in SGL’s existing slab structure, LPG pricing, any other policy etc. If required in future OWNER may ask for extra cashiers and meter readers in existing and new towns, if the need arise.
ANNEXURE # 11

SCHEDULE OF BILLING CYCLE WILL BE AS UNDER IN SAP (ILLUSTRATION ONLY):

<table>
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<tr>
<th>Billing cycle</th>
<th>Portions</th>
<th>Meter reading start Date</th>
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<th>Bill Distribution start date</th>
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### ANNEXURE # 12

**DETAILS OF SGL ASSETS**

**STATIONS, ODORANT UNIT, DRS, INDUSTRIAL, COMMERCIAL & DOMESTIC CUSTOMERS, STEEL & MDPE NETWORK**

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<th>Sr No</th>
<th>Locations / Tenders</th>
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<th>DRS</th>
<th>MRS</th>
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<th>DOM</th>
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ANNEXURE # 13

DETAILS OF SGL’S GAS PIPELINE ISOLATION VALVE CHAMBER (VC) & SRM

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<th>Location</th>
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</table>

\[\sum \sum \sum\]
ANNEXURE # 14

DETAILS OF EMERGENCY VEHICLE
SABARMATI GAS LIMITED

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - OWNER’S OBLIGATION
## TABLE OF CONTENTS

1.0 OWNER’S OBLIGATIONS .......................................................................................................... 3
1.0 **OWNER’S OBLIGATIONS**

OWNER shall not provide the required furnished office space. However, Telecommunication / Wireless Communication system only Sim Card for customer complaint. However, Cost for Mobile Hand set along with accessories & uses charges shall be borne by Bidder.

OWNER shall provide the security arrangement for its premises / route of pipeline. However, BIDDER shall be responsible for security arrangement for Worksites / Equipments / Spares & Consumables, Non Sparking Tools / Tackles, etc… specified under his battery limits / scope of work. All Civil work / job for CGD Network shall be carried out as per direction of OWNER in charge.

OWNER shall provide training to the BIDDER’s personnel for any specific / special trainings, etc… once in tenure of the contract, if required. Additionally, OWNER may provide special trainings for the installations / equipments / fire & safety, if any, from time to time.

OWNER shall provide the copy of MIS to the successful BIDDER. BIDDER has to submit SOP, QA / QC Plan, Work Instructions / Guidelines, Formats, AOMP, etc… for the entire scope of work in consultation with the OWNER.

OWNER shall not provide supply of electricity and its payment; Stand by Power supply ( ) to Office Lighting / Equipments, Computers, Printers, Instrumentation & Control Rooms, Fan, Internet facility and its maintenance. However, BIDDER shall be responsible to keep all the system in healthy conditions by optimum utilization.

OWNER shall provide all the Fire Protection / Fighting Equipments / Devices such as Fire Extinguishers (Except firefighting equipment required for Vehicles which are in BIDDER scopes.), etc… including periodic Calibration, Testing & maintenance thereof. However, PPE’s for BIDDER’s personnel shall be provided by him.

OWNER shall arrange for the Testing and Calibration of all Installations / Equipments. However, BIDDER’s personnel shall assist OWNER / its representative for the activity.

OWNER shall procure NG Odorant (Ethyl Mercapitan). However, BIDDER shall assist in carrying out the O&M of Odorant activity.

Insurance for entire CGD Network, Installations, Equipments and Assets including Third Party liability shall be arranged / paid by the OWNER except BIDDER’s personnel, Equipments, Consumables & Spares, etc… BIDDER or its personnel shall coordinate in case of any assessment, claims, recovery, follow-ups, etc… as & when required.

All the invoices and communication will be authorised by OWNER’s representative.

Owner shall keep on vigilance on all the activities at any time during the tenure & reserves all right to take disciplinary action in case of any misbehave, damages, fault at BIDDER’s part, theft / manipulation, malpractice, etc…

During the tenure of the Contract, OWNER at its sole discretion can relocate / shift the Equipments / Installation / Assets to any other locations. In such event, the cost of the relocation will be borne by the OWNER.

OWNER shall provide / extend the existing facility, equipments etc as per the enclosed list / annexure to the BIDDER.

OWNER has all right reserves for any addition or deletion of equipments, assets, man, machine, etc… at the site at any time of the tenure.
OWNER has all the rights reserved to carry out the job pertaining to the station from any other Vendor, if found dissatisfactory or half / partial completion in terms of workmanship, duration, etc... In such case, necessary deduction from BIDDER shall be made.

BIDDER shall provide Emergency Vehicle duly required body building as per Owner’s standard design & colour/ renovation, Fuel, Driver and Vehicle maintenance. Necessary insurance for the Drivers, Vehicle, RTO charges, Maintenance cost, etc…shall be borne by the BIDDER. Nothing extra shall be paid in the regard.

BIDDER shall ensure the optimum usage of the facility provided by OWNER & return on completion of the contract in good working / satisfactory conditions to the OWNER duly reconciled. OWNER reserves the right to recover the cost against any damages, theft / loss / missing or partial return, etc…from BIDDER.

OWNER shall pay the cost of shifting, alteration of existing pipeline or may be recovered from the consumer / third party, if damaged or required by the consumer. If it is at consumer end then shall be recovered & levied from him.

OWNER reserves the right to extend / upgrade the existing network / installations / equipments / facility at any time of tenure & shall arrange the validation / upgradation (designing) of new / existing network internally / externally at its cost & risk. However, BIDDER shall assist OWNER to carry out the process / survey / assessment, if required.

OWNER shall arrange the land acquisition / ROU / ROW / Liaisoning agency, if required to perform the work for existing set up or for new establishment / projects at its cost & risk. However, BIDDER shall assist / coordinate OWNER to carry out such activity.

OWNER shall provide / furnish the details pertaining to new construction sites, if any.

Liaisoning for installation / Shifting of PE Pipeline along roads shall be under the scope of contractor, however SGL shall assist contractor in every possible manner. No separate Liaisoning charges with local authorities shall be paid to the contractor.

OWNER shall procure & supply necessary spares and consumables as recommended by vendor / OEM or requisitioned by the BIDDER, in various sizes & capacity such as, MDPE Pipes, PE Ball Valves, NG Odorant, OEM Spares for PRS, DRS, MRS, IMS, Service Regulator, meter, Transition Box, Valve Chambers, Control Panel & their equipments / installations as per enclosure. The storage of such free issue material shall be made available near site at OWNER’s premises / stores including safety, security etc…

OWNER shall take up issues pertaining to warranty / guarantee related to the package unit on receipt of intimation from BIDDER with the concerned vendors.

BIDDER shall procure & supply necessary spares for all the residual items as per enclosure from approved vendors & specifications in specified quantities at his cost & risk including consumables, accessories, etc...

OWNER shall be responsible for the sales tax, GST, statutory levies, consent, adherence of statutory norms such as air, water, soil, effluent monitoring, control, disposal, at its cost & risk. BIDDER shall coordinate & assist / supervise such activity to be performed from time-to-time without claiming any extra cost.
OWNER shall coordinate & arrange statutory compliance, mutual-aid, medical centre, onsite / offsite emergency handling from time-to-time required for entire operations except BIDDER scope. BIDDER shall coordinate & assist / supervise the activity to be performed from time-to-time without claiming any extra cost.

OWNER shall coordinate for any particular matters with upstream & downstream contracts pertaining O&M, such as Gas supplier, Consumers and Corporate, Statutory, Local authorities, etc. for technical / non-technical matters. However, BIDDER shall coordinate / assist OWNER in the entire activities & day today / routine issues as well.

OWNER shall establish the policies, standard operating procedures (SOP), etc…as well as handle / carryout the customer services as follows;

- Alteration / extension / transfer of existing connections for Domestic / Commercial connections,
- Name Transfer / Ownership of existing connection in case of Property Sale, Death of Occupier / Owner,
- New / Upgradation / Extension of PE Network, Equipments / Installation,
- NG supply to Industrial application / units / establishments.
SABARMATI GAS LIMITED

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - BATTERY LIMIT, SPARES, REFERENCES, VENDORS
# TABLE OF CONTENTS

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<th>Section</th>
<th>Title</th>
<th>Page</th>
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1.0 BATTERY LIMIT, SPARES, REFERENCES, VENDORS

1.1 Battery Limit

Battery Limit for O&M of CGD Network under BIDDER’s scope of work is specified as under;

The battery limit for bidder’s scope of work starts from above ground City Gate Station (CGS) facility to the pressure regulation burner of stove in case of domestic and commercial connection and from metering station (MRS) to industrial consumer connection (burner / furnace). This battery limit also includes underground CS pipeline, City Gate Station, PRS, includes, various type (size & capacity) of Valves, Pressure Regulating & Control system (Active & Monitor type), Filter-cum-separators, Odorizing system, aboveground piping / tubing, Transition fittings and Accessories, Canopy over (if required) PRS / CGS/CPRS/DRS/MRS, Foundation, Fencing, Drain pit, Fire & Safety Equipments, illumination installation, Signage, etc…The battery limit ends at gas tap of domestic / commercial burner including underground MP / LP, PE mains (pipelines), service lines, Transition Boxes, Isolation PE Ball valves installed in Valve chamber / pits consisting purging connections, Line markers, Critical locations / crossings, PNG domestic / commercial connections comprising of riser, transition fittings, main control valve, GI piping & fittings, gas meters & gas regulators (domestic / commercial), GI pipe & fittings, gas tap, Steel reinforced rubber Hose etc…in various sizes & capacities. Also, includes offices premises & the assets / equipments / facilities, etc…DRS, MRS, service regulator, industrial connection

1.2 Spares / Inventory Management

OWNER shall procure and provide relevant & adequate spares / material / equipments for the entire operations as per the industrial inventory practices or as recommended by OEM / Vendor prescribed / specified under scope of OWNER & BIDDER respectively as per the enclosure. However, BIDDER shall requisite the exact requirement covered under OWNER’s scope / OEM spares well in advance from time to time to the OWNER.

BIDDER shall;

- Identify the needs of equipments, spares, consumables, etc…and review the list of spares provided by OWNER.
- Keep proper record for the complete assembly, spares and consumables utilized for the O&M activities on daily basis.
- Advice OWNER promptly, if any correspondence / warranty claim may be taken up with the supplier of the equipment / spares installed or a claim may be made under any insurance policy.
- Advise OWNER for procurement of recommended maintenance and insurance spares for continuous / uninterrupted operations of the installation / equipment / facility.
- Ensure safety and security of all the spares / stores at all the times.
- Ensure usage the high / medium pressure spares, fittings, accessories, etc. as per the OEM specification only.
- Ensure the guarantees / warrantees issues, as per OEM.
- Reconcile the spares issued by the OWNER / used for the O&M or under BIDDER’s scope of supply as per MIS or as instructed. However, OWNER shall recover the cost against any damage, theft, loss / shortage, etc.
- Ensure periodic inspection / checks for the inventory made in terms of quantity, quality, expiry, damages / scratches, security, etc. This includes inspection & checking of delivered / dispatch / receipt material as well.

Storage of free issue spares / OWNER’s scope of supply shall be made available to the BIDDER. However, BIDDER shall store the material, spares, etc…under his scope at his own cost & risk, which should be made
available to OWNER / consumer within specified time frame includes transportation, conveyance, insurance, security, wear & tare, etc…BIDDER shall ensure the storage of his material at the nearest place of CGD Network, except emergency spares.

All spares shall be properly tagged, coded, wrapped and packaged so that they will be preserving in original condition under the normal condition of storage. All electronic items / instruments shall be properly packed in antistatic packing.

BIDDER shall ensure the inventory, storage, supply, transportation / mobilization, laying, installation, erection, transfer, etc…as per the specification / guidelines provided in the Particular Technical Specification (PTS) or manuals of OEM / Bid document.

BIDDER shall produce the material Invoices, Channa, Test Certificates, process / witness / inspection documents & other references for the consumable materials etc…procured for the scope of work.

OWNER reserves right to procure all the material in full or partial, as & when required, directly from the vendor & in such case, no commission / inventory cost shall be given to the BIDDER on such inventory.

OWNER shall reimburse the approved rate to BIDDER towards consumption of materials / items in monthly bill. However, BIDDER shall keep proper records & verification / certification of OWNER / its representatives.

BIDDER shall ensure the availability of tools & tackles and Minimum inventory of consumable at any time during the contract period as per annexure attached with this document.

BIDDER shall provide the equipments, Non Sparking tools & tackles (conventional & special) and other resources as required to carry out the scope of work at all the time as per the enclosure, failing which necessary deduction / penalty shall be made up on such cases. Also, the ownership of all these items should be in the name of BIDDER only. No rental items shall be allowed throughout the tenure.

Materials specified as to be issued by the OWNER will be supplied to the BIDDER by the OWNER from its stores. It shall be responsibility of the BIDDER to take delivery of the materials and arrange for its loading, transport and unloading at the work site at his own cost. The materials shall be issued between the working hours and as per the rules of the OWNER as framed from time to time.

OWNER shall inform to the BIDDER of customer complaints and BIDDER shall attend & repot the compliances of complaints to the OWNER.

BIDDER shall furnish to the OWNER’s representative for approval, when requested or if required by the specifications, adequate samples of all Materials and finished to be used. Such samples shall be submitted before the work is commenced and in sample time to permit tests and examinations thereof, if any. All materials furnished and finished applied in actual work shall be fully equal to the approved samples.

1.3 References

BIDDER shall prepare / update all the drawing / sketches / documents / specifications, whatsoever required for the scope of work at his own in consultation of OWNER / its representative. OWNER shall provide all the original references / technical specification (owner’s O & M) such as, P&ID, OEM guidelines / manuals, As-built / Schematic drawings, statutory documents / license, etc…to the successful BIDDER.

BIDDER shall conduct the survey & submit the detailed report / drawing as & when required for the modification, alteration, shifting, extension, new construction / laying / installation of PE / PNG on AutoCAD within stipulated time frame. Where approval / review of drawings before manufacture / construction / fabrication has been specified, it shall be BIDDER’s responsibility to have these drawings prepared as per the directions of OWNER’s representative and got approved before proceeding with manufacture / construction / fabrication as the case may be. Any change that may have become necessary in these drawings during the
execution of the work shall have to be carried out by the BIDDER to the satisfaction of OWNER’s representative at no extra cost. BIDDER shall also provide the required copies of such drawings, documents, etc…

1.4 Vendors

OWNER shall provide the list of approved vendors for the procurement of specified spares, materials, consumables, etc…for the scope of work (enclosed). BIDDER shall adhere to the same for the entire period of the contract.

In case of any deviations required, then BIDDER shall give in writing for such deviations along with adequate justifications. Only after taking consent from OWNER / its representatives, BIDDER shall use such deviated material at site.

OWNER reserves all the right to reject such deviation request without assigning any reasons whatsoever. OWNER also has all right to amend / revise the vendor list from time to time; hence, BIDDER shall be responsible to follow / implement such revision / amendments.

No cost shall be reimbursed, if any discrepancies is observed / found in the matter.

∑ ∑ ∑
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - LAYING OF POLYETHYLENE MAIN PIPELINES AND SERVICE PIPELINE FOR VARIOUS CONNECTIONS
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1.0 GENERAL INFORMATION

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

The main scope of this Specification comprises of laying of underground Polyethylene Medium density Polyethylene (MDPE100) main pipelines and service pipeline. The scope covers all the activities associated with the purchasing (Bought out items which is in scope of contractor supply only), laying, joining, testing and commissioning of MDPE main pipelines and service pipelines of different sizes ranging from 20mm up to 180mm OD in new & existing gas charged areas.

This technical specification defines the basic guidelines to develop suitable construction methodology for carrying out different activities listed out in the schedule of rates of this tender.

These specifications must be read in conjunction with the “Technical Standards and Specifications including safety Standards for city or local natural gas distribution Network (i.e T4S)” laid down by the PNGRB.

In case of any conflicts, clarification from SGL’s EIC shall be sought and deemed to be final and binding.

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 DEFINITIONS

OWNER/CLIENT Sabarmati Gas Limited (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)
PTS Present <<Particular Technical Specification>> and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by SGL at Site.
QAP Quality Assurance Plan
EIC Engineer – in – charge
VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials
CONTRACTOR The person, firm or company to whom the Work Order is addressed
MANUFACTURER Means the Manufacturer of the Materials / Bought Out items.

3.0 SCOPE OF WORK

Generally the following shall constitute the Contractor’s scope of work but not limited to:

3.1 CONTRACTOR shall provide schedule within 15 (fifteen) days of receiving the notification of award of WORK / CONTRACT, covering the Scheduled Status of all functions of the development of network like procurement, construction and commissioning phases. This proposed network shall be reviewed and approved by the OWNER/OWNER’S REPRESENTATIVE and the agreed network development shall form the basis of scheduling and monitoring.
3.2 CONTRACTOR shall prepare functional schedules and resource mobilisation based on approved schedules of execution of job in all the disciplines for the following:

- Procurement Schedule
- Construction Schedule

3.3 Contractor has to submit the Construction/Execution procedures before commencement of work to Owner / Owner’s representative in line with the Client issued Technical specifications and QA/QC plans for approval.

3.4 Prior to start of construction activity, contractor shall prepare route survey drawings (in Hard Copy as well as in AUTOCAD editable) marked for proposed gas pipe line laying with size/s and submit to Owner or Owner’s representative for approval.

3.5 Laying of Medium / Low pressure PE 100 Pipeline with proper road reinstatement to / from Service Regulator (SR) to various streets/societies shall be executed as per schematic (planned) drawing approved by Owner’s representative.

3.6 Day to day coordination with concerned authorities i.e. Municipality, Nagarpalika, Panchayat office, R&B and others for smooth working and obtain the approval for optimum route as per ROU at site from concerned authorities shall be in the scope of contractor. Also Contractor shall not sign / execute any agreement and/or undertaking of any such documents which amounts to be undertaken by Owner and which shall only be signed and executed by Owner.

3.7 Client / Owner shall make all the application to the Concerned Authorities for ROU etc., liaison with the concerned authorities during execution of the job, obtaining NOC from concerned authorities once the work is completed.

3.8 Any statutory payments made for obtaining such permissions/NOC’s etc. shall be reimbursed upon submitting valid receipts, issued by the respective Authorities.

3.9 Liaisoning with concerned authorities for getting back of Refund of Bank Guarantee/security deposits made to the agencies for laying of the PE pipelines and submission of refund of security deposit to SGL, in case of Demand Draft only after intimation from SGL.

3.10 CONTRACTOR HAS TO ENSURE THE BACKFILL, WATERING, COMPACTION AND CARRYOUT A TEMPORARY REINSTATEMENT OF ALL PREMISES OF STATUTORY AUTHORITIES AFTER COMPLETION OF PE LAYING WORK IMMEDIATELY.

3.11 Obtaining clearances, co-ordination, liaison and arrangement for statutory inspection and approval shall be the contractor’s responsibility, inspection and acceptance of the work by statutory authority shall not relieve the contractor from any of these responsibilities under this contract.

3.12 Any change/additions required to be made to meet the requirements of statutory authorities, shall be carried out by Contractor, within the contract price and to no additional cost to Owner.

3.13 Major crossings like River / Water Canal / National Highway / Four lane state Highway, Railway lines etc. may be done through steel pipeline and is not in scope of this tender. However, both ends of steel pipeline with PE pipes shall be connected through transition fittings under this tender terms and conditions.

3.14 Provision and maintenance of proper store by the contractor near to the work area. Also ensure proper storage and stacking, providing security and insurance cover during storage and handing over the balance free issue materials to Owner during reconciliation.

3.15 Construction & commissioning of PE 100 pipeline downstream of District Regulating Station (DRS) up to Domestic / Commercial customer premises including installation of PE ball valves & Service Regulators (SR).
3.16 Making trial pits to determine the underground utilities/services such as existing pipelines, Cables (Electrical/Communication), Conduits, U/G drainage, Sewers, tunnels, Subway foundations etc. for deciding optimum feasible route and depths for laying the pipelines based on the route plans indicated by Owner. The Contractor will obtain all available information regarding the existence and location of other underground utilities to the Site Engineer in advance to decide excavation route for laying of PE pipeline. However, trial pits at a suitable distance of 30 meters or as per instruction of engineer in charge should be excavated based on site requirement for identification of utilities. Restoration of the abandoned trial pits and trenches shall be the contractor’s responsibility. No payments shall be made for such type of works. The trial pits shall be excavated to minimum depth of 1.5 meters so as to locate any utilities present in the trench and shall be properly backfilled accordance with Owners specification. There will be no additional payments in respect of abandoned trenches and expenses incurred because of insufficient of inadequate trail holes, or any associated lost time or delays.

3.17 Restoration of existing ground features such as grass / turfing, paving, roads, drains, concrete, floral beds, fencing, titles, flooring masonry etc. to original condition, and to match with adjoining conditions, functionally and aesthetically up to the entire satisfaction of Owner / any other Third party agency designated by Owner and local authorities, failing which, it will be done at the risk and cost of the contractor. Obtaining satisfactory completion certificates /NOC for the restoration work done from the concerned authorities.

3.18 All excavated trenches / pits shall be backfilled properly before the leaving the site at day end i.e. there shall not be any open trenches / pits left open during night time.

3.19 Contractor shall take utmost care to avoid damages to underground utilities. Additional protection shall be provided for utilities like pipe, cable, etc. on main roads. In case of occurrence of any such incident, it has to be rectified to the satisfaction of concerned authority of utility immediately by contractor within quoted rates, failing which Owner will get it done at risk & cost to the contractor and penalty shall be laid as per SCC Clause of 29.0 of Volume IA of II of commercial.

3.20 The scope of work and technical requirements associated with PE pipe laying in different types of earth surfaces are as follows.

- Pipe laying in unmade surface of any type,
  - Normal soil and grassed areas
  - Rocky area.

- Pipe laying in a made up surface, It includes taking up of a hard surface of any type i.e. metal, asphalt / tarmac, concrete, bituminous, tiled, brick lined etc.

3.21 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 shall be reinstated to original condition.

3.22 All tiles/ slabs/ crabs, stones etc. removed during excavation shall be placed properly.

3.23 Installation of Safety/warning Signs and barricading of the entire route to be trenched. Pits to be similarly barricaded along with warning signs and caution boards.

3.24 To excavate trenches as per specifications with stable slopes and with restricting minimum disturbance to above ground/underground services/installations. It should be ensured that trenches should not collapse due to water and soil till placement of pipes.

3.25 All materials, equipment, trailers for transportation, loading, unloading, stringing etc. for Owner’s supplied Free issued materials (FIM) from owner designated stores to project site is in contractor scope.
Trenching, sand bedding, MDPE pipe laying, electrofusion jointing, sand filling, warning tape laying, backfilling & restoration, flushing / pigging, testing, route marker installation, nitrogen purging, commissioning of PE pipeline and submission of as laid drawing in hard copy as well as Autocad duly approved by TPIA and Owner’s representative.

Uncoiling/stringing the MDPE pipes of required sizes (i.e. 180, 125, 90, 63, 32 & 20 mm) pipes into trenches as per approved procedure.

Joining the pipe ends with fittings & valves by approved bar coded auto electro-fusion techniques only as per Tender Specification.

Installation of electrofusion fittings like elbow, tees, reducers, couplers, tapping saddles, transition fittings, valves etc., including valve pits and its supports, Tie-in with MDPE pipeline in the Valve chamber / Service Regulator module etc. as per specification & satisfaction to the EIC.

The rate for Installation of Valve Chamber includes all excavation, backfill, reinstatement and other civil work required for installing PE Valve Chamber and making connections of the inlet and outlet pipe work with proper alignment.

Laying pipelines by any methodology including trenchless technology methods with or without casing pipes as per specifications and as directed by EIC.

Laying of HDPE conduit, where ever applicable, along the MDPE pipe.

Fabrication, Supply and Inspection of good quality half round concrete sleeves / full hume pipes (This is applicable to contract where they are not meeting a criteria of tender requirement), other materials and, fittings is in the scope of contractors as per the provisions of tender.

Back filling, watering and compaction using approved ‘good’ soil, sand or excavated earth or borrowed earth by ramming or mechanical such jumping jack compactor of appropriate size wherever required. sand or excavated earth or borrowed earth should be properly sieved before usage. Cleaning of all unserviceable materials, debris, excess earth trenches etc. to designated disposal area.

Carrying out pneumatic testing and purging of laid MDPE pipeline, Installation of PE valves & Tie-in with MDPE pipeline in the Valve chamber as per specifications and approved procedures. Providing all consumable including nitrogen, tools & tackles, instruments, manpower and other related accessories for carrying out the testing of pipes. Separate rates for purging will be paid as per SOR.

Purity of Nitrogen as per the company approved procedure shall be ensured.

Construction, Supply, fabrication & Installation of valve chamber, RCC route marker, Pole marker with foundations and valve chamber pole markers etc. as per tender specifications and the directions of the EIC/Owner’s representative.

Construction, Supply, fabrication & Installation of valve chamber including supply of frame and cover of valve chamber by the contractor.

Commissioning of gas, in the tested MDPE Line shall be done as per the approved procedure.

Tie-in of the MDPE Medium pressure pipeline (1.5 to 4.0 bar(g)) with the DRS by using transition fittings.

Installation of Service Regulator as per Owner specifications and drawing including construction / fabrication of installation arrangement.

- The Contractor rate shall include for
  - All excavation, backfilling, reinstatement and other work required to install the SR module and make connections of the inlet and outlet pipe to the appropriate PE pipeline with electrofusion fittings. The rates of fusion of PE Pipes, Valves, Fitting should also include in PE laying rate.
  - The supply of any construction material such as cement, sand, metal grit, bricks etc. required for completing the installation including labour as per approved drawing and specification of Owner.
  - Installation, testing and commissioning of the SR module.
3.42 Returning surplus free issue material to Owner stores after obtaining clearance from TPIA/Consultant/Owner, reconciliation of free issue materials.

3.43 Rectification of defects arising due to poor workmanship during defect liability period of pipelines/installations handed over to Owner.

3.44 Provision of the safe signing, cordonning and barricading shall be done for excavated trench as per the Owners specification. Failure to comply with this to the requirement of Owner will result in imposing applicable penalties which shall be laid as per SCC Clause of 29.0 of Volume IA of II of commercial / suspension of work until appropriate arrangement for protecting excavation is made available or till the time as is deemed fit by the owner

3.45 The Contractor shall ensure removal and disposal of all waste materials and packaging. Pipe short pieces and pipe off cuts from the free issue material shall be returned to the Owner store and reconciled against the pipe issued.

3.46 The Contractor shall supply all necessary pumping equipment and power sources to de-water trenches and excavations as required by Owner.

3.47 The testing, purging and commissioning of pipeline network has to be done to Owner’s requirements. Pressure testing will be carried out either with compressed air or nitrogen, and no other test medium may be used. Compressed air or Nitrogen cylinders shall be provided by the contractor. Nitrogen shall be supplied in cylinders with proper identification and traceability, tested and certified and fitted with regulators, hoses and connections that are in good working condition and meeting required parameters. No extra payment will be made for any delays incurred, or repair or rectification work found necessary as a result of test failures due to faulty workmanship or negligence on the part of the Contractor

3.48 Monthly target for Domestic PNG Connection shall be compared with the Contractors’ performance every month. In case contractor fails to achieve the target then penalty shall be laid (on quarterly basis) as per SCC Clause of 29.0 of Volume IA of II of commercial. However, Cumulative unit rate for PNG connectivity as well as PE laying shall be established on the basis of running bills.

3.49 Maintaining the PE network till the commissioning and handing over the network to O&M.

3.50 Preparation and submission of all documents As-built drawings, details of crossings and utilities, PE job cards duly certified by TPIA, EIC for main / service lines and deviation statements on completion/commissioning of work by way of drawing, sketches and tables in soft & hard copies.

3.51 Handing over the completed works to Owner for further operations.

3.52 Following activities are also in Contractor’s Scope:

- Carry out joint technical feasibility survey for requests received.
- Contractor shall submit the documents, which include but not limited to the following:
  - Approval technical deviation, if any.
  - Material reconciliation report.
  - As laid Auto Cad drawing (Hard copy and Soft copy in editable mode)
  - Material test certificate of contractor supplied materials.
  - Satisfaction certificate from concerned authority for reinstatement.

The above job scope mentioned shall be covered under the rate quoted for PE laying.

No deviation from the approved technical specification / issued construction drawings shall be undertaken without written approval of EIC.

3.53 Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/ safety/statutory 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.
4.0 MATERIAL, MANPOWER, EQUIPMENT AND MACHINERY

4.1 Material, Procurement and Supply

Material to be Supplied by Owner as Free Issue

4.2 Unless otherwise specified, Owner will supply following materials such as PE – pipes i.e 32 mm and above, PE valves & service Regulator module. All materials other than mentioned below shall be supplied by contractor as per attached technical specification to complete the laying of gas main pipelines and service pipelines.

- PE – 100 Pipes,

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>PE Pipe size</th>
<th>SDR (Thickness in MM)</th>
<th>Straight / Coil Length in Mtr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>180mm Dia.</td>
<td>11 (16.4)</td>
<td>12.0 M (Straight)</td>
</tr>
<tr>
<td>2</td>
<td>125mm Dia.</td>
<td>17.6 (7.1)</td>
<td>12.0 M (Straight) or 50 M (Coil)</td>
</tr>
<tr>
<td>3</td>
<td>90mm Dia.</td>
<td>17.6 (5.2)</td>
<td>50 M (Coil)</td>
</tr>
<tr>
<td>4</td>
<td>63mm Dia.</td>
<td>11 (5.3)</td>
<td>100 M (Coil)</td>
</tr>
<tr>
<td>5</td>
<td>32mm Dia.</td>
<td>11 (3.0)</td>
<td>100 M (Coil)</td>
</tr>
</tbody>
</table>

- PE Ball valves :180mm, 125mm, 90mm, 63mm and 32mm
- Service regulator Module

4.3 Receipt of materials above mentioned free issue items from the owner’s designated stores, loading, transportation, unloading at project site. Proper storing, stacking, identification.

4.4 Providing security and insurance before installation, during execution of job and commissioning of pipelines including transportation of materials to site shall be in contractor’s scope of works.

4.5 Material reconciliation statement of free issue material duly certified by Owner’s representative shall be submitted to Owner along with RA bill.

4.6 The free issue material shall not be procured & used from any other source by contractor.

Material to be supplied by the contractor:

4.7 The supply of bought out items shall be strictly as per relevant tender Specifications.

4.8 Following materials shall be supplied by the contractor scope of work but not limited to :

- PE-100, 20 mm Dia. Pipe, SDR-11 (Min. 2.3 mm thickness).
- PE-100 Electro fusion Fittings
- HDPE Casing Pipe

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Size of MDPE</th>
<th>Size of HDPE</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20 mm</td>
<td>50 mm</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>32 mm</td>
<td>50 mm</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>63 mm</td>
<td>90 mm</td>
<td>Note – 1 &amp; 2</td>
</tr>
<tr>
<td>4</td>
<td>90 mm</td>
<td>125 mm</td>
<td></td>
</tr>
</tbody>
</table>
## Note 1:
Tentative sizes of the HDPE casing pipe for Moling / HDD / Boring

## Note 2:
Size of the casing pipe may vary according to the length of the carrier pipe.

- RCC or Brick Chamber including frame and Precast SFRC cover of valve chamber for PE valve installation
- Warning Taps
- Route / Line markers

### 4.9
All pipe fittings shall be black in colour & of SDR 11 (Min. 2.3 mm thickness for size up to 20mm,) SDR 11 (for Sizes of 32mm & 63 mm), SDR 17.9 (for Sizes of 90mm & 125mm) and SDR 11 (for Sizes of 180 mm), PE 100 Grade.

### 4.10
All materials shall be handled safely and stored properly in a permanent, covered, lockable store/ware house preferably near site in such a manner as to prevent any damage to the materials from scratching, gouging, indentation, excessive heat, oxidization effect or by contact with any sharp objects or chemicals. The PE pipes and fittings shall be stored in covered storage to protect material from sunshine, rain etc.

### 4.11
All materials for all types of pipeline markers including cement, sand, reinforcement etc. along with painting material.

### 4.12
All equipment and consumables required for Hydrostatic / Pneumatic testing like pumps, compressor, temporary headers and pressure and temperature gauges, corrosion inhibitor for water used for hydrostatic testing, including water for testing.

### 4.13
All materials/ compressed air/ pig required for cleaning, filling, dewatering, swabbing for pipeline etc.

### 4.14
All types of painting materials including primers, paints, solvents sand blasting materials, cleaning agents, compressed air etc. shall be suitable for normal corrosive environment.

### 4.15
The Contractor shall procure material from approved vendors only mentioned in this document. Final inspection at Contractors stores shall be carried out by Owner representative / Third Party Inspection Agency duly appointed by Owner.

### 4.16
Contractor should ensure that any material which are procured by them to be inspected prior to dispatch from contractor store to site for installation by Owner representative / Third Party Inspection Agency as per the test certificate of materials provided by manufacturer.

### 4.17
Owing to the technical requirements or otherwise, Owner reserves the right to amend / vary / modify the material requirement and/or specification at any time during the period of the Contract. The financial implication, if any, would be mutually discussed and agreed for which Contractor would fully Co-operate with Owner.

### 4.18
Owner has provided the specification for the material in the scope of the Contractor for procurement and use. However in case, due to omission or otherwise, any specification is not provided, the Contractor would approach the Owner and obtain approved specifications in writing prior to the actual procurement and use of the material. It may be noted that considering the safety aspect, Owner would approve the specification of all material to be used for the execution of the contract.

### 4.19
Backfilling material
The Contractor shall be responsible to arrange the supply of fine sand free from any impurities like clay, mica, and soft flaky pieces, as per the instructions of EIC/Owner’s representative. **For supply of any imported backfill including approved Sweet earth / Coarse Sand, aggregate etc, charges are payable and is included in MDPE laying rates. Also, supply of sand in Trench no separate charges are payable.**

4.20 In case specified trench depths are not achieved & if directed by Engineer-In Charge with necessary approval, Contractor has to provide concrete casing pipes/ slabs or cement concrete, without any cost implication to Owner.

4.21 Other Materials:

The Contractor shall supply the following items wherever required:

- All materials required for framework, trench support and temporary trench crossings if required as per site conditions
- All sign boards, barricades, tin sheets, lighting arrangement and protective equipment.
- All minor items not mentioned in the Contract but necessary for the satisfactory completion and performance of the Work under this Contract.
- Material required for Construction, supply & installation of Valve Chambers.
- Half round concrete sleeves / Full Round hume pipes. (This is applicable to contract where they are not meeting a criteria of tender requirement),
- Permanent (Pole) markers (Refer enclosed drawing no. TEIND-STD-G-M-9002)
- Any other materials

4.22 Manpower

The Contractor shall provide the skilled and unskilled labour, tools, materials and equipment necessary for the proper execution of the Work.

4.23 Equipment, Machinery & Tools

This will include but is not limited to the list of specialized items included in attached Annexure of bid.

4.24 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.

4.25 Contractor must have dedicated Bar coded electro-fusion machine (Automatically Readable) that can read the bar code of the fittings automatically shall be used for joining of the PE pipes/fittings. Manual feeding Electro-fusion machines are not acceptable for jointing purpose. The contractor has to submit the calibration certificate of Electro Fusion machine with bar coded control unit at the time of start of work and at fixed intervals as per the instructions of Owner. Contractor shall ensure that the machines are always available at site.

4.26 For electro-fusion jointing, the contractor shall bring own tools, tackles and equipments including DIESEL GENERATOR SET at least 5.5 KVA with ELCB having a adequate capacity of power required for electro fusion machine.

4.27 Taking power connection form electric poles, connections without written permission from the concerned authorities or residential premises is strictly not permitted.

4.28 Contractor shall also arrange pipe cutters (like circular, guillotine), End Scrapers, Pipe Straighteners, Top loading clamp for fusing saddle tapping tee, clamps of all sizes for Electro-fusion fittings, re-rounding tools...
and test ends, double insulated cables, Industrial power board with Pipe 3-pin plug, Proper earthing of equipments, etc.

4.29 Failure in arrangement of tools, tackles and equipments in time shall be penalized as per SCC of tender which shall be laid as per SCC Clause of 29.0 of Volume IA of II of commercial.

