RATE CONTRACT FOR HIRING OF SERVICES FOR REPAIR & MAINTENANCE OF PNG INSTALLATIONS AND CUSTOMER COMPLAINTS/ REQUEST SERVICES

TENDER DOCUMENT NO. IGL/ET2/CP/CP18457

PART II OF II
TECHNICAL VOLUME

INTRODUCTION

- **INTRODUCTION & SCOPE**

  INDRAPRASTHA GAS LTD. (IGL), a joint venture company of Gas Authority of India Limited (GAIL), M/s Bharat Petroleum Corporation Limited (BPCL) and Govt. of National Capital Territory of Delhi (NCT) plans to augment the PNG Network. It supplies natural gas to domestic & commercial consumers in Delhi, Uttar Pradesh, Haryana & Rajasthan.

  IGL is now inviting tenders on Competitive Bidding basis for MDPE & GI/Cu repair & maintenance work in NCT of Delhi and NCR of U.P & Haryana for commissioned areas, these areas are handed over to operation and maintenance department, who in turn are seeking contractors to assist in meeting their objective.

  The present document covers the technical specifications for the enquiry.

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1.0 GENERAL INFORMATION

Indraprastha Gas Ltd. (OWNER) is a Joint Venture Company of Gas Authority of India Ltd. (GAIL), Bharat Petroleum Corporation Ltd. (BPCL) and Govt. of NCT of Delhi. Owner plans to expand Natural Gas Distribution network throughout the National Capital Territory of Delhi, Noida, Gr. Noida & Ghaziabad. The objective is to supply Natural Gas to both domestic and commercial customers, and to provide compressed gas as a fuel for Automobiles. IGL has demarcated zonal boundaries for Delhi –NCR & U.P for all existing areas and now is seeking Contractors to assist in meeting the above objective of each individual zone.

The main scope of this Specification comprises of repair, operation and maintenance of underground Polyethylene main pipelines and service pipeline. The scope covers all the activities associated with the purchasing (specified items only), repair, laying, testing and re-commissioning of MDPE main pipelines and service pipelines in existing gas charged areas of sizes ranging from 20mm to 180mm OD, which includes PE/GI transition fitting above ground level along with testing, shifting, removals & modifications (if required), painting of GI & Copper Pipes along with Meter installation both for domestic and commercial segment on customer request.

The scope also includes attending customer service requests which consists of repair & maintenance (modification/dismantling/removal), testing, painting and commissioning of above ground GI / Cu pipes and associated fittings, replacement of valves, regulators up to and including meter for Commercial/Domestic Customers. However, the piping may have to be carried out up to Appliance valve, in case of some commercial/domestic connections as per customer requirement.

Except free issue items like Domestic & Commercial Meters, Regulators, Isolation and Appliance valves, PE Pipes and PE Fittings, Contractor shall procure and supply all other material (GI fittings, GI pipes, Cu pipe, Cu/Brass fittings, SS 316 Anaconda, Re-inforced Rubber hose, Consumables etc. which is required from the outlet of PE / GI transition fitting up to the Domestic / commercial customers "Appliance / stove / oven valve.

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	INDRAPRASTHA GAS LTD. IGL
SS	STANDARD SPECIFICATION
TPIA	THIRD PARTY INSPECTION AGENCY (TO BE APPOINTED BY IGL)
EIC	ENGINEER- IN – CHARGE

3.0 GENERAL SCOPE OF WORK

Generally, the following shall constitute the contractor's scope of work but not limited to:

Plan and prepare a schedule for execution and work implementation as per QA/QC plans to be issued by Owner/Owner's representative. Contractor has to submit the Construction/Execution procedures before commencement of work to Owner/ Owner's representative for approval.

Contractor has to arrange office cum store (Minimum 2000 sq.ft.), where all free issue materials as well as Contractors supplied materials will be stacked. Contractor shall be responsible for safety and security of all the stacked material in the store.

Contractor has to maintain a separate Log book in which he has to show the date of receipt of complaints and the resolved date of the complaints. The difference between receipt of complain and resolved date of complain shall be resolved as per TAT Schedule. If complain is not resolved as per requirement then, penalty will be imposed.

Receipt and Transportation of free issue material from IGL Stores to Contractor’s stores, proper storing, stacking, providing security.

All materials shall be stored in contractor’s stores in the vicinity of allocated C/R with due approval from EIC 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.

In case of planned shut downs, making trial pits to determine the underground utilities/services such as existing pipelines, Cables (Electrical/Communication), Conduits, U/G drainage, Sewers, tunnels, Subways foundations etc., and deciding optimum feasible route and depths for laying the pipelines based on the route plans indicated by Owner and Obtaining the approval for optimum route and ROU from the concerned authority. Installation of Safety/warning Signs and barricading of work area to be trenched.

Pits to be similarly barricaded along with warning signs and caution boards.
To make trenches with stable slopes but restricting minimum disturbance to above ground/underground services/installation as per specifications and approved route plans keeping the trenches free from water and soil till placement of pipes.

Joining the pipe ends with fittings & valves by approved electro-fusion techniques as per Owner Specification.

On event of damage, installation of pipe fittings as required like elbow, tees, reducers, couplers, tapping saddles, transition fittings, valves etc., including construction of supports, valves pits, inspection chambers etc. as per specification & satisfaction to the C/R In-charge / EIC.

Shifting / Emergency Laying of MDPE pipelines using Horizontal Directional Drilling (HDD) methods with or without casing pipes (HDPE pipes) as per specifications and as directed by EIC.
Fabrication, Supply and Inspection of good quality of GI sleeve and Half round concrete sleeves and other materials, fittings to be supplied by the contractors as per the provisions of tender.

Back filling and compaction by jumping jack compactor, wherever required, using approved 'good' soil or using excavated earth or borrow earth as per requirement and specifications and replacement of the tiles, slabs removed during the excavation. Cleaning all unserviceable materials, debris, excess earth trenches etc. to designated disposal area.

Carrying out pneumatic testing and purging as per specifications and approved procedures, providing all tools & tackles, instruments, manpower and other related accessories for carrying out the testing of pipes.

Supply, fabrication, re-installation & painting of Stone route markers, RCC route marker, Pole marker with foundations, Plate markers etc. as per the directions of the EIC/Owner's representative.

Commissioning of gas in the tested PE Line shall be done as per the approved procedure. Preparation and submission of As-built drawings & details of crossings for the repairs carried out.

Restoration of existing ground features such as grass/turfing, paving, roads, drains, concrete, floral beds, fencing, tiles, flooring masonry etc. to original condition, and to match with adjoining conditions, functionally and aesthetically up to the entire satisfaction of Owner/Third Party agency designated by Owner and local authorities, failing which, it will be done at the risk and cost of the contractor. If required, obtaining satisfactory completion certificates for the restoration work done from the concerned authorities.

Returning surplus material to Owner stores after obtaining clearance from Owner/Owner' s representative, reconciliation of free issue material/consumables on quarterly basis.

Handing over the completed works to Owner for their operation/use purposes.
Rectification of defects arising due to workmanship during defect liability period of pipelines/installations handed to Owner.

Preparation and submission of all documents like As-built drawings, details of crossings, utility graphs, deviation statements on repair/re-commissioning of work by way of drawing, sketches and tables in soft & hard copy. Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works shall also be covered under the Scope of work and has to be completed by the Contractor within specified schedule at no extra cost to OWNER.

Contractor shall submit the QAP/procedure/drawing etc. of all the material to be procured by him for approval before procuring the items. If, QAP/procedure/drawing etc are not approved from client/TPIA then owner has the authority to refuse /reject the material.

Receiving Regulators, Domestic Meters, Isolation and Appliance Valves, PE Pipes and PE Fittings as free issue items from Owner's stores, loading, transportation, unloading at O&M site. Proper storing, stacking, identification, providing security and insurance during and before modification, installation and re- commissioning of pipelines, obtaining approval for optimum route and permission for work from customer/concerned authority and EIC.

Selection of route for modifications, repair with the EIC / Control Room In-charge and marking the same on walls/floors anywhere between 'transition fitting' to 'cooking oven/stove/appliance', making openings and 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.

Contractor shall procure all other material to be used from the outlet of PE/ GI transition fitting up to the Domestic/Commercial customers "appliance /stove / oven except free issue materials issued by IGL for satisfactory completion to the owner/owner's representative.

Supply and Installation for Modification of GI pipes of ½", ¾" and 1" dia. anywhere between transition fittings to customer's kitchen appliances including NPT threading of GI pipes, supply of proper seal outs for threads to join fittings such as elbows, tees, connectors, unions, plugs, sockets, regulators, meters, appliance & isolation valves etc., as per laid procedures and specification including clamping and sealing etc. The GI pipes shall be painted after the testing of the GI installation.

Supply and Installation of Copper pipes, Solder wire and flux to join fittings such as elbows, tees, connectors, meters, valves etc., complete as per procedures and specifications including clamping and sealing etc.
Supply and Installation of clamps for fixing pipes, Meter brackets, supply of paints for painting of GI Pipes and 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.

Carry out testing of GI Riser and internal Kitchen piping (GI or Copper) installed in kitchens till appliance valves.

Carry out removal & dismantling of all sizes of GI/ Copper of pipes on customer's /IGL request.

Conversion of all types of LPG kitchen appliances to NG based appliances, also taking Signatures on GIRM/Maintenance Cards & Joint Meter Records (JMRs) of customer. Changing side of appliance (i.e left to right or right to left), disconnecting a PNG connection, SS316 Anaconda, steel reinforced rubber hose, other related request/complaints are part of the scope.

To maintain material inventory, emergency tools and tackles for attending all type of complaints.

To demonstrate the Customer regarding use, safety and maintenance related aspects of NG based appliances and installations.

Cleaning, flushing, pneumatic testing and re-commissioning of GI/Cu pipe & fittings, meters, valves etc as per specification and hand over the same to Owner/Customer to the entire satisfaction of Control Room In-charge/ EIC.

Dismantling of scaffolding/temporary structures and cleaning of site & restore the site as per its original condition.

Restoration of walls, flooring and other damages while executing the above ground installation.

Preparation and submission of above ground installation card for each house/commercial establishment indicating the laid qty. of GI/Cu pipe including fittings.
Any other activities not mentioned/covered explicitly above but otherwise required for satisfactory completion of customer service requests /operation/safety/statutory/maintenance of the works in existing gas charged areas 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.

Contractor shall be responsible for any misconduct/unethical activities of his personnel if reported by customer and a penalty will be levied on contractor as per SCC of Contract. Contract may also be terminated at the sole discretion of EIC.

providing JCB for excavation of earth/LCV (Light commercial vehicle) for transportation of material and manpower / Tractor mounted air compressor/Pump (for removal of water/mud from trench or pits)/ RCC Breaker machines with fuel, driver/operator, transportation with all tools & tackles and consumables required in emergency.

Shifting and Installation of FRS/MRS/DRS Skid/Wall Mounted MRS includes dismantling of skid, Loading, shifting, Transportation, unloading, and re-installation as designated locations. Also necessary modification during re-installation shall be done by the contractor

4.0 MATERIAL, MANPOWER, EQUIPMENT AND MACHINERY

Material to be supplied by Owner as Free Issue.

Unless otherwise specified, owner will supply following material such as MDPE - pipes, fittings, valves, transition fittings, HDPE pipe as casing material to contractor (of all sizes), Domestic Meters, Regulators, Isolation and Appliance valves and all materials other than mentioned above shall be supplied by contractor as per technical specification to complete the laying of gas main pipelines and service pipelines.

The free issue material shall not be procured from any other source by contractor. Material reconciliation statement of free issue material duly certified by Owner and TPI shall be submitted to IGL on monthly basis.

Material to be supplied by the contractor:

Contractor shall procure / purchase GI Pipes & fittings, Brass fittings, Cu pipes, MLC Pipes & fittings and Re-Enforced Rubber Hose and consumables required for satisfactory completion / safety / statutory obligation of the works as per tender at no extra cost to Owner. IGL logo shall be marked on the material supplied by contractor. The contractor shall take approval from owner / owner representative for marking on the material to be procured by contractor before placement of order.
The Contractor shall have adequate tools (such as Hammer Drill, Piston Drill, Pipe Cutters, Dies for threading, Pipe wrenches, spanners, Conversion kits, Solder Torch, Copper Tube Cutters, Tube Benders, Lacquers, Thinner etc.) in specified numbers, all types of clamps, plant & equipment, manpower necessary for proper execution of the work. This will include but not be limited to list of specialized tools and tackles indicated in ANNEXURE 1.
On monthly basis, contractor has to get their equipment's, machines and tools checked & verified by respective IGL's C/R In-Charges which shall be submitted along with RA bills for records. In case of non-availability of minimum equipment, machinery & tools, applicable penalties shall be levied on the Contractor as mentioned in SCC of commercial tender and will be deducted from the Contractor's running bills.

Special tools shall be available at the site for carrying out drilling work in walls other than Brick or RCC (Ex. Granite, Marble, Wooden, Glass Cutting etc.)

The contractor has to ensure the availability of generator for drilling of holes. In case the power supply is availed at the site from societies, individual residents, contractor shall settle the claims raised by the electricity providers without any 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 purchase minimum 2 Die sets of ½" & ¾" and 1 set of 1" per control room and submit the certificate for Die sets confirming to NPT thread and calibration certificate for Pressure gauges.

Contractor shall submit the specification of all the material to be supplied by him to EIC for approval before commencing the execution. No hiring of equipment's, tools and tackles by the contractor is allowed at the site. In case, contractor is found not in possession of enlisted required tools and tackles, penalty shall be levied as per Special Conditions of Contract and will be deducted from the contractors running bills

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.

Clamps, Rawal Plugs, Screws and Nozzles etc.

The Clamps, Brackets for meter, Rawal Plugs, Screws, Nozzles, etc. shall be approved lot wise by EIC prior to installation. Re-drilling of existing appliance (burners) nozzles is strictly not permitted. The quality of materials procured will get approved and will be as directed by Control Room In-Charge/ZIC.

The indicative sketch of the Meter Brackets and GI/Copper Pipe Clamps is enclosed with the tender.

Consumables and other materials:

Special Consumables such as Teflon tapes, solder wire, flux, lacquer, thinner, soap solution, heating element for Copper soldering shall be under the scope of the contractor.

These consumables shall be of reputed make and required grades/class.
All materials required for work, NPT threading Die, Copper 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 Belts, Self-Locking Safety Harness Belts etc.).

Special consumable such as grease for maintenance of domestic appliances, all paints for painting of GI Pipes, Petrol, Diesel, Fuels and Oils required are to be supplied by the contractor and are included in the rates.
All minor items not mentioned in the contract but which are necessary for the satisfactory completion and performance of the work under this contract shall also be in Contractor's scope.

Acquisition, Receipt and Storage of Materials

The Contractor shall collect Domestic meter, Regulators, Isolation and Appliance Valve from Owner's designated stores in between the hours to be advised by the Control Room In-Charge/ZIC.

The Contractor shall carry out assessment of material required for GI/Copper installation in allocated area. Contractor has to maintain minimum inventory level at their respective control rooms. After approval from Owner, Contractor shall place order for procurement of GI Pipes & fittings, Copper pipes, MLC Pipe & fittings, Brass Fittings and Re-Enforced Rubber Hose (Technical specifications attached in the tender document) to any of approved vendors as per the list attached in the tender document. The contractor shall also ensure that the QAP for these materials shall be approved by IGL before the start of production activity. Once QAP is approved, contractor shall forward inspection call to the Owner depending upon the material requirement at the site. The inspection of these materials shall be carried out by Owner appointed third party agency. It is contractor's responsibility for document submission, arranging dispatch clearance, handling, loading, transportation and unloading of these materials at their own respective store.
Any other activity not mentioned/covered explicitly above 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 IGL. The Contractor shall carry free issue material in such a manner as to preclude damage during transportation and handling.

The Contractor shall physically examine all materials at the time of acceptance of the material in store 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 of material in store by the Contractor and the cost of repair or replacement or rectification shall be borne by the Contractor, if the material is not returned to IGL store within 1 month of issue.

All materials shall be stored in contractor's stores in the vicinity of allocated C/R at his risk and cost 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.

On monthly basis, contractor has to get their material reconciliation sheet checked and verified by respective C/R In-Charges/representatives and shall be submitted along with RA bills for records.

5.0 ISSUE OF WORK INSTRUCTIONS

The contractor will be required to carry out GI modifications/shifting of installations in the areas where MDPE pipeline has been already laid and gas charged. The methodology followed for GI modifications/shifting may vary in case of individual and multi storied flats.

All skilled personnel like Plumbers/Technicians will be deployed by contractor. These technicians shall only be 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 will be levied to the contractor as per special conditions of the contract.

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.

The schedule of items of GI/Cu installations have been described in brief and shall be held to be completed in all respect including safety requirements as per HSE PTS attached herewith. The payment shall be made against completed and measured works only. No extra works whatsoever shall be considered in execution of these items.

In case of any unwarranted extra works carried out in any zone and other than SOR, necessary approvals shall be taken by EIC with the management.

6.0 PROGRESS OF WORK

The contractor shall proceed with the work under the contract with due expedition and without delay as per the defined Turnaround Time (TAT) period. 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. Weekly progress reports shall be submitted in the formats approved by Owner, indicating broadly details of work carried on modifications, removal of GI installations, replacement of defective and non functional meters and regulators (domestic and commercial), status of various customer request like modification, flame problem after 15 days of commissioning gas leakage etc., conversions & re-conversion, painting of GI Pipes and riser testing.

7.0 WORK SHEETS

The quantities of GI/Cu pipe installed for modifications and other customer service request will be checked by Owner's site engineer and the same shall be incorporated in GIRM, Customer Call Sheets signed & dated as certified, on site. The cards will then be approved by the EIC. The contractor shall collect the existing company policy documents against customer request work from owner to keep updated from time to time.

Measurement sheets/Documents shall be prepared based on the modifications & other request checked and certified by the site engineers and customer where as required for billing purpose.

8.0 PERMISSIONS / APPROVALS

In event of damage to gas charged pipelines, shifting/Replacement of pipeline, contractor may need to obtain special permissions from statutory bodies for carrying out repair work on pipelines. Statutory bodies in this case are MCD, NDMC, PWD, GDA, GNN, GNDA, NOIDA Authority, NHAI, CPWD, AAI, Indian Railways, DDA, State Police, Fire Departments, DSIDC, UPSIDC, HUDA and any other Government Agencies who maintains the public lands and accord permissions for laying of pipeline by various utilities.

IGL will pay the road restoration / Departmental charges / security deposit / Bank guarantees for getting the clearances from statutory bodies. It is the contractor's responsibility to inform and co-ordinate with concerned local authorities, RWA, residents, customers and other utility agencies before and after the commencement of repair work at site. To ensure smooth repair work on as and when basis, the contractor has to liaison with respective authorities.

It is the responsibility of the contractor to obtain "No Objection Certificate" (NOC) from land owing agencies/Statutory bodies, after completion of the restoration to their satisfaction and getting released the security deposit / bank guarantees submitted by IGL for obtaining permissions on production of documentary evidence (this is applicable on case to case basis).

No Separate payment will be made on account of approvals/permissions. In case of any deviation/change in the route/additional laying, IGL shall pay the additional Road Restoration Charges only after receiving of revised estimate and further to written confirmation from the concerned Owner site in-charge.

The inspection of work by statutory authorities shall be the responsibility of the contractor without any extra cost to IGL.

Any change / addition required to be made to meet the requirements of the statutory authorities shall be carried out by the contractor without any extra cost to IGL. The inspection and acceptance of the work by statutory authorities shall however, not absolve the contractor from any of his responsibilities under this contract.

The prospective bidder 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 prospective bidders shall also liaison and coordinate for the same.
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 customer service request received are attended in phased manner as per TAT and attached flow chart. However, it is the contractor's responsibility to fix a firm appointment with the consumer for carrying out the work.

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. C/R In-Charge/EIC may review the records every week. The contractor shall submit the detailed list of work carried/attended and balance work on users at least once bi-weekly as per approved format.

The contractor is also required to obtain a "Labour License" from the Assistant Labour Commissioner of Concerned Authority.

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.

The contractor has to take responsibility of the actions of supervisors, plumbers and helpers provided by him.

9.0 REFERENCE SPECIFICATION, CODES AND STANDARDS

The contractor shall carry out the work in accordance with the requirement of latest relevant applicable standards, this specification, Owner's Engineering Standards; relevant Oil Indian Safety Directorate (OISD) norms, PNGRB Regulations, ASME B31.8-Gas Transmission and Distribution Piping Systems; Australian Standard 3723-Installation and Maintenance of Plastics Pipe Systems for Gas; and the American Gas Association Document – Purging Principles and Practice. ISO-4437/IS: 14885 for underground polyethylene pipes and OWNER's approved procedures.