4.30 Only approved manufacturer supplied of electro fusion fitting materials as well as accepted at site by Owner or owner’s representative shall be used for elector fusion for PE pipes &fitting.

4.31 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 asphalting/ road works.

4.32 Hydraulic Rock breaking machine with proper safety features to eliminate the hazard to operators and nearby lives due to uncontrolled movement of debris due to breaking of rock. Manual operated rock breaking machine shall not be used. Contractor also has to arrange his own equipment at site for trench less crossings such as HDD, Moling and rock cutting equipments, HDPE fusion equipment whenever required

4.33 In case there is non-availability of approved equipments, tools and tackles during the work at site, suitable penalties, as per special terms and conditions of the contract, will be levied and deducted from the running bills as per SCC Clause of 29.0 of Volume IA of II of commercial.

4.34 Acquisition, Receipt & Storage of Materials

The Contractor shall collect all materials from Owner stores during working hours following all documentation procedures laid down and as directed by the EIC.

The Contractor shall carry pipe in such a manner as to preclude damage during transportation and handling.

PE pipes supplied in straight lengths may be carried in straight pipe racks.

The Contractor shall at the time of receipt of material physically examine all materials and notify the EIC immediately of any damage or defect noticed by the Contractor. The EIC shall duly note any damage or defect in a site instruction book and both parties shall countersign the entry.

Any damage not so recorded will be deemed not to have existed at the time of receipt of material by the Contractor and the cost of repair or replacement or rectification shall be borne by the Contractor.

Any material once issued from Owner store, if found in non working condition at site shall be brought to the notice of EIC with Goods Issue Note reference in writing within 7 days and after subsequent approval shall return defective material in Owner stores as instructed by EIC.

All materials shall be stored in a permanent, covered, lockable contractor’s store preferably near site in such a manner as to prevent any damage to the materials from scratching, gouging, indentation, excessive heat or by contact with any sharp objects or chemicals. The MDPE pipes and fittings shall be stored in covered storage to protect material from sunshine, rain etc.

If delay is more than as instructed by EIC and material is under warranty, the material will be accepted with a penalty, else the material will not be reconciled and amount of the same will be deducted from bills which shall be and penalty shall be laid as per SCC Clause of 29.0 of Volume IA of II of commercial.

The contractor shall ensure that no defective material shall be returned to store at the time of closure of contract. The format for defective materials returning to stores will be made available by EIC.

The Contractor shall maintain log book at their respective stores stating issue and availability of free issue material at any given day. Further, it is mandatory for the contractor to submit inventory details of free issue and purchased materials on monthly basis to Owner’s representative as per the approved format of the owner. The inventory details shall be in correlation with the Daily progress chart and material reconciliation sheet.
5.0 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 at his own cost the following reports in agreed formats and frequency by owner.

- Daily Activity Reports (Daily progress / planning ) shall be submitted to EIC daily morning as approved format.
- Weekly Progress reports,
- Graphs with Utilities,
- Testing reports,
- Equipment and Manpower deployment status report ( Monthly)
- Material Consumption & Inventory report. (monthly)
- Material Reconciliation reports (Along with every RA bill)
- Approved Deviation statements (as and when required).

6.0 APPROVALS & PERMISSIONS FOR PIPELINE LAYING

Owner shall apply and obtain permissions from statutory bodies for laying of pipelines permissions but it shall also be the responsibility of the Contractor to obtain permissions, wherever required. However, Owner will pay the road restoration / Departmental charges / security deposit / Bank guarantees for getting the clearances to concern statutory bodies.

Statutory bodies in this case are CPWD, PWD, NHAI, Urban Development Authorities, Statutory Authorities, Indian Railways, Municipality, Nagarpallic, Panchayat office and any other Government Agencies who maintains the public lands and accord permissions for laying of the utilities.

Contractor shall ensure that the road restoration to the minimum against the work to be carried out immediately to ensure the backfill, watering, compaction and carryout a temporary reinstatement of all premises of statutory authorities work such as road, railway etc after completion of PE laying and jointing work.

It is the contractor’s responsibility to inform and co-ordinate with the concerned local authorities and also with other utility agencies before and after the 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.

Basic permissions will be made by available by Owner from concerned Authorities to cross their pipeline / Utilities. However, contractor shall be responsible for obtaining further specific approval from statutory authorities as required for the completion of the Work.

The contractor shall plan and ensure that work taken up under a single permission shall be completed within the stipulated time period and permission revalidation process is avoided. No separate liaison charges are liable to Owner for permission revalidation cases.

It is the responsibility of the contractor to obtain “No Objection Certificate” (NOC) from land owning agencies/Statutory bodies after completion of the restoration to their satisfaction and getting Liaisoning with them for refund / released of the security deposit / bank guarantees submitted by Owner for obtaining permissions on production of documentary evidence. No separate payment will be made on account of approval / permissions.
The contractor shall coordinate with the relevant authorities for execution of job in line with approvals / the proposed pipeline route drawings. The inspection of work by statutory authorities shall be the responsibility of the contractor without any extra cost to Owner.

In case contractor delays laying of pipeline work under a single permission, the work or part of work may be offloaded to some other contractor on his risk and cost.

Any change / addition in construction specifications required to be made to meet the requirements of the statutory authorities shall be carried out by the contractor without any extra cost to Owner.

The inspection and acceptance of the work by statutory authorities shall however, not absolve the contract from any of his responsibilities under this contract.

### 7.0 REFERENCE SPECIFICATION, CODES AND STANDARD

The contractor shall carry out the work in accordance with the requirement of latest relevant applicable standards, Tender specifications, Owner’s Engineering Standards; relevant Oil Indian Safety Directorate (OISD) norms, PNGRB Regulations(T4S), ASME B31.8-Gas Transmission and Distribution Piping Systems and Owner’s approved procedure, if any during the tenancy of contract.

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.

### 8.0 QUALITY OF WORK

All works carried out under this contract shall confirm to applicable standards, codes of practice, construction procedures and other technical requirements as defined in the technical specifications.

The manpower deployed on the respective activities shall be adequately trained & shall have necessary skills to execute / supervise the work. However, the assessment on the qualification of the personnel shall match the qualification given in guidelines for qualification be at the discretion of EIC.

PE welders shall be registered with Owner and shall be trained by Owner approved agency and other skilled personnel shall be approved by Owner’s representative and identification cards shall be issued to them. Only personnel who matches the qualification and are approved by Owner shall be allowed to execute the critical activities like Electro fusion jointing of PE Pipes & Fittings.

### 9.0 SAFETY

9.1 Contractor’s engineer In charge / Manager / Supervisor shall be responsible for Safety procedures, policy, PPE’s etc at site during the Execution of works

9.2 The Contractor shall conform to the safety 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 site.

9.3 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.

9.4 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.

9.5 Under no circumstances, they should left the open trench unattended and should ensure that the trench is backfilled before leaving the site at the end of the day.
9.6 The Contractor shall provide PPE’s like helmets, safety shoes, etc. to the labour as mentioned in tender document which are necessary for safe working practice and is approved by HSE officer on site.

9.7 Any accident causing injury to any person or damage to property or equipment shall be reported to the EIC and the cost of repair / replacement of the damage equipment shall be borne by the contractor. Where the EIC determines that the work is being performed by Contractor in an unsafe manner, he may suspend the Work until corrective action is taken by the Contractor.

9.8 For further details Refer “Special Terms and conditions of Contract” and attached PTS - HEALTH & SAFETY.

9.9 Manual boring has to be executed with fully insulated boring tool, as per the Owner specifications and job should be executed on receipt of work permit in line with the guidelines attached with the tender document.

10.0 ROUTE SURVEY

10.1 Planning, detailing the size, operating pressure, underground utilities, foreign pipelines, crossings, Approximate location of the proposed mains valve and connections /associated Service Regulator installations will be issued to the contractor at the start of the works. However, in cases where such details are not available with Owner, the contractor shall be responsible to carry out the survey and prepare drawings for Owner’s approval

10.2 Main lines

The final alignment of mainlines will be worked out at site in consultations with the Owner’s representatives after route survey and trial pits, at contractor cost. 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.

10.3 Service lines

- EIC/Third Party Inspection Agency and the contractor will conduct a joint survey at each probable premise / housing colony/pockets/area to be supplied with gas. The survey record will note customer’s detailed potential gas supply points, proposed regulator positions and estimates of material quantities. The contractor’s representatives will make sketch of the agreed pipe routes. After the measurements, contractor’s representative will make a debit note for the extra / additional work and rise to the customer & collect the respective amount & deposit at Owner site office with proper documentation.
- 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 record the job executed in PE job cards and complaint of customer’s and maintain the same till safe handing over to EIC.
- Duly certified Xerox copy of the PE job card is to be maintained by contractor till the bill payment process is completed. Owner will not be responsible for time lost due to failed appointments or disputes with customers.

11.0 ORGANISATION STRUCTURE

11.1 Contractor shall designate Resident Construction Manager (RCM) / Project Manager who will be responsible and single point contact to interact with EIC/TPIA and authorized to attend review meetings, receive material, authorized to sign documents, claims and receive payments etc.

11.2 Contractor shall employ a Project Manager / Coordinator on his company roll.

11.3 All construction work will be carried out as per direction of EIC, and EIC will be the primary point of contact between the contractor and Owner on site. All work will be issued and sanctioned through the EIC Contractor shall ensure that technical quality standards are adhered to during work execution is carried out cost effectively and a good customer and public image is maintained for Owner.

11.4 The contractor will deploy his own supervisors as directed by site engineers/EIC. These personnel will be reporting to the EIC for monitoring construction standards and for ensuring that all technical requirements
are met for the job being carried out. The contractor’s supervisor(s) will have day-to-day liaison with the Site Engineer, and will provide the Site Engineer with technical reports and audits, and other management information as is required on work progress and construction quality standards.

11.5 The contractor’s supervisor shall have mobile telephones to ensure that they can be contacted at all times. The contractor will also nominate one person who can be contacted if necessary in odd 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 Owner as is required. The normal day-to-day issue of work instructions, communication will be between EIC and the contractor’s supervisor and the Site Engineer shall be coordinated by RCM.

11.6 Contractor shall maintain a Project Site Office, Material Store in their allotted site, preferably near to the Owner office / Site with following facilities:

- Telephone, Mobile Phones, Fax machines, Printers/Scanning/Xerox machines, Computers with internet facility.

On award of the contract, the contractor shall establish and submit documentary evidence for above, which will be verified by the owner before award of the work order.

12.0 STRUCTURES, SERVICES AND OTHER PROPERTY

12.1 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 Site Engineer in advance of any excavation. In any event, trial pits shall be made at intervals of a maximum of 30 meters or as per instruction of engineer in charge based on site requirement. Restoration of the abandoned trial pits and trenches shall be the contractor’s responsibility. No payments shall be made for such type of works. The trial pits shall be excavated to minimum depth of 1.5 meters so as to locate any utilities present in the trench.

It is contractor’s responsibility to interact with other utility agencies regarding their existing utilities and finalise the route along with these agencies and Owner/Owner’s representative.

There shall be no additional payments in respect of abandoned trenches incurred because of insufficient or inadequate trial pits, or any associated loss of time or delays.

12.2 Protection of Structures and Utilities

The Contractor shall at his own cost ensure supports and protections of 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 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 type of operations or work. Special care shall be taken while laying of pipelines near the trees / street light poles.

12.3 Interference with Traffic, Street Drainage and General Public

The Work shall be executed in such a manner so as to cause a minimum inconvenience to public at large, usage of public or private roads, lanes, thoroughfares, walkways, rights-of use or passages through which the Works are to be executed. The trench shall be backfilled, compacted, levelled and extra soil 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 use a private driveway, access track or entrance without the prior approval of the EIC in any circumstance.

The Contractor shall provide suitable access wherever 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 divert them wherever necessary and use all proper measures to provide for the free passage of water.

The contractor shall conduct his operation at all times, with a view to minimize noise and other objectionable nuisances (e.g. oil leakage) as far as practicable.

The Contractor shall handover the completed works after proper cleaning of the site.

13.0 HANDLING OF PIPES AND COMPONENTS BEFORE AND DURING LAYING

HANDLING OF PIPES OR PIPELINES

It is compulsory:

- To take the necessary precautions to prevent damage during the loading, transportation, unloading and various other operations involving the handling of pipes and fittings;
- To stack the pipes on a flat surface and to support and clamp them sufficiently during transport;
- To organize the movement of the pipes so that the pipe or the ends of it do not drag across the ground.

It is prohibited:

- To roll pipes across the ground or the road surface;
- To lift up or move pipes or pipelines with cables, chains or other hard or squeezing ropes;
- To bring the pipes into contact with a naked flame, oil or bituminous products.

Any pipe which is temporarily left alongside the trench shall always be protected against water ingress and the introduction of impurities by means of temporary cap. Particular attention shall be made to this temporary cap while the pipe is laid in the trench. The temporary cap shall be designed in such a way that they can be easily mounted and removed.

The ends of pipes temporarily left behind in the trench shall be temporarily caped so as to prevent water or mud to penetrate even if the trench is completely filled with water. To do this, appropriate caps may be used.

The presence of water or impurities in the pipe shall be considered as a serious fault by the contractor and the contractor shall flush / pigging to clean the pipeline, at his own expenses, until the water, dirt or any other impurity has been removed to satisfaction of EIC.
14.0 TRENCHING

The schematic drawing with the details of trench is enclosed in the tender as per drawing No. TEIND-STD-G-M-9003 & 9020.

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 in the Drawings, Specifications or as otherwise directed by the EIC.

Contractor shall excavate and maintain the pipeline trench on staked centreline as per approved drawing 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.

Excavation, beyond 1.5m depth, trench side wall protection, backfilling, compaction, removal of excess earth/material, to designated place as per specifications and instructions of Engineer-in-charge.

Owner may require excavation by hand, local route and detouring and limiting the period of executing of the works. Before trench cuts through water table, work should be executed in phased manner with due care taken in order to ensure soil stability.

Contractor shall ensure that Pick axe or crow bar used for manual excavation shall be non conductive.

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 the bottom and sidewalls of the trench.

14.1 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.

In case of crossing of water bodies the minimum depth shall be measured from the top of the pipe to the bottom of lowest Scour level across the water body.

The depth of the trench will be such as to provide minimum cover as stipulated below:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Pipe Dia. (OD)</th>
<th>Minimum Trench width</th>
<th>Minimum Cover in normal area laying</th>
<th>Trench Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20 mm</td>
<td>320 mm</td>
<td>1000 mm</td>
<td>1120 mm</td>
</tr>
<tr>
<td>2</td>
<td>32 mm</td>
<td>330 mm</td>
<td></td>
<td>1150 mm</td>
</tr>
<tr>
<td>3</td>
<td>63 mm</td>
<td>360 mm</td>
<td></td>
<td>1150 mm</td>
</tr>
<tr>
<td>4</td>
<td>90 mm</td>
<td>390 mm</td>
<td></td>
<td>1200 mm</td>
</tr>
<tr>
<td>5</td>
<td>125 mm</td>
<td>425 mm</td>
<td></td>
<td>1200 mm</td>
</tr>
<tr>
<td>6</td>
<td>180 mm</td>
<td>480 mm</td>
<td></td>
<td>1200 mm</td>
</tr>
</tbody>
</table>

Minimum Cover Requirements for Pipelines at different locations
Location Min. Cover (Mtr.)
Normal / Rocky terrain 1.0
Minor river / unlined canal / nala crossings, tidal areas and other watercourses. 1.5
Major river crossings 2.5
Rivers with rocky bed 1.5
Lined canals / drains / nalas etc.. 1.5
Drainages ditches at roadway and railrods 1.0
Rocky areas 1.0
Cased / uncased road crossings 1.2
Cased railroad crossings 1.7

Any increase from the trench widths specified will not alter the unit rates of MDPE laying.

The minimum depth & width may be greater than as mentioned above as may be required by EIC/ Government/Public authorities under jurisdictions/ underground utilities / structure etc. The Contractor shall perform such work, according to the requirement of concerned authorities and without extra compensation.

Also, in case of Drains/Culverts/Utilities crossing through open cut where excavation cut is more than 1.5m, the extra excavation shall be paid as specified the extra excavation is inclusive in the laying rates. **No separate payment is chargeable for extra excavation and it includes backfilling as well.**

In case, the trench depth could not be achieved due to practical problems with top cover less than 1000 mm but greater than 600 mm due to site constraint 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 pipe / hume pipes, concrete partition or concrete slab without any extra cost to owner with due approval as per owner’s guideline.

**HOWEVER, APPROVAL OF LESS COVERS SHALL BE GIVEN IN WRITING BY EIC AND DULY APPROVED BY THIRD PARTY INSPECTION AGENCY WITH DUE APPROVAL AS PER OWNER’S GUIDELINE TO CONTRACTOR WITH APPLICABLE ADDITIONAL PROTECTION IF ANY LIKE FULL / HALF ROUND UME PIPE SUPPLIED BY CONTRACTOR, SHOULD BE INSTALLED AT NO EXTRA COST TO THE OWNER.**

**14.2 Width of Trench**

The width of trench shall be wide enough to provide bedding around the pipe as specified in guidelines and to prevent damage to the pipe inside the trench. Unless otherwise directed by the EIC and the minimum distance from the inside edge of the trench wall to the outside of the pipe shall be as per the Drawing no. TEIND-STD-G-M-9003 & TEIND-STD-G-M-9020.

**14.3 Trench Base**

The trench bottom shall be cut or trimmed to provide a uniform bedding for the pipe and shall be free from stones, metal, wood, vegetation, clods of earth or other debris before placement of the pipe.

In case trenching is excavated in rocky terrain, a bedding of soft soil or sand shall be provided in the trench base to the satisfaction of EIC.

**Hard Rock:**

Hard rock is defined as trench material with a single piece of rock, dimension exceeding 1.5 m in any direction, and requires cutting by use of pneumatic chisel / drill or sledge hammer and chisel or removal of the same by additional excavation shall be considered as hard rock.
Additional applicable rates shall be payable for hard rock excavation as per line item of SOR over and above the pipeline laying rates in case the cutting of rock is more than 1.5 meter in single stretch along the direction of trench.

Excavation through soil mixed with small boulders that have been used for a road base will not be considered as hard rock for the purpose of payment.

14.4 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/utilities in the vicinity of the Works.

- Minimum 500 mm where the gas pipe crosses other assets/utilities, etc., for electric cables, the clearance. However, 150mm minimum gap with special protection may be acceptable based on approval of EIC by providing additional protection such as RCC hume pipe, RCC half Round sleeve or PVC Sheet etc with no extra payment to be paid to contractor.

- Minimum 500mm distance in horizontal direction shall be maintained where the gas pipes (MP & LP) are on a same trench or similar alignment to the other assets/utilities. If not possible to lay pipelines side by side, meeting above guidelines then laying in both pipes in same trench shall not be done.

- When two PE pipeline (MP & LP) shall be laid in same trench then MP pipeline has to be laid at Road side and LP pipeline is to be laid at extreme side of the road.

- The protective material shall be supplied and installed by the Contractor at his cost.

**HOWEVER, APPROVAL OF LESS GAP SHALL BE GIVE IN WRITING BY EIC AND DULY APPROVED BY THIRD PARTY INSPECTION AGENCY AND AS PER OEWNR'S GUIDELINE AT NO EXTRA COST TO THE OWNER**

14.5 Under Ground Interferences

The Contractor shall locate and manually expose all underground facilities if any during trenching. Safety barriers shall be erected along the trench to prevent any damages or accident. On locations where pipeline is laid under the existing facilities and near the approaches of 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 with no additional cost to Owner, if required.

Whenever it is permitted by Authorities and/or Owner to open cut paved road crossing, or where the 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 Owner. After laying the pipeline, backfilling shall be immediately performed and all the areas affected by the excavation works shall be temporarily restored.

**CONTRACTOR HAS TO ENSURE THE BACKFILL, WATERING, COMPACTION OF ALL PREMISES OF STATUTORY AUTHORITIES AND PRIVATE PREMISES AFTER COMPLETION OF PE LAYING WORK IMMEDIATELY.**

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 the satisfaction of concerned authorities, resident and Owner.
14.6 Others

Throughout the period of execution of excavation work, the Contractor shall provide and use warning signs/warning boards, Proper barricading and cordonning prior to starting of excavation. Contractor shall also provide traffic lights or lanterns, fencing, etc. as required by the local authorities’ jurisdiction and/or Owner at both ends of trench and also shall ensure the removal of the same after completion of work from the site.

The Contractor shall perform the proper line/ chuna making prior to excavation of trench as per the Owner specification.

The contractor shall ensure the deposition / storage of excavated soil keep away from the trench at least 300 mm from the trench edge to avoid collapse of trench and also ensure the Crossover plates of adequate width and length at society entrance or places where people crossover the trench.

For all roads, paths, walkways etc. Which are open-cut, the Contractor shall provide temporary diversions properly constructed to allow the passage of normal traffic with the minimum inconvenience and interruptions.

The paving shall be restored to its original condition after the pipeline is installed.

The Contractor shall excavate all such aforesaid depths as may be required at no extra cost of Owner.

Under cutting of trench is not permitted in any conditions of ground or terrains.

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 trenches is required at the approaches to crossings of roadways, railroads, rivers, streams, drainage and ditches without any extra cost implication to Owner.

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 Owner or relevant authorities.

Where the pipeline crosses underground utilities/structures, Contractor shall first manually excavate to a depth and in 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 perform the work to the satisfaction of the Owner of the existing pipeline/cable/utility. 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.

14.7 Bedding & Filling

The Contractor shall ensure that the pipe when placed in the trench is supported and surrounded by a bed of sand, which shall be stone free, in order to ensure no damage occurs to the pipe.

The Bedding of fine sand shall be placed to a minimum thickness of 100 mm at below of pipe i.e “PRE PAD” and 100 mm at top of pipe i.e. POST PAD.

In case of rocky terrain bedding of fine sand shall be placed to a minimum thickness of 150 mm below of pipe and 100 mm at top of pipe.

Unless directed by the EIC the quantity of bedding and filling fine sand shall confirm specifications. There shall be no void space in the bedding and filling of fine sand around the pipe.
15.0 LAYING

Main line

CONTRACTOR shall intimate before laying of pipe to TPI / EIC well in advance. Laying of MDPE pipelines shall be commenced only after ensuring proper dimensions and clean surface of the trench and after clearance from TPIA/EIC. The trench bottom shall be free from the presence of cuts, stones, roots, debris, stakes, rock any other material, which could lead of deep scratches/perforation/tearing of the pipe wall. After ensuring above and sand bedding of trench bottom, the MDPE pipe coil shall be uncoiled smoothly through proper equipment’s/care inside the trench ensuring no damage to pipe coil during laying. Special care shall be taken to ensure that the uncoiling is properly controlled and can not hit persons nearby the work area. Also, the area, where the pipe is to be uncoiled, shall be made free of sharp objects.

CONTRACTOR shall examined Pipe bore / inside for cleanliness prior to lining up and all extraneous matter shall be removed and the extreme end shall be capped before laying.

Contractors shall ensure open ends of pipe placed in the trench shall be securely capped or plugged to prevent the ingress of water or any foreign material as this could cause a future blockage of pipe or regulator malfunction due to dust, etc.

The trench after this can be released for back filling leaving adequate lengths open at the ends, for jointing.

In case trench is flooded with water due to damage of utilities or due to rain Dewatering shall be carried out prior to laying of pipe. No laying shall be allowed if the trench is not completely de watered.

Direction change, turning of PE piping shall be made by welding PE EF fittings However, use of elbows for change in direction shall be minimized and natural bending of PE pipes shall be used wherever possible and as per instruction given by TPIA/EIC.

The PE pipe natural bend radius shall be maintained if

- No joint in the bend : Min. 15D
- With Joint in the bend : Min 35D

All drains / culverts / nallah should be crossed below the bed level and PE pipe to be laid through RCC Hume pipe, provided by contractor, unless and until specific approval is obtained from Site Engineer in writing.

PE pipes shall be laid with a minimum clearance of 500 mm from other underground utilities, unless otherwise agreed with the Site Engineer.

PE pipes shall be laid at a centre of trench with a minimum clearance of 150 mm from both the wall of trench unless otherwise agreed with the Site Engineer for proper padding of soft soil /sand etc as per requirement.

Where given specific approval by the EIC, a pipe may pass through an open drain or nallah, the pipe shall be installed inside a concrete or steel sleeve for protection. The sleeve material shall be procured and laid by the Contractor, with prior approval of the EIC for the quality of material. In general the GI Sleeve and MS sleeves material specification shall be confirming to IS 1239 (Heavy Duty) specification of reputed make. The rate for payment of GL sleeve shall be inclusive in line items rate of PE laying work.

All other related work necessary to break through the walls of the obstruction and to seal the annulus between the pipe and the sleeve and the wall, shall be deemed to be included in the rates.

Contractors shall ensure adequate cleared spacing at PE insertion point to avoid difficulty in PE insertion/laying.
In case of open cuts and moling, where two pipes are to be laid parallel in same trench or same pits, 30% of the respective SOR Item rates of the lower size pipe shall be paid extra.

Valves shall be installed at locations shown on the Design Plan or directed by the EIC and joined with PE pipes by electro fusion techniques.

To the extent possible, the valves shall be placed on a concrete square block at the bottom to achieve equivalent support of the incoming and outgoing pipe work, else suitable arrangements to be made to place the regulator.

After installation of PE Valve, valve chamber to be constructed as per the approved specification and drawing of Owner.

Rough sketches of Graphs with details of depth, length, offsets from fixed references, other utility crossings, fittings, sizes of the casing pipe used for the pipeline shall be prepared on daily basis and to be submitted to EIC. This details shall be further be incorporated into As-Built Drawings.

**Service Line:**

The service pipe rises out of the ground at the customer’s premises through GI pipe sleeve / Half Round Concrete sleeve as mentioned below:

**Half Round Concrete Sleeve (Tender drw no. : TEIND-STD-G-M-9015):**

The installation of Half Round Concrete sleeve for service lines shall be done by sealing the annulus between pipe and sleeve, firm fixing of the Concrete sleeves by concrete mix pedestal, clamping, sand filling, etc.

All other related work like necessary to break through the walls of the obstruction and to seal the annulus between the pipe and the sleeve and the wall shall be deemed to be included in the rates.

### 16.0 JOINTING OF PE PIPE BY ELECTROFUSION FITTINGS

The procedure for jointing of PE pipes and fittings as mentioned below.

Only Bar coded electro-fusion machine (Automatically Readable) that can read the bar code of the fittings automatically shall be used for joining of the MDPE pipes/fittings. Manual feeding Electro-fusion machines are not acceptable for jointing purpose.

The contractor has to submit the calibration certificate of Electro Fusion machine with bar coded control unit at the time of start of work and at fixed intervals as per the instructions of Owner.

Contractor shall ensure that the machines are always available at site.

For electro-fusion jointing, the contractor shall bring own tools, tackles and equipments including DIESEL GENERATOR SET with ELCB having a adequate capacity of power required for electro fusion machine.

Taking power connection form electric poles, connections without written permission from the concerned authorities or residential premises is strictly not permitted.

Contractor shall also arrange double insulated cables, Industrial power board with 3-pin plug, Proper earthing of equipments etc.

Failure in arrangement of tools, tackles and equipments in time shall be penalised as per SCC of tender which shall be laid as per SCC Clause of 29.0 of Volume IA of II of commercial.
Only approved manufacturer supplied of electro fusion fitting materials as well as accepted at site by Owner or owner’s representative shall be used for electro fusion for PE pipes & fitting.

Only registered, qualified and certified / approved welders / jointers shall be allowed to make joints on the MDPE pipeline.

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/TPI as per the standard procedures forwarded by Owner/TPI.

All approved Jointers shall bear identity cards signed by Owner /TPI during fusion job and shall furnish the same on demand by Owner /TPI. Applicable penalties shall be levied, in case, it is found that fusion is being carried by non-qualified jointers as per the provisions made in Special Conditions of the Contract and penalty shall be laid as per SCC Clause of 29.0 of Volume IA of II of commercial.

Welders / Jointers shall carry ID card issued by the approved welder training agency / TPIA / EIC on site. Welders/ jointers shall not be allowed to make a joint in case if he is not carrying the ID card on site. Any new welder shall be registered first with Owner and shall get training with Owner approved training program at contractor’s expense.

Owner can instructed to contractor to send any fusion joint on random basis in the approved laboratory to verify the strength & fusion procedure. For this testing, the cost shall bear by the contractor, Owner shall not pay any addition cost for the same.

CONTRACTOR shall arrange all the tools required for Electro-fusion welding, as specified below

<table>
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<tr>
<th>Cutting</th>
<th>Pipe Cutter for Pipe Cutting (Rotary Cutter up to 63mm/Guillotine Cutter for 63mm and above)</th>
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<tr>
<td>Scrupping</td>
<td>Universal Scrapper up to 63mm / Rotary Peeler for 63 mm and above</td>
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<td>Isopropyl Alcohol and Lint free Tissue Paper for Degreasing and cleaning</td>
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</tr>
<tr>
<td>Welding</td>
<td>Electro-fusion Machine with Voltage stabilizer, Generator Set 5.5 KVA</td>
</tr>
</tbody>
</table>

All Electrical accessories in working condition, Wooden box for Electro-fusion machine.

The Contractor shall ensure that polyethylene pipe is only cut with an approved plastic pipe-cutting tool (Rotary Cutter up to 63mm/Guillotine Cutter for 63mm and above). Before fusion is attempted, the contractor shall remove the oxidised surface of the pipe using Universal Scrapper up to 63mm/Rotary Peeler for 63 mm and above before inserting into the electro-fusion coupler. The tool must remove a layer of 0.1 mm to 0.2 mm from the outer surface of the polyethylene pipe.

No fusion shall be allowed without clamping device and the approved cutting tools (Hack saw shall not be allowed for cutting the pipe).

The contractor has to supply all the consumables required for carrying fusion of the joints (like tissue paper, napkin, acetone etc.)

After fusion is completed, Pipe alignment clamp used for coupler & top load clamp used for saddle shall be kept in position till the cooling time mentioned on the fitting is over.

Contractor site supervisor shall prepare welding joint report as per the approved joint numbering system. Welding joint report shall be submitted to EIC for verification before
pneumatic testing of the particular site. Joint numbers shall be written on each joint with the help of permanent marker pen after cooling of the joint.

If, upon inspection, the EIC determines a joint is defective, Contractor shall remove the joint by an approved method. The cost of replacing joint shall be borne by the Contractor including the cost of pipe and fittings removed.

Jointing of PE pipes shall be as per Owners technical specification. Jointing shall be carried out by electrofusion method only.

**Electro Fusion Fitting Jointing**

For electro fusion fitting jointing, an electrical resistance element is incorporated in the socket of the fitting which, when connected to an appropriate power supply, melts and fuses the materials of the pipe and fitting together.

Manual feeding Electro-fusion machines are not acceptable for jointing purpose.

**Only Owner approved manufacturer supplied electro fusion fitting accepted and shall be used for electro fusion for PE pipes &fitting.**

The effectiveness of Electrofusion fitting technique depends on attention to the preparation of the jointing surfaces, in particular the removal of the oxidized surface of the pipe over the EF Fitting depth and ensuring the jointing surfaces area clean. Also, the pipe should be checked for ovality. If ovality causes a gap between concentrically located pipe and the fitting to exceed 1% of the pipe OD, the pipe must be re-rounded by proper tool to ensure correct EF jointing. 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.

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.

Sometimes coiled pipes may be too oval to fit into EF Fittings, 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.

**Equipment**

a. The control box (Electrofusion unit) 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 boxes are to include safety devices to prevent excessive voltages being present at the control box output. The safety device 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 into the trench.
b. Pipe cutters with saw and saw guide shall be used to cut pipe ends to be joined at right angle.

c. A mechanical pipe surface preparation tool (Pipe scrapper) shall be used before fusion is attempted. The tool is to be 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 0.1 – 0.2 mm thick from the outer surface of the pipe preferably in a continuous strip over that length and round of the pipe.

d. Pipe alignment clamps for restraining, aligning and re-rounding the pipes in the fusion process shall be used for all types and sizes of EF fitting.

e. Protection against adverse weather conditions like rain and excessive heat in summer.

f. The contractor has to submit the calibration certificate of Electro Fusion machine with bar coded control unit at the time of start of work and at fixed intervals as per the instructions of Owner. Contractor shall ensure that the machines are always available at site. No stoppage of work due to the non availability of machines shall be allowed.

g. For electro-fusion jointing, the contractor shall bring own tools, tackles and equipments including DIESEL GENERATOR SET with ELCB having an adequate capacity of power required for electro fusion machine

h. Contractor shall also arrange double insulated cables, Industrial power board with 3-pin plug, Proper earthing of equipments etc. Contractor shall ensure that Bare cable without proper plug shall never be used by their manpower at any site for any purpose.

**Electro Fusion Jointing Method / Procedure**

**Preparation**

a. Ensure there is sufficient space to permit access to the jointing area in the pit/trench.

b. Check that the pipe ends to be jointed are cut at right angle or square to the axis of the pipe by using proper pipe cutters and any burrs removed. PE pipe cutting with Hacksaw blade will not be allowed in any case.

c. Check visually that the pipe/fitting surface is free of defects such as cuts, abrasion etc. and wipe pipe ends using clean lint-free material to remove traces of dirt or mud or grease etc up to at least 100 mm length. Avoid using excessive ovalized pipes. Ovality of the pipes to be removed by using Re-round tool

d. Mark the area over which the oxidized pipe surface is to be removed, i.e. In excess of the insertion depth, on each pipe to be jointed by placing the EF Fitting 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 an indelible marker pen or similar. The scraping area must be 10mm larger than the insertion depth of the fittings.

e. Remove the oxidized surface from the pipe, by scraping it. Remove a uniform surface for a depth of approximately 0.1mm for pipe diameter upto 63mm and 0.2 mm for pipe diameter higher 63mm.

f. AVOID ABSOLUTELY other scraping equipment such as abrasive paper, rasp, emery wheels, saw blades, etc other than Mechanical/Manual scrapper.

g. A mechanical scrapper could be used however; there is a considerable risk that the end preparation will not be adequate with the use of such a tool, so extra care shall be taken during scrapping with mechanical scrapper.

h. Before inserting the PE pipe into the PE fitting, clean the scraped surface using isopropyl alcohol to remove the dust.
i. Remove the fitting from its packing and clean the scraped area of the pipe surface and the bore of the fitting with a disposable or tissues wipe impregnated with isopropyl alcohol. Ensure the prepared surfaces are completely dry before proceeding.

Note that

➢ The prepared pipe surface should not be touched by hand.
➢ The fitting should not to be removed from the packaging at this stage.

j. The aligning clamp must be used for all types and sizes of EF fittings to be joined which

➢ Protects, during the electrofusion and the subsequent cooling, mechanical stresses on the jointing.
➢ Does not allow possible off centering between both ends to be jointing and to recover the out of round of parts, if ovalized.

k. In case of EF coupler jointing, sign a mark using an indelible pen on the two ends to be welded corresponding to the depth of insertion, in general equal to half length of the coupler.

l. Insert the coupler on both pipes up to marking and fasten the pipe into the aligning clamp.

a. Connect the electro fusion control box input leads to the generator.

m. Check that the reset stop button, if fitted on the control box, is in the correct mode.

n. Check that there is sufficient fuel for the generator to finish the joint. Start the generator and check that it is functioning correctly.

o. Switch on the control box, Connect the control box output leads to the fitting terminals and check that they have been fully inserted and proceed with the set-up of the jointing parameters, strictly following the instructions of the fusion unit.

p. Press the start button on the control box and check that the heating cycle is proceeding as indicated on the display.

q. When the fusion cycle is completed, verify the fusion indicators coming out. The fusion indicators are located near the terminal connection of the fitting. If there is no apparent move in the melt indicators, the joint should be cut out and a fresh joint made (See note below).

WARNING: The coming out of the fusion indicators is only a confirmation that the heating cycle has been occurred, and not an indication that the jointing cycle is correctly done

r. If a satisfactory joint has been made, the joint is to be left in the clamps for the cooling time specified on the fitting or the automatic control box. Cooling, in order to avoid possible stresses on the jointing, strictly respect the cooling time indicated on the bar-code and do not remove aligning clamp of the fittings. In no case artificial cooling by placing wet cloth or sprinkling of water be allowed.