Should the contractor find any discrepancy, ambiguity or conflict in or between any of the Standards and the contract documents, then this should be promptly referred to the Engineer-in-Charge (EIC) for his decision, which shall be considered binding on the contractor.

10.0 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 work shall be adequately trained & shall have necessary skills to execute / supervise the work. However, the assessment on the qualification of the personnel shall be at the discretion of EIC.

11.0 SAFETY

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 vicinity when these materials are being used.

Trench walls shall be battered with sufficient slope in order to minimize a trench collapse. Where there is a danger of an earth slide or collapse, the trench shall remain open for the minimum time possible with proper barricading. The Contractor is to ensure that no person enters a trench, which is of a depth of 1.5 meters or greater, unless the trench has adequate shoring or the sides are battered to such an extent as to prevent a trench collapse.

The Contractor shall also protect all work sites with warning signs, barricades and night lighting. The Contractor shall inspect all fenced excavations daily, and maintain them in good order.

The trenches/ pits shall not be kept open in night times. However, in case the same is essential the same shall be properly barricaded with proper lighting arrangements & manned.

The Contractor shall provide PPE's like helmets, safety shoes, etc. to the labour which are necessary for safe working practice.

Any accident causing injury to any person or damage to property or equipment shall be reported to the EIC 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 the Contractor in an unsafe manner, he may suspend the Work until corrective action is taken by the Contractor.

PPE, Continuous Barricades and caution tapes along the trenches as per approved drawing in tender, Use of Safety Boots, Hand gloves, Reflective jackets, Hard hats(helmets), Safety shoes, eye and ear safety equipment, Fire extinguishers and as per the detailed scope of work in tender specifications. Refer drawing number 15792-10-03-26, 32. For further details Refer "Special Terms and conditions of Contract" & SOR.

12.0 ORGANISATION STRUCTURE

Contractor shall designate O&M In-Charge who will be responsible to interact with EIC/TPIA and authorized to attend review meetings, receive material, authorized to sign documents, claims and receive payments etc.

Prior approval of IGL is mandatory before deploying Supervisor/Coordinator/Fusion Technician/ Plumber. After approval from IGL, all manpower shall take safety training from IGL and individuals shall keep the Safety Training Competency (STC) card during duty hours.

All work will be issued and sanctioned through the Control Room In-charge and site control exercised by Site Engineers. The contractor shall ensure that technical quality standards are maintained, that construction is carried out cost effectively and that a good customer and public image is maintained for Owner.

The contractor will deploy his own supervisors as directed by site engineers. These personnel will be reporting to the Control Room In-charge 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.

The contractor's supervisor shall have Mobile sets 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. The normal day-to-day issue of work instructions, communication between Owner and the contractor's supervisor and the Site Engineer.

Contractor shall maintain a Customer Care Centre, O&M Site Office, and Material Store in their allotted site with following facilities:

- Telephone, Mobile Phones, Fax machines, Printers/Scanning/Xerox machines, Computers with internet facility.
- One Nos. -Four-wheeler with driver, he shall be well equipped with tools and tackles for attending any emergency complaints and ongoing execution work.
- On award of the contract, the contractor shall establish and submit documentary evidence for above, which will be verified by the owner before award of the work order.

13.0 RIGHT-OF-USE SURVEY AND MARKING

The modifications in existing GI/Copper pipeline route shall be decided with consent of the consumer and Control Room In-charge. Contractor must ensure that the

persons/workers/supervisors/ workers at site shall have proper identity cards prior to entering the premises of the consumer.

No temporary or permanent deposit of any kind of material resulting from the work shall be permitted in the approach 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/Owners Representatives along with the contractor will conduct survey of each premises where modifications and repair work has to be carried out. The survey record will note Customer requirement and proposed modifications details available gas supply points and proposed meter relocation (on case to case basis) and estimates of material quantities. The contractor's representatives will make as sketch of the agreed pipe routes, if necessary.

The contractor will be responsible for contacting the Customer and making the necessary arrangements for access, and appointments to carry out the work. Owner will not be responsible for any time lost due to broken 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 outside ROU. The contractor shall also carryout 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 to protect the public.

14.0 PROTECTION OF STRUCTURES AND UTILITIES

The contractor shall at his own cost, support and protect all buildings, walls, fences or other structures and all utilities and property which may, unless so protected, be damaged as a result of the execution of the works. He shall also comply with the requirements in the specification relating to protective measures applicable to particular operations or kind of work.

While painting, contractor must take care of the consumer premises while carrying out the job such as spillage on floor, walls, ceilings, shades etc. If the same does occur, the contractor is to immediately make good to original.

15.0 TESTING OF DOMESTIC CONNECTIONS

On allotment of work, Contractor shall visit the site and prepare plans for execution of the work. Only after written confirmation from C/R In-Charge and issue of written Permits shall start with the allotted work.

Contractor shall deploy manpower after assessing the work load along with required tools and tackles to carry out work as per customer requirement and in accordance with technical specifications. All type of work shall be prioritized for attending.

Contractor has to supply different types/sizes of approved powder coated clamps (Mild Steel) for fixing GI pipes, Meter Brackets, consumables suiting to the site conditions. The contractor shall get verified from TPI for every fresh lot of the clamps, brackets and other consumables, prior to start of maintenance of GI Risers and Domestic Connections work.

The contractor shall ensure that all reusable pipes and fittings and specially meter and regulators shall be stored properly with both ports sealed and if required shall be packed in a box so as to avoid dust etc. All such material (considered as free issue at the time of reconciliation), received by contractor on dismantling any domestic or commercial installation, shall be first verified and certified from Control Room In-charge and then kept at contractor's store for future usage.
On reinstallation of GI/copper pipes & fittings in above mentioned dismantled cases, as per site requirement, contractor shall carry out modification primarily using old lot of GI pipes & Fittings dismantled from other houses, however shall supply his own procured fresh material for additional GI/Copper pipes & fittings for completing the installation.

The GI installation shall be clamped to the building at intervals not exceeding 1.5 mtrs. Maximum distance between clamps shall be 1.5 – 2 m when pipe goes to the straight, if any tee or fittings lies in between the pipe then clamp shall be placed 150 mm far away from centre line of fittings at every sides. However, the same may be changed as per site conditions/as directed by EIC. Minimum gap between pipe & wall shall be 25 mm. 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 then 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 is in contractor's scope. Contractor has to take prior approval for design/types of clamps, paintings etc. after drilling of holes, a PVC sleeve of suited

size shall be placed in side hole before GI/Copper installation. The rates for installation of GI/Copper pipes includes supply of PVC on as and when requirement basis.
Pipe shall preferably be entered into building above ground and remain in a ventilated location. The location for entry shall be such that it can be easily routed to the usage points by the shortest practicable route.

For carrying out any modification or shifting work, the gas supply of existing customer tapped on the same riser or lateral shall be discontinued. Before stoppage of gas supply, the contractor has to take appointments & consents from existing customers for carrying out the work. Sometimes, modification work takes more than one day, the affected customer shall be pre-intimated to make separate arrangements due to non-availability of gas for a day. Contractor shall ensure to complete the work within shut down time period.

On start of modification work, the source points of gas in a riser i.e. regulator shall be tripped and dismantled after closing brass isolation valves on upstream of regulator. Thereafter, a dead plug shall be tightened on open end of brass valves having 4 bar pressure. After completion of modification/shifting work, the reinstalled riser and lateral shall be tested as per requirement of client. As for copper installation, after modifications, the installation shall be tested on manometer at 100 mbar for minimum 15 min. No pressure drop is allowed on testing of this installation and once the pneumatic testing is completed, the regulator shall be installed, reset for gas charging of riser till appliance.

Removal of functional meter & its reinstallation with meter brackets is included in rates of modifications and shall not be charged in extra to owner.

On riser testing, the contractor shall plan, schedule, coordinate and take consent of gas users on that riser before carrying out shut down. Once contractor plans and gets clearance from customers, they shall carry out testing of the pipe installation within the stipulated shut down time. All such testing work will involve closing/shutting of brass valves installed before meters of individual existing customer and subsequent removal of regulator from riser after closure of isolation valve installed on upstream of

regulator. After taking shut down, the riser shall be tested by pneumatic pressure at 300 mbar for 15 minutes (Range of Calibrated pressure gauge shall not be more than 2 times of test pressure). No pressure drop is allowed. In case of pressure drop, the contractor shall identify leakage point and repair/replace with new fittings or valves whatever is

required within the shutdown period and again test the riser before it is cleared for gas charging.
In case where only pneumatic testing is carried out on commissioned GI/Copper riser and internal piping of a connection, the removal & reinstallation of GI pipes & Fittings, Copper Pipes & Fittings, regulator & meter in case of any leakage shall not be paid separately.

The consent format for riser testing and any planned shutdown of riser will be provided by Owner.

The contractor shall also ensure that gas supply shall not be provided to the customer in any Concealed Piping, meter installed in closed cabinet. During installation the Copper pipe is to be Cut to proper length with tube Cutter, the burrs removed with a file, cleaning of outside surface of pipe & inside surface of fitting, applying flux to the tube and fitting around the outer/inner ends, inserting the tube in to the fitting, applying heat to the assembled joints using conventional blow torch to melt solder wire. Contractor shall submit the joining procedure of Cu pipe & Fitting for approval from EIC. The jointing of copper pipes shall be carried out by approved plumbers only. Contractor has to supply different types/sizes of approved clamps (PE 80/PVC) for fixing Copper pipes suiting to the site conditions Contractor has to take prior approval of EIC for quality of the clamps, solder, flux, lacquer, thinner etc. The approval shall be taken for every fresh lot of clamps from EIC before installation at site.

All copper piping shall be clamped to the building at intervals not exceeding 500 mm. The solder wire shall be of reputed company of diameter size 3.25mm, Lead free as per BS 29453:1994 (Soft solder alloys) and supplied in coils. Solders for use with copper tube & fittings generally melt within the temperature range 180°C - 250°C. The contractor has to furnish the certificate of confirmation of standards before start of work.
Contractor shall ensure that all installed PNG installations, Pipes, Fittings are in exposed condition and does not pose any threat of accidents, leakage or blast due to gas entrapment inside the closed cabinet or concealment of pipeline by customer inside kitchen i.e below slab, etc. The rates for modifications in such cases are applicable as per respective SOR i.e dismantling, reinstallation, modifications, meter installations/relocations etc. Any other activities not mentioned above, other wise required to complete the job shall be executed by contractor without any cost implication to Owner.

The contractor shall supply the Calibrated Pressure Gauges / Manometer / Diaphragm Gauges of suitable range for testing of GI/Copper Installations ranging from 0-10, 0-4 bars/0-150 m bar/0-250 m bar respectively. The calibration certificate of pressure gauges shall be submitted before the start of the execution work. The pressure gauges shall be calibrated as desired by C/R In-Charge but positively once in a year. The details of testing shall be properly recorded in the Modification cards.

16.0 INSPECTION

The contractor shall rectify any defect noticed during the various stages of inspection to the entire satisfaction of Control Room In-charge/ EIC before proceeding further. Irrespective of the inspection, repair and approval at intermediate stages of work, contractor shall be responsible for making good any defects found during final inspection/guarantee period/defect liability period as defined in general condition of contract.

17.0 PURGING & COMMISSIONING

The rate for purging & commissioning shall be included in the GI/Cu installations.
Care shall be taken to ensure that the outlet is so located that vent gas cannot drift into buildings. The re- commissioning of the GI installation should be performed as follows:

- Ensure the method of purging is such that no pockets of air are left in any part of the Customer's piping.
- Ensure that all appliance connections are gas tight, all appliance gas valves are turned off and there are no open ends.
- Where possible, select an appliance with an open burner at which to commence the purge i.e., a hotplate burner.
- Ensure the area is well ventilated, and free from ignition sources.
- Ensure branches that do not have an appliance connected are fitted with a plug or cap.
- Turn on one burner control valve until the presence of gas is detected. A change in the audible tone and smell is a good indication that gas is at the burner. Let the gas flow for a few seconds longer, then turn off and allow sufficient time for any accumulated gas to disperse.
- Turn on one gas control valve again and keep a continuous flame at the burner until the gas is alight and the flame is stable.
- Continue to purge until gas is available at other appliances.

18.0 DISMANTLING & REPLACEMENT OF METERS & REGULATORS, MRI (METER RELATED ISSUES), RE-MEASUREMENT, FLAME, INSTALLATION OF ISOLATION /APPLIANCE VALVE AND VISIT CHARGE

The work includes removal of non-functional, defective or damaged domestic and non-domestic meters & regulators and then re-installation of these with associated inlet (Corrugated Flexible hose) and outlet connections (GI/Brass fittings), on the wall/GI service pipe with approved powder coated meter brackets, Clamps and angles in 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 Rawal Plugs, screws etc. In case the Rawal Plugs are not holding than wooden blocks or other fixing arrangements like cement etc. to be used for proper grouting.

The same rates for removal & installation will apply irrespective of whether the meter is situated inside or outside the property. Wherever a bank of meters & regulators is to be replaced or reconstructed the rate shall be for each complete meter replaced and simultaneous installation.

The Meter & regulator installation shall 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. In case, the same as mentioned above has not been followed earlier and after directions from EIC, necessary modifications shall be taken up by contractors after approval from EIC/control rooms and claims shall be settled according to respective SOR. 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 just entering the customer premises/kitchen but before the meter installation. If not installed earlier, for installation of brass valves, modifications shall be carried out and shall be payable according to respective SOR, after direction from EIC.

Contractor shall attend (if required) customer GI/Cu pipe re-measurement request and shall submit the measurement in standard format as provided by IGL.

The above activities along with restoration of the area to original shall be carried out to the complete satisfaction of consumer and Control Room In-charge/ EIC.

19.0 CONVERSION OF BURNERS

The work in this section includes:

- The changing of nozzles and associated controls in accordance with manufactures instructions for both domestic and imported burners/ovens/grills/hotplate.
- The changing of old appliance connection rubber hoses and nozzles and re-greasing taps as necessary. Attend leakages of rubber hoses and on instructions of EIC replace with new and payable as per SOR.
- The contractor shall supply the steel reinforced rubber hoses with fixing clamps as per attached technical specification at the time of conversions.
- The contractor has to supply all types of nozzles/jets required for all types of appliances including imported burners, Grills, Ovens, without any extra charges to Owner.
- Cleaning and performing minor maintenance of appliances.
- Attend all requests related to proper working of appliances.
- Attend temporary & permanent disconnections request by customers. Replace and reconvert NG appliances to work on LPG is payable. Testing for gas escapes, soundness and performance of appliances.
- Instructing the Customer for safe use of natural gas and for fixing of safety and conversion labels.
- Contractor must attend the requests regarding appliances, leakage, fire etc.
- All consumables (Nozzles, greases, soap solutions etc.) are in contractor's scope.
- Changing or repairing of any items damaged during conversion.
- In case any complaint related to Flame problem and new stove conversion received from customer within 15 days of rectification carried out, Contractor will be responsible for the same. In such cases, contractor will attend and rectify the complaints free of cost.

Contractor will have to provide both Pin gauges and standard sized nozzles. The payment will be released only after submission of necessary documents i.e JMR/GIRM Card of the individual house to owner.

20.0 RESTORATION

Wherever the excavation is carried out for repair of damaged pipeline, restoration to the original surface condition is in the scope of Owner or as directed by EIC. All excavated pits for repairing like on roads, footpaths (including roads and footpaths inside colonies) shall be restored to original condition, and the same shall be done as per CPWD/IRC norms and to the satisfaction of the concerned local Authority/Third Party Agencies designated by Owner (if any). 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.

Where slabs and blocks are to be restored, the level of the compacted sub-base is to be adjusted according to the slab/block thickness. The slabs or blocks should be laid on moist bedding material, which should be graded sand, mortar or mortar mix. The slabs or blocks should be tapped into position to ensure they do not rock after laying. The restored slabs or blocks should match the surrounding surface levels. Joint widths should match the existing conditions, and be filled with a dry or wet mix of mortar. 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 restorations cannot be completed immediately, the Contractor shall provide and maintain a suitable temporary running surface for vehicular traffic and pedestrians. The Contractor will be responsible for the maintenance of all restoration carried out, for the duration of the Contract guarantee period.

The Contractor is to ensure the restoration work is properly supervised, and that the material used is suitable for the purpose and properly compacted. Where the required standards are not achieved the Contractor will be required to replace the defective restoration work.

After laying pipeline, backfill material without containing extraneous material or hard lumps of soil or stones shall be filled and watered in layers of 150mm. Warning mats shall be placed as per specification. Earth shall be filled watered and compacted in layers with the help of earth compactor (Jumping jack compactor where ever space is available). After backfilling, the crown of the earth shall be between 50mm and 100mm above road surface and shall be free from sharp-edge stone and boulders.

Note that payment for restoration will be released only after satisfactory completion and certification by Owner/Owner's representative with clearing the sites of all surplus materials, etc. Contractor has to obtain the No Objection Certificate (NOC) from the concerned local authorities/RWA after completion of the restoration work (if required). 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 CPWD/IRC/MCD specification to its original condition and also to the entire satisfaction of landowner (Private/Public).

The expenditure incurred towards testing of the material used for restoration, as per the applicable standards, shall be borne by contractor.

21.0 INSTALLATION OF SLEEVES, CONSTRUCTION OF PEDESTAL AND MODIFICATION IN OLD TF POINTS

On allocation of work by Control Room In-Charge, as built drawings showing pipe size details, existing gas charged areas & address of gas users, location & valve size inside valve chambers, approximate location of the existing mains will be issued to the contractor at the start of the survey by the owner.

Installation of new or replacement of damaged GI sleeves & Half round RCC Sleeves

GI Sleeve:

A bending tool shall be used to bend the GI sleeve pipe so that it has the appropriate curvature and is free of kinks. The installation of GI sleeve for service lines shall be done by sealing the annulus between pipe and sleeve, firm fixing of the GI sleeves by concrete mix pedestal, clamping, sand filling, etc.

The contractor shall supply the minimum dia. size of 2.5" or 3" GI sleeves (Heavy Duty), 300 mm in length as per direction of Control Room In-Charge. The vertical portion of the sleeves shall be fixed to the wall of the premises in a secure manner. The Service lines shall be installed in accordance with the drawing enclosed in the tender.

Half Round Concrete Sleeve:

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. Half round concrete sleeve shall be made as per attached drawing.

The replacement and new installation shall be carried out only after allotment of work from Control Room In-Charge. As all the work is being carried out near to gas charged pipeline, due care shall be taken to avoid any damages while excavating on existing network. All safety gadgets and firefighting equipment's shall be placed at all work sites before start of work as precautionary measures. The rates for new and replacement of sleeves includes appointment with existing gas users for informing planned shut down on riser, supply, transportation of material to site, mobilization of manpower, dismantling of regulator, excavation of pits for squeezing and restoration of excavated pits with making of pedestal.

The final replacement/installation with GI or RCC sleeve will be worked out as per site conditions in consultations with the Control Room In-Charge after route survey on existing installations. Any change in plans for replacement/installation of sleeve due to site constraint will be notified to Control Room In-Charge & his specific written approval shall be obtained before carrying out the job.

This shall include supply & installation of GI Sleeves, 2.5" NB x 300 mm length GI Sleeve / Half Round Concrete Sleeves for domestic connections , 3" NB x 300 mm length GI Sleeve as per IS 1239 part I heavy duty for commercial and industrial installations, excavation, breaking through any obstructions, Squeezing of MDPE pipe near to Transition fittings ,dismantle of regulator, shutdown the riser /individual connections, insertion of GI pipe, sealing the annulus, firm fixing of the sleeves with concrete mix, preparation of pedestal & restoration of excavated pits within the size of pedestal. The rate includes liaisoning with statutory bodies if required and no separate rates are payable.

Construction of Pedestal & Sand filling

Construction of pedestal and sand filling will be worked out as per site conditions in consultations with the Control Room In-Charge after survey on existing installations.
The Contractor shall be responsible to arrange the supply of approved coarse sand (size 0.6 – 2 mm as per IS 383) free from any impurities like clay, mica, and soft flaky pieces, as per the instructions of EIC.
Scope includes all civil works including supply of manpower, materials, excavation of pit including PCC, finishing, clean up, Sand Filling and restoration as defined in technical specification & instruction of Control Room In-Charge. The rate includes liaisoning with statutory bodies also.

Modification of Old Transition Fittings

Any modification required in existing transition fittings will be worked out as per site conditions in consultations with the Control Room In-Charge after survey on existing installations. Scope includes excavation, breaking any obstructions, Squeezing of MDPE pipe near Transition fittings and modification/shifting of PE pipes, dismantling regulator, shutdown the riser/individual connections, modification of GI pipe, Installation of isolation valve (if required), re-testing, commissioning of GI and MDPE pipe, sealing the annulus, firm fixing of the sleeves with concrete mix, preparation of pedestal & restoration of excavated pits within the size of pedestal. The rate includes liaisoning with statutory bodies if required, all civil works including supply of manpower, materials, excavation of pit, PCC, finishing, clean up, restoration and sand filling.

Construction, Repair & Maintenance of valve Chambers

The Construction/modifications/repair of valve chambers will be worked out as per site conditions in consultations with the Control Room In-Charge after survey on existing valve chambers. All civil works including supply of manpower, materials including

water proofing compound of reputed make, excavation of pit, piping supports including all PCC, RCC and Brick works for valve pits, pedestals with insert plates as required, sealing of pipe at pits, providing cover etc., finishing, painting, clean up and restoration as per technical specification & instruction of Control Room In-Charge. Water proofing compound shall be used in such proportion as recommended by manufacture but in no case it shall exceed 3% by weight of Cement.

On repairing of RCC Slab of valve chamber, the rates include dismantling existing RCC slab & erection and re-fabrication new slab without disturbing the side walls of chamber. All the debris shall be immediately removed after completion of the job. As for easy identification of valve chambers, the manhole cover shall always be painted with Canary yellow paint and rates inclusive. The contractor shall ensure the valve chambers to be free of any leakage/water seepage after its construction/repair/modification. Valve chambers located on main road shall be installed with Iron Channel/Garters (if required) as per instruction of Control Room in Charge. For new construction/replacement of valve chamber, pre-cast concrete chamber, Painting of Emergency numbers, sand padding shall be done as per instruction of Control Room In-Charge. Cleaning and removal of deposited debris in valve chambers shall be done by the contractor. Scope also includes installation of PE valve in valve chamber with required squeezing of on line Gas network, cutting, cleaning, electro fusion jointing, testing and commissioning of gas network. The rate includes liaisoning with statutory bodies and no separate rates are payable.

Material for Valve Chambers

RCC Pre-cast Slab shall conform to IS: 456. Heavy Duty RCC Manhole Cover shall be used. It shall be with raised with Lifting hooks. The RCC manhole cover shall have a clear opening as per the Construction Drawings issued to the contractor. All material required for modifications, repair etc is scope of supply by 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.
- For carrying out modification work, the MDPE valve pit shall be covered with sand bags from bottom to top and then only work will start. Sandbags to be placed without disturbing the laid pipe. Gunny bags and Sand should be of approved quality.
- Pre-cast RCC slab shall be placed as indicated in the construction drawing issued to the contractor. PCC to be placed below the pipe as indicated. Once PCC is set sand is to be filled and properly rammed so that pipe and pre-cast concrete blocks are firmly place.
- Valve will be supplied without the operating stem. Approved quality sand is to be placed in between area. The supply of sand and is included in the rates of construction/repair of valve chamber.
- Installation of MS rungs shall be inclusive & carried out at time of cleaning of valve chamber.
- Surrounding area to be properly cleared and PCC to be placed around the location where pre-cast slab with RCC Manhole cover is placed. The RCC pre-cast slab to be laid in level and finished smooth.

Fabrication, Installation, Painting & Relocating of Pipeline Markers

A joint survey will be conducted by TPI/Owner with contractor along the route for identifying & recording new installations/re-location/painting of various existing markers.

This shall include supply and installation /reinstallation of Route Markers / Pole Markers/plate marker as per the attached drawings, along the route / along boundary wall, lamp posts including all associated civil works such as excavation and construction in all types of soils, construction of pedestals and grouting with concrete, cleaning, supply and application of approved color and quality of primer and paint, stencil letter cutting of numbers, direction, chainage etc., restoration of area to original condition and performing all works as per drawings, specification and instruction of Control room In-charge. Contractor will provide a list of installation or reinstallation of markers to Control room In-charge and get their approval before start of work.

The contractor will be responsible for liaison with statutory bodies if required and making necessary arrangements for carrying out the work. Contractor shall maintain job card for work carried out at site. Permanent Markers (Drawings are enclosed with the tender document.) shall be fabricated, supplied and installed on the ROU as per the directions of Control room In- charge. The installation of the type of the Permanent Marker shall be decided by the Control room In-charge depending on site condition. The contractor shall also ensure that a sample of all type of markers shall get inspected and approved from Control room In-charge before installation at the site. The RCC/stone Markers shall be painted before installation as per the approved procedure. Whereas the Pole with foundation & Plate markers are to be supplied with powder coated Golden Yellow paint. The supply various types of markers as per the specification is in contractor's scope.

In many areas, the existing and installed markers needs total repainting with art work on it which is payable under applicable SOR for RCC, Stone & Pole Markers of all sizes. Due to regular construction activities near to vicinity of gas pipeline, markers needs to be relocated as there are chances of damages to them.

Guidelines:

- Interval between any two RCC/ Stone markers for mainline (180mm to 63mm) shall not be more than 50m.
- Pole markers with foundations shall be installed after two RCC/ Stone markers as per attached drawing.
- In addition to above, Plate markers (As per attached drawing) shall be installed in individual societies/areas as per the instructions of the Control room In-charge.
- For the distribution network 32mm & 20mm pipe, plate markers shall be installed as per the site conditions and directions of the Control room In-charge.
- The artwork is typical for all the markers, with Owner's logo on it. The contractor must take prior approval for the artwork from Control room In-charge before installation of Markers.

22.0 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 Control Room In Charge.

Fusion Operators and other skilled personnel like plumbers, conversion techniques shall be deployed by contractor.

23.0 RECORDING (AS-BUILT DRAWINGS)

The as-built drawing shall be submitted on location & area wise as specified. The bill of materials used for the particular area shall be specified on the drawings. One-site sketches, picking up key reference points, shall be made during the installation of services. The lengths, depths of re-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.

The following points shall be taken care to the preparation of as built drawings.

a) The as built drawings should be in the scale of 1:200 and shall be submitted in an A-0 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) Minimum three (03) offsets of every joint, from permanent structure shall be recorded on As Built.

d) 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 built drawing. 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 built drawings shall be as per the approved legends provided by EIC.

e) Details & offset distances from other utilities present in excavated pits (e.g. MTNL, NDPL, BSES, DJB etc.) should be given in as built drawing. If there is any change in depth of the pipeline, the same shall be clearly marked with details in the as built drawings. The details (material, size & length) of additional protection provided to pipeline shall also be clearly indicated.

f) 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.

g) 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.

h) Total as built-length (size wise), bill of materials should be mentioned in each sheet respectively.

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 (1:200).

o) As built drawings shall be duly signed & stamped by area TPIA.

p) The details shall be prepared in standard format using PDF and .dwg and submitted in Pen Drive. 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

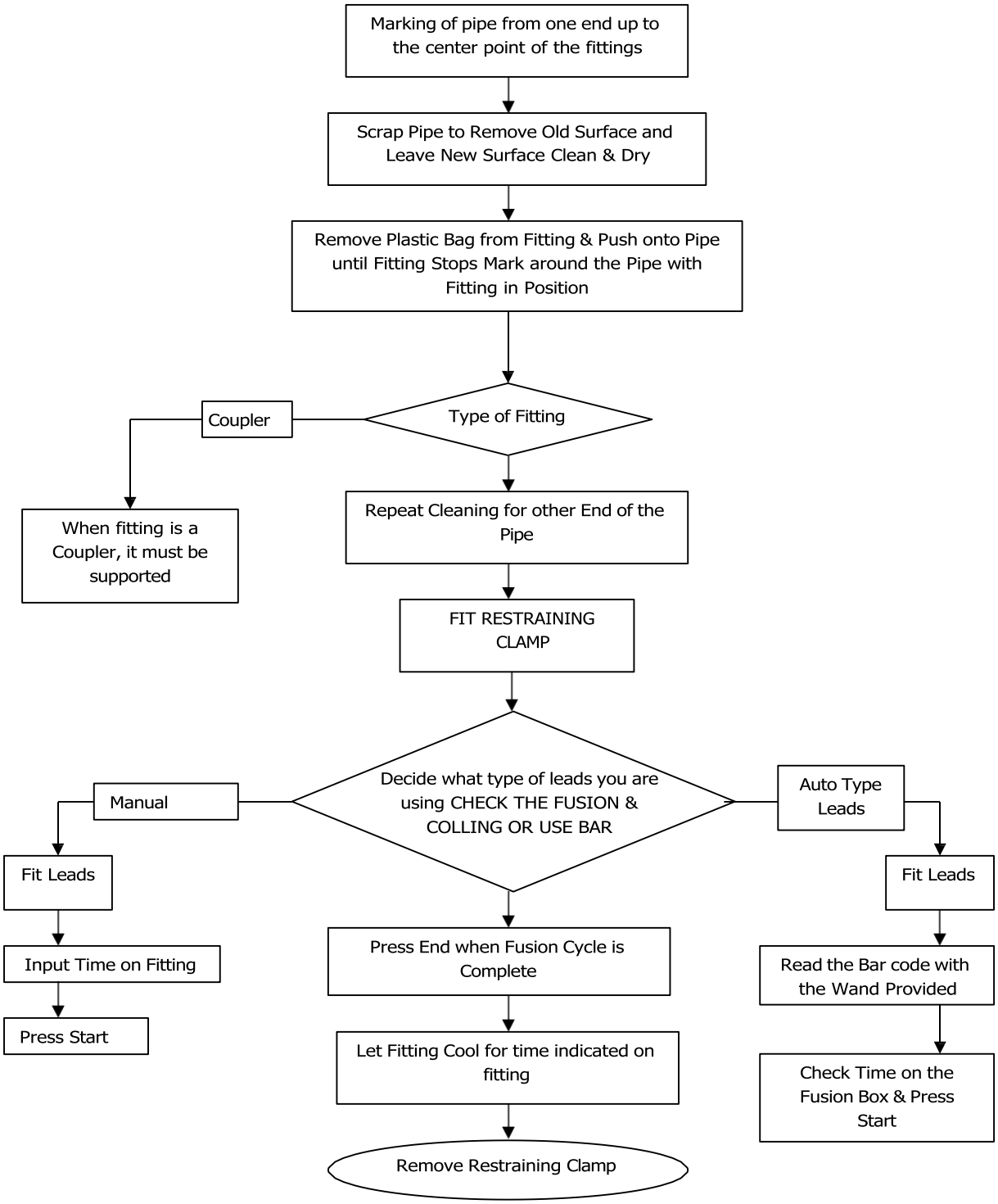
ANNEXURE - 1

MINIMUM TOOLS & EQUIPMENTS TO BE PROVIDED/MAINTAINED BY THE CONTRACTOR FOR EMERGENCY REPAIR AND MAINTENANCE OF MDPE INSTALLATIONS

S. No.	Category	Equipment Details	Quantity (Nos.)
1	A	Electro Fusion Machine (Automatically readable)	2
2	A	Portable Generator (5.5 KVA)	1
3	A	RCC Breaker/Jack Hammer (Hilti)	1
4	A	De-watering /MUD pump (minimum 2HP)	1
5	A	Guillotine MDPE Pipe cutter (63mm to 180mm)	2
6	A	Rotary MDPE Pipe Cutter upto 63mm	2
7	A	HDPE pipe Cutter all diameter	1
8	A	Squeeze Tools with stoppers (Manual) upto 63 mm	4
9	A	Squeeze Tools with stoppers (Hydraulic) 63mm to 180mm	4
10	A	Rotary Peelers for PE pipes of 63mm to 180 mm dia.	2
11	B	Universal Scrapers	4
12	B	Tapping Tools/Allen Keys	2 sets
13	B	Flame Proof Flood Lights with Tripod stand	1
14	B	Flame Proof Chargeable Portable LED Torch	2
15	B	Foldable Ladder (minimum 12 feet)	2
16	B	Electric Wire & Extension board/Power socket	100 mtrs
17	B	Safety Helmet (Karam)	10
18	B	Safety Gum Boots	8
19	B	Electrical Shock Proof Gloves	8
20	B	Safety Cones	8
21	B	First Aid portable Kit	1
22	B	Caution Tape/Barricading Roll (min. 100 m)	2
23	B	Calibrated Pressure Gauges (0-10 Bar)	2
24	B	Calibrated Pressure Gauge (0-6 bar)	2

Note - Any other tools & tackles not mentioned above but otherwise required for satisfactory completion of work shall also be provided by the Contractor without any cost implication to IGL.

FUSION COUPLERS FROM 20MM TO 180MM



ANNEXURE - 3				
MINIMUM INVENTORY TO BE MAINTENED BY THE CONTRACTOR FOR PE LAYING, MAINTENANCE JOBS PER CONTROL ROOM				
S. No.	**Mat. Code**	**Description**	**Unit**	**Minimum Requirement Per Control Room**
1	0605008000	PIPE MDPE 20 MM DIA	m	100
2	0605012800	PIPE MDPE 32MM DIA	m	100
3	0605025200	PIPE MDPE 63 MM DIA	m	50
4	0605050000	PIPE MDPE 90 & 125 MM DIA	m	50
5	0605072000	PIPE MDPE 180 MM DIA	m	12
6	0606050000	PIPE, HDPE, DIA 125 MM, PE-80 PN-6	m	10
7	0606080000	PIPE HDPE 200MM DIA PE80 PN6	m	10
8	0606100000	HDPE PIPE 250 MM PE80 PN6	m	10
9	0606126000	PIPE HDPE DIA -315 MM. PE80 PN6	m	5
10	0705005000	APPLIANCE BALL VALVE 1/2"	No.	50
11	0706005000	ISOLATION BALL VALVE SIZE 1/2"	No.	20
12	0706007500	ISOLATION VALVE 3/4"	No.	20
13	0706010000	ISOLATION BALL VALVE 1"	No.	3
14	0706015000	ISOLATION VALVE 1-1/2" (40 MM)	No.	2
15	0708025210	MDPE BALL VALVE 63 EF END (WITHOUT STEM)	No.	1
16	0708050010	MDPE BALL VALVE 125 EF END (WITHOUT STEM	No.	1
17	0708072010	MDPE BALL VALVE 180 EF END (WITHOUT STEM	No.	1
18	0708112810	MDPE BALL VALVE 32 EF END (WITHOUT STEM)	No.	1
19	0801025210	MDPE BENDS 63 MM OD 90 DEG PE80/100	No.	1
20	0801050010	BEND MDPE 125 X 90 DEG PE80/ PE 100	No.	1
21	0801072010	BEND MDPE 180MM 90 DEG. PE80/ PE100	No.	1
22	0802025210	MDPE BENDS OF SIZE 63 MM OD OF 45 DEGREE	No.	1
23	0802050010	BEND MDPE 125 X 45 DEG PE80/ PE100	No.	1
24	0802072010	BEND MDPE 180MM 45 DEG PE80/ PE100	No.	1
25	0813008010	COUPLER MDPE 20MM OD PE80/ PE100	No.	10
26	0813012810	COUPLER MDPE 32MM OD PE80/ PE100	No.	10
27	0813025210	COUPLER MDPE 63MM OD PE80/ PE100	No.	5
28	0813050010	COUPLER MDPE 125MM OD PE80/ PE100	No.	5
29	0813072010	COUPLER MDPE 180MM PE80/ PE100	No.	2
30	0814000110	SADDLE TAPP. MDPE 63X20MM PE80/PE100	No.	1
31	0814000210	SADDLE TAPP. MDPE 63X32MM PE80/PE100	No.	2
32	0814000710	SADDLE TAPP. MDPE 32X20MM PE80/PE100	No.	5
33	0814000810	SAD TAP. MDPE 125X63MM PE80/PE100 W CPLR	No.	1
34	0814050010	SADDLE TAPP. MDPE 125X32MM PE80/PE100	No.	1
35	0814072010	SAD TAP. MDPE 180X63MM PE80/PE100 W CPLR	No.	1

S. No.	Mat. Code	Description	Unit	Minimum Requirement PerControl Room
36	0815000210	REDUCER MDPE 63X32 PE80/PE100 WTH CPLR	No.	1
37	0815000310	REDUCER MDPE 180X63 PE80/PE100 WTH CPLR	No.	1
38	0815000410	REDUCER MDPE 125X63 PE80/PE100 WTH CPLR	No.	1
39	0815000510	REDUCER MDPE 32X20 PE80/PE100 WTH CPLR	No.	1
40	0817008010	EQUAL TEE MDPE 20MM PE80/PE100 WITH CPLR	No.	5
41	0817012810	EQUAL TEE MDPE 32MM PE80/PE100 WTH CPLR	No.	5
42	0817025210	EQUAL TEE MDPE 63MM PE80/PE100 WTH CPLR	No.	2
43	0817050010	EQUAL TEE MDPE 125MM PE80/PE100 WTH CPLR	No.	1
44	0817072010	EQUAL TEE MDPE 180MM PE80/PE100 WTH CPLR	No.	1
45	0818008010	END CAP MDPE 20MM EF END PE80/ PE100	No.	20
46	0818012810	END CAP MDPE 32MM EF END PE80/ PE100	No.	10
47	0818025210	END CAP MDPE 63MM EF END PE80/ PE100	No.	5
48	0818050010	END CAP MDPE 125MM EF END PE80/ PE100	No.	2
49	0818072010	END CAP MDPE 180MM EF END PE80/ PE100	No.	2
50	1003000000	TRANSITION FITTING PE TO GI 32 MM TO 1"	No.	2
51	1003000100	TRANSITION FITTING PE TO GI 32MM TO 3/4"	No.	2
52	1006000010	TR. FITTING PE TO CS 63MM X 2" PE80/100	No.	1
53	1302000001	DIAPHRGM METER G-1.6 (with serial nos)	No.	20
54	1303000000	DIAPHRGM METER G-1.6 REVERSE	No.	5
55	1430000001	REGULATOR DOMESTIC 4 BAR TO 21m BAR 6.5	No.	20

Note:- Material codes may be altered as per the IGL system requirements.

ANNEXURE - 2

MINIMUM TOOLS & EQUIPMENT TO BE PROVIDED/MAINTAINED BY CONTRACTOR FOR GI/COPPER MODIFICATION WORK

S.No.	Equipment Details	Quantity (Nos.)
1	Pipe wrench 250 mm	4
2	Pipe wrench 350 mm	4
3	Pipe wrench 450 mm	4
4	Adjustable spanner 50 mm	4
5	Adjustable spanner 150 mm	4
6	Adjustable spanner 250 mm	4
7	Set of combination spanner 3/16"-11/4" AF	2
8	Set of combination spanners 5mm - 46mm	2
9	Heavy duty tool boxes	2
10	Combination Spanner 6 to 32 mm	2 set
11	3/4'' Socket Heavy Duty 36,41,45 mm long end Heavy Duty	2 set
12	Combination Spanner 32, 36,41,45 mm	2 set
13	Screw Driver Set (Taparia)	2 set
14	Screw Driver heavy Duty	2 set
15	Square Socket Set (Taparia)	1
16	Star screw driver set	2 set
17	Adjustable wrench 8"	2 set
18	Adjustable Wrench 12"	2 set
19	Set flat-headed screw drivers	2
20	Small hammer (5kg)	2
21	Combination pliers/mole grips	2
22	Set of files	2 set
23	SS twist drills 0.5-10 mm (for appliance conversion)	15
24	Hand drill chuck	10
25	Drill bits for 1" pipe	2
26	Stocks and dies for NPT threading ½",3/4", 1" GI Pipe	1 set each
27	Portable pipe vice & tripod	2
28	Copper Pipe Bending Machine	2
29	SS Tube Bender	2 set
30	Portable electric drill 240V, heavy duty (Bosch)	4
31	Copper pipe Cutter 12mm	2

32	SS Tuber Cutter	2 set
33	GI pipe cutters ½"-1"	2
34	Rubber Hose Cutter	4
35	Cage & Wire Cutter	1
36	Hacksaw and blades	4
37	Measuring tape 05 m	2
38	Measuring tape 15 m	1
39	Measuring tape 30 m	1
40	Pneumatic Foot Pump	2
41	Electric Wire & Extension Board	50 mtrs
42	Paint Brush (1/2" - 2")	1 set
43	Wire brush/ Sand Paper	2
44	T20 Screw Driver	5
45	Blowtorch	1
46	Soldering iron	2
47	Petzel/Karam Harness	2 set
48	Safety Helmet (Karam)	10
49	Electrical Shock Proof Gloves	4 pair
50	Caution Tape/Barricading Roll (min. 100m)	2
51	Safety Cones	6
52	First Aid Portable Kit	1
53	Calibrated Pressure Gauge (0-4 bar)	4
54	Calibrated Pressure Gauge (0-600 mbar)	2
55	Calibrated Pressure Gauge (0-150mbar)	2
56	Calibrated Digital Pressure gauge (0-4 bar)	2
57	Flame Proof Chargeable Portable LED Torch	2
58	Foldable Ladder	1
59	Welding Machine with all accessories	As & when required
60	Steel Pipe Cutting Machine	As & when required
61	Steel Pipe Grinding Machine	As & when required

Note - Any other tools & tackles not mentioned above but otherwise required for satisfactory completion of work shall also be provided by the Contractor without any cost implication to IGL.