Note 1: Bar coded EF units are available which obviate the need to enter the fusion time. Manually feeding of fusion time in EF unit shall not be allowed.

Note 2: Gloves and goggles should be worn during the Fusion process.

Note 3: If there is an accidental interruption during the joining cycle, operation can only be repeated after the electrofusion joint has totally cooled (min. 1 hour) This operation can be done only once.

Note 4: 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.

Records
Records of appropriate servicing and calibration of Electrofusion unit shall be kept at site.

Training

It is necessary that operators, inspection and supervisory personnel acquire the skills of electro fusion fitting fusion. The necessary training should be carried out by a 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 fitting joints from pipes and fittings of different sizes.
- Inspect for and identify joints of acceptable quality.

Electro Fusion Saddle Jointing

a. With electro fusion saddle jointing, an electrical resistance element is incorporated in the base of the saddle which, when connected to the appropriate power supply, melts and fuses the material of the fitting and the pipe together.

b. The success of the technique depends on effective preparation of the jointing surfaces, in particular the removal of the oxidized surface of the pipe over the area equivalent to the fusion area of the saddle, and cleaning of the pipe surfaces.

c. Top loading clamp shall be used for holding the tapping tee saddle during the fusion cycle. In some cases, if the manufacturer’s procedure for holding the fitting is provided, then the same should be followed during the fusion cycle.

Squeeze-off

a. To control the gas flow a special tool may be used to squeeze the pipe walls together. Hydraulic squeezing tools are used to supply the necessary force to compress the pipe walls for sizes 90 mm and above. Manual squeezing tools can be used for squeezing below 90mm PE pipes.

b. As will be seen the squeeze-off equipment comprises two bars to apply pressure to the 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 squeeze off tool should have a 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 some reduction in the 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 then a second squeeze can be used. A second squeeze-off distance should be a minimum of three pipe diameters and right angles to the initial 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 a squeezing operation.

17.0 BACKFILLING

17.1 Trenches excavated during the day shall be backfilled by evening before workmen leave the site unless, otherwise as approved by the Owner Engineer In charge.
Backfilling shall be done after ensuring that appurtenance have been properly fitted and the pipe is following the trench 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.

**The Contractor shall supply all necessary pumping equipment and power sources to de-water trenches and excavations as required by Owner.**

Prior to backfilling it should be ensured that the Pre and Post padding of compacted thickness 100 for soft soil and 150 mm for rocky area is put below, around and above the pipe immediately.

Trench is filled with fine sand around the pipe as per the specification given in this document and soft graded soil layer up to 150 mm to be backfilled above layer of sand immediately after lowering where required.

Backfilling shall be carried out immediately after the post padding (where required) has been completed in the trench, inspected and approved by Owner/ TPI, 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 on the instruction of EIC.

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 trench and adjacent excavated areas on both sides of the trench to such a height which will, in Owner / TPI / A 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 landowner or authority having jurisdiction at no extra cost to Owner.

When the trench has been dug through driveways or roads, all backfilling shall be executed with sand/suitable material in layers as approved by Owner’s representative and shall be thoroughly compacted. Special compaction methods as specified may be adopted. All costs incurred there upon shall be borne by the Contractor.

The Contractor shall also ensure laying of PE Warning Tap 300 Micron in thick and 300 mm wide for below 20 mm, 32 mm and 63 mm PE laying and 1000 micron in thick and 300 mm wide for 90 mm , 125 mm and 180 mm PE laying of approved marking and colour of Owner, shall be placed on LP & MP PE pipeline in the trench after backfill of the trench up to a height of 300 mm on the top of the PE Pipes. The warning mat is to be unrolled centrally over the pipe section and thereafter further backfilling will commence.

Backfilling activity shall include watering and proper compaction of backfilled soil by jumping jack compactor, wherever required as per instruction of EIC and watering in layers of 150mm above the warning mat. Proper crowning of not more than 150mm shall be done. All the excavated material that could 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 jointing of pipes.
All the excavated material that could be used during the Restoration process shall be stacked and kept separately and properly.

**CONTRACTOR HAS TO ENSURE THE BACKFILL, WATERING, COMPACTION AND CARRYOUT A TEMPORARY REINSTATEMENT OF ALL PREMISES OF STATUTORY AUTHORITIES WORK SUCH AS ROAD, RAILWAY ETC AFTER COMPLETION OF PE LAYING AND JOINTING WORK IMMEDIATELY**

While random inspections if back filling is not as per the specifications, the Contractor will have to re-open the trench and rectify the back filling as per the Owner specification without any additional charge.

Debris and other surplus material shall be removed immediately after the back filling.

The contractor shall not be entitled for payment on laying & backfilling till the above activities are completed.

18.0 **MAJOR CROSSING**

Major crossings like River / Water Canal / National Highway / Four lane state Highway, Railway lines etc shall be done as decided by Owner or owner’s representative is not in scope of contract of MDPE laying & PNG installation or not cover in this tender. However, both ends with MDPE pipes shall be connected by the contractor under this tender terms and conditions with no additional cost to Owner.

19.0 **TRENCHLESS LAYING (MANUAL BORING (MOLING)/ HDD / CASING)**

Manual Boring (Moling), HDD and casing are to be considered as methods of trenchless laying and are payable under line items of SOR.

**FOLLOWING MUST BE ADHERED STRICTLY FOR SAFE EXECUTION OF MANUAL BORING (MOLING)**

- The Manual boring shall be carried out as per the requirement specified by Owner’s representative and approved procedures.
- The contractor has to carry out survey of the underground utilities before going for the Moling to avoid any damage to other utilities. No extra payment will be made for any trial / abandoned pits made during the survey.
- The contractor has to arrange sets of manual boring tools as per the approved specification/drawing of Owner. No boring tools other than the approved one shall be allowed at site.
- Contractor shall plan manual boring work well in advance before start of works with detailed drawing to be prepared and submitted to EIC for approval Contractor shall carry out assessment of risk involved at particular site and also submit mitigation plan to EIC for approval prior to manual boring.
- Contractor shall submit check list along with rough sketch showing location for proposed boring pit, boring route and other utilities, if any within the boring route with details of the each utility listed in consultation with society officials / individual house owner in case of a ground connection to EIC for approval.
- **The contractor shall ensure that the size of the hole shall not be more than 20% of the size of the casing / carrier pipes whichever is applicable.**
- The rates for Moling, 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.
- Any damages occurred to other utilities during the Moling operation shall be immediately notified and rectified by the contractor without any cost implication to Owner.
• 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, in case of Manual moling in continuous lengths, will be considered in the moling length.

• Contractor shall co-ordinate with Local municipal authorities, electricity departments & other underground utility operators and intimates them with detail drawing of proposed boring site. If possible, a joint site visit along with the concern officials may be arranged so as to avoid damage/accidents.

• 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 Owner.

• Contractor shall obtain Work permit or prior approval before manual boring activity from EIC.

• Final depth of the boring shall be arrived based upon location all other underground utilities enrooting the boring path and maintaining safe distance of Minimum 500 mm from the deepest existing utility.

• In case of electrical cable on the route of boring path, electrical supply, if possible, shall be cut off during boring operation in coordination with local electrical utility company.

• Maximum length of boring at one stretch shall not exceed 5 Mtrs to the extent possible.

• Contractor shall ensure proper tools & tackles, PPE’s listed below to be provided to labour at site. Fire extinguisher & all other safety precaution shall be provided by the contractor at site prior to starting of the work.
  • Hand gloves
  • Gum boots
  • Helmet
  • Boring tool must be electrical shock proof.

• Contractor shall ensure that only one man at a time shall excavate in a confined space. A second man shall to watch & be alert for any emergency handling Contractor shall ensure that execution of manual boring work is under continues supervision by their experience supervisor till completion of work.

• Contractor shall ensure that boring pit shall be properly cordoned at all times till completion of work.

• Contractor shall ensure that after completion of Moling/boring the hole and boring pit shall be properly compacted / filled with soil by watering as approved procedure and the boring pits and others work shall be restored immediately after completion of work to the satisfaction of EIC.

• Contractor shall ensure that boring pit is large enough to work in comfort till completion of work.

• If there is water seepage into the bore of pipe manholes. Manual boring shall not be done on that location.

• If the ground is unstable, Contractor shall provide timber to support the boring pit for saving it from collapse. If the excavation is 1.5Mtr. deep or greater the boring pit must be timbered irrespective of depth. In either case of alternative to timbering is to better the sides of the excavation Contractor shall ensure that labours performing boring are well trained in the use of tools, use of PPE’s. Safety & boring procedure shall be informed / conveyed by contractor in presence of Owner EIC and records of such training of boring work shall be available with the contractor for auditing by Owner officials, as and when required.

• Contractor shall ensure that, Manual boring must be executed only day light. Boring work in the night is strictly prohibited.

• PE pipe may be laid by manual boring technique by prior approval of Site Engineer. Provision of manual boring tool shall be in the scope of contractor and the same shall be as per approved drawing / specification of Owner.
• After completion of Manual Moling the hole shall be properly compacted / filled with soil by watering and by approved procedures.

• Manual boring rate will not applicable for intermediate open cut excavation.

**Augur Boring / HDD (Horizontal Directional Drilling) - PRESENTLY, IT IS NOT IN THIS TENDER SCOPE.**

• Boring / HDD is required to be carried out where conventional trenching/Moling is not possible viz. Railways, major waterways, highways, roads, congested areas etc.

• The Contractor shall obtain details of such crossings and the Contractor in consultation with Owner shall prepare construction drawings.

• Execution of the work shall be based on the Owner’s representative approved drawings.

• The contractor has to carryout detailed survey of the underground utilities before commencement of Boring / HDD to avoid the damage to the other utilities.

• No other extra payment shall be made for any trail/abandoned pits made during the survey.

• The supply of all equipment required for carrying out the Boring / HDD is in contractor’s scope.

• The Boring / HDD operation shall be carried out in accordance with API-1102.

• The type of Boring / HDD to be carried out i.e., conventional / with or without casing shall be at the discretion of Owner.

• Contractor shall obtain Work permit or prior approval before manual boring activity from EIC.

• The rates are inclusive of excavation of pits, jointing, pilot boring, bentonite cleaning, reaming, insertion of carrier pipe, backfilling, compaction, etc.

• The type and availability of machines is sole responsibility of the contractor and as per the site conditions & requirements to entire satisfaction of EIC.

• The length of the Hole (excluding the sizes of the pits on both ends) shall be considered for the measurement of Boring / HDD length.

• Boring / HDD rates is payable as per line item of SOR, per sizes of carrier pipes whereas no extra payment shall be made for the pits excavated, jointing, insertion of carrier pipes, backfilling with excavated Soil / Soft Soil/sand including watering, compaction, restoration etc for laying of the pipeline through Boring / HDD.

• In case of Rock Drilling, the rates are applicable for all types of rock surfaces.

• Any damages occurred to other utilities during the Boring / HDD operation shall be immediately notified and rectified by the contractor without any cost implication to OWNER.

• Boring / HDD profiles should be properly marked/recorded in graphs as per scale before it is drafted in the as built drawing.

### 20.0 RESTORATION

20.1 Wherever the restoration to the original surface condition is in the scope of Owner or as directed by EIC. all roads, footpaths (including roads and footpaths inside colonies) shall be restored to original condition, and the same shall be done as per CPWD/ IRC or any other applicable norms and to the satisfaction of the concerned local Authority / Third Party Agencies designated by Owner. To retard curing of the installed concrete, wet sackcloth is to be placed on the finished surface and kept damp for a period of 36 hours

**CONTRACTOR HAS TO ENSURE THE BACKFILL, WATERING, COMPACTION AND CARRYOUT A TEMPORARY REINSTATEMENT OF ALL PREMISES OF STATUTORY AUTHORITIES WORK SUCH AS ROAD, RAILWAY ETC AFTER COMPLETION OF PE LAYING AND JOINTING WORK IMMEDIATELY.**
The restoration to the original surface condition is in the scope of contractor and the same shall be restored to its original condition as directed by EIC and the same shall be done as per to the satisfaction of Owner’s EIC/Owner’s representation. To retard curing of the installed concrete, wet sackcloth is to be placed on the finished surface and kept damp for a period of 7 days.

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 lying. 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 procedure for restoration of Road / Footpath, placed is only indicative. However, the restoration shall be done in accordance with the norms of the 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 restoration 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.

**Note that payment for restoration will be released only after satisfactory completion of restoration and clearing the sites of all surplus materials, submission of NOC etc.**

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 restore the defective work.

Contractor has to obtain the No Objection Certificate (NOC) from the concerned local authorities after completion of the temporary or permanent restoration work. The restoration specification specified in the tender is only a typical specification and the contractor has to carry out restoration as per the latest version concerned local or statutory Authorities like R&B/NHIA/S/RAILWAY/Nagarpalika/ Panchyat etc specification to its temporary or original condition and also to the entire satisfaction of landowner (Private/Public).

### 21.0 TESTING

Pressure testing shall be carried out either with compressed air (free from oil and greases) or nitrogen and no other test medium shall be used. Compressed air or Nitrogen gas shall be provided by Contractor for testing purposes and is to be included in the laying rates. Nitrogen shall be supplied in labeled, tested and certified cylinders and complete with all necessary regulators, hoses and connections which shall be in good order and working condition. No extra payment will be made for any delays incurred, or repair or rectification work found necessary as a result of test failures, where this is the result of faulty workmanship or negligence on the part of the Contractor.

For both main & service pipeline laying, the Contractor shall perform progressive pressure testing & pneumatic testing to ensure no leaks in long lengths of pipe.

Schematic drawing of PE network to be tested shall be prepared with clearly marked pressurisation point, Venting point, PE Valve/s Location.

Prior to pressure testing of PE network, proper flushing shall be done with Compressed air of Nitrogen for the entire PE network to the satisfaction of EIC by the contractor and get approval from Owner representative,

The pneumatic test pressure shall be 6.0 Kg / cm², and there shall be no unaccountable pressure loss during the test period.
The holding period of test section of MDPE main pipeline network at least 24 hrs after pressure stabilization period of 30 minutes. The holding period may then commence and continue for 24 hours.

In some cases, Services line testing shall be carried out independently from main MDPE Network / pipeline, then the test duration may be reduced to 4 Hrs. In this case, the service testing shall be performed after the service installation but before the service tee tapped. Also in some cases the tapping of the service tee will be delayed pending the completion and purging of the main pipelines.

Contractor shall ensure following before starting of pneumatic testing.

- Tested hoses / hoses tested at required pressure and clamps to be used.
- Area of testing to be away from populated area or sand bags to be kept around so that in case of accident it acts as barriers.

If compressed air is being used for pneumatic testing contractor, shall ensure that compressor of appropriate capacity is being used.

If Nitrogen is being used for pneumatic testing, Contractor shall ensure industrial nitrogen purity by checking oxygen % in the cylinder as per Owner guidelines.

Contractor shall ensure that testing section of PE pipeline is completely isolated positively.

Measuring instruments shall have been calibrated and their accuracy and sensitivity confirmed before the start of testing, where in, calibrated pressure gauges of suitable range shall be supplied & used for testing by the contractor.

The range of pressure gauge is minimum 1.5 times of test pressure and least count of gauge should be 0.1 Kg/cm2.

The pressure gauges shall be calibrated from time to time as desired by EIC.

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.

The testing shall include, but not be limited to the provision of consumable and Non consumable materials, tools, tackles and equipments, Personal Safety Equipment, Fire Extinguisher, Adaptor, Polyethylene connecting pipe etc.

22.0 PURGING

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

The Contractor shall also provide nitrogen required for purging as per the direction of EIC. Nitrogen shall be supplied in labelled, tested and certified cylinders and completed with all necessary regulators, hoses and connections, which shall be in good and working condition.

No separate payment shall be paid for supplying Nitrogen cylinders for purging of max. Line pack Pressure as 2 Bar and is included in the laying rates

Prior to use of nitrogen cylinder, Contractor shall ensure industrial nitrogen purity by checking oxygen % in the cylinder as per owner guidelines

In addition, the Contractor shall submit purging plan and get approval from Owner / Owner representative 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 Adaptor, Purge stack with flame trap and gas sampling point, Gas sampling equipment (may be gas leak detector), squeeze-off tool etc.

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.

23.0 INSTALLATION OF SERVICE REGULATOR (SR) MODULE

Location for Installation of service regulator shall be decided by EIC

Contractor shall ensure that the Service Regulator module is installed and supported on a bed of firmly compacted as per the drawing provided in this document.

The scope of work and technical requirements associated with the Installation of Service Regulator Module of inlet pressure 1.5 to 4.0 bar (g) and Outlet pressure 110 mbar(g) supplied by Owner are as follows.

- The SR module shall be a complete pre-fabricated unit, including all valves, fittings, test points and ancillary fittings.
- The SR module shall be supplied with pre-tested and ready for installation by Owner and frame mounted with housing or canopy.
- Contractor shall carry out all the necessary excavation/breaking of surface(Tar/RCC) etc. For Installation of Service regulator module as per the foundation drawing/specification attached TE-IN Drawing No.: TEIND-STD-G-M-9016.
- Installation of Service Regulator should be in such a position that Flow direction of Service Regulator and gas flow in pipeline is in the same direction while connecting upstream and downstream of PE network.
- Contractor shall ensure that usage of 90 degree EF elbow, Coupler for hook-up of the Service Regulator for 63mm and above size pipeline.
- Contractor shall apply Golden yellow colour on foundation of Service Regulator
- Contractor shall connect inlet and outlet of service regulator module by appropriate EF fitting with transition fitting of SR module.
- Contractor shall carry out functional testing of service regulator and carry out leak test prior to commissioning of service regulator as per instruction of EIC
- Contractor shall carry out leak test of all the joints of Service Regulator module with soap solution during commissioning as per the instruction of EIC.

GUIDELINES FOR SELECTION OF LOCATION FOR INSTALLATION OF SERVICE REGULATOR:

Location selection for Service Regulator is very significant activity for safe and uninterrupted gas supply to Domestic customers. EIC will decide and intimate the installation location of Service Regulator module to Contractor. However the guidelines for selection of location for installation of Service Regulator module is as per the below.

Wherever possible, Location is to be selected inside the premises immediately after entering into premises i.e. Apartment premises, Society premises etc. However, in most of the cases it is not possible to install Service Regulator besides the main/sub/internal road. To select the location for installation of Service Regulator, following criteria needs to be considered.
Preferred Location

**Private premises**: If possible, immediately after entering and adjacent to boundary wall of private premises.

**Foot-path**: If Foot-path is available near planned location.

**Min. Distance to be maintained**

- 10.0 Mtr. from any turning / junction of the road.
- 15.0 Mtr. from Bus stand or public gathering spot.
- 15.0 Mtr. from any above ground electrical installations i.e. Transformer, Junction box, Pole etc.

**Location to be avoided**:

- Water logged area
- In front of Entry / Exit of building / Shop etc.
- Garbage collection centre/point

**INSTALLATION & TESTING OF SERVICE REGULATOR**

- Pre-commissioning testing for performance of safety devices i.e. UPSO, OPSO, and Relief valve, which is integral part of Service Regulator, shall be done.

- The set pressure of Service Regulator for different features are as per the below.
  - **Set Pressure**: 100 – 110 mbar
  - **UPSO**: 50 mbar
  - **OPSO**: 150 mbar

- All electrofusion joints (SR Hook up joints) shall be checked with soap solution before commissioning of Service Regulator.

**COMMISSIONING OF SERVICE REGULATOR**

- Ensure all installation and pre-commissioning activities as mentioned above are completed.

- Inlet and Outlet valves shall be kept in closed position.

- Gas in upto inlet valve of Service Regulator by opening of Valve/squeeze tool.

- Leak test shall be carried out upto upstream of inlet valve.

- If no leakages found, open inlet valve of Service Regulator and ensure no leakages upto outlet isolation valve.

- Monitor Outlet pressure of Service Regulator upto 4.0 minutes before opening outlet valve.

- Ensure positive lock-up pressure (to confirm no leakages or open end during commissioning) in downstream network before opening outlet valve.

- Ensure that not a single domestic connection has been connected through downstream of the network which is to be commissioned.

- Release lock up pressure before opening outlet valve of SR and by keeping inlet valve closed.

- Slowly open inlet valve first and subsequently outlet valve of Service regulator to allow Gas – in the downstream network.
24.0 INSTALLATION OF PE VALVE & CHEMBER

PE Valve

The location for installation of PE valve shall be proposed by contractor and decided by EIC and shall be installed at installed at every 1.0 km on PE Medium Pressure network.

RCC Valve chambers / pits shall be constructed for valve size of 125 mm Dia. & above sizes and Brick valve chambers / pits shall be constructed for valve size of 125 mm Dia below in accordance with tender drawings. However, Owner EIC shall reserve the right to decide the type of construction of RCC or Brick valve chamber as per the site Condition. Payment for the construction of valve chamber shall be as per tender SOR.

The construction of the valve chambers shall be taken up immediately after installation of valve.

The PE Ball valve shall be supported on a bed of firmly compacted and construction of RCC or Brick Valve chamber shall be as per attached TE-IN Drawing No.: TEIND-STD-G-M-9012 & TEIND-STD-G-M-9013 in the tender.

Materials for pre cast / fabricated SFRC Valve chamber cover.

SFRC Pre-cast Slab shall conform to IS: 456. Heavy Duty RCC Manhole Cover / Slab shall be used. It shall be with raised with Lifting hooks. The RCC manhole cover / Slab shall have a clear opening as per the Construction Drawings issued to the contractor.

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 shall be placed below pipeline without disturbing the laid pipe.
- Gunny bags and Sand should be of approved quality.
- PCC shall be placed below the pipe as indicated in the applicable standard drawing. Once PCC is set then approved quality of sand shall be filled and properly rammed so that pipe and pre-cast concrete blocks are firmly placed.
- Valve shall be issued by Owner without Operation Stem.
- Valve chamber shall be construction to cover the PE Valves. A care shall be taken during installation of valve chamber against damage of PE Pipes as well as PE valves. Then approved quality sand shall be filled in the valve chamber as per instruction of Owner EIC.
- The supply of sand is included in the rates as per line item of SOR. No separate payment shall be made against supply of approved quality of sand required for installation of valve chamber.
- Supply of Pre cast Valve chamber frame and cover of valve chamber for PE valve installation is inclusive.
- PCC shall be done around the location where pre-cast slab with SFRC Manhole cover is placed.
- The SFRC pre-cast slab shall be laid in level and finished smooth.
- Surrounding area to be properly cleared and restored its original conditions and to satisfactory of Owner or Owner’s representative.
25.0 PERMANENT MARKERS

25.1 It is strictly prohibited to install permanent markers without written approval from Owner/EIC only and must be as per approved drawing by Owner/EIC Only.

25.2 It shall be ensured the details to be written on pipeline marker as per approved drawing of Owner/EIC.

25.3 It shall be ensured the installation of pipeline route marker along with pipeline route as per direction / approved drawing of Owner/EIC.

25.4 Permanent Markers (As per Drawings enclosed with the tender document. TEIND-STD-G-M-9002) shall be fabricated, supplied and installed on the ROU at regular intervals as per PNGRB Guidelines or as per 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 contractor shall also ensure that a sample of all type of markers shall be inspected and approved by Owner / Owner representative before shipment of the lot at site and prior to installation at the site. The inspection of all types of markers shall be carried out lot wise.

25.5 The RCC Markers shall be painted before installation as per the approved procedure. Whereas the Pole marker (Markers with foundation) shall be supplied with powder coated Golden Yellow paint. The supply of the paint and application as per the specification is in contractor’s scope. Payment shall be paid as per relevant line item of SOR. Contractor shall obtain the approval lot wise & before installation at site from the Owner or Owner’s representative.

Guidelines for installations of Markers.

- PE Pipeline Markers shall be fabricated and installed as per the drawing No.: TEIND-STD-G-M-9004, Type -A at every 100 metres interval along the pipeline route.
- RCC Route markers shall be fabricated and installed as per the drawing No.: TEIND-STD-G-M-9005, Type- B after installation of 02 (Two) PE Pipeline Markers as per Drawing No.: TEIND-STD-G-M-9004, Type-A. Wherever, RCC Route marker (Type –B) installed along with pipeline route, there shall not be installed PE Pipeline Marker.( Type-B).
- Permanent markers with foundation (Drawing No.: TEIND-STD-G-M-9002) shall be installed at every one (1) kilometre interval along the pipeline. Wherever, permanent marker installed, ther shall not be installed the PE Pipeline Marker (drawing No.: TEIND-STD-G-M-9004, Type –A) and RCC Route marker (Drawing No.: TEIND-STD-G-M-9005, Type- B).
- For the distribution network 32 mm & 20 mm, markers shall be installed as per the site conditions and directions of the Site In charge.
- In addition to above, Pole markers with foundation shall be installed in individual societies / areas as per the instructions of the site in charge.

25.6 However, final decision shall be taken for installation of marker at site by EIC.

25.7 The artwork is typical for all the markers, with Owner’s logo on it. The contractor must take prior approval for the artwork from EIC before installation of Markers. The lot wise approval shall be attached with bills.

26.0 COMMISSIONING

Contractor shall provide the required personnel, Vehicles, labour, supervision, tools, equipment, instruments and technical assistance for performance tests, Pre commissioning and commissioning activities as per requirement / satisfaction of Owner /Owner’s representative.

Guidelines for commissioning of MDPE network

- NO NETWORK SHALL BE COMMISSIONED WITHOUT A VALID WORK PERMIT AT SITE.
Contractor shall take hot work permit from Owner, O&M before starting of Commissioning of MDPE networks and shall ensure the hot work permit available at site. Owner Engineer in charge of MDPE work shall check the same before starting of MDPE network.

Overall schematic drawing of section / AS BUILT drawing shall be prepared with clearly marked with Venting, Elevation, MDPE Valve/s Location, Existing end cap showing vent point. by the contractor and get approval from Owner/Owner representative. Prior to the start of commissioning of MDPE network.

Prior to the start of commissioning of MDPE networks, the following shall ensure

1. Proper flushing, Hydro testing & Pneumatic testing record of proposed section for commissioning of MDPE network.
2. Proper venting location / point
3. Proper barricading and warning sign board at venting /MDPE valve location.
4. Availability & Installation of Calibrated pressure gauge
5. Ensure the EF jointing machine, DG Set etc with ELCB (Earth leak circuit breaker)
6. Ensure availability of calibrated methane detector / Gascoseeker
7. Ensure availability of additional Squeeze tools for emergency
8. Ensure the traffic controlled by man and diversion at the time of Gas In

27.0 STANDARD OF WORK

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. The manpower deployed on the respective work shall be adequately trained and 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.

Fusion Operators and other skilled personnel like plumbers, conversion techniques shall be approved by Third Party Inspector Agency/Owner’s representative. Simultaneously Identification Cards duly signed by Third Party Inspector Agency/Owner’s representative shall be issued to them. The contractor shall maintain proper record for the identification cards issued to their workers.

28.0 RECORDING (AS-BUILT DRAWINGS)

The following points shall be taken care to the preparation of as built drawings.

a) The as laid drawings should be in the scale of 1:100 and shall be submitted in an A-0 / A-1 sheet. The drawings shall be in layers according the AUTOCAD features category.

b) Pipeline feature shall be shown as a continuous line, breaks only at joints, fittings, valves, tee point, etc. Diameter, Pipe material, length, and location of pipeline whether on the road or footpath, should be clearly indicated.

c) Distance of pipeline from permanent property/structure should be provided at least every 20 metres. If there is any change in alignment / orientation and offset distances etc. Of the pipeline in between the above said 20 mtr, the same shall be clearly mentioned in the as laid drawings. Gas objects (off valves, tees,
elbows, couplers, transition fittings etc.,) shall be shown as block objects (which form a single node to connect) with respect to Owner symbols / legend. The As laid drawings shall be as per the approved legends provided by EIC.

d) Details & offset distances from other utilities present (e.g. BSNL/ MTNL etc.) should be given in as laid drawing. If there is any change in depth of the pipeline, the shall be clearly marked with details in the as laid drawings. The details (material, size & Length) of additional protection provided to pipeline shall also be clearly indicated.

e) Details of the PE stop off valves &. Other fittings used (i.e. tees, elbows, couplers, transition fittings, etc.) should be shown with adequate information orientation &. Offsets from permanent structures in the immediate vicinity.

f) Technical deviations (if any) should be provided with reference to the buildings permanent structures around, and the same should be cited clearly with all the relevant details, including separate sketches/Blowups / sectioned drawings / exploded view.

g) Total as laid-length (size wise), bill of materials or the bill of materials used for the particular area wise should be mentioned in each sheet of drawing.

h) Specific remark should be provided where sufficient depth is not maintained.

i) Complete details of nallah crossings should be shown in a separate sketch.

j) Names of roads, major landmarks and buildings should be mentioned appropriately for reference.

k) Proper chainage shall be mentioned on all the drawings to be referred with continuation reference.

l) Direction of gas flow shall be indicated in each of the drawings.

m) Text on the as laid drawing should be clearly visible.

n) Land base features shown on the drawing shall match the exact distance as they were on real ground with respect to scale (1:100).

o) As laid drawings shall be duly signed & stamped by area Owner or Owner’s representative.

p) The as-built drawing shall be submitted on area wise as specified.

q) The details shall be prepared in standard format using MAP INFO/AUTOCAD MAP and submitted CD RAM. 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.

r) The Contractor will be required to submit the computerized- Auto Cad version as laid drawings for PE pipe network duly certified by Site Engineer / TPIA appointed by Owner. The As laid drawing should include sufficient details for location of PE pipe line with respect to permanent structures, pipeline section length including surrounding utilities details.

s) Complete sets of As build drawing on tracings with requisite numbers mentioned in the Special Conditions Of the Contract.

t) The Contractor may use the route plans provided by Owner as the basis for recording mains installation.

u) Soft copies of route plans shall be provided to the successful bidder.

v) On-site sketches, picking up key reference points, shall be made during the installation of services.

w) The lengths, depths of installed pipe work, offsets from fixed references, changes in direction, major fittings, crossing details of trench less method etc, shall be recorded together with appropriate references to other services crossed and in the proximity of the gas pipe.

x) The details shall be prepared in standard format using available technology/software and submitted in CD ROM.

y) Contractor shall also make the item wise material consumption report for the respective areas in an EDITABLE soft copy and the same shall also be submitted along with the “as-built” drawings.
29.0 INSURANCE

The BIDDER is required to provide third party insurance to indemnify Owner from any claims arising from their work or actions for the quantum of work awarded. The insurance would cover the following:

- Injury to, or death of, BIDDER’s employees or their sub contractors, if any subject to approval of OWNER
- Injury to, or death of, members of the general public and Owner’s customers.
- Damage to the property and belongings of the general public and Owner’s customers.
- Loss or theft of any of Owner's materials or equipment entrusted to the care of the BIDDER.
- Cost of any claims arising from the damage of plant and equipment owned by any utilities.

30.0 CIVIL WORKS

GENERAL REQUIREMENT

The contractor has to supply the adequate materials and skilled manpower for the completion of all the civil works. The contractor shall also ensure that the work is carried out as per the details mentioned in the Schedule of rates.

Supplying, fabrication, installation / erection of structural steel/ chain link fencing / barbed wire / materials required for Earthing pits such as copper cable / copper rod/ copper flat, Copper or GI plate and all type concrete (Including shuttering of required in all types of concrete work including levelling course below foundation, substructures such as pedestals, pedestals bases, pipe supports, sleepers cable trench including construction joints, bitumen painting on surface in contact with soil, providing and fixing reinforcing steel, shuttering, inserts, finishes, Valves chambers, cable trench, under, floors, making recess, projections, fixing inserts conduit pipes (GI, PVC, HDPE, etc.) laying in alternate panels, filling the gaps between the panels with bitumen etc. making stops, finishing edges, leaving bars for pedestals & sleepers and any other locations. etc. at all depths and heights complete as per drawings, specifications and direction of the Engineer-in-charge.

Note: Rate to include cost of all labour, tools, tackles, equipment, hire charges, Supply of all materials, shuttering, earthwork in excavation and backfilling using approved earth in all conditions etc. with all bye works and sundry works.

Special cares shall be taken at the time of labours working in depths/lifting of the skids by hydreas/ cranes considering all the safety guidelines.

The contractor has to ensure that sample of the all the materials 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 Owner.

The contractor shall ensure extra / surplus materials / malba shall be immediately removed from the site after completion of the job.

APPLICABLE CODES & STANDARDS

The following Indian codes and standards shall be used for design of Civil and Structural works. In all cases, latest revisions with amendments, if any, shall be followed. Apart from the specific codes mentioned
herein, all other relevant and related codes concerning the specific job under consideration and/or referred to in these codes and technical specifications shall be followed wherever applicable. (All codes shall be latest as on the date of issue of the document in which this design basis is attached.

**LOADS & FORCES**

i. IS: 875 - Code of practice for Design loads (other than (Part I to V) earthquake) for Buildings & Structures

ii. IS: 1893 - Criteria for Earthquake resistant design of structure

**FOUNDATION**

i. IS: 1080 - Code of practice for design and construction of shallow foundations in soils (other than raft, ring and shell).

ii. IS: 1904 - Code of practice for design and construction of foundations in soils - General requirements.

iii. IS: 6403 - Code of practice for determination of bearing capacity of shallow foundations.


**CONCRETE STRUCTURES**


ii. IS: 1786 - Code of practice of specification for high strength deformed steel bars and Wires for concrete reinforcement.

iii. IS: 4326 - Code of practice for earthquake resistant design and construction of buildings.


v. IS: 432 - Code of practice of specification for mild steel and medium tensile steel bars and hard drawn steel wires for concrete reinforcement (grade I)

vi. IS: 13920 - Code of practice for ductile detailing of reinforced concrete structures subjected to seismic forces.


**STEEL STRUCTURES**

i. IS: 800 - Code of practice for general construction in steel.

ii. IS: 808 - Code of practice for dimensions of Hot Rolled Steel Beam, Column, Channel and Angle Sections.

iii. IS: 814 - Covered electrodes for manual metal arc welding of carbon and carbon manganese steel.

iv. IS: 2062 - Code of practice for Hot rolled low, medium and high tensile structural
vi. IS: 1364 - Code of practice for Hexagon head bolts, screws and nuts of product Grade A and B.

vii. IS: 1363 - Code of practice for Hexagon head bolts, screws and nuts of product Gr. - C.
x. IS: 2016 - Code of practice of specification for Plain washers.

xi. IS: 277 - Code of practice for Galvanized steel sheet (Plain and corrugated)
xii. IS: 1230 - Code of practice for Cast Iron rain water pipes and fittings
xiii. IS: 1728 - Code of practice for Specification for sheet metal rain water pipes upto 100mm nominal size gutters, fittings and accessories.


FIRE PROTECTION FACILITIES

i. OISD 117 - Fire protection facilities for Petroleum Depots and Terminals.
ii. OISD 118 - Layouts for Oil and Gas Installations.
iii. OISD 163 - Process Control Room Safety.

OTHER CODES

i. Indian Road Congress (IRC) Codes.
ii. NFPA Codes for Clean Agent and CO₂ system.
iii. IS Codes for Fire Fighting Equipment & for various civil works.

SYSTEM OF UNITS

All analysis & design shall be carried out using the International System (SI) of units (KN, Meter, etc.)

MATERIALS

Concrete

All RCC & PCC Construction shall conform to IS: 456-2000 and as specified in the general technical specifications.

The concrete Mix shall be of Grade M 20 (unless noted otherwise) as per specifications for all RCC Construction.

50 mm thick concrete pavement shall be constructed as per M-10 of RCC / PPCC including preparation of base such as compacted sub grade, 200 thk. Sand.

Cement

Only approved quality of ordinary portland cement Grade 43 for all the civil works conforming to IS code shall be used for the foundations and other works. For all concrete works below ground, sulphate resistant cement shall be decided in accordance with the Indian Standards based on the findings of the detailed soil investigation

If required, special type of cement shall be provided. However, before using the type of cement, approval shall be taken from Owner/Owner’s Representative.

Aggregate
20 mm down stone aggregate shall be used for concrete works.