Brief Scope of work as per SOR items:

- **Hiring of Equipment's/Vehicle for Emergency Repair Services & Pipeline shifting services**

Hiring of RCC Breakers, Tractor Mounted Air Compressor, JCB Machine, Pump for removal of water/mud/Slurry from trench/pits - 4 hours

Scope includes providing JCB for excavation work/ for transportation of material and manpower /Tractor mounted air compressor/ Mud, Slurry, Water Pump (for removal of water/mud from trench or pits) / RCC Breaker machines with fuel, driver/operator, transportation with all tools & tackles and consumables required in emergency within stipulated time frame as defined in tender document. Payment for deployment of JCB/tractor mounted air compressor/pump (for removal of water/mud from trench or pits)/ RCC Breaker shall be done for minimum 4 hours. Rates are inclusive of liaisoning with statutory authorities, other utility agencies and settlement of 3rd party claims for damages by JCB/tractor mounted air compressor/ Pump/ RCC Breaker m/c.

Hiring of Welder for 08 hours

Scope includes supplying a Welding machine along with power source/fuel, a operator with helper, transportation, and all necessary tools, tackles, and consumables required within the time frame specified in the tender document. Payment for the deployment of the Welder will be made for a minimum of 8 hours. The rates include coordinating with customers, statutory authorities, other utility agencies, and resolving any third-party claims for damages caused by the Welding machine/workmanship.

- **Restoration of trenches, pits etc.**

Restoration of trenches & pits excavated for repairing of damaged or for rerouting/modifications of laid/existing MDPE pipeline to original conditions, surface like PCC, Asphalted/Bituminous Road, Concrete Pavement, Agra & Kota Stones, Tiles (Chequered/Interlocking etc.), Dry Brick Pavement as per the technical specifications attached in the tender after laying of pipeline for Built- Up surface as per the directions of EIC / Site In charge. Scope includes supply of approved quality material, testing of materials by third party agencies (if required) as per technical specification / CPWD / IRC Standards, submission of the restoration reports. The NOC from local authorities (if required) will be as per direction of EIC/IGL control room Incharge. It includes cases, where excavation was carried out to repair the damaged section of pipeline/where the trench settles despite earlier restoration.

❖ Shifting/ Emergency Laying of MDPE Pipeline/Service Pipeline

Plan and prepare a schedule for execution and work implementation as per QA/QC plans to be issued by Owner/Owner's representative. Contractor has to submit the Construction/Execution procedures before commencement of work to Owner/ Owner's representative for approval.
Prior to start of construction activity, contractor shall prepare route survey drawing in AUTO CAD / Computerized drawing (minimum size of sheet is A3) marked for proposed gas pipe line laying and submit to IGL/PMC for approval
Obtaining permissions from respective land owning agencies such as MCD, NDMC, PWD, DDA, NHAI, GNN, GDA, Railway Irrigation department, DSIDC, UPSIDC, NOIDA, Greater Noida etc. for road cutting for laying of the pipelines, liaison with the concerned authorities during execution of the job, obtaining NOC from concerned authorities once the work is completed. Getting back/refund of bank guarantee/security deposits made to the agencies for laying of the pipelines.

Making trial pits to determine the underground utilities/services such as existing pipelines, cables (electrical/communication), conduits, u/g drainage, sewers, tunnels, subways foundations etc. for deciding optimum feasible route and depths for laying the pipelines based on the route plans indicated by Owner.
Wherever required the grass/turfing, pavement, linings, drains, roads and other such 'pucca' area shall be locally removed to facilitate trenching and pipe laying works. The same is to be reinstated as original.
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.
To make trenches with stable slopes but restricting minimum disturbance to above ground/underground services/installation as per specifications and approved route plans keeping the trenches free from water and soil till placement of pipes.
Uncoiling/stringing the MDPE pipes of required sizes (i.e. 180, 125, 63, 32 & 20 mm) pipes into trenches as per approved procedure.
Joining the pipe ends with fittings of valves by approved automated electro-fusion techniques only as per tender specification.

Installation of pipe fittings like elbow, tees, reducers, couplers, tapping saddles, transition fittings, valves etc., including construction of supports, valves pits, inspection chambers etc. as per specification & satisfaction of the EIC.
Laying pipelines by any methodology including trenchless technology methods with or without casing pipes (HDPE pipes) as per specifications and as directed by EIC.
Back filling and compaction by jumping jack compactor wherever required, using approved 'good' soil or using excavated earth or borrow earth as per requirement and specifications and replacement of the tiles, slabs removed during the excavation. Cleaning all unserviceable materials, debris, excess earth trenches etc. to designated disposal area.
Carrying out pneumatic testing and purging as per specifications and approved procedures, providing all tools & tackles, instruments, manpower and other related accessories for carrying out the testing of pipes.

Supply, fabrication & installation of Stone route marker, Pole marker with foundations, Plate markers, valve chamber etc. as per the directions of the EIC/Owner's representative.

Commissioning of gas in the tested PE line shall be done as per the approved procedure.

Restoration of existing ground features such as grass/turfing, paving, roads, drains, concrete, floral beds, fencing, tiles, marbles, flooring masonry etc. to original condition and to match with adjoining conditions, functionally and aesthetically up to the entire satisfaction of Owner / Owner's representative /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 No Objection Certificates for the restoration work done from the concerned authorities.

Returning surplus material to Owner stores after obtaining clearance from TPIA/Consultant/ Owner, reconciliation of free issue material/consumables.

Handing over the completed works to owner for their operation/use purposes.

Rectification of defects arising due to poor workmanship during defect liability period of pipelines/installations handed over to Owner.

Preparation and submission of all documents like Pit wise as graph, As-built drawings, details of crossings, utility graphs, PE cards for service line and deviation statements on completion/commissioning of work by way of drawing, sketches and tables in soft & hard copy.

- **Liasioning with Land Owning Agencies for Permissions**

Submission of permission letter, RR charges, BG and other security charges and obtaining permissions from respective land-owning agencies such as MCD, NDMC, PWD, DDA, NHAI, GNN, GDA, Railway, Irrigation department, Forest (Protected & Un- Protected), DSIDC, UPSIDC, NOIDA, Greater Noida etc. for road cutting for laying of the pipelines, liaison with the concerned authorities during execution of the job, obtaining NOC from concerned authorities once the work is completed. Getting back/refund of bank guarantee/security deposits made to the agencies for laying of the pipelines.
Obtaining clearances and coordination with concerned RWA of the allotted area for internal network laying and obtaining NOC from RWA after completion of work.
Obtaining the approval for optimum route and ROU from the concerned authority.

- **Health, Safety & Environment (HSE)**

The scope of work includes ensuring compliance with all applicable Health, Safety, and Environment regulations, laws and guidelines provided by client related to MDPE work. The contractor shall be responsible for implementing and maintaining an effective HSE Management system that ensures the safety and well-being of personnel, prevents harm to the environment and minimizes risks associated with the work. Contractor will ensure to follow work permit system, conducting tool box talk, risk assessment, mitigate potential hazard, proper barricading of site, and availability of PPEs before commencement of work. The contractor shall be held responsible for any disruption caused to environment, personnel and property and follow the government guidelines and regulations. The rates

encompass all liaising expenses, including those related to statutory authorities, other agencies, and third-party settlement claims.

- **Shifting and Installation of FRS/MRS/DRS Skid/Wall Mounted MRS**

Scope includes Dismantling, Loading at IGL's store/ Site, Transportation to another store/ site, Unloading, Shifting and installations of skids (FRS, MRS, DRS, etc.) on the platform / foundation using cranes / hydra etc. with fuel, driver/operator and all consumable required as per site conditions.
Disconnection, Loading, Transportation, of wall mounted MRS from IGL's designated site to another site and all others necessary documentation. Also includes unloading of the systems, storage of system (wherever required), replacement of meter/regulator (wherever required), Re-installation of MRS at IGL's designated site, as required by the site conditions.
Rates are inclusive of liaising with statutory authorities, other utility agencies and settlement of third party claims

- **Attend/Repair works for Emergency leakages for MDPE Network**

Transportation including loading, unloading, handling of all free issue materials from IGL stores or Contractor's store to work site for repairing the emergency leakages from existing MDPE charged network. Scope includes providing manpower and machinery with fuel, driver/operator, transportation with all tools & all consumable required for the completion of attend/repair works. Execution of the work including excavation of the pits, dewatering, Casing cutting, Jointing, testing the network after repair, purging (wherever required), commissioning and backfilling, compaction, submission of testing and commissioning report as defined in bid document & as instructed by EIC / Site Engineer of Owner. Rates are inclusive of liaising with statutory authorities, other utility agencies and settlement of third party claims

- **Supply of NEW/FRESH GI Pipe/Cu Pipe including Fittings**

To maintain minimum inventory of material, consumables as per instructions of IGL control room in charge. Prior assessment of shortage & material requirement for installation at site, order placement for Purchasing of GI Pipes & GI Fittings, Copper pipes & Copper fittings, Brass Fittings from IGL's approved vendors (list attached in tender) , forwarding QAP for approval & subsequently arranging Inspection Call, Dispatch Clearance, handling, loading, transportation and unloading of these items at respective contractor’s store. Receiving, taking over, handling, loading, transportation and unloading of owner supplied above ground items like regulators, meters, meter regulator, Isolation Valve, Appliance valve and other free issue items from Owner’s designated stock yards to Contractor’s own stores / work sites, proper storing, stacking, identification, providing security and insurance cover. Making temporary but stable platforms/ scaffolding/ rope ladders and supply of all other safety devices including full body harness.

- **Installation/Re-Installation services of Pipes Including Fittings**

The scope of work includes assessing the existing installation, obtaining necessary permits, and isolating the system if required. Installation/Reinstallation of GI/ Copper service pipes & fittings only for modifications, restorations & extra points, removal/re-installation/replacement of Meter/meter regulator, regulators, Valves etc. including NPT threading, as specified, Drillings of holes through the walls (Brick, RCC), Granite, Marble, Wood Cutting, Glass Cutting with proper heavy duty hammer drill machine, tools & tackles, using proper sealant/grout material and colours to match the original replacement of the damages during drilling, restoring the area to the original condition, Installation of PVC sleeve in hole piece, Painting of entire length of pipe along with fittings after proper surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint. Restoring the wall surface to original conditions, Supply & fixing of approved clamps & dowel Plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape / lock tight, Joining of transition fittings to above ground service. GI/Cu pipes testing, purging and commission of the complete installation. Planning & coordination for intimation and permission from the affected customers. All installation/re-installation carried out with GI/Copper will be paid on running meter basis. These rates include testing and commissioning.

- **Dismantling/Removal of threaded GI pipes and Copper Pipes with Fittings**

The scope of work includes assessing the existing installation, obtaining necessary permits, and isolating the system if required. It includes the dismantling, removal, or disconnection of GI and copper service pipes and fittings as per the request of the customer or end user. It also involves installing end caps or dead plugs at risers, lateral tappings, MIV, etc., followed by testing to ensure proper sealing.
All removed materials will be stored at the contractor's designated storage area. Additionally, GI & Cu pipes and all fittings dismantled from the site shall be returned to the IGL Control Rooms after material reconciliation against each PO in every RA Bill or Final Bill as per IGL requirements. The contractor is also responsible for restoring any holes or openings created at the customer's premises during the removal process.
The contractor must promptly submit material details and meter reading data to the Control Room immediately after dismantling or as instructed by ZIC/RIC. All tasks must be performed in accordance with the provided guidelines, ensuring proper handling, transportation, storage, and reporting of materials. No additional payment will be provided for the supply of extra fittings.

- **Supply & Installation of CS/GI pipe along with CS Fitting/ forged Fittings by welded method**

To maintain minimum inventory of material, consumables as per instructions of IGL control room in charge. Prior assessment of material requirement for installation of riser & header at site, Procurement of GI Pipes (heavy duty) as per IS-1239 Part-I duly powder coated, forged fittings conforming to IS-1239 Part-II, CS pipe as per ASTM A106 Gr B & CS Fittings conforming to ASTM A105/ ASTM A234 WPB or equivalent from any of the approved vendors of IGL. Scheduling, Planning of material & Forwarding inspection call, Getting Dispatch clearance from IGL/PMC, Handling, loading, transportation and

unloading of these materials at contractor's store / site.
Preparation and approval of sketches, schedules, execution procedures & WPS as per technical specification. All consumables e.g. electrodes, flux etc. for welding pipes and fittings are under contractor's scope. Finalizing optimum route in consent of IGL representative from transition fitting to last floor of building (wherever required) including lateral piece with isolation valve.
Dismantling, Erection, Fabrication, Socket Welding, Testing & Installation of welded GI Pipes & Fittings etc., including NPT threading as per technical specification.
Supply & fixing of MS angle clamps, Ceiling clamps & dowel plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape / lock tight, Supply and fixing of studs & bolts of various sizes ranging from 1/2" to 2", Jointing of transition fittings to above ground GI pipes, purging, testing and commissioning of the complete installation.
In case of complete riser modification, welded riser shall be installed after successful testing at ground level. Pneumatic testing shall be carried out for entire riser length after installation of riser as per technical specification. All the safety equipment's, tools and tackles required for satisfactory execution of welding/installation work are under contractor's scope.
Any other material & activities not mentioned/covered above, but otherwise required for satisfactory completion/safety of work as defined in tender has to be supplied / done by contractor within specified schedule at no extra cost to owner.

- **Dismantling/Removal of Welded GI pipe & forged Fittings**

The scope of work for the dismantling and removal of welded GI pipes and forged fittings includes assessing the existing installation, obtaining necessary permits, and isolating the system if required. The rate covers carefully dismantle and remove the pipes and fittings using appropriate tools, such as cutting or welding as needed. After removal, the materials will be handed over to owners control room/store. The work area will be cleaned, restored (including holes) and any damage caused during the process will be restored. A detailed report will be provided immediately, including the materials removed and meter reading to client. Welded GI pipes and all forged fittings dismantled from site shall be returned back to IGL Control rooms after material reconciliation or as per client requirement. The contractor will ensure compliance with all safety standards, using necessary protective equipment and safe work practices throughout the process.

- **Modification and Up gradation of MRS Skids/Wall Mounted MRS & MRS Cages/Cabinets**

It includes taking shutdown of existing MRS, dismantling meters/ regulators, replacement/Fixing of meters/regulators with associated inlet and outlet connections/fittings supply of pipes & fittings, pipe cutting, threading, welding & firmly fixing with approved meter clamps/ brackets and other supports by proper grouting. Restoring the area to the original condition as per the specifications. Rates include all as above along with testing of joints till re-commissioning.
Receiving, handling, loading, transportation and unloading of owner supplied MDPE Pipe & Fittings, Meter and Regulator and other free issue items from IGL's designated stock yards to Contractor's own stock-yards/ work-sites. Proper storing, stacking, identification,

providing security, and insurance cover for the materials. It also included procurement and supply all materials (butt end or threaded) CS pipe & fittings, Ball valves, Brass Valves, Rubber Hoses, Brass jets/Nozzles consumables like spiral wound & insulating gaskets, fasteners, painting material, cold applied tape, tools & tackles, clamps, pressure gauges, skilled and unskilled manpower etc. for satisfactory completion of the work. The designing and installation procedures shall also be provided by the contractor to IGL before start of installation work.

The contractor shall procure & supply the following materials/ items/ equipment but not limited to, Procurement and supply of all items /material viz. pipes, SS tubing, ball valves, fittings and flanges, Strainer, NRV, Brass Valves, Globe Valves, gaskets, fasteners, clamps and supports (refer enclosed drawings), pressure gauges, Cold applied tapes, Manpower (skilled and unskilled), consumables (welding rods, filler wires, lubricants/oils, waste cottons etc.) and other tools and tackles for fabrication, erection, installation, commissioning of MRS.

- **PAINTING - GI pipes, FRS / MRS SKID / Wall Mounted MRS**

Painting of wall mounted MRS/cages/cabinet/above ground entire length of GI pipe along with fittings of various sizes installed at domestic and commercial/Industrial connection after proper cleaning and surface finish by one coat of approved primer paint and two coats of approved synthetic enamel paint complete as per specifications & directions of EIC. Rates are inclusive of Painting of Emergency numbers on Cabinet/cages (if required). Restoring the wall surface to original by cleaning / touching of the corresponding paint to original as per instructions & to the satisfaction of the EIC.

- **Riser testing, Anaconda Replacement, Meter Checking & Replacement**

Pneumatic testing of commissioned GI risers at 300 mbar, including the dismantling and re-installation of regulators of all sizes to isolate and resume gas supply for affected customers. The riser should be pressurized to 300 mbar using a foot pump and held for at least 15 minutes to monitor any pressure drop on a calibrated pressure gauge (PG). If any leakage is detected, it must be rectified immediately by either replacing the damaged pipe/fitting or tightening the affected section. No additional payment will be made for leakage rectification during riser testing.

Regulators and valves will be provided by IGL as free-issue items. The contractor is responsible for proper coordination and communication with residents/users, ensuring prior notice is given before isolating and resuming gas supply. The scope also includes tightening and replacing damaged clamps with new ones for GI installations, as well as installing new clamps wherever required, as directed by the IGL Control Room In-Charge. The rates cover procurement, inspection, and transportation to the site and are inclusive of liaising with statutory authorities, RWAs, and settling third-party claims.

Meter checking by installing check meter in series with existing meter

The scope of work involves the inspection and verification of installed meter using a master meter. This process requires installing the master meter in series with the existing meters and monitoring gas consumption and meter readings for a minimum of three days. The percentage error is then calculated based on the readings of the new meter. If the

error exceeds the permissible limit, the faulty meter will be replaced with a new one. The contractor is responsible for effective coordination and communication with residents or users, ensuring prior notice is provided before isolating and restoring the gas supply. The work also includes proper disconnection, installation, sealing, and testing of the replacement meter to ensure accurate functionality. Scope also includes signing of consent, GIRM and related documents by TPI and customer as per the requirement of IGL. Scope includes receiving, handling, loading, transportation and unloading of owner supplied free issue items from IGL's designated stock yards to work site/Control room/Contractor's own stock-yards. Proper storing, stacking, identification, providing security and insurance cover for the materials.

Replacement of existing faulty/Old meter by New Meter

The meter replacement process includes safe disconnection of the defective meter, installation of the new meter with proper sealing, clamps, conducting meter functionality tests and performing Leakage testing after replacement work. The contractor is responsible for effective coordination and communication with customers or users, ensuring prior information is given before isolating and restoring the gas supply. All work must be carried out following safety guidelines and standards to maintain system integrity and reliability. Scope also includes signing of consent, GIRM and related documents by TPI and customer as per the requirement of IGL. Scope includes receiving, handling, loading, transportation and unloading of owner supplied free issue items from IGL's designated stock yards to work site/Control room/Contractor's own stock-yards. Proper storing, stacking, identification, providing security and insurance cover for the materials.

Supply and service for Replacement of existing Anaconda with Cu pipe & Brass Fittings

The scope of work includes the supply, installation, and replacement of flexible hose with copper pipe & fittings. The contractor is responsible for proper handling, alignment, and sealing of the connections to meet safety. Additionally, testing must be conducted to verify the integrity and functionality of the installation before commissioning. The contractor is responsible for effective coordination and communication with customers or users, ensuring prior information is given before isolating and restoring the gas supply.