Aggregates for concrete, mortar or for any other purposes shall always be free from earth, clay, loam, soft clayey, shale or decomposed stone, organic matter and other impurities and shall be hard and dense.


**Sand**

The sand to be used for filling under the floor and grading work shall conform to IS 383:1999 zone IV or zone V.

**Reinforcement**

Uses of Steel shall be Min. 2% of total volume of concrete.

Minimum 8 steel round bar shall be used for RCC works.

Reinforcement bars for RCC shall be HYS (High yield strength deformed) of grade Fe 415 conforming to IS: 1786 (minimum yield strength 415 N/mm²) and MS round bars for grade I conforming to IS: 432 part I.

**Grout**

Approved quality non shrink (premix type), free flow grout shall be provided for all anchor bolt sleeves, pockets & spaces under column bases, shoe plates etc. with a crushing strength of (28 days) minimum 40 MPa.

**Structural Steel**

Structural steel be used for general structural purpose shall be 410 MPa conforming to IS: 2062. The min. tensile strength shall be 410 MPa. The min. yield strength shall be as follows:

a. Thickness < 20mm 250 MPa
b. Thickness between 20-40 mm 240 MPa
c. Thickness > 40 mm 230 MPa

Welding shall conform to IS 814:1963

Structural steel shapes shall conform to IS: 808 (for hot rolled steel beam, column channel and angle sections).

**Anchor Bolt**

Materials for anchor bolts such as MS bars, washers, nuts, pipe sleeves and plates etc. shall conform to IS: 1363 & IS: 1364 of 1992.
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - INSTALLATION OF ABOVE GROUND GI PIPING & FITTINGS FOR DOMESTIC & COMMERCIAL CONNECTIONS
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1.0 INTRODUCTION & SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

SGL endeavours to expand its existing PE network as well as to lay Natural Gas Pipeline (PE) to reach out to new areas within SGL’s area of operation.

The main scope of this contract comprises the installation of above ground pipes in New as well as in Existing Gas charged areas. Including PE service lines and from the outlet of ‘PE/GI transition fitting’ up to the DOMESTIC/COMMERCIAL Customers ‘Appliance/stove/oven valve’ as per the enclosed drawing no. TEIND – STD – G – M – 9007, 9010, 9011, 9017.

The scope includes procurement & installation of above ground GI pipes and associated fittings for Commercial / Domestic Customers.

Except the free issue material, Contractor shall procure all the items such as Powder coated ½” NB, 1 NB, or 1 1/2” NB GI pipes, Powder coated ½” NB, 1 NB, or 1 1/2” NB GI fittings, excess flow check valve, Inlet/outlet brass adaptor for Meter / Regulator, PTFE Tape, Powder coated MS Pipe Clamp with Screw, Nozzle for Burner conversion etc. Required for installation of connection up to the Domestic / commercial customers “Appliance / stove / oven valve”.

In case of domestic connection, the piping shall be done up to Gas Tap and final connectivity up to the Burner shall be provided including conversion for use of NG. Refer Drawing No.: TEIND – STD – G – M – 9007, 9010, 9011.

In case of Commercial / Non Commercial connection, the piping shall be done up to meter outlet. Refer Drawing No.: TEIND – STD – G – M – 9017.

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 DEFINITIONS

OWNER/ CLIENT Sabarmati Gas Ltd.,( SGL)
CONSULTANT Tractebel Engineering Private Ltd.,(TE-IN)
PTS Present <<Particular Technical Specification>>and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at Site.
EIC Engineer – in – charge
QAP Quality Assurance Plan
VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials
CONTRACTOR The person, firm or company to whom the Work Order is addressed
CUMULATIVE LENGTH The riser length (excluding lateral tapping) shall be considered and averaged out among all the households, whereas the lateral piping
shall be included only for one particular connection

3.0 SCOPE OF WORK

Generally the following shall constitute the Contractor’s scope of work but not limited to:

3.1 CONTRACTOR shall prepare functional schedules and resource based on Scheduled of all the disciplines for the following:

- Procurement Schedule
- Construction Schedule

3.2 Contractor has to submit the Construction/Execution procedures and manpower list to be deployed at site before commencement of work to Owner’s representative in line with the Owner issued Technical specifications and QA/QC plans.

3.3 Prior to commencing any work on site, contractor shall obtain the permission for work from the concerned authority/ house owner and EIC.

3.4 Obtaining the approval for optimum route and permission for work from the concerned authority and EIC.

3.5 Above ground GI (Galvanized Iron) pipe installation at Domestic / Commercial customer premises and conversion of burner in case of Domestic connection as per the guidelines/specification given in this document

3.6 Tap-off from PE service/main PE pipe line (Ground Connection), Installation of GI pipes, transition fittings to connect Domestic / Commercial connection.

3.7 Day to day coordination with concerned authorities/ Society secretary/ House owner for smooth working at site,. Also Contractor shall not sign / execute any agreement and/or undertaking of any such documents which amounts to be undertaken by Owner and which shall only be signed and executed by Owner

3.8 Based on list provided by Owner of the registered customer, Bidder shall visit the customer premises for selection tentative route of installation as agreed by Owner representative and customer. Based on route selected, contractor shall prepare estimated debit note with BOM and in prescribe Owner format.

3.9 Contractor shall prepare the triplicate copy of each estimated debit note and handover one copy to customer and one copy to customer care centre on daily basis.

3.10 Upon payment & realization of estimated debit note amount and generation of services order, EIC shall issue a list of service orders of customer and work shall start only after receipt of such intimation.

3.11 Selection of route with the EIC / TPIA and marking the same 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.

3.12 Transportation, loading, unloading of Owner’s supplied materials from Owner’s designated stores to contractors store and then at site is in contractor scope.

3.13 All materials, equipment, trailers for transportation, loading, unloading, stringing etc. for Owner’s supplied materials is in contractor scope.

3.14 Receipt of Free issue materials from Owner’s stores, loading, and transportation, unloading at project site proper storing, stacking and identification.

3.15 Supply and Installation of powder coated GI pipes of sizes ½” NB, 1 NB, or 1 1/2” NB, between transition fittings (installed by PE contractor) to customer’s kitchen appliances including NPT threading on GI pipes, supply and application of TEFLOM tape on threads to join fittings like elbows, tees, brass adaptors, regulators, meters, appliance & isolation valves etc for leak proof installations, as per laid procedures and specification including clamping.
3.16 Colour touch up to be done on installed GI pipes after testing of the entire connection.

3.17 Supply of clamps for fixing pipes, Meters, box for regulator, wherever required, painting of pipes & fittings. Providing consumables grout material, repair / restoration of walls / floors changes for the pipes including the materials required for conversions and tools and tackles etc., complete as per specification.

3.18 Supply and installation of necessary screw and nuts for installation of GI pipes & others as per the specification given in this document.

3.19 Conversion of all types of LPG kitchen appliances to NG based appliances & to take customers Sign on Job card / joint Meter Records (JMRs).

3.20 Demonstration to the Customer regarding safe usage of Natural Gas, Guidance on Do's and Don'ts in case of leakage, safety and maintenance related aspects of NG based appliances and installations.

3.21 Pneumatic testing and commissioning of the GI installations, meters, valves etc as per specification and hand over the same to Owner/Customer to the entire satisfaction.

3.22 Dismantling of scaffolding/temporary structures and cleaning and restoration of the site to its original condition.

3.23 Restoration of walls (cementing on brick holes), flooring and other damages during execution of the above ground installation work

3.24 Provision and maintenance of proper store by the contractor near to the work area. Also ensure proper storing & stacking, providing security and insurance cover during storage, installation, commissioning and hand over the balance free issue materials to Owner.

3.25 The Contractor shall ensure removal and disposal of all waste materials and packaging.

3.26 The Contractor shall supply all necessary equipment and power sources to execute the work.

3.27 The testing, purging and commissioning of installation has to be done to Owner’s requirements. Pressure testing shall be carried out with air/nitrogen, and no other test medium may be used. Nitrogen cylinders shall be provided by the contractor. Nitrogen shall be supplied in labeled, tested and certified cylinders, and complete with all necessary regulators, hoses and connections which shall be in good order and working condition. No extra payment will be made for any delays incurred, or repair or rectification work found necessary as a result of test failures, where this is the result of faulty workmanship or negligence on the part of the Contractor.

3.28 Handing over the completed works to Owner for their operation/use purposes.

3.29 Maintaining the PNG installation till the commissioning and hand over to O&M

3.30 Returning surplus material to Owner stores after obtaining clearance from TPIA/Consultant/ Owner, reconciliation of free issue material/consumables.

3.31 Rectification of defects arising due to poor workmanship during defect liability period of service lines/installations handed over to Owner.

3.32 Test certificates of all contractor procured materials shall be submitted to TPI/Owner’s representative for their record.

3.33 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 etc. and deviation statements on completion / commissioning of work.

3.34 Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works as per instruction of EIC 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
4.0 MATERIAL, MANPOWER, EQUIPMENT AND MACHINERY

Material to be supplied as a free issue material by OWNER

4.1 Unless otherwise specified, Owner will supply the following materials to contractor. Other than mentioned below shall be supplied by contractor as per attached technical specification to complete the laying of service pipelines and Dom./Com. PNG connections.
- Domestic/Commercial - Meter
- Domestic/Commercial - Gas Pressure Regulator
- Commercial Meter Box

4.2 Material reconciliation statement of free issue material duly certified by Owner’s representative shall be submitted to Owner on monthly basis along with RA bill.

4.3 The free issue material shall not be procured from any other source by contractor.

Material to be supplied by the contractor:

4.4 The supply of items as indicated in SOR shall be strictly as per relevant Technical Specifications enclosed with the Tender and as per guidelines of various clauses of SCC and SOR.

4.5 Following materials shall be supplied by the contractor scope of work but not limited to:
- 20 mm OD PE -100 Pipe , SDR – 9
- Powder coated ½” NB, 1 NB, or 1 1/2” NB GI pipes (Length of GI Pipes should be 3.0 Mtr. only.)
- Powder coated ½” NB, 1 NB, or 1 1/2” NB GI fittings
- ½” NB, 1 NB, or 1 1/2” NB Isolation valve
- ½” NB Appliance valves (Gas Tap)
- Steel reinforced flexible rubber hose (This item shall not be older than six months from the date of manufacturing at the time of installation.)
- Inlet & outlet (with NRV) brass adaptor for Meter
- Inlet & outlet brass adaptor for Regulator
- Screw Clamp required for fixing of Steel reinforced rubber hose
- Powder coated MS Pipe Clamp with Screw and Nuts.
- RCC Guard.
- PE to GI Transition fittings.
- Nozzle for Burner conversion
- Required all consumables like grease, clamps, PTFE tape, rawl plugs.

4.6 All materials shall be handled safely and stored properly in a permanent, covered, lockable store/warehouse preferably near site in such a manner as to prevent any damage to the materials from scratching, gouging, indentation, excessive heat, oxidization effect or by contact with any sharp objects or chemicals. The PE/GI pipes and fittings shall be stored in covered storage to protect material from sunshine, rain etc.

4.7 The Contractor shall procure material from approved vendors only mentioned in this document. Final inspection at Contractors stores shall be carried out by Owner representative / Third Party Inspection Agency duly appointed by Owner.
4.8 Contractor should ensure that any material which are procured by them to be inspected prior to dispatch from contractor store to site for installation by Owner representative / Third Party Inspection Agency as per the test certificate of materials provided by manufacturer.

4.9 Owning to the technical requirements or otherwise, Owner reserves the right to amend / vary / modify the material requirement and/or specification at any time during the period of the Contract. The financial implication, if any, would be mutually discussed and agreed for which Contractor would fully Co-operate with Owner.

4.10 Owner has provided the specification for the material in the scope of the Contractor for procurement and use. However in case, due to omission or otherwise, any specification is not provided, the Contractor shall approach the Owner and obtain approved specifications in writing prior to the actual procurement and use of the material. It may be noted that considering the safety aspect, Owner would approve the specification of all material to be used for the execution of the contract.

4.11 **Equipment & machinery to be supplied by contractor**

The Contractor shall provide labour, tools (such as Hammer, Drilling machine, Piston Drill, PE/GI Pipe Cutters, Dies for threading, Pipe wrenches, spanners, conversion kits, lacquering, thinner if required.) in specified numbers. This will include but not limited to list of specialised tools and tackles indicated in Annexure # 1.

Special tools shall be required at site for carrying out drilling work in walls other than Brick or RCC (Ex. Granite, Marble, Wooden, Glass Cutting etc.)

Thread tap sets & gauges of all sizes shall be present at the site for inspection by Owner / TPIA at the time of execution.

The contractor has to ensure the availability of DG sets for continuous power supply.

In case the power supply is taken from societies, individual residents, contractor shall settle the claims raised by the electricity providers if any without cost implication to OWNER.

In case contractor doesn’t settle the claims for using the electricity from societies/individual residents, on demand by the providers, OWNER will settle the claims and the same will be deducted from the contractor’s bills. The progress of work shall not hamper due to non-availability of power supply.

The contractor has to submit the valid calibration certificate for Pressure gauges.

Contractor shall submit the manufacturer test certificate / lab test certificate for all items procured by him for verification/approval before commencing the execution.

No hiring of equipments, tools and tackles by the contractors is allowed at the site. In case, any contractor is found in possession of tools and tackles not enlisted as per annexure1, penalty will be levied as per SCC which shall be deducted from the running bill and EIC may stop the work.

4.11.1 **Plant and Equipment**

All vehicular type machinery shall be in good working condition 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.

4.11.2 **Sealant, Grout**

The contractor shall be responsible to arrange the supply of any consumable sealant or ready mix grout material required for restoration of holes. 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.

4.11.3 Clamps, Rawl Plugs, Screws and Nozzles etc.

The Clamps, Brackets for meter, Roul Plugs, Screws, Nozzles, etc. shall be approved lot-wise by EIC prior to installation. Re-drilling (Simmering) in existing appliance (burners) nozzles is strictly not permitted. The quality of materials procured shall be approved as directed by EIC.

4.11.4 Consumables Items

- Special Consumables such as Teflon Tapes, shall be supplied by the contractor and are included in installation rates.
- These consumables shall be of reputed make companies and required grades/class as per the vendor list given in this document.

4.11.5 Other Materials

The contractor shall supply the following items wherever required:

- All materials required for work, NPT threading, pipe jointing, testing etc.
- All signs, barricades, lights and protective equipment.
- All material required for working at higher floor levels (i.e., scaffolding, Ladder, safety helmet and PETZL Supplied safety harness etc.). No other safety harness other than PETZL shall be allowed at site.
- All paints for touch-up works of GI Pipes and fittings, required are to be supplied by the contractor and are included for within the rates.
- All major & Minor items not expressly mentioned in the contract but which are necessary for the satisfactory completion and performance of the work under this contract.

4.12 Acquisition, Receipt and Storage of Materials

The Contractor shall collect Free Issue materials as mention above from Owner’s designated stores near to the site or Owner Office as advised by the EIC.

The contractor shall carry out assessment of material required for GI installation in allocated area. After approval from Owner, contractor shall place order for purchasing Bought out items) to anyone of approved vendors as per the list attached in the tender document. The contractor shall also ensure that these materials shall be as per QAP enclosed in the tender. The inspection of these materials shall be carried out by Owner appointed third party inspection agency / EIC. It is contractor’s responsibility for providing relevant test certificates for verification at their own respective store.

Any other activity not mentioned / covered, explicitly, but otherwise required for satisfactory completion / operation / safety / statutory / maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule at no extra cost to Owner. The Contractor shall carry free issue material in such a manner as to prevent damage during transportation and handling.

The contractor shall carry pipe in such a manner as to preclude damage during transportation and handling.

The contractor shall at the time of acceptance physically examine all materials and notify the EIC immediately of any damage or defect noticed by the contractor. The EIC shall duly note any damage or defect in a site instruction book and both parties shall countersign the entry.
Any damage not so recorded will be deemed not to have existed at the time of acceptance by the contractor and the cost of repair or replacement or rectification shall be borne by the contractor.

All materials shall be stored in contractors stores near site in such a manner as to prevent any damage to the materials from either scratching, gouging, indentation, excessive heat or by contact with any sharp objects or chemicals.

The contractor shall be required to submit Monthly material reconciliation statement and submit inventory details of materials every month along with RA Bill.

The Contractor shall maintain log book at their respective stores stating issue and availability of free issue material at any given day. Further, it is mandatory for the contractor to submit inventory details of free issue and purchased materials on monthly basis to Owner’s representative as per the approved format of the owner. The inventory details shall be in correlation with the Daily progress chart and material reconciliation sheet.

5.0 ISSUE OF WORK INSTRUCTIONS

5.1 The contractor will be required to carry out GI installation in the areas where MDPE network commissioned/laying is under progress, only after clearance is accorded by Owner’s EIC. However, testing of GI installation shall be done in conjunction with laying of MDPE Service Lines to respective premises.

5.2 A general scheme of distribution to domestic consumer is indicated in enclosed drawing (TEIND – STD – G – M – 9007, 9010, 9011) for reference. It may vary in case of individual and multi storied flats.

5.3 All skilled personnel like jointers, conversion technicians will be approved and certified by EIC. These technicians shall be only authorized to take up respective jobs. In case it is found that some other contractor personnel other than authorized are carrying out these works, applicable penalty shall be levied per SCC of tender which shall be laid as per SCC Clause of 29.0 of Volume IA of II of commercial or mentioned elsewhere in the BID documents.

5.4 The rates to be quoted by contractor shall be inclusive of all preparatory / bye works, platform 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.

5.5 The schedule of items of GI installations have been described in brief in SOR and shall be held to be completed in all respect including safety requirements as per PTS of HSE, 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.

6.0 PROGRESS OF WORK

The contractor shall proceed with the work under the contract with due expedition and without delay.

Contractor shall assess the material requirement of the allotted area and submit the schedule plan for execution & purchasing before start of actual work.

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 at his own cost the following reports in agreed formats and frequency by owner.

- Daily Activity Report (Daily progress / planning as per approved format by EIC daily morning.
- Weekly Progress
- Testing reports,
- Equipment and Manpower deployment status report ( Monthly)
• Material Consumption & Inventory report. (monthly)
• Material Reconciliation reports (Along with every RA bill)
• Approved Deviation statements (as and when required).

No deviation from the approved technical specification / issued construction drawings shall be undertaken without written approval of EIC.

7.0 WORK SHEETS

7.1 The quantities of items and other details shall be checked by Owner's site engineer and the same shall be incorporated in GI job cards, the job card shall be signed & dated as certified by EIC at customer premises. Then the job card will be approved.

7.2 Measurement sheets shall be prepared based on the Job cards and checked and certified by the site engineers for billing purpose.

7.3 If measurement sheets prepared based on job card, submitted are illegible, incomplete or incorrectly booked they will be returned to the contractor.

8.0 PERMISSIONS / APPROVALS

8.1 Contractor shall be responsible for obtaining permissions from society management, RAW, individual residents and any other concerned authority, if required, for completion of the work. Contractor must take the prior appointment from the residents for carrying out the work.

8.2 All the contractor manpower shall carry and wear identity card during approach or execution of works at customers issued by contractor.

8.3 It is the contractor’s responsibility to inform and co-ordinate with the concerned local authorities and also with other utility agencies before and after the commencement of work at site. To ensure smooth execution of the work on a day-do-day basis, the contractor has to liaise with respective authorities. The contractor shall plan and ensure that work taken up under a single permission shall be completed within the stipulated time period and permission revalidation process is avoided. No separate liaison charges are liable to Owner for permission revalidation cases.

8.4 It is the responsibility of the contractor to obtain “No Objection Certificate” (NOC) from land owning agencies/Statutory bodies after completion of the restoration to their satisfaction and Liaisoning with them for refund of the security deposit / bank guarantees submitted by Owner for obtaining permissions on production of documentary evidence.

8.5 The contractor shall coordinate with the relevant authorities for execution of job in line with approvals / the proposed pipeline route drawings . The inspection of work by statutory authorities shall be the responsibility of the contractor without any extra cost to Owner.

8.6 In case contractor delays laying of pipeline/installation work, the work or part of work may be offloaded to some other contractor on his risk and cost.

The CONTRACTOR shall work in close consultation/coordination with the EIC.

8.7 The contractor shall not sign/execute any agreement and/or undertaking on any such documents which amounts to be undertaken by Owner. The same shall only be signed and executed by Owner, however, the contractor shall also liaison and coordinate for the same.

8.8 The necessary coordination, liaison and arrangements for inspection and approval shall be the contractor’s responsibility. Inspection and acceptance of the work by authority shall not relieve the contractor from any of these responsibilities under this contract. The contractor shall plan the execution of work in such a manner so that all the registered customers are attended in phased manner. However, it is the contractor’s responsibility to fix a firm appointment with the consumer for carrying out the work.
8.9 A log book/job card for such appointments with Consumer/any other agencies shall be maintained and the schedule/appointment once taken shall be adhered to by the contractor. TPIA/EIC shall review the records every week. The contractor shall submit the detailed list of RFC/Conversions and balance work on Registrations at least once a week as per approved format.

8.10 The contractor is also required to obtain a “Labour License” from the Assistant Labour Commissioner of respective Administration/Central Govt and others area, if any.

8.11 It will be the contractor’s responsibility to familiarise himself and comply with, any other local rules, regulations or statutory requirements applicable to the work.

8.12 The contractor has to take responsibility of the actions of supervisors, plumbers and helpers provided by him.

8.13 Any change / addition in construction specifications required to be made to meet the requirements of the statutory authorities shall be carried out by the contractor without any extra cost to Owner. The inspection and acceptance of the work by statutory authorities shall however, not absolve the contract from any of his responsibilities under this contract.

9.0 REFERENCE SPECIFICATION, CODES AND STANDARDS

The contractor shall carry out the work in accordance with the requirement of latest relevant applicable standards, Tender specifications, Owner’s Engineering Standards; relevant Oil Indian Safety Directorate (OISD) norms, PNGRB Regulations(T4S), ASME B31.8-Gas Transmission and Distribution Piping Systems.

If the contractor find any discrepancy, ambiguity or conflict in between any of the Standards and the contract documents, then this should be promptly referred to the EIC for his decision, which shall be considered binding on the contractor.

10.0 SAFETY

The contractor shall take care of all safety norms applicable for such works at site. Contractor shall provide all safety appliances e.g., uniforms, safety helmets, gloves, safety belts, ladders, staging, shoes, goggles, self-locking safety harness belts etc.

All necessary care shall be taken while working at heights and workmen with proper skills 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.

In case of any case found that contract is not following the safety guidelines, as issued by Owner, Contract shall bear applicable penalties as per Special Conditions of Contract (SCC )Clause of 29.0 of Volume IA of II of commercial or elsewhere mentioned in the bid documents.

No night working shall be permitted, without proper lighting and prior approval of EIC.

SCC to be read in conjunction with this clause.

11.0 RIGHT-OF-USE SURVEY AND MARKING

The route of the pipeline to be installed shall be decided with consent of the consumer and Site Engineer/EIC. Contractor must ensure that the plumbers/workers/supervisors/ working 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 or 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 land Owners 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 Owner.

Owner/TPIA and the contractor at each premises or housing colony to be supplied with PNG will conduct a joint survey. 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 as sketch of the agreed pipe routes.

The contractor will be responsible for contacting the Customer and making the necessary arrangements for access and appointments to carry out the work. Owner will not be responsible for any time lost due to failed appointments or disputes with Customer.

The contractor shall confine its operations within limits of the Right in use. The contractor shall restore any damage to property or utility.

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 Owner necessary for safety of public.

### 12.0 PNG DOMESTIC, NON DOMESTIC & COMMERCIAL INSTALLATIONS

Following guideline shall be followed during the route selection for GI pipe installation by the contractor as well as Owner’s engineer:

#### A. FOR WORKING AT HEIGHT (FOR STEEL / G.I. RISER INSTALLATION)

- The work to be carried out at height any location is evaluated for potential injury due to fall of a person or fall of object from height and compliance requirements are identified as applicable.
- Prior to start of the job at height, joint site visit is carried out with Owner’s representative for following purpose:
  - Carry out Site Specific Risk assessment (SSRA)
  - Select the G.I Riser installation site for safe execution, identify control measures considering site condition
  - Ensure minimum 15 feet distance from G.I Riser to nearby overhead HT electrical cables. In case, distance is less than 15 feet, Riser installation work shall not be executed and intimation to Owner’s representative in writing.
- Obtain Permit to Work (PTW) prior to execution
- Use Inspected, Tested & Certified “Fit for Use” Rope access system (PETZL equipment)
- Ensure availability of permanent fixed structure for perfect anchoring of fall arrest harness at top of the building
- Ensure deployment of medically fit, competent & authorised plumber team at site
- Ensure proper cordonning of working area, control unauthorized access and keep personnel & public clear of the working area using warning signs and barriers.

#### B. FOR LATERAL INSTALLATION / CUSTOMER PREMISE (G.I PIPE)

- Pipe shall not be installed on un-plastered wall or in the house under construction or in an unventilated void space.
- Route shall be selected so that maximum length of the pipeline shall be installed outside and of the shortest possible length.
- It shall be with minimum change of directions and minimum no of threaded joints.
- It shall have maximum two Points in the single kitchen for gas stove only.
- Compound gate or doors and windows inside the house shall not hit the Gas pipeline, if no alternative route found, installs proper pipe protection guard.
- G.I. pipe installation should be a minimum 300mm away from heat source and Electrical installations. If it is not possible for G.I. installation then suitable protection should be given.

If the G.I. pipe installation is carried out inside cupboards, there should be a provision for adequate ventilation like louvers/holes in cupboard doors and also avoid threaded joints inside.

**POSITIONING OF VALVES, REGULATOR & METER**

- **RISER ISOLATION VALVE:**
  - For apartments, one riser isolation valve shall be provided at a height of 2 meter from the ground level.
  - Customer wise individual main isolation valve shall be installed.

- **METER REGULATOR:**
  - Regulator shall be installed in such a way that it reduces the length of H.P. Line (Max. pressure 0.1 Bar) to minimum possible.
  - Wherever possible meter Regulator shall always be installed outside residence and at a convenient height.

- **GAS METER:**
  - It is advisable to install Gas Meter shall in such a way that it shall be protected from direct rain or waterfall on the meter. Location of the Gas meter shall be decided during the route selection.
  - Meter shall be installed at convenient height so that it is easy for the meter reader to take correct readings.
  - The meter shall never be positioned very near to Electric Line/installation. A minimum distance of 300 mm shall be maintained.
  - Brass Meter adaptor and Brass regulator connector shall be used as per approved Owner as specification and drawing.

- **APPLIANCE VALVE:**
  - The position of the appliance valve shall be convenient to operate and it shall keep the rubber tube at a safe distance from the heat source.
  - The orientation and distance from cooking platform/ground shall be maintained in such a way that the Bending Radius of the Rubber Tube (Suraksha Hose) shall be more than 100mm.
  - Appliance valve shall be installed in ventilated space and the lever of appliance valve shall not foul with the wall during the on-off operation.

- **GI PIPE CUTTING & THREADING**
  - After site and route clearance, the measurements for pipe cutting shall be taken and pipes shall be cut accurately as per the required lengths.
  - If the length of pipes is not correct, the threaded joints come under heavy stresses, which may ultimately cause gas leakage.
  - The Pipe ends to be threaded must be cut at right angle by using proper pipe cutters.
• Installed piping threaded connections / joints shall be tightened in such a way that all the joints shall be free from heavy stresses and misalignments due to incorrect pipe length.
• The condition of thread die and pipe vice jaws shall be checked regularly and shall be free from defects.
• NPT taper thread dies to be used for threading and shall be checked with “GO” and “NOGO” gauge.
• Cutting fluids (oils) shall be used while thread cutting.
• Threaded pipes shall be handled carefully so that the threaded oily portion shall be free from dust, mud, water and any damage due to impact of any object.
• Cutting burrs on the pipe shall be removed from the edges. The edges shall be straight and free from Knife-edge formation.

➢ STEEL / G.I. PIPE RISER & DOMESTIC INSTALLATION

• Working at height should be avoided if weather conditions could endanger health and safety of personnel.
• Ensure that risks from falling objects (Drill machine, spanners, screw drivers, clamps etc.,) are properly controlled.
• Teflon tapes shall be wrapped on threaded portion of the pipe with minimum three overlaps. The Teflon tap should be of approved make.
• The no of clamps shall be adequate. The pipeline portion containing the Regulator and Meter, either horizontal or vertical, shall have clamps on both side of the regulator and meter. Clamps shall be fitted in such a way that they do not create misalignment of pipes.
• The clamp shall be installed by drilling 6 mm hole in plastered wall and screwed using rowel plug.
• Distance between two clamps shall not be more than 1.0 meter.
• Clamps shall be installed in a straight line and shall be parallel to each other.
• The clamps shall be fixed properly on the walls and should grip pipe in position.
• For wall crossing, drill the hole with the help of electrical drilling machine in such a way that plaster and tiles shall not be damaged. It shall be ensured that there is no concealed wiring or any other fitting on the opposite side of the wall for a particular location of drilling
  • Self-adhesive anti-corrosive tape shall be wrapped on the pipe with 50% overlap.
  • Casing sleeve shall be installed in wall for wall crossing.
• Alignment of the pipeline shall be maintained.
• Wherever compound gate, house door or window may hits the G.I. pipe, protection clamp shall be installed to protect the pipe.
• Concealed piping shall not be done.
• All the pipes shall run on walls with clamps. Pipe should not be overhung and shall not be installed without pipe clamp.
• Wherever powder coating is peeled off during fitting and tightening of the pipe, touch up shall be done after the installation is completed by two coats of approved paint.
• Prior to installation all pipes and fittings shall be checked internally to ensure that they are free from any obstruction.
• PE to GI (transition fitting) threaded joint shall be provided above ground.
• PE pipe length should be 1.5 mtr. of transition fitting.
• For idle point/future point only Cap / plug to be used.

➢ INSTALLATION OF GEYSER CONNECTION IN BATHROOM.

As far as possible, Geyser to be installed in open space.

If customer is not convinced with installation of Geyser outside the Bathroom, ensure below mentioned guidelines.

• Sufficient bathroom space i.e. minimum 1.0 mtr. x 1.5 mtr. x 2.0 mtr.
• Cross ventilation of size 0.45 mtr. x 0.45 mtr. to be provided by customer before commencement of Gas to geyser for easy air circulation.

➢ GROUND CONNECTION

• It shall be done as per PE installation PTS (P.008167 L21 0302)

➢ CONVERSION OF BURNER

• All the appliance valve and riser isolation valve shall be kept in closed position.
• Ensure that meter and regulator adaptor shall be leak proof.
• Open the burner knob and remove the plug from the hot plate.
• Clean the simmer hole and Make the simmer hole of 0.6 mm with the help of simmer drill.
• At the time of drilling the hole, ensure that it should not be inclined and Remove the dust from plug. After greasing, plug and knob should be properly positioned at their original position.
• Remove the burner from hot plate and clean it. Open the existing jet (LPG) and replace it with suitable jet for sufficient flame and complete combustion of NG.
• Place the burner on its original position and connect the nozzle with appliance valve using new flexible and braided SURAKSHA rubber hose.
• The length of rubber hose shall not exceed 1.0 mtr.
• Both the ends of the rubber hose shall be clamped by metallic clamps on the nozzle.
• Check all the joints with soap solution and ensure that the flame colour should be blue.

➢ ONLINE TAPPING FROM RISER / HORIZONTAL COMMON HEADER GI PIPELINE

Following Guideline shall be followed during on line tapping from commissioned GI Riser or Horizontal Common header.

• Hot Work permit shall be issued by Owner, O&M.
• It shall be ensured that all required tools and tackles and consumables are available at site.
• It shall be intimated to all affected customers prior to isolation of Riser supply and isolate their main isolation valve.
• It shall be ensured to Closed / complete isolation of main control valve and proper tagging shall be done for closing.
• Keep one person near Main isolation valve to ensure no one will operate the valve during on line tapping work.
• Proper PPE shall be used for on-line tapping.
• End plug from where taping shall be done to be removed slowly till complete venting of Natural Gas from Riser pipe line.
• After complete venting of Natural Gas from Riser pipeline, check with soap solution to ensure no passing of Natural Gas from Main isolation valve.
• Ensure complete fitting of GI pipe up to individual main isolation valve. If further GI installation up to meter and appliance valve is not planned on same day then fix hollow hex plug. Ensure no leakage/valve passing before starting balance work of the connection.
• Open main isolation valve and carry out leak check with soap solution of newly fitted GI pipeline.
• After ensuring no leakage, open individual main isolation valve and ensure proper gas supply to the customers and ensure no open end is left before leaving the site.

13.0 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 colour touch up, contractor must take care of the consumer premises while carrying out the job such as spillage on floor, walls, ceilings, such shades etc. If the same does occur, the contractor has to immediately make things to original.

14.0 GI ABOVE GROUND INSTALLATION

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 line, to the Customers appliance, including the installation of regulator, valves, fittings, meters, flexible hose, clamps etc. The contractor shall be required to provide all equipment, tools and materials necessary to execute the work in an efficient and effective manner. Along with ladders, scaffolding pipe, NPT dies, tripods, vices, fittings and Teflon tape, drills for concrete and other masonry, drills for timber, Granite, Marble Stones and laminated surfaces inside Customers property, bending tools, clamps, sleeves to facilitate the pipe passing through floors and walls, paint for marking etc.

All GI risers at the outside of buildings shall be fully supported to carry the weight of piping. A flanged foot, or similar device, capable of supporting the total weight of the riser, shall support risers. The riser shall be installed in a vertical line form its point of support to its highest point with a minimum of changes in direction. The threading of GI pipe shall be NPT and confirming to ANSI B1 20.1 for installation of riser or working at height.

Contractor has to supply different types/sizes of powder coated clamps (Mild Steel) for fixing GI pipes as per the enclosed drawing and specifications in this document. The contractor shall get approval from EIC for every fresh lot of the clamps, and other consumables, prior to start of installation. The detailed cross sectional of Powder coated GI Pipe Clamps are as per Drawing No. TEIND – STD – G – M – 9022.

All riser and lateral pipe shall be clamped to the building at intervals not exceeding 1.5 mtr.

Maximum distance between clamps shall be 1.0 mtr 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 centre line of fittings at every sides. The joints/ fittings of the GI installation 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 bevelled such as to prevent an accumulation of water. Supply of clamps for all sizes of the GI pipes

Pipe shall 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.

The contractor shall also ensure that supply shall not be provided to the customer in any Concealed Piping.

**PNG JOB CARD**

PNG Job card as per approved format of Owner or Owner representation shall be prepared duly signed by Contractor, Customer & Third Party Inspector and to be submitted to Owner immediately on completion of conversion.

### 15.0 TESTING OF GI INSTALLATION

Before carrying out the pneumatic test of the GI installation; testing assembly, air foot pump with pressure gauge / manometer shall be checked its calibration and proper functioning.

Before pneumatic testing of the installed connection spacing between two clamps, tightening of the clamps thread joints, alignments of the whole piping shall be checked. Valve shall be kept in open position and the appliance valve shall be kept in close position.

Ensure Meter and Regulator is not installed during PPT. Proper Meter spool piece shall be installed during PPT (No flexible hose to be allowed).

Ensure during the testing, air should reach up to the appliance valve. After completion of testing, pressurized air shall be released from appliance valve only.

Calibrated pressure gauge shall be used having the range up to 1.5 times of test pressure..and least count of gauge should be 0.1 Kg/cm2

Position of the pointer of the pressure gauge shall not be marked with the marker pen on the glass. It should be recorded in the test recorded during Pneumatic testing of GI Installation.

After pressurization of the whole piping section shall be checked for the leakage with the help of soap solution.

The installation from PE / GI transition fitting up to regulator shall be tested at the pressure of 6.0 Kg/Cm2) or at 150 mbar as the case may be.

The testing of GI riser pipe up to regulator shall be done with the isolation valve in open condition and open end plugged.

The GI installation from regulator outlet to appliance valve (except meter) shall be tested at a pressure of 3.5 Kg/Cm2 for a hold period of 30 Minutes with no pressure drop. All the joints in the installation shall be checked with soap solution.

Type of testing, test pressure and test duration as per the below.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Testing</th>
<th>Test Pressure</th>
<th>Test Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pipe Pneumatic Test (PPT)</td>
<td>3.5 Kg/Cm2</td>
<td>30 Minutes</td>
</tr>
</tbody>
</table>
The meter shall be removed while carrying out the testing at 3.5 Kg/Cm² and joints of the meter shall be tested on line with soap solution after completion of the work. For testing proper test ends shall be made along with gauges and subsequently 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 gas pressure with holding period of 15 min with no pressure drop.

The contractor shall supply the Calibrated Pressure Gauges / Manometer / Diaphragm Gauges range for testing of GI Installations.

The contractor shall supply the Pressure Gauges, Manometer and Diaphragm Gauges range for testing of GI Installations ranging from 0-4 bars / 0-150 mbar / 0-250 mbar respectively.

The calibration certificate shall be submitted before the start of the execution work.

The pressure gauges shall be calibrated from time-to-time as desired by EIC but positively once in every Six months.

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.

The details of testing shall be properly recorded in the GI cards.

16.0 INSPECTION

Contractor shall have to ensure the manufacturer/vendor monogram on accepted bought out items which are in their scope such as GI pipes, GI fittings etc during receipt of f materials.

The contractor to the entire satisfaction of EIC before proceeding further shall rectify any defect noticed during the various stages of inspection. Irrespective of the inspection, repair and approval at intermediate stages of work, contractor shall be responsible for rectification, replacement of defective materials found during final inspection/guarantee period/defect liability period as defined in general condition of contract.

17.0 PURGING & COMMISSIONING

The rate for purging & commissioning shall be included in the GI installations.

Contractor shall ensure that the outlet is so located that vent gas cannot drift into buildings.

Contractor shall perform the commissioning of the GI installation 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 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 any 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.

18.0 INSTALLATION OF REGULATOR & METER

• Installation of domestic meters with associated inlet and outlet connections (GI/Brass fittings), on the wall with approved powder coated meter brackets and angles in new & existing gas charged areas.

• The contractor shall supply approved powder coated meter brackets and angle brackets. A sketch of the brackets is referred from the enclosed drawing for reference. It is required that one sample of each type of bracket is approved before the work is started.

• Firmly secure the meters on the wall with good quality Roul Plugs, screws etc. In case the Roul Plugs are not holding then wooden blocks or other fixing arrangements like cement etc. to be used for proper grouting.

• 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 installations will not be provided in any fixed enclosures, cabinets (below or above the slab) or confined space in the customer premises.

• The contractor shall ensure that GI installations and rubber hoses shall not be exposed to direct heat of Gas burners. The installation should have minimum clearance of about 1 meter from electric point mains & switches. Minimum distance between Appliance Valve & Gas Burners shall be 0.3 Meters. The isolation valves shall be installed after entering the customer premises/kitchen but before the meter installation.

• The same rates of 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.

• The above activities along with restoration of the area to original shall be carried out to the complete satisfaction of consumer and EIC.

The following shall be taken care during installation of Valves, Regulator & Meter

• Union and testing T shall be installed before riser isolation valve.

• Meter control valves, Meter regulator and Gas meter shall be protected from the over tightening of the thread.

• Valves, Meter regulator and Gas meter shall be installed with the clamps on both sides. As far as possible hex nipple shall not be used for connecting. Both side threaded 3” to 8” long pipe nipple shall be used.

• Gas meter, regulator and installed piping shall be aligned properly.

• Flow direction of the gas meter shall be checked before installation.

• Flat rubber washer shall be checked and ensure at inlet and out let of the adaptor joint to the meter.

• Pipe nipple shall be installed between elbow and regulator to avoid direct load of line or riser on regulator and a clamp must be provided on the pipe nipple.

The above activities along with restoration of the area to original shall be carried out to the complete satisfaction of consumer and EIC.
19.0 **PAINTING OF GI PIPES**

The entire lengths of the pipeline along with fittings 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 30 microns per coat of reputed make like Asian, Berger, Nerolac etc.

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.

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 thereof 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.

20.0 **CONVERSION OF DOMESTIC APPLIANCES**

Contractor shall perform the conversion of Domestic Appliance as follows.

- 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 rubber 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, soundness and performance of the appliance.
- Instructing the Customer for 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 SGL’s operation and maintenance.
- All consumables (Nozzles, greases, tools etc.) are in contractor’s scope.
- Changing or repairing of any items damaged during conversion.

It may be noted that the rates as per SOR Item will apply to conversion of all type of appliances found in both domestic and commercial premises. Under the rates, the contractor will have to provide both Pin gauges and standard sized nozzles. The payment shall be released only after submission of necessary documents of the individual house to Owner.

21.0 **RESTORATION**

Contractor has to restore the area wherever 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.
Wherever any items of the consumer is damaged/broken during working, the same will be rectify or replace to the total satisfaction of the consumer.

The restored slabs or brickwork 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 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. Wherever the required standards are not achieved the contractor will be required to replace the defective reinstatement work at no extra cost to Owner.

Contractor payment for GI piping shall be released only after satisfactory restoration and clearing of the sites of all surplus materials etc.

### 22.0 SUBMISSION OF FINAL RECORDS

Contractor shall submit three sets each of the following documents in hard & soft copy:

a) Return of filled Estimated debit note books before issue of new book.

b) Job card duly signed by TPIA, Customer and EIC. (Details recorded in Job cards of every domestic house.)

c) Scan (PDF) copy of job cards (Isometric drawing, Installation, testing and commissioning reports etc.) in DVD / CD.

d) Total list of houses & commercial establishments in the area allotted,

e) Provide details of connections provided & reasons where connection could not be given / completed.

f) Details of houses where extra piping done along with materials used.

g) Total material consumption report.

h) Material reconciliation.

i) Test reports & calibration certificates of gauges etc.

j) Any other documents / records required.

k) Consumption data of Meters and Regulators on fortnightly basis and along-with every fresh requisition.

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SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - PE PIPES

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<tr>
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<th>Date</th>
<th>Description</th>
<th>Prepared By</th>
<th>Checked By</th>
<th>Approved By</th>
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<td>14.06.2018</td>
<td>Issue Draft for RFP</td>
<td>BP</td>
<td>KKJ</td>
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∑ ∑ ∑
1.0 INTRODUCTION & SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

The intent of this specification is to establish minimum requirements to manufacture and supply of PE pipes used for casing purpose of carrier pipe, supplying natural gas.

The scope of the tender will include manufacture, supply, inspection, testing, marking, packaging, handling and despatch of PE pipes of ratings and grades as per IS: 14885: 2001 with latest amendments.

All codes and standards for manufacture, testing, inspection etc shall be of latest edition.

Owner 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.

2.0 DEFINITIONS

OWNER/CLIENT Sabarmati Gas Ltd., (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)
MANUFACTURER VENDOR Means the Manufacturer of the PE Pipes.
The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS Present <<Particular Technical Specification>> and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at site
EIC Engineer – in – charge

3.0 MATERIAL

The material grade of polyethylene PE Pipes shall be PE 100, SDR-11, DN 20 (Below 32). Material shall conform to the requirement of Cl. No. 5 of IS: 14885: 2001 with latest amendments. Raw material of PE pipe shall be virgin quality.

4.0 PRESSURE RATING

The pressure rating of pipe shall be PE-100 shall be as per Table -7 of Clause 8.1 & 9.1 of IS: 14885: 2001 with latest amendments.

5.0 HYDROTESTING STRENGTH

5.1. PE Pipes shall be tested at 20°C, 80°C and 80 °C for 100 Hrs, 165 Hrs and 1000 Hrs respectively.
5.2. Test result shall be no sign of localized swelling, No leakage or Bursting.

6.0 NOMINAL DIAMETER (DN)

The nominal diameter of pipes covered in this standard is DN 20, N 32, DN 63, DN 90, DN 125 and DN 160.

7.0 DIMENSION, WALL THICKNESS, LENGTH OF PIPES

7.1. The Dimension of PE-100 shall be as per Table -3 of Clause 6.1 of IS: 14885: 2001 with latest amendments
7.2. The wall thickness of PE-100 shall be as per Table -4 of Clause 6.2 of IS: 14885: 2001 with latest amendments

<table>
<thead>
<tr>
<th>Nominal Diameter DN</th>
<th>Material Grade - PE 100 Wall Thickness, min. / max. (mm.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2.3 / 3.0</td>
</tr>
</tbody>
</table>

7.3. Length of Pipes

The required Maximum length of DN 20 pipe is 100 mtrs per coil.

**8.0 TOLERANCE**

8.1. Tolerances for Length of Pipes

- Tolerances for each rolled pipes : -0 / +0.5m

8.2. Tolerances for Outside diameter shall be as per Table 3 of IS: 14885: 2001 with latest amendments.

- Tolerances for 20 mm Dia pipe : -0 /20 mm
- Tolerance shall meet the thickness requirement as mentioned in Cl. No. 6.1 of present PTS.

8.3. Ovality of Pipes shall be as per Table 3 of IS: 14885: 2001 with latest amendments.

- Ovality to the 20 mm Dia pipe : 1.2 mm

**9.0 COLOUR**

9.1. Colour of DN 20, PE – 100 pipe shall be orange as per Clause 4.4 of IS: 14885: 2001 with latest amendments

**10.0 QUALITY ASSURANCE PLAN (QAP)**

Pipe end shall cleanly cut, square with the axis of pipe and protected against shocks and ingress of foreign bodies by appropriate end caps.

The Contractor/Manufacture /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.

- Material test Certificates / report as per clause 5 of IS: 4984: 1995 with latest amendments.
- Performance requirements as per clause 5, 8, & 9 of IS: 14885: 2001 with latest amendments.
- Type test as per clause no. 9.1 of IS: 14885: 2001 with latest amendments.

**11.0 INSPECTION / DOCUMENTS**

Inspection shall be carried out as per Owner Technical Specification.

TPIA /EIC shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.

Contractor / Manufacture /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 Tech. Spec. & specified code for 100% material, at the time of final inspection of each supply lot of material.

Contractor / Manufacture /Vendor shall furnish all the codes / documents shall be made available for reference of TPIA at the time of inspection.
For any control, test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vendor about inspection date and place along with production schedule.

Even after third party inspection, EIC reserves the right to select a sample of items / materials randomly from each manufacturing batch / lot & have these independently tested. Should the results of these tests fall outside the limits specified in Owner technical specification, then Owner reserves the right to reject all production supplied from the batch.

Pipes shall be free from no sign of localized swelling, no leakage or bursting during hydro testing as well as delivery at site.

Pipe shall be free from scoring, cavities and other surface defects and pipe end shall be cut cleanly and square to the axis.

Pipe end shall cleanly cut, square with the axis of pipe and protected against shocks and ingress of foreign bodies by appropriate end caps.

### 12.0 MARKING

12.1. Owner name shall be marked on each pipe.

- All pipes shall be permanently and legibly marked along their length with a legend which shall be impressed to a depth of not more than 0.2 mm.
- Marking details shall be formed in such a way that marking does not initiate cracks or other type of failure and in such a way that with normal storage weathering and processing and permissible method of installation use legibility shall be maintained for the pipe.

12.2. Legend shall be repeated at intervals of 1 m and shall consist of following Information:

a) Owner Trade mark / Name or Brand (i.e. Owner / Client Name)
b) Material and designation (i.e. D-20N, SDR-9, PE-100).
c) Manufacturer’s identity name or trade name
d) Purchase Order No.
e) Code & Standard (i.e. IS – 14885 :2001)
f) Batch no. or lot no
g) Weight of coil and Length of Coil at every meter.
h) Manufacturing Date
i) Service (i.e. GAS)

### 13.0 PACKAGING

Packing shall be done for Pipe end cleanly cut, square with the axis of pipe and protected against shocks and ingress of foreign bodies by appropriate end caps.

Packaging shall be done in Hessian cloth (jute), PVC/PE films to avoid direct sunlight and facilitate outdoor storage and the ends shall be protected by proper end caps to prevent from shocks and ingress of the foreign body.

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details and also complied with at the time of delivery.
14.0 DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - ELETROFUSION FITTINGS FOR PE PIPES
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15.0 DOCUMENTS OF PRECEDENCE
1.0 INTRODUCTION & SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

The intent of this specification is to establish minimum requirements to manufacture, testing and supply of Plastics piping systems for the supply of gaseous fuels -Polyethylene (PE) Fittings.

The scope of the tender will include manufacture, supply, inspection, testing, marking, packaging, handling and despatch of Plastics piping systems for the supply of gaseous fuels -Polyethylene (PE) Fittings as per EN 1555-3 : 2002 / ISO 8085-3 with latest amendments.

All codes and standards for manufacture, testing, inspection etc shall be of latest edition.

Owner 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.

Following PE Eletro fusion fittings shall be supplied under this specifications.

- Electro fusion socket fitting
- Electro fusion saddle fitting
  - Tapping tee
  - Branch saddle
- Mechanical fitting
- Spigot end fitting
- Voltage regulation
- Intensity regulation

2.0 DEFINATION

OWNER/CLIENT  Sabarmati Gas Ltd., (SGL)
CONSULTANT  Tractebel Engineering Private Ltd., (TE-IN)
MANUFACTURER  Means the Manufacturer of the Electro fusion Fittings.
VENDOR  The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS  Present <<Particular Technical Specification>>and its entire appendix, if any.
TPIA  Third Party Inspection Agency to be appointed by Owner at site
EIC  Engineer – in – charge

3.0 MATERIAL

Compound

The compound from which the fittings are made shall conform to EN 1555-1.

Material for non-polyethylene parts

PE pipes conforming to EN 1555-2:2002 and the requirements for the level of material performance of non-polyethylene parts shall be at least as stringent as that of the compound for the piping system

Elastomers
Elastomeric seals shall conform to EN 682 and other sealing materials are permitted if suitable for gas service.

Other Materials

Greases or lubricants shall not exude onto fusion areas, and shall not affect the long-term performance of fitting materials

Other materials may be used provided that it is proven that the fittings conform to this standard.

Approved Manufacturer for Raw Material

- SOLVAY
- BOREALIS
- FINA
- DOW
- ELENAC

4.0 MECHANICAL PROPERTIES

- Fittings shall be tested using pipes, which conform to EN 1555-2.
- Jointed pipe and fitting test pieces shall be assembled in accordance with the technical instructions of the manufacturer and take into account the limit conditions of utilisation described in EN 1555-5.
- The sample test assemblies shall take account of manufacturing and assembly tolerances.
- In the event of modification of the jointing parameters, the manufacturer shall ensure that the joint conforms to the requirements given in clause 7.2 of as per EN 1555-3.
- Unless otherwise specified by the applicable test method, the test pieces shall be conditioned at (23 ± 2) °C before testing in accordance with Table 4 of as per EN 1555-3.
- When tested in accordance with the test methods as specified in Table 4 using the indicated parameters, the fittings shall have mechanical characteristics conforming to the requirements given in Table 4, as applicable to the following types of fitting:
  - Electro fusion socket fitting;
  - Electro fusion saddle fitting;
  - Spigot end fitting.

5.0 PHYSICAL CHARACTERISTICS

The physical characteristics of elect fusion fittings shall conform to the requirements of Table 6 of clause 8 .2 as per EN 1555-3.

6.0 PERFORMANCE REQUIREMENT

When electro fusion fittings conforming to this standard are assembled to each other or to components conforming to other parts of EN 1555, the joints shall conform to EN 1555-5.

7.0 HYDROSTATIC PRESSURE TEST

Electro fusion fittings shall confirm to the requirements of Table 4 of clause 7.2 as per EN 1555-3.

8.0 PNEUMATIC PRESSURE TEST

Electro fusion fittings shall be leak tightness tested and confirm to the requirements of Table 4 of clause 7.2 as per EN 1555-3.

9.0 DIMENSIONAL TOLERANCES

Dimensions tolerances of various types of Eletro fusion fitting shall be as per EN 1555-3.
Measurement of dimensions

Dimensions shall be measured at 23 ± 2 °C, after being conditioned for at least 4 h. The measurement shall not be made less than 24 h after manufacture of fittings.

Diameters and lengths

The electro fusion socket diameter and lengths shall conform to Table 1 and clause 6.2 of as per EN 1555-3.

Outlets from tapping tees and branch saddles shall conform to clause of 6.4 of as per EN 1555-3.

The dimensions of spigot end fittings shall conform to Table 3 and clause of 6.4 of as per EN 1555-3.

Mechanical fittings with polyethylene spigot ends (Polyethylene spigot ends) shall conform to 6.4.

Mechanical fittings with polyethylene electro fusion sockets shall conform to 6.2.

Wall Thickness

The minimum wall thickness of a fitting shall be in accordance as per Clause of 6.2.2. and Table 2 of as per EN 1553-3.

Wall thickness of the fusion end

The wall thickness of the fusion end shall be at least equal to the minimum wall thickness of the pipe, except between the plane of the entrance face and a plane parallel to it, located at a distance not greater than (0.01 De + 1 mm), where a thickness reduction for e.g. a chamfered edge is permissible.

Wall thickness of the fitting body

The wall thickness of the fitting body measured at any point, shall be at least equal to the nominal wall thickness of the pipe.

The permissible tolerance of the wall thickness at any point shall conform to those of the nominal wall thicknesses given in EN 1555-2.

Any changes in wall thickness of the fitting body shall be gradual in order to prevent stress concentrations.

Out-of-roundness of the bore of a fitting (at any point)

When a fitting leaves the site of the manufacturer, the out-of-roundness of the bore of a fitting at any point shall not exceed 0.015dn.

10.0 COLOUR

The colour of the PE parts of fittings shall be black or agreed previously, they can also be coloured yellow or orange.

11.0 QUALITY ASSURANCE (QA)

The Contractor/Manufacture /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.

- Material test certificates / reports
- Performance requirements and type test, if any.

12.0 INSPECTION / DOCUMENTS

i. Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / EIC.

ii. TPIA /EIC shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.

iii. TPIA /EIC shall carry out random inspection during manufacturing/ final inspection.
iv. Contractor / manufacturer / Supplier / 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 OWNER 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 items randomly from each manufacturing batch/ lot and have these independently tested. If 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.

vi. For any control test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vendor about inspection date & place along with production schedule.

13.0 MARKING

Electro fusion fittings marking shall confirm to the requirements of clause 10 as per EN 1555-3.

The minimum required marking shall conform to Table 7 of EN 1555-3.

Each fittings shall be embossed with OWNER’s logo, manufacturers name and trade mark on fittings.

Each packing containing fittings shall carry the following stamped or written in indelible ink.

a) Number of the System Standard- EN 1555
b) Manufacturer's name and/or trademark
c) Nominal outside diameter(s) of pipe, dn (i.e. 20 mm, 36 mm, 63 mm, 90 mm, 125 mm & 180mm etc)
d) Material and designation (i.e. PE 80 or PE 100)
e) Design application series (i.e. SDR – 9/11/17.6 whichever is applicable)
f) SDR fusion range (i.e. SDR 11 –SDR 26)
g) Manufacturer's information
h) Internal fluid (i.e. Gas)
i) Month and year of manufacturing

14.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details and also complied with at the time of delivery.

15.0 DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - GI PIPES WITH POWDER COATING

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1.0 INTRODUCTION AND SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

The Proposed specification is designed to distribute PNG to Domestic, Commercial and Industrial customers.

This present document covers the technical specification for the procurement of GI Pipes used in high pressure natural gas transportation and 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 GI pipes of heavy steel tube. Unless modified by this specification, requirements of IS 1239 (Part-I): 2004 (Latest edition) & IS 10748 (Latest edition) shall be valid.

2.0 DEFINITIONS

OWNER/CLIENT Sabarmati Gas Ltd., (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)
MANUFACTURER Means the Manufacturer of the GI Pipe with powder coating.
VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS Present <<Particular Technical Specification>> and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at site.
EIC Engineer – in – charge

3.0 MATERIAL

The material used for the manufacturing of GI pipes confirming to IS 1239 (Part -1); 2004 (Latest edition).

4.0 PRESSURE TEST

Hydrostatic pressure test shall be carried out at a pressure of 5 Mpa for the duration of at least 3 second and shall not show any leakage in the pipe.

Vendor to submit the internal pressure test certificate for the same. Owner Representative or Third party Inspection Agency appointed by Owner shall witness finish goods testing as per the sample procedure specified in IS: 1239 (Part-I) – latest edition.

5.0 DIMENSIONS, THICKNESS & DIMENSIONAL TOLERANCES

The dimensions & nominal mass of tubes shall be in accordance with Table 5 subject to the tolerances permitted in CL.8.1 & 9 of IS 1239 (Part-I) : 2004 (Latest edition ). Length of each pipe shall be 3 mtrs with. + 3, - 0 mm tolerance. However, pipe length shall be considered 3 m. only for measurement / payment purpose.
### 6.0 END CONNECTION OF PIPE

i. Unless specified otherwise, tubes shall be supplied, screwed with taper threads.

ii. External threads shall be tapered & confirmed to ASME B1.20.1.

iii. For checking conformity of threads gauging practice in accordance with ASME B1.20.1.

### 7.0 FREEDOM FROM DEFECTS

On visual examination the outside & inside surfaces of pipes shall be smooth & free from defects such as cracks etc.

### 8.0 GALVANIZING

i. Pipes shall be galvanized to meet the requirement of IS: 4736 – 1986 with latest amendment.

ii. All galvanized Tubes shall be Zinc Coated by Hot dip galvanizing in accordance with IS: 4736-1986 & its relevant parts.

iii. Zinc conforming to any grade specified in IS: 4736 – 1986 or IS: 13229- 1991 with latest amendment shall be used for the purpose of galvanizing.

iv. Galvanizing bath: The molten metal in the galvanizing bath shall contain not less than 98.5% by mass of zinc.

v. Mass of zinc coating: Minimum mass of zinc coating determined as per IS: 6745 shall be 360-400 gms /m².

vi. Uniformity of galvanized coating: The galvanized coating when determined on a 100 mm long test piece in accordance with IS 2633: 1986 with latest amendment shall withstand 5 one – minute dips.

vii. Freedom from defect: The zinc coating on internal & external surfaces shall be uniform adhered, reasonably smooth & free from such imperfections as flux, ash & drop inclusions, bare patches, black spots, pimples, lumpiness runs, rust stains, bulky white deposits & blisters. Rejection & acceptance for these defects shall be as per Appendix - A of IS 2629: 1985 with latest amendments.

viii. Samplings

   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 IS: 4711: 1995 with latest amendment.

c) The sample found conforming to above requirements shall then be tested for mass of zinc coating in accordance with Clause 5.1 of IS: 4736 – 1986 with latest amendment.


9.0 QUALITY ASSURANCE (QA)

The Contractor/Manufacturer /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.

- Material test certificates / reports
- Performance requirements and type test, if any.

10.0 INSPECTION / DOCUMENTS

Inspection shall be carried out as per Owner Technical Specification.

TPIA /EIC shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.

The manufacturer shall have a valid licence to use ISI monogram for manufacturing of pipe in accordance with the requirement of IS: 1239.

Contractor / Manufacturer /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 Tech. Spec. & specified code for 100% material, at the time of final inspection of each supply lot of material.

Contractor / Manufacturer /Vendor shall furnish all the codes / documents shall be made available for reference of TPIA at the time of inspection.

For any control, test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vendor about inspection date and place along with production schedule.

Even after third party inspection, EIC reserves the right to select a sample of items / materials randomly from each manufacturing batch / lot & have these independently tested. Should the results of these tests fall outside the limits specified in Owner technical specification, then Owner reserves the right to reject all production supplied from the batch.

11.0 MARKING

Each pipe shall be embossed with manufacturer’s / Owner’s logo, manufacturer’s name or trademark, size designation, class of pipe at the interval of not more than 1 meters.

Each packing containing pipes shall carry the following embossed, stamped or written by indelible ink.

a) Manufacturers name or trademark.

b) Class of pipe – Heavy & Medium

c) Indian standard mark (ISI)

d) Lot number / Batch no. of production

Each pipe conforming to this standard shall also be marked with BIS standard mark.

12.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / Vendor / Bidder shall submit the packaging details and also complied with at the time of delivery.
13.0 DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.

∑ ∑ ∑
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - GI FITTINGS WITH POWDER COATING
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INTRODUCTION AND SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

The Proposed specification is designed to distribute PNG to Domestic, Commercial and Industrial customers.

This present document covers the technical specification for the procurement of GI fittings used in high pressure natural gas transportation and 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 Malleable Cast Iron Fittings unless modified by this specification, requirements of IS 1239 (Part-I): 2004 (Latest edition) and IS 1879 – latest edition shall be valid.

DEFINITIONS

OWNER/ CLIENT Sabarmati Gas Ltd., (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)
MANUFACTURER Means the Manufacturer of the GI fittings with powder coating.
VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS Present <<Particular Technical Specification>> and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at site.
EIC Engineer – in – charge

MATERIAL

The material used for the manufacturing of GI fittings shall conform to IS 1879 – 1987 (Latest Edition) or IS 14329 – 1995 with latest amendments Grade BM 300.

PRESSURE TEST

Vendor shall carry out pneumatic pressure test as per Clause 11.1b of 1879 – 1987 with latest amendments on each & every fittings. Vendor to submit the Internal Quality control certificate for the same. Owner shall witness pneumatic testing as per the sampling procedure specified in 1879 – 1987 with latest amendments.

COMPRESSION TEST

This test shall be conducted to judge the malleability of the pipe fittings & shall be carried out as per Clause 12 of 1879 – 1987 with latest amendments.

SAMPLING

Owner Representative of Third Party Inspection Agency appointed by Owner shall witness the tests as per clause 14 of 1879 – 1987 with latest amendments. However, vendor to perform 100% inspection of visual,
7.0 DIMENSIONS & DIMENSIONAL TOLERANCES

i. Dimensions of various types of fittings shall be as specified in sections 2 to 10 of IS 1879 – 1987 with latest amendments, as applicable.

ii. Wall thickness of fittings and tolerances on them shall be as given in Table 1.2 of IS 1879 – 1987 with latest amendments,

iii. In case of reducing fittings, the dimensions at each outlet shall be those appropriate to the nominal size of the outlet.

iv. Elbows, Tees, Sockets and caps shall be of reinforced type.

8.0 WEIGHT & WALL THICKNESS

Weights of various types of fittings shall be as specified in sections 2 to 10 of IS 1879 – 1987 with latest amendments, as applicable.

<table>
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<th>Nominal Diameter DN</th>
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<td></td>
<td>Class - C</td>
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<td>Nominal weight (Kg / m)</td>
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<td></td>
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<td>-10% / + Not limited</td>
<td>-10% / + Not limited</td>
<td>-10% / + Not limited</td>
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9.0 THREADS

i. Outlets of fittings shall be threaded to dimensions & the tolerances as specified in IS: 554—1975.

ii. All internal & external threads shall be tapered.

iii. For checking conformity of threads gauging practice in accordance with IS: 8999-1979 shall be followed.

iv. Chamfering: The outlet of fittings shall have chamfer. The chamfer shall have an included angle of 900 ± 50 for internal threads & 700 ± for external threads.

10.0 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.

11.0 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.

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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 gms/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. Samplings
   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.
   e) Test procedure shall be as per Clause 9 of IS: 4759-latest edition.

12.0 QUALITY ASSURANCE (QA)

The Contractor/Manufacture /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.
- Material test certificates / reports
- Performance requirements and type test, if any.

13.0 INSPECTION / DOCUMENTS

i. Inspection shall be carried out as per Owner Technical Specification.
ii. TPIA shall ensure the manufacturer / vendor monogram on accepted GI fittings during inspection of materials.
iii. TPIA /EIC shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.
iv. Contractor / Manufacture /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 Tech. Spec. & specified code for 100% material, at the time of final inspection of each supply lot of material.
v. Contractor / Manufacture /Vendor shall furnish all the codes / documents shall be made available for reference of TPIA at the time of inspection.
vi. For any control, test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vendor about inspection date and place along with production schedule.
vii. Even after third party inspection, EIC reserves the right to select a sample of items / materials randomly from each manufacturing batch / lot & have these independently tested. Should the results of these tests fall outside the limits specified in Owner technical specification, then Owner reserves the right to reject all production supplied from the batch.

14.0 MARKING

Each fitting shall be embossed with Owner’s logo, manufacturer’s name or trademark or monogram and the size designation.
Each packing containing fittings shall carry the following embossed, stamped or written by indelible ink.

a. Manufacturer’s name or trade mark or monogram
b. Designation of fittings.
c. Lot number.

Each fitting conforming to this standard shall also be marked with BIS standard mark.

15.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / Vendor / Bidder shall submit the packaging details and also complied with at the time of delivery.

16.0 DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.

∑ ∑ ∑
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - BRASS FITTINGS WITH HEAD CHROME PLATING

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1.0 INTRODUCTION & SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

This specification covers the requirements for materials of Brass and its fittings. Unless modified by this specification, requirement of IS 559 / IS 319: 2007/ BS 864 / EN 1254 Part 1 shall be valid. However, Latest Edition of IS/BS/EN shall be governing for Specification, if applicable.

2.0 DEFINITION

OWNER/ CLIENT Sabarmati Gas Ltd., (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)
MANUFACTURER Means the Manufacturer of the Brass Fittings with Head Chrome Plating.
VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS Present <<Particular Technical Specification>>and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at site.
EIC Engineer – in – charge

3.0 MATERIAL

i. The material used for the manufacturer of Brass fittings shall conform to IS 319:2007 ( Latest edition)
ii. Material used for Brass Fitting shall be Clean, Smooth, and free from the surface defects like blisters, Silvers, Scales, Fins, Spills, Cracks etc and Free From internal defects like Porosity, Piping etc.
iii. Threading on the Brass fittings shall be done as per BS 21 / IS554.

4.0 CHEMICAL PROPERTIES

Chemical composition of free cutting brass rods of Brass and its fittings shall be as mentioned in IS 319: 2007 with Head Chrome Plating.

Copper (Cu) : 56.0 % to 59.0 %
Lead (Pb) : 2.0 % to 3.5 %
Iron (Fe) : 0.35 % Max
Other Impurities (Excluding Iron) : 0.70 % Max
Zinc (Zn) : Remaining

5.0 HYDROSTATIC / PNEUMATIC PRESSURE TEST

All Brass fittings shall be sustaining the pressure of 3.5 bars for 30 minutes holding time during testing at site after installation and no leakage is permitted.

The test shall be performed on each size of the fittings at site after installation.

6.0 DIMENSIONAL TOLERANCES OF FREE CUTTING BRASS BARS, RODS AND SECTION

Sizes
The materials of Brass Fitting (Free Cutting Brass Rods) shall be supplied in sizes as specified in IS 319: 2007 or IS 2826 or as per Purchaser requirement.

**Tolerances**

The tolerances on sizes of bars/rods shall be as specified in IS 2826.

### 7.0 DIMENSION, WALL THICKNESS & TOLERANCE OF BRASS FITTINGS

Dimensions tolerances of various types of brass shall be as per drawing enclosed with tender (Drawing No.: TE-IND-STD-G-M-9021)

The minimum wall thickness of a fitting shall be in accordance with Table 3 of EN 1254 Part 1

### 8.0 END CONNECTION

End connection of the brass fitting must be capable of end feeding to the NTP and as per drawing enclosed with tender (Drawing No.: TE-IND-STD-G-M-9021)

Internal solder ring type fitting is not acceptable.

### 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 QUALITY ASSURANCE (QA)

The Contractor/Manufacturer /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.

- Material test certificates / reports
- Performance requirements and type test, if any.

### 11.0 INSPECTION / DOCUMENTS

i. Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / EIC.

ii. TPIA /EIC shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.

iii. TPIA / EIC shall carry out random inspection during manufacturing/ final inspection.

iv. Contractor / manufacturer / Supplier / 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 OWNER 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 items randomly from each manufacturing batch/ lot and have these independently tested. If 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.

vi. For any control test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vender about inspection date & place along with production schedule.
12.0 **MARKING**

Each fittings shall be embossed with OWNER’s logo, manufacturers name and trade mark BS 864 / EN 1254 Part – I and designation of fittings.

Each packing containing fittings shall carry the following stamped or written in indelible ink.

b) Manufacturer’s name or trade mark.

c) Designation of fittings.

d) Month and year of manufacturing

13.0 **PACKAGING**

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details and also complied with at the time of delivery.

14.0 **DOCUMENTS OF PRECEDENCE**

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.

\[ \sum \sum \sum \]
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - STEEL REINFORCED RUBBER HOSE

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Σ Σ Σ
1.0 INTRODUCTION AND SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

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 DEFINITIONS

OWNER/ CLIENT Sabarmati Gas Ltd., (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)
MANUFACTURER Means the Manufacturer of the Steel Reinforced Rubber Tube.
VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS Present <<Particular Technical Specification>> and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at site.
EIC Engineer – in – charge

3.0 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 single layer of high tensile steel 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.

4.0 MECHANICAL & OTHERS PROPERTIES

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.

4.6 Ozone resistance

It shall be carried out as per clause no. 5.5.of IS 9573: 1978

4.7 Core

It shall be black low temperature synthetic rubber tube resistant to LPG.

4.8 Outer Layer

Orange pinpricked outer cover Fire Ozone & Abrasion Resistant Synthetic Rubber.

5.0 HYDROSTATIC TEST

5.1 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.

5.2 Bursting pressure shall be carried out as per Clause 5.5.2 of IS 9573. The minimum burst pressure shall be 5 Mpa.

5.3 Grip strength test shall be carried out as per Annexure – A of clause 5.5.7 of IS 9573 and also shall comply with the requirement of Clause no. 5.5.7 of IS 9573.

5.4 Burning behavior / 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.

6.0 DIMENSIONS, THICKNESS & DIMENSIONAL TOLERANCES

i. Bore size

<table>
<thead>
<tr>
<th>Nominal size (mm)</th>
<th>Minimum base diameter (mm)</th>
<th>Minimum bend radius (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 mm</td>
<td>7.9</td>
<td>95</td>
</tr>
</tbody>
</table>

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

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 ± 1%.

7.0 QUALITY ASSURANCE (QA)

The Contractor/Manufacture /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.

- Material test certificates / reports
- Performance requirements and type test, if any.
8.0 INSPECTION / DOCUMENTS

i. Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / EIC.

ii. TPIA / EIC shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.

iii. TPIA / EIC shall carry out random inspection during manufacturing/ final inspection.

iv. Contractor / manufacturer / Supplier / 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 OWNER 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 items randomly from each manufacturing batch/ lot and have these independently tested. If 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.

vi. For any control test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vendor about inspection date & place along with production schedule.

9.0 MARKING

Each hose shall be indelibly marked as follows:

b) Manufacturer’s name or trade mark., if any

c) Nominal bore

d) Batch no. / Lot no.

e) Month and year of manufacturer

f) Type of hose

g) BIS marking

10.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / Vendor / Bidder shall submit the packaging details and also complied with at the time of delivery.

11.0 DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.

\[ \sum \sum \sum \]
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - WARNING TAPE

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Σ Σ Σ
1.0 INTRODUCTION & SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

The Proposed specification is designed to distribute PNG to Domestic, Commercial and Industrial customers.

The present document covers the technical specifications for the procurement of Warning Tape. Warning Tapes shall be laid in the ground above the gas main line in order to indicate their presence.

2.0 DEFINITIONS

OWNER/CLIENT Sabarmati Gas Ltd., (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)
MANUFACTURER Means the Manufacturer of the Warning Tape.
VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS Present <<Particular Technical Specification>> and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at site.
EIC Engineer – in – charge

3.0 REFERENCE CODE

IS 10889 High Density Polyethylene OR Ploy Chloride

4.0 OBJECT

This Specification refers to the grid of Plastic Material Film which is laid in the ground above the gas mains, in order to indicate their presence.

5.0 MATERIAL

Raw material of the warning Tape shall be Virgin material.

The material grade of Warning Tape shall be High Density Polyethylene (HDPE) or Polyvinyl Chloride with warning sticker / stamp.

a) Mechanical properties

Tensile strength at break (Machine direction) - 300 Kgf / cm² (minimum)

Elongation in machine & Transverse direction (%) - 300 (minimum)

6.0 RECOMMENDED MANUFACTURER FOR RAW MATERIAL

1. SOLVAY
2. BOREALIS
3. FINA
4. DOW  
5. ELENAC  
6. RELIANCE  
7. GAIL  
8. HALDIA  

However any other reputed national or international Manufacturer may also be consider for supply of Raw material with approval of Owner / Owner’s representative  

7.0 DIMENSION AND WALL THICKNESS  

Warning Tape shall have following dimensions:  

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>300 mm ± 5 mm</td>
</tr>
<tr>
<td>Thickness</td>
<td>Min. 300 Micron for width below 20 mm, 32 mm and 63 mm and Min 1000 Micron for 90 mm, 125 mm and 180 mm</td>
</tr>
</tbody>
</table>

Negative tolerance on thickness is not allowed.  