- **Shifting/Modification/Uplifting of Transition Fittings**

Scope includes excavation, breaking any obstructions, Squeezing of MDPE pipe near Transition fittings or as per instruction of EIC and modification/shifting/uplifting of PE pipes/TF fittings, dismantling regulator, shutdown the riser/individual connections, modification of GI pipe, Installation of isolation valve (if required), saddle cutting (if required), re-testing , commissioning of GI and MDPE pipe, sealing the annulus, firm fixing of the sleeves with concrete mix, preparation of pedestal & restoration of excavated pits within the size of pedestal as defined in technical specification and instruction of EIC. The rate includes liaising with statutory bodies if required, all civil works including supply of manpower, materials, excavation of pit including PCC, finishing, clean up and restoration as defined in technical specification & instruction of EIC. Rates are inclusive of liaising with statutory authorities, other utility agencies and settlement of 3rd party claims

- **NG Conversion & Flame Problem**

Conversions of all types of LPG Kitchen appliances to NG based appliances, Supply & changing of the nozzles / jets and associated controls for domestic & imported appliances including oven and grill with proper tools and tackles. The rate also includes testing of Kitchen piping from Isolation Valve to Appliance valve and supply and fixing of Reinforced rubber hose with clamps. Cleaning and performing minor maintenance, greasing etc. and all associated works for conversion of appliance. Testing and displaying the performance to the customer, signing of joint meter records (wherever required) and instructing safety norms to the customer as per specifications & to the satisfaction of customer / owner / Engineer in Charge.
Any other material & activities not mentioned/covered above, but otherwise required for satisfactory completion/safety of work as defined in tender has to be supplied / done by contractor within specified schedule at no extra cost to owner.

Rectifying Flame problem of domestic & imported appliances including oven and grill with proper tools and tackles. The rate also includes testing of Appliance & Reinforced Rubber Hose from Appliance valve to inlet of appliance and fixing of clamps (wherever required). Cleaning and performing maintenance, greasing etc. and all associated works for rectifying flame problem. Displaying the performance of Burner to the customer, signing of reports and instructing safety norms to the customer as per specifications & to the satisfaction of customer / owner / Engineer in Charge.
Any other material & activities not mentioned/covered above, but otherwise required for satisfactory completion/safety of work as defined in tender has to be supplied / done by contractor within specified schedule at no extra cost to owner.
Flame problem issue Applicable only after 15 days from the date of conversion of appliance.

- **Attend & Repair Work for Emergency leakages from Riser (Height work/Jhulla Work only)**

Scope of work includes mobilization and deputation of manpower, machine, DG Set for power supply, tools, tackles, PPE's, Safety equipment's, etc. to attend and repair the Riser/GI leakages work at height. Execution of work includes cutting, bevelling and edge preparation, threading, grinding the edges of pipes, fittings, etc. including Non-destructive testing (wherever applicable), testing of pipes and fittings after repair, commissioning. It covers the receiving, handling, loading-unloading, and transportation of free-issue material from IGL stores, control rooms or the contractor's store to the site for repairing the damaged/leaked riser or GI/CS pipeline. Arrangement of PPEs like ascender/descender, helmets, safety harness belts are in contractor scope. The contractor will ensure to follow work permit system and safety norms with proper permit approvals from client. The rates encompass all liaising expenses, including those related to statutory authorities, other agencies, and third-party settlement claims.

❖ Construction, Repair & Maintenance of valve Chambers:

Fabrication and erection of new Valve chambers as per drawing - RCC

The scope of work for the construction of RCC valve chambers includes preparing the site by clearing and excavating to the required depth and dimensions for the valve chamber, ensuring proper drainage and soil compaction to create a stable foundation. The work includes PCC (Plain Cement Concrete) foundation, followed by the construction of the chamber walls using appropriate materials, such as brickwork, RCC, or pre-cast concrete, in accordance with the approved design specifications. Reinforcement will be installed as per the structural design to ensure stability, strength and sealing of all connections to prevent leaks and ensure functionality. The valve chamber will be equipped with a durable lid /manhole cover or slabs, providing easy access for maintenance. The work will comply with relevant safety, quality, and regulatory standards. Rates are inclusive of painting of emergency numbers on manhole cover, coordination with statutory authorities, other utility agencies and settlement of third-party claims.

Fabrication and erection of new Valve chambers as per drawing - Long Stem Valve

The scope of work for the construction of long stem valve chambers includes preparing the site by clearing and excavating to the required depth and dimensions for the valve chamber, ensuring proper drainage and soil compaction to create a stable foundation. The work includes PCC (Plain Cement Concrete) foundation, followed by the construction of the chamber walls using appropriate materials, such as brickwork, RCC, or pre-cast concrete, in accordance with the approved design specifications. Reinforcement will be installed as per the structural design to ensure stability, strength and sealing of all connections to prevent leaks and ensure functionality. The valve chamber will be equipped with a durable lid /manhole cover or slabs, providing easy access for maintenance. The work will comply with relevant safety, quality, and regulatory standards. Rates are inclusive of painting of emergency numbers on manhole cover, coordination with statutory authorities, other utility agencies and settlement of third-party claims.

Repair/Modification in size, Increase/Decrease in height of valve chambers

Scope of work includes all civil activities such as supplying manpower, materials, pit excavation, repair and/or modification of existing valve chambers, including RCC and brick type. The work involves increasing or decreasing the height of the valve chambers, as well as modifying their size to accommodate changes in piping or other system requirements including excavating around the valve chambers. Supply of Class A brick, sand, coarse sand, cement, water, RCC along with plaster, shuttering and supporting material, demolition, increasing of height of chamber as per site requirement and provision of mason are in the scope of contractor. All work shall be done in accordance with relevant codes, standards, and approved drawings provided by client. Rates are inclusive of painting of emergency numbers on manhole cover, coordination with statutory authorities, other utility agencies and settlement of third-party claims.

Ring installation on existing valve chamber

Scope of work includes the installation of a ring on an existing valve chamber, ensuring structural strength and proper alignment. It includes site assessment to evaluate the chamber's condition and barricading the work area. The ring is then positioned and fastened in place, ensuring a secure fit and effective sealing.

The work also includes all civil activities such as supplying manpower, materials, pit excavation, dismantling of existing ring structure (if any), preparing the surface, placing new ring and jointing with Plain Cement Concrete (PCC), finishing, and cleaning up the site. Finally, the scope ensures full restoration of the site in accordance with the technical specifications and the guidance of the EIC. All rates provided are inclusive of the above-mentioned tasks, as well as any liaising and coordination with relevant authorities and agencies.

Fabrication of fresh top RCC slab of valve chambers

Scope of work includes proper fabrication of fresh top of valve chamber (RCC type) as per the approved drawing or as per requirement of client. The formwork is to be prepared with cut-outs for valve chamber openings, and reinforcement bars needs to be placed according to the design specifications. Concrete is then mixed, poured, and compacted using vibrators to eliminate air pockets. After pouring, the slab is cured for strength and durability. Transportation, labor, masonry, tool ,tackles, water, reinforced material, removal of formwork/shuttering after concrete setting are included in rate. Rates are inclusive of painting (including the demarcation of emergency numbers) on the manhole cover, coordination with statutory authorities and other utility agencies, and the settlement of third-party claims.

Providing manhole cover of valve chambers (only in case where manhole cover is damaged/ lost)

Scope includes the supply and installation of a minimum 7.5 mm thick RCC heavy-duty manhole cover with an iron frame on circumference of sizes as required on top of the valve chambers/ring, or as per the instructions and approval of the client. Any civil work, transportation, labor, masonry, and proper placement of the manhole cover on the valve chamber will also be included in the contractor's scope. Rates are inclusive of painting (including the demarcation of emergency numbers) on the manhole cover, coordination with statutory authorities and other utility agencies, and the settlement of third-party claims.

Sand filling in Valve Chamber

Scope of work includes the supply, transportation, manpower, and filling of clean, dry sand into the chambers. The work includes clearing the valve chamber of debris, ensuring proper sand quality, and filling the chamber to the required depth in layers, with each layer compacted to prevent settling. After filling, the site will be cleaned of any excess material. The work will be performed in compliance with safety standards, with proper protective equipment provided for all personnel. Rates are inclusive of coordination with statutory authorities and other utility agencies, as well as the settlement of third-party claims.

Cleaning of malba/water/mud slurry

Scope includes supplying manpower, transportation, dewatering pump, mud/slurry-pump and all necessary tools, tackles, equipment's required for cleaning within the time frame specified in the tender document. Contractor will ensure to safety work practices, proper barricading of site, and availability of PPEs before commencement of work. The rates include coordinating with customers, statutory authorities, other utility agencies, and resolving any third-party claims for damages caused by the Welding machine/workmanship.

Painting of Valve Chamber Manhole Cover

Scope of work includes removing all debris, dirt and foreign materials around the manhole cover to ensure smooth opening and closing for valve operation. The rate encompass cleaning of manhole using appropriate tools, removal of any build up around hinges or seals to ensure proper functioning, transportation, manpower and painting of manhole cover(including demarcation of emergency numbers). After cleaning, all waste and debris will be properly disposed of, and the site will be left clean and safe. Rates are inclusive of coordination with statutory authorities and other utility agencies, as well as the settlement of third-party claims.

Liaisoning for construction of New valve chamber

Scope includes Coordination with other utility agencies and obtaining permissions from land-owing agencies like MCD, PWD, DDA, NDMC, NHAI, AAI, GDA, GNDA, GNN, Forest Dept, NHAI, Indian Railways, other government agencies that maintain the public and private lands, i.e., apartments/institutions, etc.
Settlement of claims with third party, if any on the cases where a Valve Chamber is constructed on the existing charged pipeline.

- **Supply, Installation, Painting, Reinstallation & Relocation of Pipeline Markers:**

Supply and Installation /reinstallation of Route Markers / Pole Markers/plate marker as per the reference drawings, along the route / along boundary wall, lamp posts including all associated civil works such as excavation and construction in all types of soils, construction of pedestals and grouting with concrete, cleaning, supply and application of approved colour and quality of primer and paint, stencil letter cutting of numbers, direction, chainage etc., restoration of area to original condition and performing all works as per drawings, specification and instruction of Engineer-in-Charge. Rates are inclusive of liaising with statutory authorities, other utility agencies and settlement of third party claims.

- **Supply/Installation of SR Cabinets, Foundation work and SR uplifting/shifting work**

  Supply and installation of Service Regulator cover including fabrication, and painting as per technical specification. Any other material & activities not mentioned/covered above, but otherwise required for satisfactory completion/safety of work as defined in tender has to be supplied / done by contractor with in specified schedule at no extra cost to owner.

Foundation Work for SR

The scope covers the preparation of the foundation work for the service regulator, in accordance with the technical specifications provided by the client. The rate shall include the cost of all labour, tools, tackles, equipment, hire charges, supply of all materials, shuttering, and earthwork for excavation and backfilling.

Installation of New SR with foundation and Cabinet

The scope of work includes the installation of the service regulator, which includes excavation and removal of any obstructions as needed. The work also covers the squeezing, cutting, scrapping, modification and shifting of PE pipes as necessary. The contractor is responsible for modifying GI/CS pipes, installing isolation valves where required, and performing Tee/saddle cutting when necessary. After the installation of the pipes, the work includes testing and commissioning of both GI and MDPE pipes. The annulus will be sealed, and sleeves will be securely fixed using a concrete mix. The service regulator cabinet will be painted, and the complete installation of the service regulator will be finalized. The scope also includes the preparation of the pedestal and restoration of the excavated pits to match the size of the service regulator foundation, following the technical specifications. The contractor is also tasked with all liaising and coordination with statutory authorities, utility agencies, and managing third-party claims if necessary. Civil activities such as supplying manpower, materials, pit excavation, laying Plain Cement Concrete (PCC), finishing, and site clean-up will be included in the scope. The contractor will ensure the full restoration of the site in compliance with the technical specifications and under the guidance of the EIC. All rates should cover the above tasks, including any necessary coordination and liaising with relevant authorities and agencies.

Uplifting/Shifting of SR with Foundation Work (upto 3 mtr) including painting work

The scope of work includes the installation of the service regulator, which includes excavation and removal of any obstructions as needed. The work also covers the squeezing, cutting, scrapping, modification and shifting of PE pipes as necessary, along with dismantling the service regulator and shutting down the gas supply. The contractor is responsible for modifying GI/CS pipes, installing isolation valves where required, and performing Tee/saddle cutting when necessary. After the installation of the pipes, the work includes testing and commissioning of both GI/CS and MDPE pipes. The annulus will be sealed, and sleeves will be securely fixed using a concrete mix. The service regulator cabinet will be painted, and the complete installation of the service regulator will be finalized. The scope also includes the preparation of the pedestal, foundation, and restoration of the excavated pits to match the size of the service regulator foundation, following the technical specifications. Civil activities such as supplying manpower,

materials, pit excavation, laying Plain Cement Concrete (PCC), finishing, and site clean-up will be included in the scope. The contractor will ensure the full restoration of the site in compliance with the technical specifications and under the guidance of the EIC. All rates should cover the above tasks, including any necessary coordination and liaising with relevant authorities, agencies, and settlement of 3rd party claims.

Painting of SR Cabinet (inside and outside) with emergency numbers including SR assembly

The scope of work for painting covers the application of a proper surface finish the application of one coat of approved primer paint and two coats of approved synthetic enamel paint, as per the specifications and directions of the Engineer-in-Charge (EIC). The rates will also cover the painting of emergency number on cabinets/cages, if required.

- **Installation of new or replacement of damaged GI sleeves / Half round RCC Sleeves/ RCC Crush Guard**

Supply & installation of GI Sleeves, 2.5" NB x 300 mm length GI Sleeve / Half Round Concrete Sleeves/Crush Guard for domestic connections , 3" NB x 300 mm length GI Sleeve for commercial and industrial installations, excavation, breaking through any obstructions, Squeezing of MDPE pipe near to Transition fittings ,dismantle of regulator, shutdown the riser /individual connections, insertion of GI pipe, sealing the annulus, firm fixing of the sleeves with concrete mix, preparation of pedestal, , construction as per the reference drawings & restoration of excavated pits within the size of pedestal as defined in technical specification and instruction of EIC. The rate includes liaising with statutory bodies if required and no separate rates are payable.

- **Construction of Pedestal**

Scope includes all civil works including supply of manpower, materials, excavation of pit including PCC, construction as per the reference drawings, finishing, clean up, Sand Filling and restoration as defined in technical specification & instruction of EIC. Rates are inclusive of liaisoning with statutory authorities, other utility agencies and settlement of 3rd party claims

- **Construction of Pedestal for Nallah Crossing**

Scope of work for pedestal or ramp for nallah crossing includes excavation, removal of obstructions, squeezing of MDPE pipe near transition fittings, or as directed by the Engineer-in-Charge (EIC). This also involves modification or shifting of PE pipes, dismantling of the regulator, shutting down riser or individual connections, modification of GI pipe, installation of isolation valves (if required), saddle cutting (if required), installation of HDPE casing, construction as per the reference drawings, re-testing, commissioning of GI and MDPE pipes, sealing the annulus, and securely fixing the sleeves with a concrete mix. Additionally, preparation of the pedestal/ramp and restoration of the

excavated pits within the specified size, as per technical specifications and instructions of EIC, are included. The rate covers liaisoning with statutory bodies, civil works including supply of manpower and materials, excavation, PCC finishing, clean-up, and restoration as per specifications and EIC instructions. It also includes coordination with statutory authorities, utility agencies, and settlement of third-party claims.

- **Structural Steel Work**

Supplying, transporting, storing, fabricating in position and testing/examining bolted and/or welded STRUCTURAL STEEL WORKS at all levels and locations including all built-up sections/compound sections made out of rolled sections and/or plates/bent plates in trusses, purlins, wind ties, wind girders, columns, portals, racks, Dispenser, Crash Guard etc. , frameworks, crane gantries, surge girders, bracings, floor beams, lifting beams, monorails, platforms, staircases (excluding chequered plates and gratings), ladders, stoppers, brackets, side runners, sag rods, supports for equipment and technological accessories and process piping, hand railings, posts, conveyor galleries, trestles, towers, masts, junction houses etc., cutting to required size, straightening/bending if required, edge preparation, cleaning, preheating, bolting/welding of joints, (including sealing the joints of box sections with continuous welding), finishing edges by grinding, fixing in line and level with temporary staging & bracing and removal of the same after erection, grouting with Ordinary Grout or premix free flow Non-shrink Grout as specified, including preparation and submission of detailed fabrication drawings.
It also includes supplying and applying Paint (minimum 2 coats) of approved quality and shade suitable for normal corrosive environment including touching up of shop primer coat as per specification, providing temporary staging, scaffolding, testing etc., for steel structures at all levels and locations.

- **Civil Foundation and Restoration works**

Providing and Laying Plain Cement Concrete (1:2:4)

Providing & laying, Fixing, Centering and Shuttering of plain cement concrete with nominal mix 1:2:4 by mass (1 cement: 2 coarse sand: 4 coarse aggregates) with 20 mm down size graded aggregates/ gravels as specified in specifications and satisfaction to the EIC.
Restoration of trenches & pits excavated for repairing of damaged or for rerouting/modifications of laid/existing MDPE pipeline to original conditions, surface like PCC, Asphalted/Bituminous Road, Concrete Pavement as per the technical specifications attached in the tender after laying of pipeline for Built- Up surface as per the directions of EIC / Site In charge. Scope includes supply of approved quality material, testing of materials by third party agencies (if required) as per technical specification / CPWD / IRC Standards, submission of the restoration reports. The NOC from local authorities (if required) will be as per direction of EIC/IGL control room Incharge. It includes cases, where excavation was carried out to repair the damaged section of pipeline/where the trench settles despite earlier restoration.

Supply and Fixing of Deformed Steel Bars Reinforcement

Supply and placing in position high strength deformed steel bars reinforcement

(conforming to IS: 1786, Grade Fe 415) for RCC work including transporting, straightening, cleaning, de-coiling, cutting & binding to required shapes and length as per details, binding with contractor's own 16 SWG black soft annealed binding wire at every intersection, supplying and placing with proper cover blocks, supports, chairs, overlaps, welding, spacers, fan hooks etc. for all heights and depths etc. complete the work as directed.

Providing and Laying Reinforced Cement Concrete (M-25)

Providing and laying REINFORCED CEMENT CONCRETE OF M-25 Grade (Concrete shall be design / nominal mix) with 20mm & down size graded aggregates in NON SUSPENDED slabs / pavement slabs including pedestals, ramps etc. filling pockets with grouting, laying in alternate panels to required slopes, all necessary form work and finishing the top surface rough or smooth as required and directed, providing pockets/openings, recesses, chamfering etc. wherever required, vibrating, tamping, curing, and rendering smooth if required in any position, shape, level and thickness etc. all complete as specified, shown and directed. Rates to include all materials (other than steel), labour, shuttering and necessary works required to make work complete.

Supply & installation of SS Pressure gauge

Supply & installation of SS pressure gauge of approved make.
Installation of pressure gauges and their accessories inclusive of supply of necessary fittings, adaptor, tubings.
Transportation including Loading, unloading, handling of all items from Contractor's Store/IGL Store to site/PNG Control Rooms

Supply of Brass Fittings, G.I Fittings, Jumpers

Assessment of material requirement for installation at site, Order placement for purchasing GI/Cu/Brass/Jumpers from anyone of approved vendors of IGL, Scheduling, Planning of material & Forwarding inspection call, Dispatch clearance, handling, loading, transportation and unloading of these at respective contractor’s store. Proper storing, stacking, identification, providing security and insurance cover. Preparation and approval of sketches for modification, schedules & execution procedures and all others necessary documentation.
SOR for supply of GI fittings shall include all fittings
(Nipple/Union/Bend/T/Reducer/Expander/etc.) or any other fitting not specified in the tender document but required at site for job completion shall also be considered.
Transportation including Loading, unloading, handling of all items from Contractor's Store/IGL Store to site/PNG Control Rooms

Supply of Locks (Godrej make with computerized key)

It includes supply of padlocks with specifications: Minimum 03 ton pull load resistance, 12/14 pin computerized key (03nos.), Corrosion/Water Resistant, Hardened Shackle (Hacksaw Resistant), Brass Body, rivet less body with polished Finish, Automatic Locking Technology, Double side locking for double protection or Two-point locking shackle, Key Hole preferably in the bottom of the lock body., Body Shape- Round/Rectangle.
SOR includes transportation, loading, unloading of items to IGL Store/Site/Control Rooms.

Print and Supply Log Books Log Book and Signage Printing (100 pages)

It includes printing/supply of log books with Hard cover binding, 100 Leaves, size A3, A4, legal 13x8, single color printing, white/pink/yellow/blank paper, 75 GSM Paper, Single or double side printing. Print Format to be provided by IGL. SOR includes transportation, loading, unloading of items to IGL Store/Site/Control Rooms.

Print Caution Board Signage's

Cautionary Signage Board of area up to 6sq. ft. (varying sizes as per requirement) with following technical specifications:
Printing: Eco Digital Printing on Vinyl (120 mic. Wyte/ Avery)
Lamination: 80 microns (Wyte)
Sun Board: 3 mm thickness Sun board and self-adhesive option on backside
Durability: 3-4 years (Depending upon the weather condition)
SOR includes transportation, loading, unloading of items to IGL Store/Site/Control Rooms.

Customer Complaints/Requests:

The contractor is required to arrange an office-cum-store with a minimum area of 2,000 sq. ft. per zone to securely store free-issue materials, contractor-supplied materials and material removed from site. The contractor shall be fully responsible for the safety and security of all stored materials.
A customer request/complaint logbook must be maintained, recording the date of receipt and resolution of complaints. The resolution timeline must align with the Turnaround Time (TAT) Schedule. In case of delays beyond the specified TAT, penalties will be imposed. The contractor is also responsible for the receipt and transportation of free-issue materials from IGL stores to the contractor's storage facility, ensuring proper stacking, storage, and security. All materials must be stored in a location near the allocated C/R. Storage must be arranged to prevent damage from scratching, indentation, excessive heat, or exposure to sharp objects or chemicals.
Upon receiving a customer service request, the contractor must initiate a pre-call/sms to verify the correctness of the request or complaint. A customer appointment should be scheduled, followed by a detailed site survey of the house. During this survey, the contractor should brief the customer about the scope of work. A survey checklist must be completed by the supervisor to determine work permit applicability and cost estimation before starting the work. The printing of GIRM/job sheets falls under the contractor's scope.

The contractor must ensure proper manpower selection, material preparation, and tool readiness for the assigned work. A designated and qualified team, carrying valid STC cards, must arrive at the customer's location on time with all necessary materials, tools, and PPEs, along with the required Job Card (GIRM Sheet).

Before commencing work, the team must inspect and address any hazards (electrical, civil, etc.) in consultation with the customer. This includes ensuring that no electrical wires come in contact with GI/CU installations inside the kitchen and that the work area is free from oil spills or any other risks. Work must not begin if any hazard poses a risk to the team. In such cases, the customer must coordinate with the relevant utility or service provider to resolve the hazard. If necessary, work must proceed under the Permit to Work system, considering the nature of the hazard.

Upon completion, the team must perform a leakage test on the installed piping, rectify any detected leaks, and verify system integrity. The customer should then be provided with safety instructions, pasting meter stickers including information on safety valves and emergency contact numbers.

The contractor must ensure that the GIRM and customer feedback form are filled out and signed by the customer. If a work permit was issued, it must be properly closed, and the permit number must be recorded on the GIRM. The request should then be closed in SAP/CRM with all relevant details. The contractor is also responsible for feedback calls, documenting customer responses, and obtaining the happy code from the customer. Any grievance attributable to the vendor or their representatives must be resolved at the vendor’s risk and cost.

If required, the contractor must ensure that their manpower is equipped with smartphones or tablets and is trained to digitally fill GIRM details for efficiency and record-keeping.

General Instructions:

1. All activities must be carried in accordance with work permit system, PPEs and Standard Operating Procedures of IGL
2. Tools, and tackles used by vendor must be of reputed make complying with safety and manufacturing standards.
3. Squeezers with Stoppers must be used for squeezing of MDPE line.
4. Material reconciliation details to be maintained for both Free issue material and Material removed from sites and shall be submitted with each RA bills.

Note:

Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/ safety/ statutory/ maintenance of the works shall also be covered under the Scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner.

STANDARD SPECIFICATION - GI/COPPER- O&M WORKS IN LOW RISE AND HIGH RISE DOMESTIC CONNECTIONS

CONTENTS

1.0 DEFINITIONS

OWNER	Indraprastha Gas limited (IGL)
SS	Present <<Standard Specification>> and its entire appendix, if any
TPIA by IGL	Third Party Inspection Agency to be appointed Indraprastha Gas Limited
EIC	Engineer-in-charge
LOW RISE BUILDING	The Building have G+3 Floors are considered as Low Rise.
HIGH RISE BUILDING	The Building have G+13 and above Floors are considered as High Rise.
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
REGULATOR PIECE	The GI pipe from transition fittings to Regulator

2.0 GENERAL SCOPE OF WORK

Generally, the following shall constitute the Contractor's scope of work but not limited to:

- Plan and prepare a schedule for execution and work implementation as per QA/QC plans to be issued by Owner/Owner's representative. Contractor has to submit the Construction/Execution procedures before commencement of work to Owner / Owner's representative for approval.
- Receipt of regulators, domestic meters, Isolation and Appliance Valve as a free issue items from Owner's stores, loading, transportation, unloads at O&M site. Proper storing, stacking, identification, providing security and insurance during and before installation and commissioning of pipelines. Obtaining the approval for optimum route and permission for work from the concerned authority and EIC.
- Selection of route with the TPI/Owner representative 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.
- Contractor shall procure all material except free issue items for installation at the outlet of PE/ GI transition fitting up to the Domestic customers "Appliance /stove / oven for satisfactory completion to the owner/owner's representative.
- **Low Rise Connections:**
- Supply and Installation for Maintenance of GI pipes of ½", ¾", 1", 1-1/2" & above dia. anywhere between transition fittings to customer's kitchen appliances including NPT threading of GI pipes, supply of proper seal outs for threads, to join fittings such as elbows, tees, connectors, unions, plugs, sockets, regulators, meters, appliance & isolation valves etc., as per laid procedures and specification including clamping and sealing etc.
- The GI pipe shall be painted after the testing of the GI installation/re-installation

- Supply & Installation of Copper pipes including supply of lead free solder wire and flux to join fittings including supply of fittings such as elbows, tees, connectors, meters, valves etc., complete as per procedures and specifications including clamping and sealing etc.
- Supply of clamps for fixing pipes, Meters wherever required, painting of pipes and 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. shall be completed as per specification.
- **High Rise Connections:**
- Supply and Installation for Maintenance of GI pipes of ½", ¾", 1" , 1-1/2" & above dia. anywhere between transition fittings to customer's kitchen appliances including welding, NPT threading of GI pipes, supply of proper seal outs for threads, to join fittings such as elbows, tees, connectors, unions, plugs, sockets, regulators, meters, appliance & isolation valves etc., as per laid procedures and specification including clamping and sealing etc. Procurement of GI Pipes (heavy duty) as per IS-1239 Part-I duly powder coated & wrought steel fittings (forged fittings) conforming to IS-1239 Part-II from any of the approved vendors of IGL. The GI pipe shall be painted after the testing of the GI installation.
- Scheduling, planning of material & forwarding inspection call, Getting Dispatch clearance from IGL/PMC, Handling, loading, transportation and unloading of these materials at contractor's store / site.
- Preparation and approval of sketches, schedules, execution procedures & WPS as per technical specification. All consumables e.g. electrodes, flux etc. for welding pipes and fittings are under contractor's scope. Finalizing optimum route in consent to IGL
- representative from transition fitting to last floor of building including lateral piece with isolation valve as per Drawing.
- Erection, Fabrication, Socket Welding, Testing & Installation of welded GI Pipes & Fittings etc., including NPT threading as per technical specification.
- Supply & fixing of MS angle clamps, Ceiling clamps & dowel plugs with screws, grout material, suitable thread sealant i.e. Teflon Tape / lock tight, Supply and fixing of studs & bolts of various sizes ranging from 1/2" to 2", Jointing of transition fittings to above ground GI pipes, purging, testing and commissioning of the complete installation.

- Welded riser shall be installed after successful testing at ground level. Pneumatic testing shall be carried out for entire riser length after installation of riser as per technical specification. All the safety equipment's, tools and tackles required for satisfactory execution of welding/installation work are under contractor's scope.
- Any other material & activities not mentioned/covered above, but otherwise required for satisfactory completion/safety of work as defined in tender has to be supplied / done by contractor within specified schedule at no extra cost to owner
- Carry out removal & dismantling of all sizes of GI/ Copper of pipes on customer's /IGL request.
- To maintain material inventory, emergency tools and tackles for attending all type of complaints.
- To demonstrate the Customer regarding use, safety and maintenance related aspects of NG based appliances and installations.
- Cleaning, flushing, pneumatic testing and re-commissioning of GI/Cu pipe & fittings, meters, valves etc as per specification and hand over the same to Owner/Customer to the entire satisfaction of EIC/Control room In-charge.
- Dismantling of scaffolding/temporary structures and cleaning of site & restore the site as per its original condition.
- Restoration of walls, flooring and other damages while executing the above ground installation.
- STC training of all personnel is compulsory and cost of same (INR 500.00 per person) shall be borne by contractors. Training shall be arranged by client.
- Contractor shall store "Dismantled Material" in his Store/custody. Such material kept at contractor's store shall be verified, reconciled and returned to IGL on half yearly basis or as per requirement of IGL.
- Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works in existing gas charged areas 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.
- Contractor shall be responsible for any misconduct/unethical activities of his personnel if reported by customer and a penalty will be levied on contractor as per SCC of Contract. Contract may also be terminated at the sole discretion of EIC

- **Field mobility solution** shall be in Contractor's scope, i.e. providing mobile tablets (Android Smartphone) with internet facility to each team working at site to close the complaints in IGL Portal through an application which will be provided by IGL.

  Android Tablet Specs:

  Minimum 8 GB RAM of Higher.

  Minimum 8-inch LCD/LED Screen or Higher.

  Android Version 15.0 and above.

  4G & 5G connectivity, minimum 256 GB UFS storage, of reputed brands(Samsung, Oneplus, Lenovo etc. GPS Chip (for Location Tracking) with A-GPS (for accuracy during absence of internet).

  Latest Qualcomm snapdragon processor (4nm or lower). 50MP+ Back Camera.

  Minimum 12MP Dual Camera.

  Minimum 10000+ mAh LI-on battery with fast charging.

3.0 MATERIAL, MANPOWER EQUIPMENT AND MACHINERY

3.1 Material to be supplied as a free issue material

Domestic meter, Regulator, Isolation and Appliance valve shall be supplied as a free issue material to the contractor. The contractor shall not use any other material from any other source of supply other than owner's supplied material without any written approval from EIC.

3.2 Material/Equipment & machinery to be supplied by contractor

Contractor shall procure/ purchase Powder coated GI Pipe & fittings, Powder coated Wrought Steel Fittings (Forged Fittings),Brass fittings, Cu pipe & Reinforced rubber hose with other material which is required to satisfactory completion/safety/statutory of the works as per tender at no extra cost to Owner. The IGL logo shall be marked on the material supplied by contractor. The contractor shall take approval from owner/owner representative for marking on the material to be procured by contractor before placement of order.

The Contractor shall provide labour, tools (such as Hammer Drill, Piston Drill, Pipe Cutters, Dies for threading, Pipe wrenches, spanners, conversion kits, solder torch, copper tube Cutters, tube benders, lacquering, thinner etc.) in specified numbers, all types of clamps, Plant and equipment necessary for the proper execution of the work. This will include but not limited to list of specialized tools and tackles indicated in Annexure #1.

On monthly basis, contractor has to get their equipment's, machines and tools checked & verified by respective IGL's C/R In-Charges which shall be submitted along with RA bills for records. In case of non-availability of minimum equipment, machinery & tools, applicable penalties shall be levied from the running bills as mentioned in SCC of commercial tender.

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.)

The contractor has to ensure the availability of DG sets for continuous power supply. In case the power supply is availed at the site from societies, individual residents, contractor shall settle the claims raised by the electricity providers without any 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 purchase minimum 2 sets of Die of ½" & ¾" and 1 set of 1" & above dia. and submit the certificate for Die sets confirming to NPT thread and calibration certificate for Pressure gauges.

Contractor shall submit the specification of all the material to be supplied by him to EIC for approval before commencing the execution. No hiring of equipment's, tools and tackles by the contractor is allowed at the site. In case, contractor is found not in possession of enlisted required tools and tackles, penalty shall be levied as per Special Conditions of Contract and will be deducted from the contractors running bills.

3.3 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.

- **Clamps, Rawal Plugs, Screws and etc.**

The Clamps, Brackets for meter, Rawal Plugs, SS-304 Screws (2" length), Nozzles, etc. shall be verified by TPI Lot wise. Re-drilling of existing appliance (burners) nozzles is strictly not permitted. The quality of materials procured will be got Checked and verified by TPIA.

The indicative sketch of the Brackets for Meter, and GI/Copper Pipe Clamps is enclosed with the tender.

- **Consumable Items**

  - Special Consumables such as electrodes, Teflon Tapes, solder wire, flux, lacquer, thinner shall be supplied by the contractor and are included in installation rates.
  - These consumables shall be of reputed make companies and required grades/ class.

- **Other Materials**

  The contractor shall supply the following items where required:

  I. All materials required for work, NPT threading, copper pipe jointing, testing etc.

  II. All signs, barricades, lights and protective equipment.

  III. All material required for working at higher floor levels (i.e., scaffolding, Ladder, Safety Belts, Self-Locking Safety Harness Belts etc.).

  IV. Special consumable such as grease for maintenance of domestic appliances, all paints for painting of GI Pipes, Consumables such as Teflon Tapes, Solder-wire, Flux, Lacquer, Thinner, Petrol, Diesel, Fuels and Oils required are to be supplied by the contractor and are included for within the rates.

  V. All minor items not expressly mentioned in the contract but which are necessary for the satisfactory completion and performance of the work under this contract.

- **Acquisition, Receipt and Storage of Materials**

  The Contractor shall collect Domestic meter, Regulators, Isolation and Appliance Valve from Owner's designated stores in between the hours to be advised by the EIC.

  The contractor shall carry out assessment of material required for GI/Copper installation in allocated area. Contractor has to maintain minimum inventory level at their respective control rooms. After approval from Owner, contractor shall place order for procurement of GI Pipes & fittings, Copper pipes & fittings, Brass Fittings and Reinforced Rubber Hose (Technical specifications attached in the tender document) to any of approved vendors as per the list attached in the tender document. The contractor shall also ensure that the QAP for these materials shall be approved by IGL/PMC before the start of production activity. Once QAP is approved, contractor shall forward inspection call to the Owner depending upon the material requirement at the site. The inspection of these materials shall be carried out by Owner appointed third party agency. It is contractor's responsibility for document submission, arranging dispatch clearance, handling, loading, transportation and unloading of these materials 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 IGL. The Contractor shall carry free issue material in such a manner as to preclude damage during transportation and handling.

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 Control room in-charge/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 IGL store, if found in non-working condition at site shall be brought to the notice of EIC with PO reference in written within 15 days and after subsequent approval shall return defective material in IGL stores within 30 days.

If delay is more than 30 days 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 shall be levied as per SCC. 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 locked store and proper office set up as defined in bid document preferably near allotted central C/R so that all the materials are stored in such a manner so as to prevent any damage to the materials from scratching, gouging, indentation, excessive heat 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. The contractor shall make adequate security arrangements for the stacked material & any loss to the material on account of theft or improper storage is attributable to the contractor.

The Contractor shall maintain log book at their respective stores stating issue and availability of free issue material at a given day. Further, it is mandatory that the contractor is required to undertake and submit inventory details of free issue and purchased materials on quarterly basis to Owner/ Owner's representative as per the approved format of the owner.

In case of non-submission of material reconciliation in first week of every quarter, applicable penalties shall be levied as per SCC from the running bills. In case if shortage in free issue material is observed at the time of quarterly physical reconciliation / verification by IGL, equivalent value of material found short shall be withheld from running bills, Same shall be released after settlement of free issue material.

On quarterly basis, contractor has to get their material reconciliation sheet checked and verified by respective C/R In-Charges/representatives and shall be submitted along with RA bills for records. Consumption of Free issue material must be booked before processing the RA bills and copy of SAP generated print out shall be attached along with each running bill.

4.0 ISSUE OF WORK INSTRUCTIONS

- The contractor will be required to carry out GI installation as per instructions of EIC.

- These Skilled technicians shall be only authorized to take up respective jobs In case it is found that contractor personnel other than skilled technicians are carrying out these works, applicable penalty will be levied to the contractor as per contract.

- The rates to be quoted by contractor shall be inclusive of all preparatory/bye works, platform materials, labour, 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.

- The schedule of items of GI/Cu/MLC installations have been described in brief and shall be held to be completed in all respect including safety requirements as per Standard Specification 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.

- In case of any unwarranted extra works carried out in any zone and other than SOR, necessary approvals shall be taken by EIC with the management.

5.0 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. Weekly progress reports shall be submitted in the formats approved by Owner, indicating broadly the laying, testing, RFC, conversions and extra piping.

6.0 WORK SHEETS

- The quantities of GI/Cu pipe installed for modifications and other repair maintenance job will be checked by Owner's site engineer and the same shall be incorporated in Modifications & repair maintenance cards, customer call sheets, signed & dated as certified, on site. The cards will then be approved by the EIC. The contractor shall collect the existing company policy documents against Repair and Maintenance work from Owner to keep updated from time to time.
- Measurement sheets/Documents shall be prepared based on the Modifications & repair maintenance cards and checked and certified by the site engineers and customer where as required for billing purpose.
- If measurement sheets submitted are illegible, incomplete or incorrectly booked they will be returned to the contractor.

7.0 PERMISSIONS / APPROVALS

- Contractor shall be responsible for obtaining permissions from society management, RWA, 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.
- The contractor shall work in close consultation/coordination with the ElC.
- The contractor shall not sign/execute any agreement and/or undertaking on any such documents which amounts to be under taken by Owner. The same shall only be signed and executed by Owner; however, the contractor shall also liaison and coordinates for the same.
- 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.
- 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. PMC/ElC 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.
- The contractor is also required to obtain a "Labour License" from the Assistant Labour Commissioner of respective Administration/Central Govt.
- It will be the contractor's responsibility to familiarize himself and comply with, any other local rules, regulations or statutory requirements applicable to the work.
- The contractor has to take responsibility of the action of supervisors, plumbers and helpers provided by him.

8.0 REFERENCE SPECIFICATION, CODES AND STANDARDS

The contractor shall carry out the work in accordance with this specification, Owner's Engineering Standards: ASME B31.8 - Gas Transmission and Distribution Piping Systems; Oil Indian Safety Directorate Norms (OISD), the American Gas Association Document - Purging Principles and Practice and PNGRB Guidelines.

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 Engineer -in-Charge (EIC) for his decision, which shall be considered binding on the contractor.

9.0 SAFETY

The contractor shall take care of all safety norms applicable for such works at site. Contractor shall provide all safety appliances e.g., uniforms, safety helmets, gloves, safety belts, ladders, staging, shoes, goggles, self-locking safety harness belts etc.

All necessary care shall be taken while deploying personnel for working 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, contractor is found not following the safety guidelines as per attached HSE procedure, penalty shall be levied as per Special conditions of Contract. No night working shall be permitted, without proper lighting and prior approval of EIC.

Refer "Special Terms and conditions of Contract" and attached Technical specifications.

10.0 RIGHT-OF-USE SERVEY AND MARKING

The route of the pipeline to be installed shall be decided with consent of the consumer and Site Engineer. Contractor must ensure that the persons/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/Consultant and the contractor at each premises or housing colony to be supplied with gas 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, if necessary.

The contractor will be responsible for contacting the Customer and making the necessary arrangements for access and appointments to carry out the work. 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 outside ROU.

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 to protect the public.

11.0 PROTECTION OF STRUCTURES AND UTILITIES

The contractor shall at his own cost, support and protect all buildings, walls, fences or other structures and all utilities and property which may, unless so protected, be damaged as a result of the execution of the works. He shall also comply with the requirements in the specification relating to protective measures applicable to particular operations or kind of work.

While painting, contractor must take care of the consumer premises while carrying out the job such as spillage on floor, walls, ceilings, sun shades etc. If the same does occur, the contractor has to immediately make things to original.

12.0 GI AND COPPER PIPE ABOVE GROUND SERVICE PIPE

● Definitions:

a. High Rise Buildings – A building having fourteen or more storey's above ground level. (i.e. of G + 14 orientation)

b. Riser - A riser is the vertical section of a service pipe laid up a building which supplies a number of laterals.

c. Lateral-A lateral is a horizontal off-take from a riser, which supplies a single customer/dwelling.

d. Service Regulator (SR) – Service Regulator is a regulator installed on a gas service line to control the pressure from 4 bar to100 mbar that, in an emergency automatically assumes control of the pressure downstream of the station, in case that pressure exceeds a set maximum.

e. Meter Regulator (MR) – Meter regulator is a pressure regulator installed in series with another pressure regulator which reduces the pressure from 100 mbar to 21mbar.

f. Riser Isolation Valve (RIV) - Riser Isolation valve is fitted at the bottom of the riser to isolate the riser from the underground gas supply network.

g. Lateral Isolation Valve (LIV) – Lateral Isolation Valve is fitted on horizontal riser (lateral) after TEE to facilitate online Tappings and other maintenance works.

h. Meter Control Valve (MCV) - A Meter Control Valve is fitted immediately upstream of the meter to enable the internal pipe work inside the property to be isolated from the upstream gas supply network. It must be fitted in a manner that the consumer can easily operate the valve handle.