8.0 TESTING  

Testing of warning Tape shall be performed as below.  

a) Colour - Fast test  

Test specimen 100 mm to 150 mm wide shall be immersed in a 20% solution of ammonium sulphide at 15 to 20 ºC temperature for 15 days. The colour fastness shall be evaluated by comparing the test specimen with a sample specimen. The comparison shall be made by placing the two specimens on a white back ground in day light, but without exposing them directly to sun light. Test shall be accepted satisfactory, if the colour of the strip remains intact.  

b) Other tests shall be carried out as per relevant national / international standard enclosed in QAP.  

9.0 COLOUR  

The Tape shall be of bright golden yellow colour. This colour must not take any appreciable alteration in the course of time.  

10.0 QUALITY ASSURANCE (QA)  

The Contractor/Manufacturer /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.  

- Material test certificates / reports  
- Performance requirements and type test, if any.  

11.0 INSPECTION / DOCUMENTS  

i. Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / EIC.  

ii. TPIA /EIC shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.  

iii. TPIA / EIC shall carry out random inspection during manufacturing/ final inspection.  

iv. Contractor / manufacturer / Supplier / 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 OWNER 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 items randomly from each manufacturing batch/lot and have these independently tested. If 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.

vi. For any control test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vendor about inspection date & place along with production schedule.

12.0 MARKING

Marking on the Tape shall be approved by owner.

Contractor / manufacturer shall submit proposed Artwork to be marked on the Tape for the approval from Owner / Owner’s representative.

The warning Tape must be engraved with “Caution: High pressure gas pipeline below” in both English and Hindi or local language along with Owner’s Logo at a frequency of every meter.

13.0 PACKING

The warning Tape shall be delivered in rolls of 200 meters.

Packing size to be mentioned to ensure uniformity in delivery conditions of the materials being procured

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details and also complied with at the time of delivery.

14.0 DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.

∑ ∑ ∑
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - POWDER COATING OF GI PIPES & FITTINGS
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1.0 INTRODUCTION AND SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

This section contains the information and shall help to ensure that the correct specification is applied and the required quality and performance levels are achieved the exterior applications of powder coatings on galvanized steel pipes & its fitting.

This present document covers the minimum technical specification for the powder coating on GI Steel Pipes & Fittings used in high pressure natural gas transportation and 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 powder coating on GI Steel Pipes & Fittings. Unless modified by this specification, requirements of IS/ISO /EN with Latest edition. shall be valid.

2.0 DEFINITIONS

OWNER/ CLIENT Sabarmati Gas Ltd., (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)
MANUFACTURER Means the Manufacturer of the Powder Coating of GI Pipes & Fittings.
VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS Present <<Particular Technical Specification>>and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at site.
EIC Engineer – in – charge

3.0 MATERIAL

The material used for the powder coating confirming to pure polyester.

4.0 REQUIREMENTS FOR THE FABRICATED ELEMENTS

The section shall be suitable for powder coating, defects in construction which lead to corrosion, e.g. inappropriate combinations of materials, spaces which cannot be ventilated, cracks and components which are not suitable for powder coating, should be avoided.

The quality of the powder coating on galvanized Pipes & Fittings shall be primarily determined by the quality of the galvanization. The hot galvanization guidelines in IS apply only when the hot galvanized pipes & Fittings shall not be coated afterward. If coating is planned, hot galvanization should conform to the IS

The user must determine the condition of the zinc coating and its suitability as a coating substrate before powder application.

5.0 PREPARATION & PRETREATMENT
The preparation and pre-treatment of galvanized work requires a great deal of care as the quality and durability of the coating depends on it to a great extent.

To obtain a suitable powder coated surface, grinding down of the uneven areas on the galvanized surface may be required. Brushing or the use of abrasive paper, grain size 60, is recommended before initial preparation or pre-treatment.

Galvanized surfaces shall be powder coated immediately after preparation or pre-treatment and before the products of zinc corrosion, or white rust, can develop.

**PREPARATION**

Sweep blasting shall be used to prepare a clean and even surface on the zinc / galvanize coating which is ideal for adhesion of the powder coating.

The hot galvanized parts shall have a Rz mean surface roughness according to DIN 4768 of between 15 and 30 µm and a high degree of coverage.

After the sweeping process is completed, any dust must be removed thoroughly from the entire surface, which should have a uniform matte gray appearance.

Electro- and Sendzimir galvanized steel surfaces are not suitable for sweeping due to the thinness of the zinc-coating.

**PRETREATMENT**

Yellow chromating has become the most common wet-chemical process. This method uses either immersion or spraying techniques; zinc-phosphating shall also be used.

This shall rinse the conversion layer thoroughly with de-ionized water. The conversion layers must be sufficiently clean and dry before powder coating to ensure that surface irregularities do not form when the powder coating shall be cured.

**6.0 COATING SYSTEM**

Due to the excellent corrosion resistance of zinc coatings, powder coatings are usually applied to galvanized pipes and Fittings in a single coat.

The minimum thickness of powder coatings is 50 µm of porous-free coating on corners and edges.

On visible surfaces shall have an average coating thickness of at least 70 µm.

All coat thicknesses shall be measured according to ISO 2360.

**REQUIREMENTS FOR THE COATING & COATING MATERIAL**

The powder coating shall satisfy the requirements of the voluntary quality guidelines of aluminum substrates and in addition qualify for the use on galvanized pipes & Fittings.

The powder coating shall meet the requirements of BS 6497 & EN 12206-1.

The quality of other materials must be equivalent, especially with regard to the following points:

- Color and effect
- Gloss and surface characteristics such as flow properties and texture
- Resistance to weathering and anti-corrosion protection
- Mechanical properties
- Glossy at 60° C, with a gloss level of 85–95 %
7.0 TESTING

The powder coating shall be confirmed to the following test results and quality characteristics with regard to weathering, corrosion protection and mechanical properties.

Owner Representative or Third party Inspection Agency appointed by Owner shall witness finish goods testing as per the sample procedure specified in relevant ISO/IS latest edition.

<table>
<thead>
<tr>
<th>Test</th>
<th>Norm</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance to Weathering</td>
<td>conforms to EN 12206-1</td>
<td>As Per EN 12206-1</td>
</tr>
<tr>
<td>Resistance to Humidity</td>
<td>ISO 6270 [hrs]</td>
<td>720</td>
</tr>
<tr>
<td>Resistance to Mortar</td>
<td>ASTM C 207 and ASTM D 3260</td>
<td>no negative effect</td>
</tr>
<tr>
<td>Resistance to Corrosion</td>
<td>ISO 12944-6</td>
<td>C5-I and C5-M high &gt; 15 years</td>
</tr>
<tr>
<td>Coating Thickness</td>
<td>ISO 2360 [µm]</td>
<td>50-60</td>
</tr>
<tr>
<td>Adhesion</td>
<td>ASTN D 5870</td>
<td>[classification -0 ( GT=0/100)</td>
</tr>
<tr>
<td>Porosity Density</td>
<td>DIN 55 670</td>
<td>non-porous</td>
</tr>
<tr>
<td>Film Type</td>
<td>Glossy / Satin</td>
<td>satisfactory</td>
</tr>
<tr>
<td>Gloss at 60° C</td>
<td>86-95 %</td>
<td>satisfactory</td>
</tr>
<tr>
<td>Cross hatch Adhesion</td>
<td>GT = 0/100</td>
<td>satisfactory</td>
</tr>
<tr>
<td>(ASTM D-5870)</td>
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<tr>
<td>Pencil Hardness. (min.)</td>
<td>2 H</td>
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<tr>
<td>Scratch Resistance (Kg. Min.)</td>
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8.0 QUALITY ASSURANCE (QA)

The Contractor/Manufacture /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.

- Material test certificates / reports
- Performance requirements and type test, if any.

9.0 INSPECTION / DOCUMENTS

i. Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / EIC.

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iii. TPIA / EIC shall carry out random inspection during manufacturing/ final inspection.

iv. Contractor / manufacturer / Supplier / 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 OWNER 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 items randomly from each manufacturing batch/ lot and have these independently tested. If 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.
vi. For any control test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vendor about inspection date & place along with production schedule.

10.0 MARKING

Each materials / items shall be embossed with OWNER’s logo, manufacturers name and trade mark BS / EN.

Each packing containing materials / items shall carry the following stamped or written in indelible ink.

b) Manufacturer’s name or trade mark.

c) Designation of fittings.

d) Month and year of manufacturing

11.0 PROTECTION DURING TRANSPORT AND PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details during QAP and also complied with at the time of delivery.

Suitable packaging materials shall be used to protect coated components against mechanical and chemical agents such as those in mortar, plaster, cement and concrete and during storage, transport and assembly.

The supplier /Contractor / Vendor make sure that packaging materials and all other materials shall be used as intended and shall be removed without difficulty. To avoid damage to the coated surface check adhesive tapes, etc. for their suitability.

It shall be ensured that incorrect storage shall not lead to milky white spots on the surface, e.g. under packing materials, caused by a combination of moisture and warmth.

Sealing compounds and other materials such as glazing aids, drilling, cutting and other kinds of lubricants which shall come into contact with coated surfaces shall be pH neutral and free of any substances which shall damage the coating.

12.0 DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

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∑ ∑ ∑
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS – APPLIANCE VALVES

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<td>PP</td>
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</tbody>
</table>
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1.0 INTRODUCTION AND SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

This section contains the information and shall help to ensure that the correct specification is applied and the required quality and performance levels are achieved the exterior applications of powder coatings on galvanized steel pipes & its fitting.

This present document covers the minimum technical specification for the powder coating on GI Steel Pipes & Fittings used in high pressure natural gas transportation and distribution systems. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which need to be fulfilled.

The scope includes manufacture/ supply, inspection/ testing/ marking/ packaging/ handling and despatch of Ball Valves meeting all the requirements as laid down in manufacturing standard ANSI B16.33 / EN 331.

This specification refers to the requirement of Appliance Valves to be installed before the appliance i.e. stove/oven etc. for the supply of natural gas to domestic consumers.

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.

The intent of this specification is to establish minimum requirements to manufacture and supply of Appliance Ball Valves used for supply of domestic natural gas.

2.0 DEFINITIONS

OWNER/ CLIENT Sabarmati Gas Ltd., (SGL)

CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)

MANUFACTURER VENDOR Means the Manufacturer of the Appliance Valves. The person(s), firm, company, organization from whom Client / Contractor procures materials

PTS Present <<Particular Technical Specification>>and its entire appendix, if any.

TPIA Third Party Inspection Agency to be appointed by Owner at site.

EIC Engineer – in – charge

3.0 DESIGN CONDITION

Pressure : 35 Mill Barg

Temperature : 0 – 45 °C

4.0 CONSTRUCTION DESIGN

The valves shall be constructed as per ANSI B 16.33

5.0 MATERIAL

Please refer Data sheet.
6.0 MECHANICAL STRENGTH

i) The body of the valves shall be capable of withstanding without deformation or leakage a minimum 125 Nm torques, as applied to a pipe being connected to the valve.

ii) Valve shall be capable of withstanding without deformation or leakage 203 Nm bending moment or an angular displacement of 100 whichever occurs first, if applied to a pipe connected to the valve.

iii) The valves shall be capable of withstanding 25 Nm impact without breakage or leakage.

iv) Vendor shall submit Model Number along with catalogues in English along with un-priced bids.

v) Maximum turning torque to operate the valve as per table 5 of ASME B 16.33

7.0 HYDRO TEST & GAS TIGHTNESS

All Valves shall be leak tightness tested at 1.5 x Design Pressure for a period of 15 seconds and no leakage is permitted. This test shall be performed as per clause no. 4.2 of ASME 16.33.

Hydro test shall be carried out by water and Gas test shall be carried out either Air or Gas.

8.0 TEMPERATURE RESISTANCE TEST

This test shall be carried out as per 4.3 clause of ASME B 16.33.

9.0 QUALITY ASSURANCE (QA)

The Contractor/Manufacture /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.

• Material test certificates / reports
• Performance requirements and type test, if any.

10.0 INSPECTION / DOCUMENTS

i. Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / EIC.

ii. TPIA /EIC shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.

iii. TPIA / EIC shall carry out random inspection during manufacturing/ final inspection.

iv. Contractor / manufacturer / Supplier / 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 OWNER 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 items randomly from each manufacturing batch/ lot and have these independently tested. If 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.

vi. For any control test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vender about inspection date & place along with production schedule.
11.0  **MARKING**

Each material / item shall be embossed with OWNER’s logo, manufacturers name and trade mark BS / EN.

Each packing containing materials / items shall carry the following stamped or written in indelible ink.

a) Manufacturer’s name or trade mark.

b) Rate working pressure in Bar.

c) Direction of flow (mandatory)

d) Month and year of manufacturing

12.0  **PROTECTION DURING TRANSPORT AND PACKAGING**

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details during QAP and also comply with at the time of delivery.

Packing size shall be approved by owner / owner’s representative before packing the material.

Bidder shall submit the packaging details during offer and also comply with at the time of delivery.

Suitable packaging materials shall be used to protect coated components against mechanical and chemical agents such as those in mortar, plaster, cement and concrete and during storage, transport and assembly.

The supplier / Contractor / Vendor make sure that packaging materials and all other materials shall be used as intended and shall be removed without difficulty. To avoid damage to the coated surface check adhesive tapes, etc. for their suitability.

It shall be ensured that incorrect storage shall not lead to milky white spots on the surface, e.g. under packing materials, caused by a combination of moisture and warmth.

Sealing compounds and other materials such as glazing aids, drilling, cutting and other kinds of lubricants which shall come into contact with coated surfaces shall be pH neutral and free of any substances which shall damage the coating.

13.0  **DOCUMENTS OF PRECEDENCE**

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.
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<td>Pressure</td>
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<td>3.02</td>
<td>Temperature (°C)</td>
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<td>Size</td>
<td>½”</td>
</tr>
<tr>
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<td>Type</td>
<td>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/ lever for full open/close at 90° position.</td>
</tr>
<tr>
<td>4.03</td>
<td>Rating</td>
<td>125 #</td>
</tr>
<tr>
<td>4.04</td>
<td>End connection</td>
<td>Female as an inlet and the outlet shall be having Ni/Cr plated brass or steel a nozzle</td>
</tr>
<tr>
<td>4.05</td>
<td>Body material</td>
<td>Total body including the nozzle shall be of Hot Pressed / Forged Brass (ASTM B 283, Alloy UNSC37700) with Nickel/Chrome Plated. UTS – Min. 345 Mpa &amp; Elongation 25%</td>
</tr>
<tr>
<td>4.06</td>
<td>Ball material</td>
<td>Hard Chrome/ Nickel Plated, Hot pressed / machined Forged Brass Bar (ASTM B 283, Alloy UNSC37700) with Teflon Seat UTS – Min. 345 Mpa &amp; elongation 25%</td>
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<tr>
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<td>Test pressure</td>
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<td>Test medium</td>
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<td>6.04</td>
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<td>As per Standard or suggested by Owner / Purchaser</td>
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<td>6.05</td>
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<td>6.12</td>
<td>Bending Test</td>
<td>AS per ASME B 16.33 / PTS</td>
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<td>6.13</td>
<td>Torque test</td>
<td>AS per PTS</td>
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<td>6.14</td>
<td>Turning torque test</td>
<td>As per ASME B 16.33</td>
</tr>
<tr>
<td>6.15</td>
<td>Antistatic test</td>
<td>-</td>
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</tbody>
</table>
Note: -  
1. Minimum Nickel/Chrome Plated on the ball & body of appliance ball valve shall be 25 Micron. 
2. The above specified tests in PTS/Data sheet are minimum. However, the other 
   Remaining/specified tests shall be done as per ASME B 16.33
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS – ISOLATION VALVES
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13.0 DOCUMENTS OF PRECEDENCE ............................................................................................. 5
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This section contains the information and shall help to ensure that the correct specification is applied and the required quality and performance levels are achieved the exterior applications of powder coatings on galvanized steel pipes & its fitting.

This present document covers the minimum technical specification for the powder coating on GI Steel Pipes & Fittings used in high pressure natural gas transportation and distribution systems. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which need to be fulfilled.

The scope includes manufacture/ supply, inspection/ testing/ marking/ packaging/ handling and despatch of Ball Valves meeting all the requirements as laid down in manufacturing standard ANSI B16.33 / EN 331.

This specification refers to the requirement of Isolation Ball Valves to be installed before Meter for the supply of natural gas to domestic/commercial consumers.

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.

The intent of this specification is to establish minimum requirements to manufacture and supply of Appliance Ball Valves used for supply of domestic natural gas.

2.0 DEFINITIONS

OWNER/ CLIENT Sabarmati Gas Ltd., (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)
MANUFACTURER VENDOR Means the Manufacturer of the Isolation Valves.
The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS Present <<Particular Technical Specification>>and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at site.
EIC Engineer – in – charge

3.0 DESIGN CONDITION

Pressure : 4 Barg
Temperature : 0 – 45 °C

4.0 CONSTRUCTION DESIGN

The valves shall be constructed as per ANSI B 16.33
5.0 **MATERIAL**

Please refer Data sheet.

6.0 **MECHANICAL STRENGTH**

i) The body of the valves shall be capable of withstanding without deformation or leakage as per ASME B16.33 with a Min. torque of 125 Nm, as applied to a pipe being connected to the valve.

ii) Valve shall be capable of withstanding without deformation or leakage, when bending moment as per Table 3 of ASME B 16.33 or 340 Nm bending moment or an angular displacement of 100 whichever occurs first, if applied to a pipe connected to the valve, if applied to a pipe connected to the valve.

iii) The valves shall be capable of withstanding 25 Nm impact without breakage or leakage.

iv) Vendor shall submit Model Number along with catalogues in English along with un-priced bids.

v) Maximum turning torque to operate the valve as per table 5 of ASME B 16.33

7.0 **HYDRO TEST & GAS TIGHTNESS**

All Valves shall be leak tightness tested at 1.5 x Design Pressure for a period of 15 seconds and no leakage is permitted. This test shall be performed as per clause no. 4.2 of ASME 16.33.

Hydro test shall be carried out by water and Gas test shall be carried out either Air or Gas.

8.0 **TEMPERATURE RESISTANCE TEST**

This test shall be carried out as per 4.3 clause of ASME B 16.33.

9.0 **QUALITY ASSURANCE (QA)**

The Contractor/Manufacture /Vendor shall submit following for review of TPIA / EIC at the time of final inspection at contractor store before installation of materials.

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- Performance requirements and type test, if any.

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ii. TPIA /EIC shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.

iii. TPIA / EIC shall carry out random inspection during manufacturing/ final inspection.

iv. Contractor / manufacturer / Supplier / 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 OWNER 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 items randomly from each manufacturing batch/ lot and have these independently tested. If 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.

vi. For any control test or examination required under the supervision of TPIA/EIC, latter shall be informed in writing one (1) week in advance by vender about inspection date & place along with production schedule.
11.0 MARKING

Each materials / items shall be embossed with OWNER’s logo, manufacturers name and trade mark BS / EN.

Each packing containing materials / items shall carry the following stamped or written in indelible ink.

a) Manufacturer’s name or trade mark.
b) Rate working pressure in Bar.
c) Direction of flow (mandatory)
d) Month and year of manufacturing

12.0 PROTECTION DURING TRANSPORT AND PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details during QAP and also complied with at the time of delivery.

Packing size shall be approved by owner / owner’s representative before packing the material.

Bidder shall submit the packaging details during offer and also complied with at the time of delivery.

Suitable packaging materials shall be used to protect coated components against mechanical and chemical agents such as those in mortar, plaster, cement and concrete and during storage, transport and assembly.

The supplier / Contractor / Vendor make sure that packaging materials and all other materials shall be used as intended and shall be removed without difficulty. To avoid damage to the coated surface check adhesive tapes, etc. for their suitability.

It shall be ensured that incorrect storage shall not lead to milky white spots on the surface, e.g. under packing materials, caused by a combination of moisture and warmth.

Sealing compounds and other materials such as glazing aids, drilling, cutting and other kinds of lubricants which shall come into contact with coated surfaces shall be pH neutral and free of any substances which shall damage the coating.

13.0 DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.
### DATA SHEET

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<tr>
<td>1.01</td>
<td>Fluid</td>
<td>Natural gas</td>
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<tr>
<td>2.00</td>
<td>Operating condition</td>
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<tr>
<td>2.01</td>
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</tr>
<tr>
<td>2.02</td>
<td>Temperature (°C)</td>
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<td>3.00</td>
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</tr>
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<td>pressure</td>
<td>4 Barg</td>
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<td>Temperature (°C)</td>
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</tr>
<tr>
<td>4.02</td>
<td>Type</td>
<td>Isolation Ball Valve with Full Bore, NPT Female (Confirming to ANSI B1.20.1) ends for natural gas application. With operating knob, and locking arrangement with provision for sealing wire and lead seal (without Key). Valve full open/close position shall be at 90°.</td>
</tr>
<tr>
<td>4.03</td>
<td>Rating</td>
<td>125 #</td>
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<tr>
<td>4.04</td>
<td>End connection</td>
<td>End connection should be NPT Female (conforming to ANSI B1.20.1).</td>
</tr>
<tr>
<td>4.05</td>
<td>Body material</td>
<td>Hot Pressed / Forged Brass (ASTM B 283, Alloy UNSC37700) with Nickel/Chrome Plated.</td>
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<td>4.06</td>
<td>Ball material</td>
<td>Hot pressed / Machined Forged Brass (ASTM B 283, Alloy UNSC37700) with Hard Chrome/Nickel Plated with Teflon Seat</td>
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<td>4.07</td>
<td>Stem</td>
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<td>Seat &amp; seal</td>
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Note: Unless otherwise stated all tests will be witnessed by the purchaser.

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<td>Material certificates</td>
</tr>
<tr>
<td>7.02</td>
<td>All testing certificates</td>
</tr>
</tbody>
</table>

Note:  
1. Lever type handle are not acceptable.  
3. The above specified tests in PTS/Data sheet are minimum. However, the other  
4. Remaining/specified tests shall be done as per ASME B 16.33
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS-THIRD PARTY INSPECTION AGENCY
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ANNEXURE -1 ................................................................................................................................... 6
1.0 INTRODUCTION & SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

The objective is to specify the role of Third Party Inspection Agency (TPIA) appointed by Owner for inspection of different supply of items and construction work.

The Owner will appoint an independent approved Third Party Inspection Agency (TPIA) whose role shall be to witness/verify, review and certify all quality related issues for inspection of different supply of items and construction work. The TPIA shall ensure that all quality related requirements during final inspection at site are strictly followed as per Owner/Owner’s representative specifications.

This PTS also indicates general quality control requirements for various activities pertaining to PE Laying & GI Installation Projects and the extent of TPIA involvement as indicated in tender shall be binding on the Manufacturer / Vendor/ Contractor.

2.0 DEFINATION

OWNER/ CLIENT Sabarmati Gas Ltd., (SGL)
CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)

MANUFACTURER Means the Manufacturer of the materials / items
VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials
PTS Present <<Particular Technical Specification>>and its entire appendix, if any.
TPIA Third Party Inspection Agency to be appointed by Owner at site.
EIC Engineer – in – charge

3.0 SCOPE OF WORK

3.1 Role of TPIA for Supply Items

TPIA, as appointed by Owner, shall witness, review, verify and certify all quality related activities for supply of material for PE Laying & GI Installation materials at site during final inspection at contractor store as per QAP and Technical specification attached in this tender. The extent of TPIA involvement as a minimum is indicated in the various Quality Assurance Plans attached with the tender document and shall be as per final approved QA/QC procedures or as per codes and standards, wherever applicable.

3.2 Role of Owner’s Representative for Supply Items

For supply items, Owner’s Representative reserves the right to carryout independent inspection / audit of the plant during manufacturing. The extent of inspection shall be at the discretion of Owner / Owner’s Representative.

3.3 Role of TPIA for Construction Activity

TPIA, as appointed and paid by Owner will be involved in all inspection, witness, review, verify and certify construction work. The extent of TPIA involvement will be shown in the various Quality Assurance plans attached with this tender.
Prior to commencement of any activity pertaining to construction at site, Owner/Owner’s representatives shall get the documents reviewed by the TPIA.

Following Minimum requirement for checking of supplied of materials by contract/Owner, execution of works shall be followed by TPIA at site.

- TPIA shall ensure that his representative and Owner’s representative shall carry inspection of items supplied by Owner and PE/PNG contractors at their premises/stores prior to installation.
- TPIA shall arrange the relevant “IS codes” and standards document for inspection for his representative.
- TPIA Representative shall verify whether the material is procured from recommended vendor list enclosed in the tender or as per Owner approved vendor.
- TPIA Representative shall verify that material is procured by contractors in line in line with the requirement of tender document.
- TPIA Representative shall carry out physical inspection of material and review test certificates provided by Contractor / manufacturer / Vendor for each item as per the approved QAP by Owner or attached in the tender document.
- TPIA Representative shall maintain the record for each inspection as per the format attached as Annexure – I
- TPIA Representative shall ensure that the material does not comply with quality standards mentioned in tender documents then same materials shall be rejected and it is not used for execution of work at site at anywhere. Necessary records for such rejection shall be reported to EIC/City Manager/ Zonal Head and E & P Department.
- TPIA Representative shall ensure such segregation of the inspected and non-inspected materials at the contractor stores with necessary tagging.

2.4 The various Hold points’ involvement as mentioned in various QAP indicative minimum. However, actual involvement shall be decided by Owner/Owner’s Representative during review of documents, and Manufacturer / Vendor / Contractor shall be bound by the same. Manufacturer / Vendor / Contractor shall also submit the calibration certificates of all the equipment/instruments, which are part of manufacturing/Inspection & testing for TPIA review. TPIA shall also be responsible to check /verify / witness the necessary calibration of such equipment/Instruments during visit to Manufacturer’s / Vendor’s/ Contractor’s works.

4.0 ROLE OF MANUFACTURER / VENDOR/ CONTRACTOR

Manufacturer / Vendor / Contractor shall have to carry out all necessary inspections and testing which are indicated in approved documents and shall have to provide all necessary latest tools & tackles, measuring instruments and facilities, which are required by the TPIA/Owner /Owner’s representatives and all necessary assistance to carryout inspection/testing at Owner’s /Manufacturer’s / Vendor’s/ Contractor’s cost. Owner/Owner's representative shall have a right to inspect any activity.

5.0 CO-ORDINATION WITH TPIA

The detail item wise Manufacturing & delivery schedule indicating dates and location of manufacturer works shall be submitted by the Contractor within One (1) week from the date of issue of their internal Indent /Purchase order to sub vendor.

Manufacturer / Vendor / Contractor shall inform in writing minimum One (1) week in advance to inform the TPIA/Owner/Owner’s representative for Inspection Notice/Call, If any.
All coordination among TPIA/Owner’s representative/ at Contractor’s/ Vendor’s / Manufacturer’s works shall be the responsibility of Contractor. In case the Contractor fails to honour its inspection calls/notice at required place, Contractor has to reimburse all costs incurred by the Owner/Owner representative at actual.

Inspection of site construction activities shall be coordinated on daily basis and adequate notice shall be given to Owner/Owner’s representative to mobilize TPIA, this shall be as per site conditions and requirements.

6.0 INVolVEMENT OF TPIA

All procured items required for execution activities for civil, Mechanical etc works should satisfy the following conditions:

- It should be of reputed make having proven record of being successfully used in similar works earlier and as per approval by Owner / Owner’s Representative.

- All materials shall be of standard quality and shall be procured from renowned sources / manufacturers approved by Owner/ Owner’s representative.

- All tests of the materials as specified by the relevant codes should be carried out by the Manufacturer / Vendor/ Contractor in an approved laboratory and the test reports should be duly authenticated by the laboratory and should be submitted to TPIA for his approval. If so desired by Owner/ Owner’s representative, tests shall be conducted in his presence or in presence of his authorized nominee.

- Quality and acceptance of materials not covered under general technical specifications shall be governed by relevant codes.

- Manufacturer / Vendor/ Contractor shall submit manufacturer’s test reports on quality and suitability of any material procured from them and their recommendations on storages/ application/ workmanship etc. for the intended use. Submission of manufacturer’s test reports does not restrict Owner/ Owner’s representative from asking fresh test results from an approved laboratory of the actual materials supplied even from an approved manufacturer. Contractor shall furnish the QAP for all supply and construction works.

- QAP shall commence at the instigation of the requisition and follow through to materials acceptance thus ensuring total conformity to the specifications and Type test certificates of similar materials.

- Routine tests shall be carried out for materials / items as per I.S/EN etc.

- Owner/Owner’s Representative reserves the right to witness routine acceptance tests at the manufacturer works, prior to despatch, to prove compliance with specifications.

7.0 DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.
# ANNEXURE -1

## MATERIAL RECEIPT CUM INSPECTION REPORT

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>Name of TPI</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Description</th>
<th>Received Qty.</th>
<th>Name of Supplier</th>
<th>Delivery Challan</th>
<th>T.C. Availability</th>
<th>Compliance of QAP</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

**Note:** Material Test Certificate/ Recording of Physical check to be attached here with.

<table>
<thead>
<tr>
<th>Contractor</th>
<th>TPI</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Designation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

PTS - MATERIAL SAFETY DATA SHEET OF NATURAL GAS & ETHYL MERCAPTAN

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Date</th>
<th>Subject of revision</th>
<th>Author</th>
<th>Checked</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>16.06.2018</td>
<td>Issue for Draft RFP</td>
<td>BP</td>
<td>KKJ</td>
<td>PP</td>
</tr>
</tbody>
</table>
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3.0 DISCLAIMER ............................................................................................................................ 10
# Material Safety Data Sheet of Natural Gas & Ethyl Mercaptan

## 1.0 Natural Gas

### 1. Chemical Identity:

<table>
<thead>
<tr>
<th>Chemical Name:</th>
<th>Natural Gas</th>
<th>Chemical Classification:</th>
<th>Highly Flammable Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonyms:</td>
<td>Natural Gas</td>
<td>Trade Name:</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Formula:</td>
<td>CH₄</td>
<td>C.A.S. No.:</td>
<td>8006-14-2</td>
</tr>
<tr>
<td>C.A.S. No.:</td>
<td></td>
<td>U.N. No.:</td>
<td>1971</td>
</tr>
<tr>
<td>Shipping Name:</td>
<td>Natural Gas; LNG; CNG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Codes/Label:</td>
<td>2.1/2</td>
<td>NFPA Code:</td>
<td>H 1 : F 04 : R 0</td>
</tr>
</tbody>
</table>

### Regulated Identification:

- Hazchem No: 2 [S]E
- Hazardous Waste I.D. No: Not classified as hazardous waste

### Hazardous Ingredients:

<table>
<thead>
<tr>
<th>Hazardous Ingredients:</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.A.S. No.</td>
</tr>
<tr>
<td>(1) Methane</td>
</tr>
<tr>
<td>(2) Ethane</td>
</tr>
<tr>
<td>(3) Propane</td>
</tr>
<tr>
<td>(4) Ethyl Mercaptan</td>
</tr>
</tbody>
</table>

### 2. Physical and Chemical Data:

<table>
<thead>
<tr>
<th>Boiling Range / Point:</th>
<th>161.4 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State:</td>
<td>Gas</td>
</tr>
<tr>
<td>Appearance:</td>
<td>Colourless</td>
</tr>
<tr>
<td>Melting / Freezing Point:</td>
<td>-182.5 °C</td>
</tr>
<tr>
<td>Vapour Pressure:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapour Density:</td>
<td>0.6 to 0.8 (Air = 1)</td>
</tr>
<tr>
<td>Solubility in Water:</td>
<td>Slightly</td>
</tr>
<tr>
<td>Specific Gravity:</td>
<td>0.62 to 0.70 (Water = 1);</td>
</tr>
<tr>
<td>pH:</td>
<td>Not Determined</td>
</tr>
<tr>
<td>Odour:</td>
<td>Odourless (Mercaptan odour when odorized)</td>
</tr>
</tbody>
</table>

### 3. Fire and Explosion Hazard Data:

- Flammability: Yes
- LEL: 5%
- Flash Point: N.A.
- Auto Ignition Temperature: 540 °C
- TGD Flammability: Yes
- UEL: 15%
- Flash Point: Flammable
- Explosion Sensitivity to Impact: Sensitive to mechanical impact; flammable
- Explosion Sensitivity to State of Electricity: Static charged; flammable
- Hazardous Combustion Products: NOₓ, CO, CO₂
- Hazardous Polymerization: Will Not Occur
- Combustible Liquid: Explosive
- Explosive Material: Hydrocarbon
- Corrosive Material: N.A.
- Flammable Material: Yes
- Oxidizer: Incompatible with Oxidizing agents
- Others: ---
<table>
<thead>
<tr>
<th><strong>Pyrophoric Material:</strong> None</th>
<th><strong>Organic Peroxide:</strong> Incompatible with peroxide; Risk of fire</th>
</tr>
</thead>
</table>

**4. REACTIVITY DATA:**

<table>
<thead>
<tr>
<th><strong>Chemical Stability:</strong> Stable</th>
<th><strong>Incompatibility with other Material:</strong> N.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reactivity:</strong> Heat, Oxidizers</td>
<td><strong>Hazardous Reaction Products:</strong> CO (if incomplete combustion takes place)</td>
</tr>
</tbody>
</table>

**5. HEALTH HAZARD DATA:**

<table>
<thead>
<tr>
<th><strong>Routs of Entry:</strong> Normally by inhalation; Natural gas is primarily inhaled. However, most often, the inhalation hazard is carbon monoxide caused by the incomplete combustion of natural gas.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effects of Exposure / Symptoms:</strong> On loss of containment this gas can cause suffocation by lowering the oxygen content of the air in confined areas. Chronic Effect not known.</td>
</tr>
<tr>
<td><strong>INHALATION:</strong> Non irritant-Asphyxiant. May causes headache, nausea, coughing, whoezing, inactivity, sedation, breathing and convulsions.</td>
</tr>
<tr>
<td><strong>EYES:</strong> Non irritant.</td>
</tr>
</tbody>
</table>

**INGESTION:** Not applicable

**Emergency Treatment:** Fresh air, rest. Artificial respiration if indicated.

| **INHALATION:** If exposed to excessive amounts of natural gas due to a leak, remove person to fresh air using proper protective equipment. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately. If exposed to excessive amounts of carbon monoxide due to products of incomplete combustion, remove person to fresh air using proper protective equipment. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately. **EYES CONTACT:** If irritation/redness develops, move victim away from exposure into fresh air and flush eyes with clean water. **SKIN:** First aid is not normally required. Wash thoroughly with soap and water. Wash clothing before reuse, if Irritation occurs, get medical attention. **ON FROSTBITE:** Rinse with plenty of water, do NOT remove clothes. First rinse with plenty of water for several minutes, and then Refer for medical attention. **INGESTION:** Unlikely route of exposure as this is a gas at normal room temperature and pressure. Never give anything by mouth to an unconscious person. Have patient drink several glasses of water then induce vomiting by having patient tickle back of throat with finger. Keep airway clear. Get medical attention immediately. |

**Antidotes/Dosages:** Not Known.

<table>
<thead>
<tr>
<th><strong>TLV (ACGHIH):</strong> Asphyxiant</th>
<th><strong>STEL:</strong> N.A.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Permissible Exposure Limit:</strong> N.A.</th>
<th><strong>Odour Threshold:</strong> Not Known</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Acute Oral LD50 (Rat):</strong> Not applicable</th>
<th><strong>Human Odour detection limit:</strong> 0.4 ppb</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute Inhalation LC50 (Rat):</strong> Not applicable</td>
<td><strong>IDLH:</strong> Simple Asphyxiant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>NFPA Hazard:</strong> Health:1 (Slight)</th>
<th><strong>Flammability:</strong> 4( Extreme)</th>
<th><strong>Stability:</strong> 0 (negligible)</th>
</tr>
</thead>
</table>
6. PREVENTIVE MEASURES:

Personnel Protective Equipment: Safety Goggles, Face Shield, Self Contained Breathing apparatus

Handling and Storage Precautions: To be handled by trained personnel only and approved operating procedures to be followed.