- **Specification for Welding**

The requirements stated herein shall be followed for the fabrication of fillet type of welded joints of GI (IS 1239 heavy class) piping systems connected with pipe line and related facilities.

The welded pipe joints shall include the followings:

a. All line pipe joints of the Circumferential fillet welded type

b. Attachments of fitting and other supports pipes

- **Welding Consumables:**

The Welding electrodes shall confirm to the class AWS E 6013. All electrodes shall be purchased in sealed containers stored properly to prevent deterioration. The electrodes shall be handled with care to avoid damage.

Welding Process:

Welding of GI material under this specification shall be carried out using Shielded Metal Arc Welding Process (SMAW).

Welding

Root pass and final pass shall be done with 2.5 mm dia. Electrode. Welding to be carried out in line with PQR / WPS approved by IGL/PMC. Welding to be done by qualified welders only.

13.0 PREVENTIVE MAINTENANCE OF GI RISERS AND DOMESTIC CONNECTIONS

On allotment of work, Contractor shall visit the site and prepare plans for execution of the work. Only after written confirmation from C/r in charges and issue of written Permits, shall start with the allotted work.

Contractor shall deploy manpower after assessing the work load along with required tools and tackles to carry out work as per customer requirement and in accordance with technical specifications. All type of work shall be prioritized for attending.

Contractor has to supply different types/sizes of approved powder coated clamps (Mild Steel) for fixing GI pipes, Meter Brackets, consumables suiting to the site conditions. The contractor shall get approval from EIC for every fresh lot of the clamps, brackets and other consumables, prior to start of maintenance of GI Risers and Domestic Connections work. The contractor shall ensure that all reusable pipes and fittings and specially meter and regulators shall be stored properly with both ports sealed and if required shall be packed in a box so as to avoid dust etc. All such material (considered as free issue at the time of reconciliation), received by contractor on dismantling any domestic, shall be first verified and certified from Control Room In-charge and then kept at contractor's store for future usage.

On reinstallation of GI/copper pipes & fittings in above mentioned dismantled cases, as per site requirement, contractor shall carry out modification primarily using old lot of GI/Cu pipes & Fittings dismantled from other houses, however shall supply his own procured fresh material for additional GI/Copper pipes & fittings for competing the installation.

The GI installation shall be clamped to the building at intervals not exceeding 1.5 mtrs. Maximum distance between clamps shall be 1.0 – 1.5 m when pipe goes to the straight, if any tee or fittings lies in between the pipe then clamp shall be placed 150 mm far away from centre line of fittings at every sides. However, the same may be changed as per site conditions/as directed by EIC. Minimum gap between pipe & wall shall be 25 mm. 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 then 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 is in contractor's scope. Contractor has to take prior approval for design/types of clamps, paintings etc. after drilling of holes, a PVC sleeve of suited size shall be placed in side hole before GI/Copper installation. The rates for installation of GI/Copper pipes includes supply of PVC on as and when requirement basis.

Pipe shall preferably be entered into building above ground and remain in a ventilated location. The location for entry shall be such that it can be easily routed to the usage points by the shortest practicable route.

For carrying out any modification or shifting work, the gas supply of existing customer tapped on the same riser or lateral shall be discontinued. Before stoppage of gas supply, the contractor has to take appointments & consents from existing customers for carrying out the work. Sometimes, modification work takes more than one day, the affected customer shall be pre-intimated to make separate arrangements due to non- availability of gas for a day. Contractor shall ensure to complete the work with in shut down time period.

On start of modification work, the source points of gas in a riser i.e. regulator shall be tripped and dismantled after closing brass isolation valves on upstream of regulator. Thereafter, a dead plug shall be tightened on open end of brass valves having 4 bar pressure. After completion of modification/shifting work, the reinstalled riser and lateral shall be tested as per client requirement. No pressure drop is allowed on testing of this installation and once the pneumatic testing is completed, the regulator shall be installed, reset for gas charging of riser till appliance. Removal of functional meter & its reinstallation with meter brackets is included in rates of modifications and shall not be charged in extra to owner.

On riser testing, the contractor shall plan, schedule, coordinate and take consent of gas users on that riser before carrying out shut down. Once contractor plans and gets clearance from customers, they shall carry out testing of the pipe installation with in the stipulated shut down time. All such testing work will involve closing/shutting of brass valves installed before meters of individual existing customer and subsequent removal of regulator from riser after closure of isolation valve installed on upstream of regulator. After taking shut down, the riser shall be tested. No pressure drop is allowed. In case of pressure drop, the contractor shall identify leakage point and repair/replace with new fittings or valves whichever is required within the shutdown period and again test the riser before it is cleared for gas charging.

In case where only pneumatic testing is carried out on commissioned GI/Copper riser and internal piping of a connection, the removal & reinstallation of GI pipes & Fittings, Copper Pipes & Fittings, regulator & meter in case of any leakage shall not be paid separately.

The consent format for riser testing and any planned shutdown of riser will be provided by Owner.

The contractor shall also ensure that gas supply shall not be provided to the customer in any Concealed Piping, meter installed in closed cabinet. During installation the Copper pipe is to be Cut to proper length with tube Cutter, the burrs removed with a file, cleaning of outside surface of pipe & inside surface of fitting, applying flux to the tube and fitting around the outer/inner ends, inserting the tube in to the fitting, applying heat to the assembled joints using conventional blow torch to melt solder wire. Contractor shall submit the joining procedure of Cu pipe & Fitting for approval from EIC. The jointing of copper pipes shall be carried out by approved plumbers only.

Contractor has to supply different types/sizes of approved clamps (PE 80/PVC) for fixing Copper pipes suiting to the site conditions Contractor has to take prior approval of EIC for quality of the clamps, solder wire, flux, lacquer, thinner etc. The approval shall be taken for every fresh lot of clamps from EIC before installation at site.

All copper piping shall be clamped to the building at intervals not exceeding 500 mm. The solder wire shall be of reputed company of diameter size 3.25mm, Lead free as per BS 29453:1994 (Soft solder alloys) and supplied in coils. Solders for use with copper tube & fittings generally melt within the temperature range 180°C - 250°C. The contractor has to furnish the certificate of confirmation of standards before start of work.

Contractor may also be instructed to replace GI/copper installation of existing gas user without any formal complaints by customer, however as a exercise to check and ensure that all installed PNG installations, Pipes, Fittings are in exposed condition and does not pose any threat of accidents, leakage or blast due to gas entrapment inside the closed cabinet or concealment of pipeline by customer inside kitchen i.e. below slab, etc. The rates for modifications in such cases are applicable as per respective SOR i.e. dismantling, reinstallation, modifications, meter installations/relocations etc. Any other activities not mentioned above, otherwise required to complete the job shall be executed by contractor without any cost implication to Owner.

The contractor shall supply the Calibrated Pressure Gauges / Manometer / Diaphragm Gauges of suitable range for testing of GI / Copper Installations ranging from 0-10, 0-4 bars/0-150 m bar/0-250 m bar respectively. The calibration certificate of pressure gauges shall be submitted before the start of the execution work. The pressure gauges shall be calibrated as desired by EIC but positively once in a Year. The details of testing shall be properly recorded in the Modification cards.

Riser And Laterals Fabrication, Installation And Testing: -

Heavy class Galvanized Iron (GI) pipes, conforming to IS 1239- Part 1 duly Polyester powder Coated with 70 microns thickness and Wrought Steel fittings(Forged fittings) conforming to IS-1239 Part 2 shall be used for welded riser.

Powder and Galvanized (Zinc) coating shall be removed by light duty grinder or by any other suitable tool at both ends of riser pipe at about 25mm in length where welding is to be performed.

Pipe and required fittings shall be first coupled with threaded (NPT) joints. The threaded joints to be made using male tapered thread and female parallel thread fittings.Teflon/PTFE Tape or any other joining compound shall not be used in threaded joints for welded riser. Alternatively plain ended pipes and fitting can also be used for welding in welded riser.

The entire riser assembly shall be fabricated with socket welds both for threaded riser assembly and plain ended pipes. Threaded joints are permitted after first isolation valve on laterals on account of workability and future maintenance considerations. The Welding electrodes shall confirm to the class AWS E 6013 of reputed make such as Lincoln, ESAB or equivalent.

Welding to be carried out in line with PQR / WPS approved by IGL/PMC. Welding to be done by qualified welders approved by IGL / PMC only.

A riser must not be constructed so that the laterals face directly into wall from the riser. All laterals must extend a minimum of 400 mm from the riser .

Ventilation is provided to prevent gas leaks from causing the atmosphere to become unsafe. Ventilation shall be natural. It is not permitted to use mechanical ventilation to achieve the required ventilation levels.

Special Safety Harness and Protective equipments of PETZL / equivalent make are mandatory for riser installation. Details would be as per approved Safety Job Procedure. Ensure that all equipments and safety devices used are inspected, certified by competent authority & valid & suitable for use.

Plumber deployed for riser installation for high rise buildings shall be certified and prequalified with medical tests as per Safety Job Procedure.

Meter & Meter Regulator Positions

Meters will normally be located inside the property at approachable location. The kitchen / utility balcony is the preferred place to install the meter – thereby minimizing the length of the outlet pipe work.

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. Meter Regulators will be installed as per enclosed drawing.

Only pretested riser shall be erected. Pretesting shall be done with compressed air at 2 bar (g) for minimum duration of 30 minutes.

Risers and laterals upto Isolation Valves shall be Leak tested with compressed air as per client requirement.

Once testing is satisfactorily completed, uncoated portion (weldment) of risers and laterals shall be painted as per painting procedure.

Installation of 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 super hold nylon anchor Rawl Plugs, SS 304/brass screws etc. In case the Rawl 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 & chimney vents. 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 above activities along with restoration of the area to original shall be carried out

to the complete satisfaction of consumer and EIC.

- **Laterals**

The lateral extending from the riser at right- angles must extend a minimum of 400mm from the riser before passing through a wall.

- **Ventilation**

Ventilation is provided to prevent gas leaks from causing the atmosphere to become unsafe. Ventilation shall be natural. It is not permitted to use mechanical ventilation to achieve the required ventilation levels.

- **Pipes Passing Through Walls**

Where risers or laterals pass through walls the following requirements must be

observed:

a. The pipe must be sleeved in a continuous non corrosive sleeve. Joints or any

other part of a joint shall not be enclosed within the sleeve.

Pre-sleeved wall pieces are the preferred method for passing through walls and

floors.

b. Pre-sleeved wall pieces are the preferred method for passing through walls and floors.

- **Painting of GI Pipes & GI Fittings**

Contractor shall install powder coated GI pipes & GI Fittings in consultation with EIC. Contractor shall submit detailed procedure of powder coating for approval to PMC prior to supply of GI pipes.

14.0 INSPECTION

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 making good any defects found during final inspection/guarantee period/defect liability period as defined in general condition of contract.

15.0 PURGING & COMMISSIONING

The rate for purging & commissioning shall be included in the GI/Cu/MLC installations.

Care shall be taken to ensure that the outlet is so located that vent gas cannot drift into buildings.

The commissioning of the Gl installation should be performed as follows:

- Ensure the method of purging is such that no pockets of air are left in any part of the Customer's
- piping.
- Ensure that all appliance connections are gas tight, all appliance gas valves are turned off and there are no open ends.
- Where possible, select an appliance with an open burner at which to commence the purge i.e., a hotplate burner.
- Ensure the area is well ventilated, and free from ignition sources.
- Ensure branches that do not have an appliance connected are fitted with a plug or cap.
- Turn on one burner control valve until the presence of gas is detected. A change in the audible tone and smell is a good indication that gas is at the burner. Let the gas flow for a few seconds longer, then turn off and allow sufficient time for any accumulated gas to disperse.
- Turn on one gas control valve again and keep a continuous flame at the burner until the gas is a light and the flame is stable.
- Continue to purge until gas is available at other appliances.

16.0 POWDER COATING / PAINTING OF GI PIPES

Powder Coating / Painting of GI Pipes

The entire lengths of the newly laid pipeline along with fittings are to be painted / powder coated after proper surface preparation as follows:

a) PAINTING (for scratched powder coated pipes, old laid GI pipe and fittings only):

- 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. (No other make shall be used for painting).

All painting materials including primers and thinners brought to site by contractor for application shall be procured directly from manufacturers/dealers as per specifications and shall be accompanied by manufacturer's test certificates. Paint formulations without certificates are not acceptable. The contractor shall ensure that smooth finish is attained after carrying out painting.

Engineer-in-Charge at his discretion may call for test for paint formulations. Contractor shall arrange to have such tests performed including batch wise test of wet paints for physical and chemical analysis. All costs there shall be borne by the contractor. The painting work shall be subject to inspection and certification by Engineer-in-Charge at all times.

b) POWDER COATING (REFER ATTACHED PTS FOR POWDER COATING)

Contractor will be required to install Powder Coated GI Pipes and shall submit detailed procedure of powder coating for approval to CONSULTANT prior to supply of powder coated GI pipes. After installation of the entire piping system, final touching with paint shall be done to the satisfaction of EIC.

17.0 SUBMISSION OF FINAL RECORDS

Contractor shall submit three sets each of the following documents in hard & soft copy:

- Total list of houses & commercial establishments in the area allotted to him giving details of modifications/connections provided & reasons where connection could not be given / completed.
- The details recorded in Modifications cards of every domestic house.
- Details of houses where piping done along with materials used.
- Total material consumption report.
- Material reconciliation with respect to the materials issued.
- Test reports & calibration certificates of gauges etc.
- Customer call sheet.
- GIRM
- Any other documents/records required.

18.0 Compliance to Health, Safety & Environment (HSE) High Rise:

Scope includes use of fall arrestor, Ascenders / descended, PPE, Barricades/ Warning Boards (03 No's) connected with warning board/Caution tapes (Refer drawing no. 15792-10-03-26 & 15792-10-03-32) in areas where piping work is in progress, Use of Safety shoes, Wacky talky, Hand gloves, Reflective jackets, Hard hats (helmets), eye and ear safety equipment, Fire extinguishers and as per the detailed scope of work in tender specifications. Contractor shall also prepare and submit duly certified Safety check list signed by TPIA/PMC. In case of non-compliance, penalty shall be applicable as per SCC clause.

This set-up is applicable for more than 5th (G+5) and above including high rise. Above 4th floor full body safety harness & accessories of PETZL make is compulsory

STANDARD SPECIFICATION - GI PIPES

CONTENTS

1.0 INTRODUCTION AND SCOPE

INDRAPRASTHA GAS LTD. (IGL) plans to augment PNG network. It supplies natural gas to domestic & commercial consumers in the city of NCT Delhi, Uttar Pradesh, Haryana & Rajasthan GA.

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) shall be valid.

2.0 DEFINITIONS

Owner	Shall mean Indraprastha Gas Ltd. (IGL).
Manufacturer	Means the Manufacturer of the GI pipe.
SS	Means the present <<Standard Specification>> and all its appendix, if any.
Third Party Inspection Agency	Means the Inspection Agency to be appointed by IGL.
GTS	Means the present <<General Technical Specification>> and its entire appendix, if any.

3.0 MATERIAL

The material used for the manufacturing of GI pipes confirming to IS 1239 (Part -1): 2004 (Latest edition).

4.0 DIMENSIONS, THICKNESS & DIMENSIONALTOLERANCES

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 6 mtrs with + 6, - 0 mm tolerance. However, pipe length shall be considered 6 m. only for measurement / payment purpose.

Nominal Diameter DN	15 mm	20 mm
Grade	Heavy	Heavy
Outer Dia. (Max. / Min.)	21.8 mm / 21.0 mm	27.3 mm / 26.5 mm
Thickness (mm)	3.2	3.2
Nominal weight (Kg / m)	1.44	1.87

5.0 END CONNECTION OF PIPE

GI Pipes shall be supplied with plain end.

6.0 FREEDOM FROM DEFECTS

On visual examination the outside & inside surfaces of pipes shall be smooth & free from defects such as cracks etc.

7.0 GALVANIZING

- Pipes shall be galvanized to meet the requirement of IS: 4736 – 1986 with latest amendment.
- Zinc conforming to any grade specified in IS: 13229- 1991 with latest amendment shall be used for the purpose of galvanizing.
- Galvanizing bath: The molten metal in the galvanizing bath shall contain not less than 98.5% by mass of zinc.
- Mass of zinc coating: Minimum mass of zinc coating determined as per IS: 6745 shall be 360gms/m^2.
- 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.
- 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.
- **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.
  b) The sample selected according to Clause 6.1 & 6.2 of IS: 4736 – latest edition.
  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.
  d) Criteria for conformity: As per IS: 4736 – 1986 with latest amendment

8.0 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-1) – latest edition.

9.0 MARKING

Each pipe shall be embossed with IGL'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.

- Manufacturers name or trademark.
- Class of pipe –Heavy.
- Indian standard mark (ISI).
- Lot number / Batch no. of production.

Each pipe conforming to this standard shall also be marked with BIS standard mark.

10.0 INSPECTION / DOCUMENTS

Inspection shall be carried out as per Owner Technical Specification.

Owner Representative or Third Party Inspection Agency appointed by Owner shall carry out stage wise inspection during manufacturing / final inspection.

The manufacturer shall have a valid licence to use ISI monogram for manufacturing of pipe in accordance with the requirement of IS: 1239.

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.

For any control, test or examination required under the supervision of TPIA/Owner/Owner's representative, latter shall be informed in writing one (1) week in advance by vendor about inspection date and place along with production schedule.

Even after third party inspection, Owner reserves the right to select a sample of pipes randomly from each manufacturing batch & have these independently tested. Should the results of these tests fall outside the limits specified in Owner technical specification, then Owner reserves the right to reject all production supplied from the batch.

11.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Bidder shall submit the packaging details during QAP and also complied with at the time of delivery.

STANDARD SPECIFICATION -GI FITTINGS

CONTENTS

1.0 SCOPE

INDRAPRASTHA GAS LTD. (IGL) plans to augment PNG network. It supplies natural gas to domestic & commercial consumers in the city of NCT Delhi, Uttar Pradesh, Haryana & Rajasthan GA.

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 1879 – latest edition shall be valid.

2.0 DEFINATIONS

Owner	Shall mean Indraprastha Gas Ltd. (IGL).
Manufacturer	Means the Manufacturer of the GI fittings.
SS	Means the present <<Standard Specification>>and its appendix, if any.
Third Party Inspection Agency	Means the Inspection Agency to be appointed by IGL.

3.0 MATERIAL

The material used for the manufacturing of GI fittings shall conform to ISI 14329 – 1995 with latest amendments Grade BM 300.

4.0 DIMENSIONS THICKNESS & DIMENSIONAL TOLERANCES

- Dimensions of various types of fittings shall be as specified in sections 2 to 10 of IS 1879 – 1987 with latest amendments, as applicable.
- Wall thickness of fittings and tolerances on them shall be as given in Table 1.2 of S 1879 – 1987 with latest amendments,
- In case of reducing fittings, the dimensions at each outlet shall be those appropriate to the nominal size of the outlet.
- Elbows, Tees, Sockets and caps shall be of reinforced type.

5.0 WEIGHT

Weights of various types of fittings shall be as specified in sections 2 to 10 of S 1879 – 1987 with latest amendments, as applicable.

6.0 THREADS

- Threads shall be NPT type and conforming to ASME B1.20.1.
- Outlets of fittings shall be threaded to dimensions & the tolerances as specified in ASME B1.20.1.
- All internal & external threads shall be tapered.
- For checking conformity of threads gauging practice in accordance with ASME B1.20.1shall be followed.
- Chamfering: The outlet of fittings shall have chamfer.

7.0 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.

8.0 GALVANIZING

- Fittings shall be galvanized to meet the requirement of IS: 4759–1996with latest amendments.
- Zinc conforming to any grade specified in IS: 13229-1991 with latest amendments shall be used for the purpose of galvanizing.
- Galvanizing bath: The molten metal in the galvanizing bath shall contain not less than 98.5% by mass of zinc.
- Coating requirements: Mass of coating shall be 610 - 700gms/m2.
- 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.
- 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.

    d. Criteria for conformity: As per Clause 8.3 of IS: 4759-latestedition.

    e. Test procedure shall be as per Clause 9 of IS: 4759-latestedition.