Handling: Avoid breathing gas, use approved respiratory protection is there is potential for exposure above the exposure limit and possibility of Asphyxiant atmosphere. Keep away from sources of ignition. Closed system, ventilation, explosion-proof electrical equipment and lighting. Stay away and upwind of spill/release. Use non-sparking tools. Avoid static built up. Vent to outside atmosphere with precaution and control venting. Monitor concentration in atmosphere with gas measuring equipments while venting or draining.

Storage: “No smoking or open flame in storage area”. Keep away from source of ignition. Use of appropriate warning. Store cylinders in well ventilated, low fire risk area.

7. EMERGENCY AND FIRST AID MEASURE:

FIRE:

Fire Extinguishing: Water spray, Powder. To extinguish a natural gas fire, stop the flow of natural gas, use dry chemical, carbon dioxide, halon or water. Special note, the fire should not be extinguished unless flow of gas can be immediately stopped. Fire fighters should wear SCBA in case of Oxygen deficient atmosphere.

Special Procedures: Keep cylinder cool by spraying with water. Combat fire from a sheltered position. Shut off supply from safe location; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with water spray, powder, carbon dioxide. Evacuate all unnecessary personals to Assembly point.

Unusual Hazards: Asphyxiant atmosphere. Wear Safety glasses and leather gloves. In poorly ventilated area or where an inhalation risk exist use full face air line respirator or SCBA.

EXPOSURE: Gas is lighter than air and will disperse readily in well ventilated areas.

First Aid Measures:

SKIN: First aid is not normally required. Wash thoroughly with soap and water. Wash clothing before reuse, if Irritation occurs, get medical attention.

INHALATION: Remove to fresh air, if breathing is difficult, have trained person administer oxygen. If respiration stops, have a trained person administer artificial respiration. Get medical attention immediately.

INGESTION: Unlikely route of exposure as this is a gas at normal room temperature and pressure. Never give anything by mouth to an unconscious person. Have patient drink several glasses of water then induce vomiting by having patient tickle back of throat with finger. Keep airway clear. Get medical attention immediately. (Refer Point No.5-Emergency Treatment)

Antidotes/Dosages: Not Known.
### MATERIAL SAFETY DATA SHEET OF
NATURAL GAS & ETHYL
MERCAPTAN

<table>
<thead>
<tr>
<th><strong>SPILLS:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steps to be taken:</strong> Evacuate area. Call emergency services and gas supplier. For large releaser evacuate unnecessary personnel upwind of the leakage area. Remove or eliminate ignition source, minor leaks can be detect with soap solution applied at suspected leak points, never use flame to detect presence of methane. Suitable personal protective equipment to be used (SCBA, Safety goggles, etc).</td>
</tr>
</tbody>
</table>

| **Waste disposal Method:** Vent to Outside atmosphere |

<table>
<thead>
<tr>
<th><strong>8. Additional Information / References:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH = American Conference of Governmental Industrial Hygienists.</td>
</tr>
<tr>
<td>PEL = Permissible Exposure Limit (OSHA)</td>
</tr>
<tr>
<td>STEL = Short Term Exposure Limit (15 Minutes)</td>
</tr>
<tr>
<td>TDG = Transportation of Dangerous Goods. (CANADA)</td>
</tr>
<tr>
<td>TLV = Threshold Limit Value.</td>
</tr>
<tr>
<td>IDLH = Immediate Danger to Life &amp; Health.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>9. Manufacturer / Suppliers Data:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name of Firm:</strong></td>
</tr>
<tr>
<td><strong>Mailing Address:</strong></td>
</tr>
<tr>
<td><strong>Telephone / Telex Nos.:</strong></td>
</tr>
<tr>
<td><strong>Fax Nos.:</strong></td>
</tr>
<tr>
<td><strong>Telegraphic Address:</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Standard Packing:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TREMcard Details / Ref.:</strong> ------</td>
</tr>
</tbody>
</table>

**DISCLAIMER:** information contained in this material data sheet is believed to be reliable but no representation; guarantee or warranties of any kind are made as to its accuracy, suitability for a particular application or results to be obtained from them. It is up to the manufacturer/seller to ensure that the information contained in the material safety data sheet is relevant to the product manufactured/handled or sold by him as the case maybe. The Government makes no warranties expressed or implied in respect of the adequacy of this document for any particular purpose.
2.0 ETHYL MERCAPTAN

### 1. CHEMICAL IDENTITY:

- **Chemical Name**: Ethyl Mercaptan;  
- **Chemical Classification**: Highly Flammable Gas  
- **Synonyms**: Ethanethiol, ethyl sulfhydrate, Mercaptan, ethyl thioalcohol, mercaptoethane, thioethyl alcohol  
- **Trade Name**: Ethyl Mercaptan.

- **Formula**: C2H5SH;  
- **C.A.S. No.**: 75-08-1;  
- **U.N. No.**: 2363  

- **Shipping Name**: Ethyl Mercaptan;  
- **Codes/Label**: 3.1/3;  
- **NFPA Code**: H 1 ; F 4 ; R 1  

- **Regulated Identification**:  
  - **Hazchem No**: 3WE  
  - **Hazardous Waste I.D. No.**: E044  

- **Hazardous Ingredients**: C.A.S. No.  
  - (1 ) Ethyl Mercaptan 75-08-1

### 2. PHYSICAL AND CHEMICAL DATA:

- **Boiling Range / Point**: 35°C +/- 1°C  
- **Flash Point**: -38.9°C  
- **Auto Ignition Temperature**: 300°C  

- **Vapour Pressure**: @ 37.8°C =16.2 psi =838 mm/Hg  
- **Vapour Density**: 2.1 (Air = 1);  
- **Solubility in water**: 0.70 at 20°C;  
- **Specific Gravity**: 0.845 (Water = 1);  
- **pH**: Not Determined  
- **Odour**: Unpleasant; penetrating persistent and unpleasant odour of skunk

### 3. FIRE AND EXPLOSION HAZARD DATA:

- **Flammability**: Yes  
- **UEL**: 18%  
- **LEL**: 2.8%  
- **Flash Point**: -38.9°C  
- **Auto Ignition Temperature**: 300°C  

- **TGD Flammability**: Extremely Flammable  
- **UEL**: 18%  
- **Flash Point**: -17°C (CC, ASTM D3243)

- **Explosion Sensitivity to Impact**: Not Sensitive to mechanical impact  
- **Explosion Sensitivity to State of Electricity**: Static charged; flammable  
- **Hazardous Combustion Products**: NOx, CO, CO2, Sulphur oxides; H2S  
- **Hazardous Polymerization**: Will Not Occur  

- **Explosive Material**: Hydrocarbon  
- **Corrosive Material**: Sulphur  

- **Flammable Material**: Yes  
- **Oxidizer**: Incompatible with Oxidizing agents; strong acids, strong bases and alkaline metals;  
- **Pyrophoric Material**: None  

### 4. REACTIVITY DATA:

- **Chemical Stability**: Stable under normal condition  
- **Incompatibility with other Material**: Strong oxidizing and reducing agents, strong acids, strong bases and alkaline metals.  
- **Reactivity**: Heat, Oxidizers; Strong acids and bases  

### 5. HEALTH HAZARD DATA:

- **Routes of Entry**: Skin, Inhalation, Ingestion.  
- **Effects of Exposure / Symptoms**: Chronic Effect not known.  
- **INHALATION**: Harmful by inhalation. Inhalation of product vapours or mist may cause irritation to the nose, throat and respiratory system. Symptoms of exposure include headache, coughing, nausea, dizziness, coughing and breathing difficulties.  
- **EYES**: Irritating to eyes, causing pain, tearing and general inflammation.  
- **SKIN**: May cause irritation with possible redness, edema or drying due skin defatting and itching.  
- **INGESTION**: The product is unlikely to be swallowed accidently due to its very strong and unpleasant odour. Ingestion of this product will irritate the gastric tract causing nausea, vomiting, diarrhea and abdominal pains.  

#### Emergency Treatment:

- **Eye Wash and normal body shower facility near storage area.**  
- **INHALATION**: Move the affected person to fresh air. Ensure airways are clear. If breathing is difficult, have trained person administer oxygen. If respiration stops, have a trained person administer artificial respiration. Get medical attention immediately.  
- **EYES CONTACT**: If contact with eye(s) occurs, wash with running water holding eyelid(s) open (eye wash shower). Take care not to rinse contaminated water into the non-affected eye. In all cases of eye contamination it is a sensible...
precaution to seek medical advice.

SKIN: If skin or hair contact occurs remove contaminated clothing and was contaminated skin and hair with plenty of soap and running water (Eye wash/shower assembly). Wash contaminated clothing before re-use. If irritation occurs seek medical advice.

INGESTION: Never give anything by mouth to an unconscious person. Have patient drink several glasses of water then induce vomiting by having patient tickle back of throat with finger. Keep airway clear. Get medical attention immediately.

Antidotes/Dosages: Not Known.

TLV (ACGIH): 0.5 ppm/ 1.3mg/m3 STEL: N.A.
Permissible Exposure Limit: N.A. Odour Threshold: Not Known
Acute Oral LD50 (Rat): 680-1960 mg/kg Human Odour detection limit: 0.4 ppb
Acute Inhalation LC50 (Rat)/4hrs: 4420 pp, LD50 Dermal (Rat) > 2000 mg/kg IDLH: 2500ppm

NFPA Hazard: Health: 1 (Slight) Flammability: 4( Extreme) Stability: 1 (negligible)

Special: Not Known Signals:

6. PREVENTIVE MEASURES:

PERSONNEL PROTECTIVE EQUIPMENT: Full face mask chemical cartridge filter, Chemical Safety Goggles, Face Shield, Rubber Gloves, full body suit (Tyvek/PVC); Eye Wash-Shower.
Respiratory Protection: If engineering controls are not effective then as approved respirator with replaceable organic vapour filter should be used.
Eye Protection: Safety glasses with side shields or face shield should be worn.
Hand Protection: Wear hand gloves of impervious material.

Handling and Storage Precautions: To be handled by trained personnel only and approved operating procedures to be followed.

Handling:
• Use with adequate ventilation. Keep away from sources of ignition. The vapors can travel to an ignition source and flash back causing a flash fire.
• Avoid breathing Vapour, use with adequate ventilation. Wear NIOSH/MSHA approved respiratory protection if there is potential for exposure above the exposure limits.
• Do not get in eyes, on skin or clothing. • SPECIAL MIXING AND HANDLING INSTRUCTIONS;
• Keep container closed except when transferring material.
• Do not reuse containers.
• Avoid breathing gas, use approved respiratory protection is there is potential for exposure above the exposure limit and possibility of Asphyxiant atmosphere. Keep away from sources of ignition. Closed system, ventilation, explosion-proof electrical equipment and lighting. Stay away and upwind of spill/release. Use non-sparking tools.
• Avoid static built up. Electrically link and ground metal containers for transfers of the product to prevent accumulation of static electricity. Vent to outside atmosphere with precaution and control venting. Monitor concentration in atmosphere with gas measuring equipments while venting or draining.

Storage: Highly flammable. Store in a cool, dry, ventilated area away from heat, sparks and flame. “No smoking or open flame in storage area”. Keep away from source of ignition. Use of appropriate warning. Store cylinders/containers in well ventilated, low fire risk area.

Engineering Controls: Good ventilation adequate to maintain the concentration below exposure standards should be used.
The ventilation system should be suitable for use with highly flammable substances. Use non-sparking tool for maintenance. Keep container closed when not in use.

Hygiene Measures: Ensure high level of personnel hygiene is maintained when using this product. Always wash hand before eating, drinking, smoking or using the toilet.

Other Information: Vapour heavier than air-prevent concentration in hallows or sumps. DO NOT enter confined space where vapour may have collected.

7. EMERGENCY AND FIRST AID MEASURE:

FIRE:

Fire Extinguishing: Dry chemical, carbon dioxide & foam. Water ineffective, but should be used to keep fire-exposed containers by fog or spray. Fire fighters should wear SCBA and full protective clothing to minimize exposure (Full body suit)

Special Procedures: Shut down motors, pumps, electrical service and eliminate all sources of ignition. Combat fire from
a sheltered position. Use spray to keep fire exposed containers cool to avoid pressure build-up, wear self-contained breath apparatus and full protective clothing. Shut off supply from safe location. Evacuate all unnecessary personals to Assembly point.

**Unusual Hazards:** Flammable vapours, being heavier than air, may travel long distance along the ground before reaching a source of ignition and flash back. In poorly ventilated area or where an inhalation risk exist use full face air line respirator or SCBA.

**EXPOSURE:** Gas is lighter than air and will disperse readily in well ventilated areas.

**First Aid Measures:** Remove to fresh air, if breathing is difficult, have trained person administer oxygen. If respiration stops, have a trained person administer artificial respiration. Get medical attention immediately. *(Refer Point No.5-Emergency Treatment)*

**Antidotes/Dosages:** Not Known.

**SPILLS:**

**Steps to be taken:** Remove all sources of ignition. Evacuate all unnecessary personnel from area. Harmful by inhalation. Wear suitable PPE to prevent skin and eye contamination and inhalation of vapours. Do not dilute material but contain. If possible contain the spill by placing inert absorbent such as sand or dirt on to material. Prevent runoff in to drains and waterways. Use Non sparking tools to collect the material. For large releases evacuate unnecessary personnel upwind of the leakage area. If large quantities of this material enter the waterways contact Environment protection authority (GPCB) or your local waste management authority.

**Waste disposal Method:** The product can be destroyed by oxidation with hydrogen peroxide or sodium hypochlorite. Alternatively it can be incinerated at an approved waste disposal site. Levels must not be removed from containers (from No.8) Do not cut, puncture or weld on or near containers, even empty container may contain flammable hazardous residues. Contaminated container must be sent to GPCB approved agencies and disposal should be in accordance with the relevant local, state and central Govt. regulation (Hazardous Waste Management and Handling Rule’1989).

8. **ADDITIONAL INFORMATION / REFERENCES:**

ACGIH = American Conference of Governmental Industrial Hygienists.
PEL = Permissible Exposure Limit (OSHA)
STEL = Short Term Exposure Limit (15 Minutes)
TDG = Transportation of Dangerous Goods. (CANADA)
TLV = Threshold Limit Value.
IDLH = Immediate Danger to Life & Health.

9. **DISPOSAL CONSIDERATIONS**

Disposal: Do not dispose of in a sink, drain or in the immediate environment. Dispose of in a safe manner in accordance with local/ national regulations. Incineration.

10. **Transportation information**

- Proper shipping name: Ethylmercaptan
- RID/ADR: 3F1
- UN No.: 2636 Packing group I
- IMO-IMDG code: EmS 3-07
  - Label: 3 + MP
- ICAO/ IATA: Class 3

Other
- Kemler code: 33/2363

11. **Regulatory information**

- EEC
  - Symbol(s): F – Highly flammable
    - Xn – Harmful
    - N – Dangerous for the environment
  - R Phrase(s): R 11 – Highly flammable
    - R 20 – Harmful by inhalation
    - R50/53 – Very toxic to aquatic organisms. May cause long-term adverse effects in the aquatic
3.0 DISCLAIMER

Information contained in this material data sheet is believed to be reliable but no representation, guarantee or warranties of any kind are made as to its accuracy, suitability for a particular application or results to be obtained from them. It is upto the manufacturer / seller to ensure that the information contained in the material safety data sheet is relevant to the product manufactured / handled or sold by him as the case may be the Government makes no warranties expressed or implied in respect of the adequacy of this document for any particular purpose.

∑ ∑ ∑
SABARMATI GAS LTD.

TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL

LIST OF APPROVED / RECOMMENDED VENDORS

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<th>Date</th>
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<td>DEFINITIONS</td>
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<td>LIST OF APPROVED / RECOMMENDED VENDORS</td>
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1.0 INTRODUCTION & SCOPE

Sabarmati Gas Limited has been promoted by BPCL & GSPC is supplying natural gas to four segments are Domestic, Industrial and Commercial/Non Commercial customers through PNG and automobiles through its CNG outlets in the 5 districts of North Gujarat i.e. Gandhinagar, Mehsana, Patan, Sabarkantha & Aravali Districts of Gujarat.

The intent of this specification is to establish RECOMMENDED VENDOR for purchase items directly by them or any others agency appointed by them such as contractor, vendor

Owner reserves the right to make any changes in recommended vendor list by adding or delete or holding of vendor during execution of work.

2.0 DEFINITIONS

OWNER/ CLIENT Sabarmati Gas Limited, (SGL)

CONSULTANT Tractebel Engineering Private Ltd., (TE-IN)

MANUFACTURER Means the Manufacturer of the Materials / Bought Out items.

VENDOR The person(s), firm, company, organization from whom Client / Contractor procures materials

PTS Present <<Particular Technical Specification>> and its entire appendix, if any.

TPIA Third Party Inspection Agency to be appointed by Owner at site.

EIC Engineer – in – charge

3.0 LIST OF APPROVED / RECOMMENDED VENDORS

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<th>ITEM CODE / DESCRIPTION</th>
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<td>M/s Jain Irrigation System Ltd Jalgaon</td>
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<td>M/s Vishakha Irrigation Pvt ltd, Kalol</td>
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<td></td>
<td>M/s Pennwalt Agru Plastic Limited, Savli, Baroda</td>
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<td>M/s Kimplas Piping System Limited, Nasik</td>
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<td>M/s Mehta &amp; Brothers</td>
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<td>M/s Jainson Industries</td>
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<td>STEEL REINFORCED RUBBER HOSE</td>
<td>M/s KRPC Enterprise Ltd</td>
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<td>M/s Vansh Industries</td>
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| PE ELECTOFUSION FITTINGS (PE 100, SDR -11, BLACK) | M/s Pennwalt Agru Plastic Limited, Savli, Baroda  
M/s Kimplas Piping System Limited, Nasik (Trustene)  
M/s Georg Fischer Piping System Pvt. Ltd. (GF)  
M/s Innogage PE Industries SAM (M/s Glynwed Pipe Systems India Pvt. Ltd.)  
M/s. Al-Aziz Plastics Pvt. Ltd. FOR 20MM AND 32 MM COUPLER AND 32*20*32 TAPPING TEE ONLY |
| WARNING MAT                       | M/s Singhal Industries Pvt. Ltd. Gaandhinagar  
M/s Shri Vijay Wire & Cable Industries, New Delhi.  
M/s Sparco Multiplast Pvt. Ltd. Ahmedabad  
M/s Rohini Traders. Surat  
M/s K. B. Industries, Nasik  
M/s Pooja Packing, Mumbai  
M/s Cosmic Traffic, Mumbai  
M/s Bina Enterprise, Mumbai  
M/s Priya Foils Pvt. Ltd. Mumbai  
M/s. Bharat Sales Corporation, Surendranagar |
| GI PIPES (B & C-CLASS, MEDIUM & HEAVY) | M/s A.S.T Pipes Pvt. Ltd. Gaziabad  
M/s Indus Tubes Ltd. Delhi  
M/s Asian Tubes Ltd. Ahmedabad  
M/s Swastik Pipes Ltd. New Delhi  
M/s Bihar Tubes Ltd. Delhi  
M/s Siddharth Tubes Ltd. Indore  
M/s Tata Iron and Steel Co. Calcutta  
M/s Jindal Pipes Ltd. Mumbai  
M/s Surya Roshni, Bhadurganj, Haryana |
| POWDER COATING ON GI PIPES & FITTINGS | M/s Shree Ram Coats, Vadodara  
M/s Prasad Allied Corporation, Mira Road, Mumbai  
M/s Precision Colour Coats, Mumbai  
M/s Trupti Enterprise, Mumbai  
M/s Captain Coating, Surat  
M/s Shine Coating, Surat  
M/s Akruti Industries, Ankleshwar  
M/s Colour Tech, Gandhinagar |
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<td>M/s Navsarjan Powder Coating, Nadiad</td>
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<td>M/s Patel Powder Coating, Surat</td>
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### VEHICLE TRACTING SYSTEM SERVICE PROVIDER (VTS)

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<td>M/s Robokits India</td>
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<td>M/s Track</td>
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### IMPORTANT NOTES TO VENDOR LIST

1. Bidders to adhere strictly to the vendor list. No deviation shall be accepted with prior approval from the Owner.
2. The details of Recommended Vendors indicated in this list are based on the information available with the Owner & Owner’s representative. The contractor shall verify the capabilities of each vendor for producing the required quantity with the vendor. The Owner & Owner’s representative does not guarantee any responsibility on the performance of the Vendor. It is the contractor’s responsibility to verify the correct status of the vendor and quality control of each party and also to expedite the material in time.
3. Contractor shall submit the details of each of the party before placement of order.
4. For any item, if the vendor names are not available, it is the responsibility of the contractor to submit the credentials of at least three parties for Owner & Owner’s representative approval.
5. The contractor shall propose any one agency from the above enlisted TPIA along with relevant CV’s in their technical offer. Only after the approval of CV’s by the Owner & Owner’s representative, the approved personnel of TPIA for brought out items which are in scope of contract can be put on the inspection work.

### DOCUMENTS OF PRECEDENCE

Where any portion of the documents is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of the PTS shall be deemed to govern the provision(s) of documents of contract. If there is no variance or repugnance between documents and PTS, both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.
# QUALITY ASSURANCE PLAN

**TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL**

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<th>Description</th>
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<td>2.1</td>
<td>Route Marking</td>
<td>100%</td>
<td></td>
<td>Verification</td>
<td>P Rm R</td>
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<td>Excavation, Sand Bedding, PE Pipe laying and Sand Filling</td>
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<td>P W Wm (10%)</td>
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<td>2.3</td>
<td>Backfilling</td>
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<td>P W Rm (20%)</td>
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<td>P Rm (30%) Rm (20%)</td>
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<td>Valve Chamber Installation</td>
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<td>P W Rm (20%)</td>
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<td>Pushing / Pigging, Testing of PE pipeline ( Hydro &amp; Pneumatic)</td>
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<td>P W Rm (20%)</td>
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<td>Commissioning of PE pipeline network</td>
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<td>Report preparation, Progress Reporting, Documentation including As Built alignment Sheet, CS drawing etc</td>
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<td>Compliance Certificate</td>
<td>P H H</td>
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**General Requirement**

As Per Approved Procedure w.r. to tender Specification.

As Per Approved Procedure w.r. to tender Specification.
### QUALITY ASSURANCE PLAN

**TENDER FOR PROVIDING COMPREHENSIVE OPERATIONS & MAINTENANCE SERVICES FOR CGD NETWORK OF SGL**

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>Description</th>
<th>Inspection Methodology</th>
<th>Quantum of check</th>
<th>Reference Document</th>
<th>Acceptance Criteria</th>
<th>Format of Record</th>
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<th>Remarks</th>
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<td>G.I. Pipe cutting and threading</td>
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<td>Valve, Meter and Regulator installations</td>
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<td>Meter Job Card</td>
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<td>Color / Cementing</td>
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**LEGENDS:** Rw - Review, W - Witness, Rm - Random Witness, H - Hold, P - Perform, TPIA - Third Party Inspection Agency appointed by Owner for inspection at site. EIC - Owner's representative

**Notes:**

1. The Above Testing and acceptance criteria are minimum requirements, however, Contractor shall ensure that the execution of works shall also comply to the additional requirements as per Particular Technical specifications(PTS).
2. The contractor shall submit their own detailed QAP prepared on the basis of above / Technical specification for approval of Owner/Owner's representative.
3. Owner/Owner representative shall review/approve all the documents related to QAP/Quality manuals/Drawings etc. submitted by Contractor.
4. Contractor shall in coordination with detailed Plan and Inspection schedule indicating the dates and the locations to facilitate Owner/Owner's representative and TPIA to organize Inspection.
5. Critical or Special works procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specifications more stringent condition shall be applicable.
6. Owner / Owner's representative including TPIA will have the right to inspect any activity of execution of works at any time.
7. All reference Codes/ Standards, Documents shall be arranged by Contractor for reference of TPIA/ CA at the time of Inspection.
8. At the time of delivery from the manufacturer place and receipt of material in stores, Contractor will submit copy of all related document of inspection along with release note & MTC to TPIA / CA.
<table>
<thead>
<tr>
<th>S.NO.</th>
<th>Description</th>
<th>Quantum of check</th>
<th>Reference Document (IS 14885 &amp; PTS - P.012659 D 11097 005)</th>
<th>Acceptance Criteria</th>
<th>Inspection Methodology</th>
<th>Format of Record</th>
<th>MANUF. / CONTRACTOR</th>
<th>APPROVED</th>
<th>TPIA</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1</td>
<td>Raw Material Inspection</td>
<td>Each Batch</td>
<td>PE 100 as per PTS</td>
<td>IS 14885/PTS</td>
<td>MTC</td>
<td>MTC of supplier / manufacturer</td>
<td>P</td>
<td>R</td>
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<td>1.1</td>
<td>Test result of PE compound</td>
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<tr>
<td>1.2</td>
<td>Conventional Density</td>
<td></td>
<td></td>
<td>≥930 at 27°C in Kg / M³</td>
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<td>P</td>
<td>R</td>
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<tr>
<td>1.3</td>
<td>Melt mass flow rate</td>
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<td></td>
<td>±20% of value nominated by compound producer at 190°C &amp; 5 Kg Load in Gm / 10 Min.</td>
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<td>Thermal Stability</td>
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<td>&gt;20 min. at 200°C</td>
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<td>≤350 mg/Kg</td>
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<td>Pigment dispersion</td>
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<td>1.7</td>
<td>Resistance to Gas Constituents</td>
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<td>≥20 hr at 80°C at an induced stress of 2 Mpa</td>
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<td>1.8</td>
<td>Classification of PE compound</td>
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<td>MRS- shall be 10 MPa at 20°C for 50 years and material designation PE 100</td>
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<td>Type approval test for long term hydrostatic strength</td>
<td>As Per IS / PTS</td>
<td>As per Table 6 of IS</td>
<td>IS 14885/PTS</td>
<td>MTC / Record</td>
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<td>3</td>
<td>Final / Physical Inspection</td>
<td>As PTS / IS</td>
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<td>Appearance</td>
<td>Each Coil</td>
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<td>W</td>
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<td>3.1.1</td>
<td>a) Smoothness, cleanliness</td>
<td>Visual / Pipe should be smooth &amp; clean or as specified in PTS</td>
<td>IS 14885/PTS</td>
<td>Visual Inspection Report</td>
<td>P</td>
<td>Rv</td>
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<td>b) Surface Defects</td>
<td>Visual / should be free grooves, scoring etc. or as specified in PTS</td>
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<td>Visual Inspection Report</td>
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<td>Rv</td>
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<td>3.1.3</td>
<td>c) Cuttings</td>
<td>Visual / cleanly cut ends &amp; square to axis or as specified in PTS</td>
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<td>Visual Inspection Report</td>
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<td>d) Color</td>
<td>Orange as per PTS</td>
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<td>a) Outside Diameter b</td>
<td>DN 20 = 20 mm</td>
<td>20 mm</td>
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<td>b) Out Of Roundness (Ovality)</td>
<td>0.06 d (1.2 mm)</td>
<td>0.06 d (1.2 mm)</td>
<td>Venier Caliper</td>
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<td>c) Wall Thickness</td>
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<td>SDR- 9, 3 mm</td>
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<td>d) Length of Pipes</td>
<td>IS 14885 / PTS</td>
<td>IS 14885 / PTS</td>
<td>Marking in mtr</td>
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<td>Rv</td>
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<td>Hydraulic Strength 20°C for 100 hrs hrs (Acceptance test)</td>
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<td>NO sign of localized swelling, no leakage or bursting.</td>
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<td>NO sign of localized swelling, no leakage or bursting.</td>
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<td>Conventional Density</td>
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<td>3.3.6</td>
<td>Melt mass flow rate</td>
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<td>≥30 % of value nominated by pipe manufacturer at 190°C &amp; 5 Kg Load in GM / 10 Min.</td>
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<td>≥20 min at 200°C</td>
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<td>Min 15 MPa</td>
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<td>Marking</td>
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<td>a) Owner Trade mark / Name or Brand</td>
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<td>b) Material and designation (i.e. D-20N, SDR-9, PE-100).</td>
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<td>c) Manufacturer’s identity name or trade name</td>
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<td>d) Purchase Order No.</td>
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<td>e) Code &amp; Standard (i.e IS – 14885 .2001)</td>
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<td>f) Batch no. or lot no</td>
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<td>g) Weight of coil and Length of Coil at every meters.</td>
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<td>i) Service (i.e GAS)</td>
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### QUALITY ASSURANCE PLAN

**PE PIPES**

<table>
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<tr>
<th>S.NO.</th>
<th>Description</th>
<th>Quantum of check</th>
<th>Reference Document (IS 14885 &amp; PTS - P.012659 D 11097 005)</th>
<th>Acceptance Criteria</th>
<th>Inspection Methodology</th>
<th>Format of Record</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>5</td>
<td>Packing</td>
<td>As Per IS / PTS</td>
<td>As per IS 14885 &amp; PTS Clause 10.</td>
<td>Pipe end shall cleanly cut, square with the axis of pipe and protected against shocks and ingress of foreign bodies by appropriate end caps.</td>
<td>Visual</td>
<td>Inspection Report</td>
<td>P</td>
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<tr>
<td>6</td>
<td>Documentation</td>
<td>As Per IS / PTS</td>
<td>As per the term &amp; conditions of PTS</td>
<td>IS 14885/PTS</td>
<td>Visual</td>
<td>Compliance Certificate</td>
<td>P</td>
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**LEGENDS:**  
Rv - Random Verification,  W - Witness, Rw - Review of Documents / test certificates, H - Hold, P - Perform, TPIA - Third Party Inspection Agency appointed by Owner

**Notes:**

1. The Above Testing and acceptance criteria are minimum requirements, however, Contractor shall ensure that the execution of works shall also comply to the additional requirements as per Particular Technical specifications (PTS).
2. The contractor shall submit their own detailed QAP prepared on the basis of above / Technical specification for approval of Owner/Owner's representative.
3. Owner/Owner representative shall review/approve all the documents related to QAP/Quality manuals/Drawings etc. submitted by Contractor.
4. Contractor shall in coordination with detailed Plan and Inspection schedule indicating the dates and the locations to facilitate Owner/Owner's representative and TPIA to organize Inspection.
5. Critical or Special works procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specifications more stringent condition shall be applicable.
6. Owner / Owner's representative including TPIA will have the right to inspect any activity of execution of works at any time.
7. All reference Codes/ Standards, Documents shall be arranged by Contractor for reference of TPIA/ Owner at the time of Inspection.
8. At the time of delivery from the manufacturer place and receipt of material in stores, Contractor will submit copy of all related document of inspection along with release note & MTC to TPIA / CA.
9. Contract / Manufacture / Vendor shall be sent minimum 3 sample for Chemical & Physical testing of materials at his cost in a year.
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<tr>
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<tbody>
<tr>
<td>1</td>
<td>Raw Material Inspection</td>
<td>Each Batch</td>
<td>IS 1555-3 &amp; PTS - P.012659 D 11097 006</td>
<td>EN 1555-3/PTS</td>
<td>MTC</td>
<td>MTC of supplier / manufacturer</td>
<td>P Rw</td>
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<td>1.1</td>
<td>Test result of PE compound</td>
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<td>1.2</td>
<td>Density</td>
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<td>Min. 0.2 to 0.4 at 190°C &amp; 5Kg. Load in Gm / 10 Min. a sper ISO 1133.</td>
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<td>1.3</td>
<td>Melt mass flow rate</td>
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<td>2</td>
<td>Final / Physical Inspection</td>
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<td>Visual</td>
<td>Inspection Report</td>
<td>P W</td>
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<td>2.1</td>
<td>Appearance</td>
<td>Each Coil</td>
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<td>2.1.1</td>
<td>a) Smoothness, cleanliness</td>
<td>Visual / Pipe should be smooth &amp; clean or as specified in PTS</td>
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<td>Inspection Report</td>
<td>P Rw</td>
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<td>2.1.2</td>
<td>b) Surface Defects</td>
<td>Visual / should be free grooves, scoring etc. or as specified in PTS</td>
<td>EN 1555-3/PTS</td>
<td>Visual</td>
<td>Inspection Report</td>
<td>P Rw</td>
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<tr>
<td>2.1.3</td>
<td>c) Cuttings</td>
<td>Visual / cleanly cut ends &amp; square to axis or as specified in PTS</td>
<td>EN 1555-3/PTS</td>
<td>Visual</td>
<td>Inspection Report</td>
<td>P Rw</td>
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<tr>
<td>2.1.4</td>
<td>d) Color</td>
<td></td>
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<td>Black</td>
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<td>Inspection Report</td>
<td>P W</td>
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<td>2.2</td>
<td>Dimensions</td>
<td>As PTS / IS</td>
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<td>EN 1555-3/PTS</td>
<td>Venier Caliper</td>
<td>Venier Caliper</td>
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<td>2.2.1</td>
<td>a) Outside Diameter b</td>
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<td>Inspection Methodology</td>
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<td>&gt;940 at 27° C in Kg / M 3, ISO 1183</td>
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<td>MTC or Inspection Reports of supplier / manufacturer</td>
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<td>2.3.2</td>
<td>Melt mass flow rate</td>
<td>As Per EN or PTS</td>
<td>EN 1555-3 / PTS, ISO-1167</td>
<td>Min. 0.2 to 0.4 at 190 C &amp; 5Kg. Load in Gm / 10 Min. a sper ISO 1133.</td>
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<td>MTC or Inspection Reports of supplier / manufacturer</td>
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<td>2.3.3</td>
<td>Hydraulic Strength Test</td>
<td>As Per EN or PTS</td>
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<td>MTC or Inspection Reports of supplier / manufacturer</td>
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<td>As Per EN or PTS</td>
<td>EN 1555-3 / PTS, ISO-1167</td>
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<td>MTC or Inspection Reports of supplier / manufacturer</td>
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<td>Squeeze off</td>
<td>As Per EN or PTS</td>
<td>EN 1555-3 / PTS, ISO-1167</td>
<td>No sign of localized swelling, no leakage or bursting</td>
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<td>IS 1555-3 &amp; PTS Clause 10.</td>
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<td>Visual Inspection Report</td>
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<td>Rv</td>
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**Remarks:**
- P: Pass
- R: Reject
# QUALITY ASSURANCE PLAN

## ELECTRO FUSION FITTINGS

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<tr>
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<tbody>
<tr>
<td>4</td>
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<td>As Per IS / PTS</td>
<td>As per EN 1555-3 &amp; PTS Clause 13</td>
<td>EN 1555-3 / PTS</td>
<td>Visual</td>
<td>Inspection Report</td>
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<tr>
<td>5</td>
<td>Documentation</td>
<td>As Per IS / PTS</td>
<td>As per the term &amp; conditions of PTS</td>
<td>EN 1555-3/PTS</td>
<td>Visual</td>
<td>Compliance Certificate</td>
<td>P H</td>
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**GI PIPES CONFORMING TO IS:1239 (PART-1):2004**

(Latest edition) WITH POWDER COATING

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<th>CLASSIFICATION</th>
<th>INSPECTION TYPE OF CHECK</th>
<th>QUANTUM OF CHECK</th>
<th>REFERENCE DOCUMENTS</th>
<th>ACCEPTANCE NORMS</th>
<th>FORMAT OF RECORD</th>
<th>MFG. / CONTRACTOR</th>
<th>TPIA</th>
<th>REMARKS</th>
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<td>1.1 RAW MATERIAL</td>
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<td>IS:1239/PTS</td>
<td>MTC</td>
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<td>Rw</td>
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<td>CHEMICAL COMPOSITION</td>
<td>Major</td>
<td>Chem. Analysis / MTC</td>
<td>One / Heat</td>
<td>IS 1239 (Part-I) &amp; IS 10748 (Max. permissible variation for sulphur &amp; phosphorus shall be 0.05% each)</td>
<td>IS:1239 / PTS</td>
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<td>Rw</td>
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<td>PHYSICAL PROPERTIES (T.S., Y.S., %Along.)</td>
<td>Major</td>
<td>Lab. Test / MTC</td>
<td>One / Heat</td>
<td>IS:1239 (Part – I) &amp; IS:10748 (At least 320 MPa)</td>
<td>IS:1239 / PTS</td>
<td>MTC</td>
<td>P</td>
<td>RW</td>
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<tr>
<td>VISUAL &amp; DIMENSIONS</td>
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<td>Visual &amp; Measure. /MTC</td>
<td>100%</td>
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<td>IS:1239 / PTS</td>
<td>MTC</td>
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<td>Rw</td>
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<td>IS:1239 /PTS</td>
<td>MTC</td>
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<td>Rw</td>
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<td>LENGTH</td>
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<td>ISO 2360</td>
<td>ISO 2360</td>
<td>ISO 2360</td>
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# QUALITY ASSURANCE PLAN

**GI PIPES CONFORMING TO IS:1239 (PART-1):2004 (Latest edition) WITH POWDER COATING**

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</tbody>
</table>
| 5.1    | FINISH PIPE            | OVERALL FINISH, COATING & MARKING | Major | Visual | 100% | IS:1239 /PTS | a) Manufacturer's name or trademark.  
 b) Class of pipe – Heavy  
 c) Indian standard mark (ISI)  
 d) Lot number / Batch no. | MTC | P | Rw |
| 6.0    | PACKING                |                |                |                          |                  |                                                           |                  |                |                  |      |         |
| 6.1    | FINISH PIPE            | ALL FINISH PRODUCT | Major | Visual | 100% | IS:1239 /PTS | IS:1239 /PTS | MTC | P | Rw |
| 7.0    | FINAL INSPECTION       |                |                |                          |                  |                                                           |                  |                |                  |      |         |
| 7.1    | FINISHED PRODUCT / PHYSICAL PROPERTIES | FINISH DIMENSIONS | Major | Visual & Measure | Random As Per IS:4711 | IS:1239 /PTS | IS:1239 /PTS | MTC | P | Rw |
|        |                        | REVIEW OF ALL TEST CERTIFICATE / REPORTS & DOCUMENTATIONS | Major | Review | - | IS:1239 /PTS | IS:1239 /PTS | MTC | P | Rw |
| 8.0    | DOCUMENTATION          |                |                |                          |                  |                                                           |                  |                |                  |      |         |
|        |                        |                |                |                          |                  |                                                           | Compliance certificate | P | H |

**LEGENDS:**  
Rv - Random Verification  
W - Witness  
Rw - Review of Documents / test certificates  
H - Hold  
P - Perform  
TPIA - Third Party Inspection Agency appointed by Owner

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<table>
<thead>
<tr>
<th>SR. No</th>
<th>DESCRIPTION</th>
<th>COMPONENT</th>
<th>CHARACTERISTICS</th>
<th>INSPECTION TYPE OF CHECK</th>
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<th>REFERENCE DOCUMENTS (IS 1239 &amp; PTS - P.012659 D 11097 008)</th>
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<td>IS 14329 / IS 1239/ PTS</td>
<td>IS 14329 / IS 1239/ PTS</td>
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<tr>
<td>2</td>
<td>Chemical Composition of final product</td>
<td>Fitting</td>
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<tr>
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<td>Fitting</td>
<td>Descaling</td>
<td>Visual</td>
<td>100%</td>
<td>IS 14329 / IS 1239/ PTS</td>
<td>IS 14329 / IS 1239/ PTS</td>
<td>Inspection Report</td>
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<td>4</td>
<td>Destructive Testing ( Tensile , Elongation &amp; Hardness )</td>
<td>Fitting</td>
<td>Mechanical Properties</td>
<td>Lab. Test / MTC</td>
<td>IS 14329</td>
<td>IS 14329 / IS 1239/ PTS</td>
<td>Lab report</td>
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<tr>
<td>5</td>
<td>Compression Test</td>
<td>-</td>
<td>Malleability</td>
<td>MTC</td>
<td>Three samples per Heat</td>
<td>IS 1879 / PTS</td>
<td>IS 1879 / PTS</td>
<td>Inspection report</td>
<td>P</td>
<td>Rw</td>
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<td>6</td>
<td>Pressure Test</td>
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<td>-</td>
<td>MTC</td>
<td>IS 1879</td>
<td>IS 1879 / PTS</td>
<td>IS 1879 / PTS</td>
<td>Inspection report</td>
<td>P</td>
<td>Rw</td>
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<tr>
<td>7</td>
<td>Alignments of thread</td>
<td>-</td>
<td>-</td>
<td>Checking</td>
<td>IS 1879</td>
<td>IS 1879 / PTS</td>
<td>IS 1879 / PTS</td>
<td>Inspection report</td>
<td>P</td>
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<tr>
<td>8</td>
<td>Galvanizing</td>
<td>Fitting</td>
<td>Integrity of galvanized coating</td>
<td>Test certificate</td>
<td>As listed in IS 4759</td>
<td>ISO 4736 / PTS</td>
<td>PTS</td>
<td>Inspection / lab report</td>
<td>P</td>
<td>Rw</td>
</tr>
<tr>
<td>9</td>
<td>Powder Coating</td>
<td>Fitting</td>
<td>Integrity of galvanized coating</td>
<td>Test certificate</td>
<td>ISO 2360</td>
<td>ISO2360 / PTS</td>
<td>Min. 40 Micron Thick</td>
<td>Inspection / lab report</td>
<td>P</td>
<td>Rw</td>
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<td>10</td>
<td>Final inspection</td>
<td>Fittings</td>
<td>Visual, Dimensions, Finish, End, Bore, wall thickness</td>
<td>IS 1879</td>
<td>IS 1879 / PTS</td>
<td>IS 1879 / PTS</td>
<td>Inspection report</td>
<td>P</td>
<td>Rw</td>
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</table>
QUALITY ASSURANCE PLAN  
GI FITTINGS WITH POWDER COATING

<table>
<thead>
<tr>
<th>SR. No</th>
<th>DESCRIPTION</th>
<th>COMPONENT</th>
<th>CHARACTERISTICS</th>
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<th>QUANTUM OF CHECK</th>
<th>REFERENCE DOCUMENTS (IS 1239 &amp; PTS - P.012659 D 11097 008)</th>
<th>ACCEPTANCE NORMS</th>
<th>FORMAT OF RECORD</th>
<th>INSPECTION MFG./CONTRACTOR</th>
<th>TPIA</th>
<th>REMARKS</th>
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<tr>
<td>11</td>
<td>Marking</td>
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<td>-</td>
<td>Physical, On Marking on Finish Product</td>
<td>100% PTS</td>
<td>PTS Inspection report P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ty</td>
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<tr>
<td>12</td>
<td>Documentation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>PTS PTS Compliance certificate P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ty</td>
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</table>

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Tender for Providing Comprehensive Operations Maintenance Services for CGD Network of SGL
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<thead>
<tr>
<th>SR. NO.</th>
<th>INSPECTION AND TESTING</th>
<th>QUANTUM OF CHECK</th>
<th>INSPECTION TYPE OF CHECK</th>
<th>PROCEDURE</th>
<th>REFERENCE DOCUMENTS (IS 319 &amp; PTS - P.012659 D 11097 009)</th>
<th>ACCEPTANCE CRITERIA AND CERTIFICATE</th>
<th>FORMAT OF RECORD</th>
<th>INSPECTION</th>
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<tr>
<td>1</td>
<td>Raw material Testing: (Chemical / Physical Requirement)</td>
<td>One in each heat</td>
<td>Document</td>
<td>As per IS 319</td>
<td>As per IS 319 / PTS</td>
<td>As per IS 319 / PTS</td>
<td>MTC</td>
<td>P Rw</td>
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<td>2</td>
<td>Final product:</td>
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<td></td>
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<td></td>
<td></td>
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<td>2.1</td>
<td>Visual inspection (Free from defects)</td>
<td>100%</td>
<td>Visual</td>
<td>As per EN 1254</td>
<td>As per EN 1254 / PTS</td>
<td>As per EN 1254 / PTS</td>
<td>TEST REPORT</td>
<td>P</td>
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<tr>
<td>2.2</td>
<td>Dimension tolerances (Min. length of engagement, OD, wall thk. Threading)</td>
<td>100%</td>
<td>Dimension verification by GO - NO GO Gauge</td>
<td>As per EN 1254</td>
<td>As per EN 1254 / PTS</td>
<td>As per EN 1254 / PTS</td>
<td>TEST REPORT</td>
<td>P</td>
</tr>
<tr>
<td>2.3</td>
<td>Marking</td>
<td>100%</td>
<td>Visual</td>
<td>As per EN 1254</td>
<td>As per EN 1254</td>
<td>As per EN 1254</td>
<td>P</td>
<td>Rv</td>
</tr>
<tr>
<td>3</td>
<td>Final Documentation</td>
<td>-</td>
<td>-</td>
<td>PTS</td>
<td>PTS</td>
<td>PTS</td>
<td>DOCUMENT</td>
<td>P</td>
</tr>
</tbody>
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## Raw Material
Chemical & Mech. Test of material of Steel Reinforced Rubber Hose (Lining, Reinforcement material & Cover)  
**Test Parameters:** one (1) per batch  
**Quantum of Check:** 100%  
**Reference Method:** Documentation  
**Test Parameters:** IS 9573  
**Procedure:** IS 9573  
**Acceptance Criteria:** IS 9573  
**Certificate:** MTC  
**Remarks:** P Rw

## Final Product

### 2.1 Mechanical Properties
**Test Parameters:** one (1) per batch  
**Quantum of Check:** Documentation  
**Reference Method:** IS 9573 / PTS  
**Procedure:** PTS & IS 9573  
**Acceptance Criteria:** Inspection Report / MTC  
**Certificate:** P  
**Remarks:** Rw

### 2.2 Resistance of Lining to n-pentane
**Test Parameters:** one (1) per batch  
**Quantum of Check:** Documentation  
**Reference Method:** IS 9573 / PTS  
**Procedure:** Cl 5.4.3.2 of IS 9573  
**Acceptance Criteria:** Inspection Report / MTC  
**Certificate:** P  
**Remarks:** Rw

### 2.3 Adhesion Test
**Test Parameters:** one (1) per batch  
**Quantum of Check:** Documentation  
**Reference Method:** IS 9573 / PTS  
**Procedure:** Cl. no. 5.5.1 of IS 9573  
**Acceptance Criteria:** Inspection Report / MTC  
**Certificate:** P  
**Remarks:** Rw

### 2.4 Low Temperature Flexibility Test
**Test Parameters:** one (1) per batch  
**Quantum of Check:** Documentation  
**Reference Method:** IS 9573 / PTS  
**Procedure:** Cl. No. 5.5.2 of IS 9573  
**Acceptance Criteria:** Inspection Report / MTC  
**Certificate:** P  
**Remarks:** Rw

### 2.5 Flexibility of hose at 1.5 x design pressure
**Test Parameters:** one (1) per batch  
**Quantum of Check:** Documentation  
**Reference Method:** IS 9573 / PTS  
**Procedure:** Cl. No. 5.5.3 of IS 9573  
**Acceptance Criteria:** Inspection Report / MTC  
**Certificate:** P  
**Remarks:** Rw

### 2.6 Ozone Resistance Test
**Test Parameters:** one (1) per batch  
**Quantum of Check:** Documentation  
**Reference Method:** IS 9573 / PTS  
**Procedure:** Cl. No. 5.5.4 of IS 9573  
**Acceptance Criteria:** Inspection Report / MTC  
**Certificate:** P  
**Remarks:** Rw

### 2.7 Hydrostatic Test / Proof Pr. Test
**Test Parameters:** 100%  
**Quantum of Check:** Documentation  
**Reference Method:** IS 9573 / PTS  
**Procedure:** Cl. No. 5.5.5.1 of IS 9573  
**Acceptance Criteria:** Inspection Report / MTC  
**Certificate:** P  
**Remarks:** Rw
## QUALITY ASSURANCE PLAN

**STEEL REINFORCED RUBBER HOSE (TYPE -II)**

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<thead>
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<th>S. NO.</th>
<th>Item / Description</th>
<th>Test Parameters</th>
<th>QUANTUM OF CHECK</th>
<th>INSPECTION METHODOLOGY</th>
<th>REFERENCE DOCUMENTS (IS 319 &amp; PTS - P.012659 D 11097)</th>
<th>PROCEDURE</th>
<th>ACCEPTANCE CRITERIA</th>
<th>CERTIFICATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.8</td>
<td>Burst test</td>
<td>one (1) per batch</td>
<td>Documentation</td>
<td>IS 9573 / PTS</td>
<td>Min Pressure shall be 5 MPA as per Cl. 6.2 of PTS</td>
<td>Cl. No. 5.5.2 of IS 9573</td>
<td>Inspection Report / MTC</td>
<td>P</td>
</tr>
<tr>
<td>2.9</td>
<td>Grip Strength Test</td>
<td>4 specimen / Batch</td>
<td>Documentation</td>
<td>IS 9573 / PTS</td>
<td>Cl no. 6.3 of PTS</td>
<td>Cl no. 5.5.7 &amp; Annex. A of IS 9573</td>
<td>Inspection Report / MTC</td>
<td>P</td>
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<tr>
<td>2.10</td>
<td>Burning Test</td>
<td>one (1) per batch</td>
<td>Documentation</td>
<td>IS 9573 / PTS</td>
<td>Shall not burn till 45 sec. as per Cl. No.6.4 of PTS</td>
<td>Cl no. 5.5.8 of IS 9573</td>
<td>Inspection Report / MTC</td>
<td>P</td>
</tr>
<tr>
<td>2.11</td>
<td>Visual &amp; Dimensional Inspection</td>
<td>100%</td>
<td>Documentation</td>
<td>IS 9573 / PTS</td>
<td>Cl. No. 4.0 of PTS &amp; IS 9573</td>
<td>IS 9573</td>
<td>Inspection Report / MTC</td>
<td>P</td>
</tr>
<tr>
<td>2.12</td>
<td>Cover Color - Orange</td>
<td>100%</td>
<td>Documentation</td>
<td>IS 9573 / PTS</td>
<td>Cl no. 5.2.3 of PTS</td>
<td>PTS &amp; IS 9573</td>
<td>Inspection Report / MTC</td>
<td>P</td>
</tr>
<tr>
<td>3</td>
<td>Marking</td>
<td>-</td>
<td>100%</td>
<td>Documentation</td>
<td>As per Cl. No. 6.0 of PTS</td>
<td>PTS / IS 9573</td>
<td>Inspection Report / MTC</td>
<td>P</td>
</tr>
<tr>
<td>4</td>
<td>Packaging</td>
<td>-</td>
<td>100%</td>
<td>Documentation</td>
<td>As per Cl. No. 7.0 of PTS</td>
<td>PTS / IS 9573</td>
<td>Inspection Report / MTC</td>
<td>P</td>
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<tr>
<td>5</td>
<td>Final Documentation</td>
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<td>-</td>
<td>IS 9573 / PTS</td>
<td>PTS / IS 9573</td>
<td>PTS / IS 9573</td>
<td>Compliance Report</td>
<td>P H</td>
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<th>QUANTUM OF CHECK</th>
<th>Reference Document (IS 10889 &amp; PTS - P.012659 D 11097 011)</th>
<th>ACCEPTANCE CRITERIA</th>
<th>INSPECTION METHODOLOGY</th>
<th>ACCEPTANCE CRITERIA</th>
<th>REMARKS</th>
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<tr>
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<td>Raw Material Inspection</td>
<td>Each Batch</td>
<td>AS Per IS / PTS</td>
<td>Polyvinyl Chloride or Polyethylene</td>
<td>Document Material Test report</td>
<td>H</td>
<td>R</td>
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<tr>
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<td>Final Inspection</td>
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<td>2.1</td>
<td>Chemical Analysis</td>
<td>Each Batch</td>
<td>AS Per IS / PTS</td>
<td>PTS</td>
<td>Document Material Test report</td>
<td>P</td>
<td>Rw</td>
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<tr>
<td>2.2</td>
<td>Width</td>
<td>Three sample per Lot</td>
<td>PTS</td>
<td>300 mm ± 5 mm</td>
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<td>Rw</td>
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<tr>
<td>2.3</td>
<td>Thickness</td>
<td>Three sample per Lot</td>
<td>PTS</td>
<td>Min. 300 Micron in thick for below 90 mm and Min 1000 micron in thick for 63 mm</td>
<td>Venier / Micro meter Inspection report</td>
<td>P</td>
<td>Rw</td>
</tr>
<tr>
<td>2.4</td>
<td>Color Bleeding</td>
<td>Three sample per Lot</td>
<td>PTS</td>
<td>Cl. No. 8, (a) of PTS</td>
<td>Document Material Test report</td>
<td>P</td>
<td>Rw</td>
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<tr>
<td>2.5</td>
<td>Ultimate Tensile Strength at Break</td>
<td>One sample per Lot</td>
<td>AS Per IS / PTS</td>
<td>Minimum 12 N / mm2</td>
<td>Document Material Test report</td>
<td>P</td>
<td>R</td>
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<tr>
<td>3</td>
<td>Color</td>
<td>Each</td>
<td>PTS</td>
<td>Bright Yellow Color</td>
<td>Physically Visual Inspection report</td>
<td>P</td>
<td>W</td>
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<tr>
<td>4</td>
<td>Marking / Art Work</td>
<td>Per Meter</td>
<td>Cl. No. 8, (a) of PTS</td>
<td>Marking on the Mat shall be approved by owner at every 1 Meter of Warning Mat</td>
<td>Sample to be prepared for approval</td>
<td>P</td>
<td>Rw</td>
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<td>5</td>
<td>Packaging</td>
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<td>Cl. No. 9 of PTS</td>
<td>Cl. No. 9 of PTS</td>
<td>Visual Inspection Report</td>
<td>P</td>
<td>Rw</td>
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QUALITY ASSURANCE PLAN
WARNING TAPS


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### Quality Assurance Plan

**Powder Coating of GI Pipes & Fittings**

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<th>INSPECTION AND TESTING</th>
<th>QUANTUM OF CHECK</th>
<th>INSPECTION TYPE OF CHECK</th>
<th>PROCEDURE</th>
<th>REFERENCE DOCUMENT (PTS - P.012659 D 11097 012)</th>
<th>ACCEPTANCE CRITERIA AND CERTIFICATE</th>
<th>FORMAT OF RECORD</th>
<th>MFG. / CONTRACTOR</th>
<th>TPIA / CLIENT</th>
<th>REMARKS</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Powder coating material</td>
<td>One per Batch</td>
<td>Document</td>
<td>As per IS/ ISO/ EN or PTS</td>
<td>As per IS/ ISO/ EN or PTS</td>
<td>MTC</td>
<td>P</td>
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<td>Document</td>
<td>Vendor Procedure</td>
<td>PTS</td>
<td>Electrostatic Spraying (40-90 KV manual or Automatic)</td>
<td>MTC</td>
<td>P</td>
<td>Rw</td>
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<td>Document</td>
<td>Vendor Procedure</td>
<td>PTS</td>
<td>180°C to 200°C for 10mm of metal temperature</td>
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<td>P</td>
<td>Rw</td>
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<td>Porosity Density</td>
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# QUALITY ASSURANCE PLAN
## POWDER COATING OF GI PIPES & FITTINGS

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<th>PROCEDURE</th>
<th>REFERENCE DOCUMENT (PTS - P.012659 D 11097 012)</th>
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<td>Gloss at 60°C</td>
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<td>Cross hatch Adhesion</td>
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<td>Classification -0 (GT=0/100)</td>
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<td>Pencil Hardness (min.)</td>
<td>Per Batch / Lot</td>
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<td>Scratch Resistance (Kg. Min.)</td>
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### 5.0 Final INSPECTION

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<th>Visual</th>
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<th>PTS</th>
<th>MTC</th>
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<th>Rw</th>
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<td>PTS</td>
<td>MTC</td>
<td>P</td>
<td>Rw</td>
</tr>
</tbody>
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### 6.0 Final Documentation

| 6.0     | Final Documentation                   | PTS | Final | PTS | PTS | PTS | COMPLIANCE | P | H |

**LEGENDS:**  
- Rv- Random Verification  
- W - Witness,  
- Rw - Review of Documents / test certificates,  
- H - Hold,  
- P - Perform,  
- TPIA - Third Party Inspection Agency appointed by Owner

**Notes:**

1. The Above Testing and acceptance criteria are minimum requirements, however, Contractor shall ensure that the execution of works shall also comply to the additional requirements as per Particular Technical specifications (PTS).
2. The contractor shall submit their own detailed QAP prepared on the basis of above / Technical specification for approval of Owner / Owner's representative.
3. Owner / Owner representative shall review/approve all the documents related to QAP / Quality manuals / Drawings etc. submitted by Contractor.
4. Contractor shall in coordination with detailed Plan and Inspection schedule indicating the dates and the locations to facilitate Owner / Owner's representative and TPIA to organize Inspection.
5. Critical or Special works procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specifications more stringent condition shall be applicable.
6. Owner / Owner's representative including TPIA will have the right to inspect any activity of execution of works at any time.
7. All reference Codes/ Standards, Documents shall be arranged by Contractor for reference of TPIA / Owner at the time of Inspection.
8. At the time of delivery from the manufacturer place and receipt of material in stores, Contractor will submit copy of all related document of inspection along with release note & MTC to TPIA / CA.
9. Contract / Manufacture / Vendor shall be sent minimum 3 sample for Chemical & Physical testing of materials at his cost in a year.

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Tender for Providing Comprehensive Operations Maintenance Services for CGD Network of SGL

Page 2 of 2
## QUALITY CONTROL TABLE
### APPLIANCE BALL VALVE

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>INSPECTION AND TESTING</th>
<th>QUANTUM OF CHECK</th>
<th>PROCEDURE</th>
<th>REFERENCE DOCUMENT (PTS - P.012659 D 11097 013)</th>
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<th>FORMAT OF RECORD</th>
<th>INSPECTION</th>
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<td>As per ASTM B 283 (ALLOY UNS C37700)</td>
<td>As per ASTM B 283 (ALLOY UNS C37700)</td>
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<td>As per ASTM B 16.33</td>
<td>As per ASTM B 16.33</td>
<td>As per ASTM B 16.33 / PTS</td>
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<td>EN 331 / As per ASTM B 16.33 Cl no. 4.2</td>
<td>EN 331 / As per ASTM B 16.33 Cl no. 4.2</td>
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<tr>
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<td>Twist (Torque) Test</td>
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<td>EN 331 / As per ASTM B 16.33 Cl no. 4.3</td>
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<td>EN 331 / As per ASTM B 16.33 Cl no. 4.4</td>
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<td>As per ASTM B 16.33 Cl no. 4.4.5</td>
<td>As per ASTM B 16.33 Cl no. 4.4.5</td>
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<td>EN 331 / As per ASTM B 16.33 Cl no. 4.4.6</td>
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<td>P  R</td>
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<td>As per ASTM B 16.33 / PTS</td>
<td>As per ASTM B 16.33 / PTS</td>
<td>INSPECTION TEST REPORT</td>
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<td>P  R</td>
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<td>As per ASTM B 16.33 / PTS</td>
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<td>EN 331 / As per ASTM B 16.33</td>
<td>EN 331 / As per ASTM B 16.33</td>
<td>INSPECTION TEST REPORT</td>
<td>P  RW</td>
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Tender for Providing Comprehensive Operations Maintenance Services for CGD Network of SGL
### QUALITY CONTROL TABLE
#### APPLIANCE BALL VALVE

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<th>SR. NO.</th>
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<th>QUANTUM OF CHECK</th>
<th>PROCEDURE</th>
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<th>INSPECTION</th>
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<td>As per Approved Drawing</td>
<td>As per Approved Drawing</td>
<td>INSPECTION TEST REPORT</td>
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<td>P.O. / PTS</td>
<td>P.O. / PTS</td>
<td>EN 10204 3.2 CERTIFICATE</td>
<td>P H</td>
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**LEGENDS:**
- R - Review, W - Witness, RW - Random Witness (Minimum 1% of lot size)
- H - Hold, P - Perform, TPIA - Third Party Inspection Agency, CA - Control Authority (Owner / Owner's representative)

**Notes:**
1. 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 Particular Technical specifications (PTS).
2. The supplier shall submit their own detailed ITP prepared on the basis of above / Technical specification for approval of Owner/Owner's representative.
3. Owner/Owner representative shall review/approve all the documents related to ITP/Quality manuals/Drawings etc. submitted by supplier.
4. Contractor shall in coordination with Supplier/Sub vendor issue detailed Production and Inspection schedule indicating the dates and the locations to facilitate Owner/Owner's representative and TPIA to organize Inspection.
5. Special manufacturing procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specifications more stringent condition shall be applicable.
6. Owner / Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.
7. All reference Codes/ Standards, Documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA/IGL at the time of Inspection.
8. At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note & MTC.
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<th>SR. NO.</th>
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<td>As per ASTM B 283 (ALLOY UNS C37700)</td>
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<td>As per ASTM B 16.33 / PTS</td>
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<td>As per ASTM B 16.33 / PTS</td>
<td>As per ASTM B 16.33 / PTS</td>
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**Vendor** | **TPIA** | **REMARKS**
---|---|---
P | R | Preferably witness by CA

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Tender for Providing Comprehensive Operations Maintenance Services for CGD Network of SGL
### QUALITY CONTROL TABLE  
**ISOLATION BALL VALVE**

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<td>As per Approved Drawing</td>
<td>As per Approved Drawing</td>
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<td>P  RW</td>
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**Notes:**
1. 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 Particular Technical specifications(PTS).
2. The supplier shall submit their own detailed ITP prepared on the basis of above / Technical specification for approval of Owner/Owner's representative.
3. Owner/Owner representative shall review/approve all the documents related to ITP/Quality manuals/Drawings etc. submitted by supplier.
4. Contractor shall in coordination with Supplier/Sub vendor issue detailed Production and Inspection schedule indicating the dates and the locations to facilitate Owner/Owner's representative and TPIA to organize Inspection.
5. Special manufacturing procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specifications more stringent condition shall be applicable.
6. Owner / Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.
7. All reference Codes/ Standards, Documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA/IGL at the time of Inspection.
8. At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note & MTC.

**LEGENDS:**  
R - Review, W - Witness, RW - Random Witness(Minimum 1 % of lot size)  
H - Hold, P - Perform,  
TPIA - Third Party Inspection Agency, CA - Control Authority (Owner / Owner's representative)
SCHEMATIC LAYOUT OF CAUTION BOARDS AND BARRICADING

50 LTR DRUM FILLED WITH SAND AND WITH FLORESCENT PAINT

GUNNY BAGS FILLED WITH MURRUM
CAUTION BOARD

INFORMATION BOARD

LAYING OF NATURAL GAS PIPELINE
CLIENT: SABARMATI GAS LTD.
CONTRACTOR: ____________________________
SIZE OF TRENCH: ____________________________
DATE OF COMMENCEMENT: ____________________________
DATE OF COMPLETION: ____________________________
EMERGENCY NO.: ____________________________

YELLOW BACKGROUND WITH BLACK LETTERS
GREEN BACKGROUND WITH BLACK LETTERS
MATERIAL FOR RECONDITIONING TO ITS ORIGINAL CONDITION

BACK FILL WITH EXCAVATED SOIL (AS PER SPEC./AS PER INSTRUCTION OF EIC)

SLOPE 1:3

WARNING TAPE AS PER SPEC.
300MM WIDE X 300 MICRON FOR 20mm, 32mm & 63mm
300MM WIDE X 1000 MICRON FOR 90mm, 125mm & 180mm

SOFT SOIL

SAND FILLING 100mm

PIPE

SAND BEDDING

1. NORMAL TERRAIN—100mm
2. ROCKY TERRAIN—150mm

NOTES
1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. IN CASE OF ROCKY SURFACE/STONES, SAND PADDOCK OF 100mm ALL ROUND TO BE PROVIDED.
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. Pipe-cast R.C.C. (1:1.5:3) marker using 6mm dia. W.S. bars.
3. Excavating pit size 400mm x 400mm x 400mm (LxWxH) and placing post in position in pit and remaining excavating portion to be filled with R.C.C. 1:3:6.
4. Paint: Markers shall be painted with yellow color and letters shall be in black color.
5. Smooth plaster shall be done on rectangular portion — 100x100x100mm.
NOTES

1. All dimensions are in mm unless noted otherwise.
2. A modified pipeline warning sign shall be installed close to the crossing.
3. In case of armored d/c cable, C.P. bonding is to be provided between pipeline and cable armor. In case of unarmored cable, arrangement for shielding (by providing casing on either side of the pipeline or cable) shall be considered.
4. Approval of the crossing shall be obtained from concerned authorities.
5. 100mm TLC PVC of M15 grade shall be provided conforming to BS 6536.
6. Approval of warning marker design shall be obtained before the commencement of work.

SECTION X-X

EXISTING UTILITY

WELL COMPACTED BACKFILL

Q. OF PIPE

CARRIERS PIPE

WELL COMPACTED BACKFILL

WARNING TAPE

NOTE: 5

Drawing Number: E100014

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1. Normal Terrain - 100mm
2. Rocky Terrain - 150mm
WARNING
MEDIUM PRESSURE
GAS PIPELINE

COMPANY LOGO & NAME

RED

25mm

15mm

10 W/ BLACK LETTER

POWDER COATED
GOLDEN YELLOW

3 mm THK. MS PLATE

Hold down

3" O.D. MS pipe 3.0
mm(thk.) thick

HOLE TO BE BORED, WITH
150 ASSAY FLANGE MARKER
POST AND FILLED WITH 1:2:4
CONCRETE MIX

150 x 150 x 700

GROUND LEVEL

EXISTING PHONE #

WARNING
MEDIUM PRESSURE
GAS PIPELINE

COMPANY MUST BE GIVEN NOTICE PRIOR TO
ANY EXCAVATION IN THE VICINITY OF
THE PIPELINE

EMERGENCY PHONE #

TEXT IN
REGIONAL
LANGUAGE

FIXING DETAILS

200 mm

SA 403/420X6 (TYP)

3/" 25-75

3/" 25-75

.notification

NOTES

1. MARKING AND SIZES ARE ONLY INDICATIVE AND ARE SUBJECT
TO THE APPROVAL BY OWNER/OWNER'S REPRESENTATIVE BEFORE
FABRICATION.

2. SCHEME FOR POWDER COATING AND COLOURING.
ONE COAT OF PRIMER & TWO COATS OF SPECIFIED PAINTS.
ALL LETTERS EXCEPT "WARNING" TO BE PAINTED BLACK.

3. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.

4. APPROVAL OF WARNING MARKER DESIGN SHALL BE OBTAINED BEFORE THE
COMMENCEMENT OF WORK.

POLE MARKER WITH FOUNDATION
(ATE CRITICAL CROSSINGS)

TRACTEBEL Engineering

Drawing Number

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Notes:

1. All dimensions are in m unless otherwise specified.
2. Road/highway crossing shall be restored to original condition to the entire satisfaction of owner and concerned authorities having jurisdiction.
3. Refer API RP 1102 for other design and installation requirements.
4. Angle of intersection between pipeline and the road/highway shall be as close to 90° as possible, but in case less than 30°.
5. Contractor shall verify the actual dimension with respect to survey detail for each road/highway crossing and prepare detailed drawing for individual crossing engineered in charge approval before commencement of construction.
6. The casing pipe shall be of sizes mentioned at clause NO.19 of technical specification for PE laying.
1. All dimensions are in mm unless noted otherwise.
2. The sizes shown in the drawing are tentative. It shall be decided during detailed engineering.
3. Piping down stream of meter shall be 1 1/2" in case meter is installed within the kitchen.
4. Pipe length from outlet of transition fittings to inlet of isolation valve shall be 1 1/2", however, it shall be taken approval from owner before starting the execution.
5. It shall be decided by owner/owner's representative, as per site conditions.
6. Isolation valve shall be used as the outlet of meter or of pipe goes to the appliance valve and fitting shall be used as the outlet of the meter.
7. Supply shall be kept near the outlet kitchen as directed by owner/owner's representative.
8. Minimum distance between clamps shall be 1 1/2" when pipe uses in the straight length. If any tee or any fitting lies in between the pipe than clamp shall be placed 10mm far away from center line of fittings at every side. Now ends, the same may be change as per site conditions as directed by EC.
9. From the transition fittings to the isolation valve shall be considered in the outside kitchen piping.
10. At the time of measuring length of pipe, all fittings shall be counted in the pipe length.
11. RCC guard installation shall be decided by owner/owner's representative as per site conditions.

Title: Typical Domestic Connection
Layout of NG Distribution
SPECIFICATION FOR WOOD SCREWS FOR CLAMPING

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<tr>
<th>SCREW NO</th>
<th>Dd</th>
<th>Pitch</th>
<th>V</th>
<th>D</th>
<th>c</th>
<th>s</th>
<th>h</th>
<th>l</th>
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<td>3.94</td>
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<td>1.59</td>
<td>8.2</td>
<td>7.62</td>
<td>7.34</td>
<td>2.16</td>
</tr>
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</table>
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. FOR ALL PIPELINE TO BE CONSTRUCTED IN THE LAND UNDER JURISDICTION OF GOVT. OF INDIA THE MIN. COVER TO BE ADOPTED SHALL BE 1000 MM IN ACCORDANCE WITH GOVT. OF INDIA PETROLEUM PIPELINE (ACQUISITION OF RIGHT OF USER IN LAND) ACT NO. 50, 1962 AND AMENDMENT ACT NO. 13 OF 1971. ANY EXTRA COVER REQUIREMENT SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.
3. MIN. COVER REQUIREMENT SHALL BE SUBJECT TO APPROVAL OF CONCERNED AUTHORITIES WHEREVER REQUIRED.
4. EXTRA COVER REQUIREMENT SHALL BE ESTABLISHED AT ALL OVER BENDS AND HORIZONTAL BENDS WHEREVER NECESSARY.
5. FOR MIN. COVER REQUIREMENT AT PIPELINE CROSSING ROADS, RAILWAY TRACKS, WIND TOWARDS AREAS ETC REFER RELEVANT STANDARDS.

1000 UP TO SIZE 12mm
1200 ABOVE SIZE 16mm

SAND BEDDING
1. NORMAL TERRAIN-100mm
2. ROCKY TERRAIN-150mm

300MM WIDE X 300 MICRON FOR 20mm, 32mm & 63mm
300MM WIDE X 1000 MICRON FOR 90mm, 125mm & 180mm

WARNING TAPE AS PER SPEC.

LOW PRESSURE PIPE
MEDIUM PRESSURE PIPE
1. All dimensions are in mm unless noted otherwise.
2. The sizes shown in the drawing are tentative and shall be decided during detail engineering.
3. Tentative header lengths (from outlet of transition fittings to inlet of isolation valve) shall be 1.5m. Any changes in header length shall be after approval from the client.
4. G.I. insulation/water installation shall be decided by owner/owner's representative as per site conditions.
5. Maximum distance between clamps shall be 1.0m when pipe goes in the straight length. If any tee or any fitting lies in between the pipe, the clamp shall be placed 100mm from away from centerline of fittings at every site. If necessary, the same may be changed as per site conditions as directed by the client.
6. Half round R/C guard installation shall be decided by owner/owner's representative as per site conditions.
7. If pipe goes to the appliance valve then a fitting shall be used at the outlet of the meter.
SCHEME OF NATURAL GAS SUPPLY TO COMMERCIAL CONSUMERS
NOTES

1. Marking and sizes are only indicative and are subject to the approval of Owner/Client's representative before fabrication.

2. Scheme for powder coating and coloring. One coat of primer & two coats of specified paints. All letters except "Warning" to be painted black.

3. All dimensions are in mm unless otherwise specified.

4. Approval of design shall be obtained before the commencement of work.

5. All text should be written in regional language only.
At the helm of the Energy Transition, Tractebel provides a full range of engineering and consulting services throughout the life cycle of its clients’ projects, including design and project management. As one of the world’s largest engineering consultancy companies and with more than 150 years of experience, it’s our mission to actively shape the world of tomorrow. With about 4,500 experts and offices in 33 countries, we are able to offer our customers multidisciplinary solutions in energy, water and infrastructure.