9.0 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.

10.0 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.

11.0 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, dimensional & pressure test. Vendor shall furnish Internal test certificates at the time of final inspection to the Owner.

12.0 MARKING

Each fitting shall be embossed/Laser printed with IGL's logo, manufacturer's name or trademark and the size designation.

Each packing containing fittings shall carry the following embossed/Laser printed, stamped or written by indelible ink.

- Manufacturer's name or trademark.
- Designation of fittings.
- Lot number.

Each fitting conforming to this standard shall also be marked with BIS standard mark.

13.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Packing size shall be approved by owner / owner's representative before packing the material. The vendor shall submit the packaging details during QAP and also complied with at the time of delivery.

14.0 INSPECTION / DOCUMENTS

- Inspection shall be carried out as per Owner Technical Specification.
- Owner Representative or Third Party Inspection Agency appointed by Owner shall carry out stage wise inspection during manufacturing / final inspection.
- 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 Tech Spec. & specified code for 100% material, at the time of final inspection of each supply lot of material.

STANDARD SPECIFICATION - COPPER TUBE

CONTENTS

1.0 SCOPE

This specification covers the requirements for 12 mm OD X 0.6 mm wall thickness Copper tube, Half Hard. Unless modified by this specification, requirement of BS EN 1057 (latest), Half Hard, shall be valid, with the recommended changes in physical properties to suit wrinkle free bend ability.

2.0 MATERIAL

The material used for the manufacturer of Copper tube shall confirm to BS EN 1057(latest), Grade Cu - DHP or CW024A.

- **Mechanical Properties**:

  a. Ultimate Tensile Strength–235 N/sq.mm(min)

  b. Elongation – 30% (min)

  c. Hardness - 53 to 80 on HV scale.

- **Chemical Properties:**

  In Each heat one no. of the copper tube will be tested for chemical properties to confirm to non-arsenical Cu - DHP / CW024A as per BS EN 1057 to have the following chemical composition:

Copper Percentage including silver	: Min 99.9%
Phosphorus Percentage	: 0.015 to 0.040%

3.0 DIMENSIONAL TOLERANCES

The mean outside Diameter of the tube shall not vary from the specified outside diameter by more than the amount of tolerances specified in table 4 of BS EN 1057. The tolerance on the wall thickness shall be as specified in table 5 of BS EN 1057.

The length of the tube shall be 3 m. Allowable tolerance shall be (-0, +0.5 mm).

4.0 MANUFACTURE

The tubes shall be solid drawn by the process of melting, extrusion and thereafter Bright annealing. The ends shall be cut clean & square with the axis of the tube in no case shall tubes be redrawn from old or used tubes.

5.0 FREEDOM FROM DEFECTS

- The tubes shall be free from internal & external fins, flaws, skin defects, blow holes etc. or other irregularities which might restrict the free flow of fluid and shall be so designed that resistance to the flow of fluid through the tubes is minimized.
- All tubes will be supplied 100% Eddy Current tested as per ASTM E243 and BS EN 1057.Eddy Current testing is a computer aided test, wherein the tube passes through a probe & an electromagnetic field is created around the peripheral of the tube to detect any flaw or blow hole which may not be visible to the naked eye. The manufacturer must have in-house Eddy Current testing facilities to supply to IGL. IGL reserves the right to witness the Eddy Current facility at the manufacturer's factory premises.

6.0 HYDROSTATIC TEST

Hydrostatic test shall be carried out minimum 35 bar pressure for a period of 10 second as per EN 1057 (latest).

7.0 DRIFT EXPANDING TEST

Drift expanding test shall be carried out as per EN 1057. The O.D. of the tube end shall be expanded by 30% using a conical mandrel (at angle 45º) with no wrinkles, cracks, break or any form of defect should occur on the tube during & after the test.

8.0 CARBON FILM TEST

Copper tubes to be tested for carbon film test & the manufacturer will certify that the tubes meet the requirement of clause 8.5 of BS EN 1057.

9.0 CARBON CONTENT TEST

Copper tubes to be tested for carbon content test to ensure a carbon level to avoid the formation of carbon film during installation. Max. Carbon level shall be permitted as per clause 6.5 of BS EN1057.

10.0 MARKING

Each tube shall be permanently marked every meter with IGL's Logo, manufactures name & size and specification of the tube.

Each packing containing tubes shall carry the following, stamped or written in indelible ink.

- Manufacturers name or trademark
- Designation of tubes (OD x wall thk)
- Lot number.
- No. of the standard (EN1057)

11.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Packing size shall be approved by owner / owner's representative before packing the material. The vendor shall submit the packaging details during QAP and also complied with at the time of delivery.

12.0 INSPECTION/ DOCUMENTS

- Inspection shall be carried out as per IGL Technical Specifications, relevant codes/standard and Inspection Plan/ QAP. Vendor to prepare detailed QAP and submit the same for approval of IGL / IGL's Authorized Representative.
- IGL representative or third party inspection agency appointed by IGL shall carry out stage wise inspection during manufacturing/ final inspection.

- 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 IGL Technical Specification and specified code for 100% material, at the time of final inspection of each supply lot of material.

- Even after third party inspection, IGL reserves the right to select a sample of tube randomly from each manufacturing batch and have these independently tested. Should the results of these tests fall outside the limits specified in IGL Technical specification, then IGL reserves the rights to reject all production supplied from the batch.

- For any control test or examination required under the supervision of TPIA/owner/owner's representative, latter shall be informed in writing one (1) week in advance by vendor about inspection date & place along with production schedule.

STANDARD SPECIFICATION - COPPER FITTINGS

CONTENTS

1.0 SCOPE

This specification covers the requirements for 12 mm OD X 0.6 mm wall thickness Copper tube, Half Hard. Unless modified by this specification, requirement of BS EN 1057 (latest), Half Hard, shall be valid, with the recommended changes in physical properties to suit wrinkle free bend ability.

2.0 MATERIAL

The material used for the manufacturer of Copper tube shall confirm to BS EN 1057(latest), Grade Cu - DHP or CW024A.

- **Mechanical Properties:**

  a. Ultimate Tensile Strength–250N/sq.mm(min)

  b. Elongation – 30% (min)

  c. Hardness - 75 to 100 on HV scale.

- **Chemical Properties:**

  In Each heat one no. of the copper tube will be tested for chemical properties to confirm to non-arsenical Cu - DHP / CW024A as per BS EN 1057 to have the following chemical composition:

Copper Percentage including silver	: Min 99.9%
Phosphorus Percentage	: 0.015 to 0.040%

3.0 DIMENSIONAL TOLERANCES

The mean outside Diameter of the tube shall not vary from the specified outside diameter by more than the amount of tolerances specified in table 4 of BS EN 1057. The tolerance on the wall thickness shall be as specified in table 5 of BS EN 1057.

The length of the tube shall be 3 m. Allowable tolerance shall be (-0, +0.5 mm).

4.0 MANUFACTURE

The tubes shall be solid drawn by the process of melting, extrusion and thereafter Bright annealing. The ends shall be cut clean & square with the axis of the tube in no case shall tubes be redrawn from old or used tubes.

5.0 FREEDOM FROM DEFECTS

- The tubes shall be free from internal & external fins, flaws, skin defects, blow holes etc. or other irregularities which might restrict the free flow of fluid and shall be so designed that resistance to the flow of fluid through the tubes is minimized.
- All tubes will be supplied 100% Eddy Current tested as per ASTM E243 and BS EN 1057. Eddy Current testing is a computer aided test, wherein the tube passes through a probe & an electromagnetic field is created around the peripheral of the tube to detect any flaw or blow hole which may not be visible to the naked eye. The manufacturer must have in-house Eddy Current testing facilities to supply to IGL. IGL reserves the right to witness the Eddy Current facility at the manufacturer's factory premises.

6.0 HYDROSTATIC TEST

Hydrostatic test shall be carried out minimum 35 bar pressure for a period of 10 second as per EN 1057 (latest).

7.0 DRIFT EXPANDING TEST

Drift expanding test shall be carried out as per EN 1057. The O.D. of the tube end shall be expanded by 30% using a conical mandrel (at angle 45º) with no wrinkles, cracks, break or any form of defect should occur on the tube during & after the test.

8.0 CARBON FILM TEST

Copper tubes to be tested for carbon film test & the manufacturer will certify that the tubes meet the requirement of clause 8.5 of BS EN 1057.

9.0 CARBON CONTENT TEST

Copper tubes to be tested for carbon content test to ensure a carbon level to avoid the formation of carbon film during installation. Max. Carbon level shall be permitted as per clause 6.5 of BS EN1057.

10.0 MARKING

Each tube shall be permanently marked every meter with IGL's Logo, manufactures name & size and specification of the tube.

Each packing containing tubes shall carry the following, stamped or written in indelible ink.

- Manufacturers name or trademark
- Designation of tubes (OD x wall thk)
- Lot number.
- No. of the standard (EN1057)

11.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Packing size shall be approved by owner / owner's representative before packing the material. The vendor shall submit the packaging details during QAP and also complied with at the time of delivery.

12.0 INSPECTION/ DOCUMENTS

- Inspection shall be carried out as per IGL Technical Specifications, relevant codes/standard and Inspection Plan/ QAP. Vendor to prepare detailed QAP and submit the same for approval of IGL / IGL's Authorized Representative.

- IGL representative or third party inspection agency appointed by IGL shall carry out stage wise inspection during manufacturing/ final inspection.

- 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 IGL Technical Specification and specified code for 100% material, at the time of final inspection of each supply lot of material.

- Even after third party inspection, IGL reserves the right to select a sample of tube randomly from each manufacturing batch and have these independently tested. Should the results of these tests fall outside the limits specified in IGL Technical specification, then IGL reserves the rights to reject all production supplied from the batch.

- For any control test or examination required under the supervision of TPIA/owner/owner's representative, latter shall be informed in writing one (1) week in advance by vendor about inspection date & place along with production schedule.

STANDARD SPECIFICATION - BRASS FITTINGS

CONTENTS

1.0 SCOPE

This specification covers the requirements for Brass Capillary fittings (End feed fittings). Unless modified by this specification, requirement of BS 864 / EN 1254 Part 1 shall be valid.

2.0 MATERIAL

- The material used for the manufacturer of Brass Capillary Fittings shall conform to EN 1254-1 (latest), Half Hard.

- Material used for the solder should conform to BS EN 29453 and should be lead free. Solder material shall be generally melting within the temperature range 180 ° C to 250 °C.

- Threading on the Brass fittings shall be done as per BS21.

3.0 DIMENSIONAL TOLERANCES

Dimensions tolerances of various types of brass capillary fittings (End feed fittings). shall be as per EN 1254 Part 1.

The tolerances at the end shall be as per EN 1254 Part I in nominal diameter which is as follows (Ref. table 2)

Diameter	Tolerance on the mean diameter with respect to the nominal		Resulting Diametrical difference	
D	Outside Dia of male end (mm)	Inside Dia of socket (mm)	Max (mm)	Min (mm)
12 mm	+.0.04 -.0.05	+ 0.15 +0.06	0.20	0.02

The minimum wall thickness of a fitting shall be in accordance as given below (Ref Table 3 of EN 1254 Part 1)

Nominal Dia mm D	Minimum Wall thickness (mm) Brass
12	1.1

4.0 END CONNECTION

End connection of the fitting must be capable of end feeding to the NPT x 12 mm. Internal solder ring type fitting is not acceptable.

5.0 CHEMICAL PROPERTIES

Chemical composition of Brass shall be as mentioned in EN 1254 PART I. Dezincification-resistant brass material CuZn36Pb2As or CW602N.

Cu	61.0-63.0 %
Pb	01.7-02.8 %
As	0.02 -0.15%

Remaining is zinc.

6.0 CARBON IN BORE

The internal surface of brass capillary fittings for soldering or brazing shall not contain any detrimental film nor present a carbon level high enough to allow the formation of such a film during installation. The maximum total carbon level on internal surfaces shall not exceed 1.0 mg/dm^2 when tested in accordance with the specification. This test shall be carried out as per clause no. 5.4 of EN 1254 -1.

7.0 RESISTANCE TO DEZINCIFICATION

The fittings shall be manufactured from alloys containing more than 10% Zinc. So fittings shall be required to be resistant to dezincification. It shall be carried out as per Cl. 5.5 of EN 1254 -1.

8.0 STRESS CORROSION RESISTANCE TEST

A stress corrosion resistance is to be carried out as per method defined in ISO 6957 using test solution of pH9.5 but without pickling.

9.0 FREEDOM FROM DEFECT

The fittings shall be free from internal fins, blow holes, skin defects etc. or other irregularities which might restrict the free flow of fluid, and shall be designed that resistance to the flow of fluid through the fittings is minimized.

10.0 HYDROSTATIC PRESSURE TEST

All fittings shall be leak tightness tested at 1.5x25 bars for a period of 15 minutes and no leakage is permitted. This test shall be performed on each size of the fittings.

11.0 PNEUMATIC PRESSURE TEST

All fittings shall be leak tested at 6 bars for a period of 10 seconds and no leakage is permitted.

12.0 MARKING

Each fittings shall be embossed with IGL' 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.

13.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Bidder shall submit the packaging details during QAP and also complied with at the time of delivery.

14.0 INSPECTION/ DOCUMENTS

- Inspection shall be carried out as per design codes/standards, IGL Technical Specification and Inspection Plan/ Vendor's detailed QAP duly approved by owner/owner's representative.

- IGL representative or third party inspection agency appointed by IGL shall carry out random inspection during manufacturing/ final inspection.

- 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 IGL Technical Specification, at the time of final inspection of each supply lot of material.

- Even after third party inspection, IGL reserves the right to select a sample of tube randomly from each manufacturing batch and have these independently tested. If the results of these tests fall outside the limits specified in IGL Technical specification, then IGL reserves the rights to reject all production supplied from the batch.

- Vendor shall prepare and submit the detail drawings of required brass fitting for approval by IGL before starting production.

- For any control test or examination required under the supervision of TPIA/owner/owner's representative, latter shall be informed in writing one (1) week in advance by vender about inspection date & place along with production schedule.

STANDARD SPECIFICATION – FORGED FITTINGS
(WROUGHT STEEL FITTINGS)
FOR USE AT PRESSURE UP TO 100 MBAR (G)

CONTENTS

1.0 SCOPE

INDRAPRASTHA GAS LTD. (IGL) plans to augment PNG network. It supplies natural gas to domestic & commercial consumers in the city of NCT Delhi, Uttar Pradesh, Haryana & Rajasthan Ga.

This specification covers the requirements for Wrought Steel Fittings for Natural Gas for use at pressures up to 100 mbar (g). Unless modified by this specification, all the requirements of IS 1239 Part 2: 1992 and the latest editions of the standards mentioned herein this specification, including all revisions, shall apply.

2.0 SPECIFICATION FOR POWDER COATING

Owner	Shall mean Indraprastha Gas Ltd. (IGL).
Manufacturer	Means the Manufacturer of the Steel Reinforced Rubber Hose.
SS	Means the present <<Standard Specification>> and its appendix, if any.
Third Party Inspection Agency	Means the Inspection Agency to be appointed by IGL.

3.0 MATERIAL

The material used for the manufacturing of wrought steel fittings shall confirm to IS 1387: 1967 generally, and IS 1239 Part 2: 1992

4.0 DIMENSIONS & TOLERANCES

- Dimensions of various types of fittings shall be as specified in the table 1 to 31 of IS 1239 Part 2: 1992.
- Wall thickness on fittings & tolerances on them shall be as given in table 1 to 31 of IS 1239 Part 2: 1992.
- In case of reducing fittings, the dimensions at each outlet shall be those appropriate to the nominal size of the outlet.

5.0 THREADS

- Outlet of fittings shall be threaded to dimensions & the tolerances as specified in IS 554: 1999.
- All internal & external threads shall be tapered.
- After threading, the pipe body may be hot dip galvanized as per normal practice followed by cold galvanizing (spraying) of the threaded portions. The threaded portions shall be protected using end caps, etc.
- For checking conformity of threads gauging practice in accordance with IS 8999: 2003 shall be followed.

- Chamfering: The outlet of fittings shall have chamfer. The chamfer shall have an included angle of 900 ± 50 for internal threads & 700 ± 100 for external threads.

6.0 FREEDOM FROM DEFECTS

On visual examination the outside & inside surfaces of fittings shall be smooth & free from defects such as cracks, injurious flows, fine sand depth, etc. Other workmanship shall be as per Clause 14 of IS 1239 Part 2: 1992.

7.0 GALVANIZING

- Fittings shall be galvanized to meet the requirements of IS 4759: 1996.
- Zinc conforming to any grade specified in IS 209: 1992 or IS 13229: 1991 shall be used for the purpose of galvanizing.
- **Galvanized Bath:** The molten metal in the galvanizing bath shall contain not less than 98.5% by mass of zinc.
- **Coating requirements:** Mass of coating shall be 610 gms/ m2. In case of pipe nipples (manufactured in accordance with the requirements of IS 1239 Part 1: 2004), the mass of coating of 400 gms/m2 shall also be acceptable.
- **Freedom from defects:** The zinc coating shall be uniformly adhered, reasonably smooth & free from such imperfections as flux, ash bare patches, black spots, pimples, lumpiness runs, rust strains, bulky white deposits & blisters; otherwise the pipes shall be liable for rejection.
- **Sampling Plan for galvanizing**

  a) All materials of the same type in a coating bath having uniform coating characteristics shall be grouped together to constitute 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 as given in Table 2 of IS 4759: 1996.

  b) The sample selected according to Column 1 & 2 of Table 2, IS 4759: 1996 shall be tested for visual requirements as per Para 8 of IS 4759: 1996. Vendor shall have appropriate correspondence between galvanizing lot number and pipe manufacturing lot number for identification / traceability.

  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: 1996.

  d) Criteria for conformity: As per Clause 8.3 of IS 4759: 1996.

  e) Test procedure shall be as per Clause 9 of IS 4759: 1996. All galvanizing test results shall be included in the Manufacturer's Test Certificate.

8.0 PRESSURE TEST

Pneumatic pressure test shall be carried out on each & every fittings as per procedure given in IS 1239 Part 2: 1992.

9.0 COMPRESSION TEST

As per IS 1239 Part 2: 1992.

10.0 SAMPLING

Owner Representative of Third Party Inspection Agency appointed by Owner shall witness the tests as per procedure for sampling plan given in IS 4711: 1974. However, vendor to perform 100% inspection of visual, dimensional & pressure test. Vendor shall furnish Internal test certificates at the time of final inspection to the Owner.

11.0 MARKING

Each fitting shall be embossed / Laser Printed with IGL's logo, manufacturer's name or trademark and the size designation.

Each packing containing fittings shall carry the following embossed, stamped or written by indelible ink.

- Manufacturer's name or trade mark.
- Designation of fittings.
- Lot number.

Each fitting conforming to this standard shall also be marked with BIS standard mark.

12.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Packing size shall be approved by owner / owner's representative before packing the material. The vendor shall submit the packaging details during QAP and also complied with at the time of delivery.

13.0 INSPECTION/ DOCUMENTS

- Inspection shall be carried out as per Owner Technical Specification.
- Owner Representative or Third Party Inspection Agency appointed by Owner shall carry out stage wise inspection during manufacturing / final inspection.
- 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 Tech Spec. & specified code for 100% material, at the time of final inspection of each supply lot of material.
- Even after third party inspection, Owner reserves the rights to select a sample of fittings randomly from each manufacturing batch & have these independently tested. Should the results of these tests fall outside the limits specified in Owner technical specification, then Owner reserves the rights to reject all production supplied from the batch.

STANDARD SPECIFICATION FOR STEEL REINFORCED RUBBER HOSE

CONTENTS

1.0 SCOPE

INDRAPRASTHA GAS LTD. (IGL) plans to augment PNG network. It supplies natural gas to domestic & commercial consumers in the city of NCT Delhi, Uttar Pradesh, Haryana & Rajasthan GA.

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 SPECIFICATION FOR POWDER COATING

Owner	Shall mean Indraprastha Gas Ltd. (IGL).
Manufacturer	Means the Manufacturer of the Steel Reinforced Rubber Hose.
PTS	Means the present <<Particular Technical Specification>> and its appendix, if any.
Third Party Inspection Agency	Means the Inspection Agency to be appointed by IGL.
Type 4	Wire Reinforced hose for domestic / commercial installations

3.0 MATERIAL

- 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.

- Reinforcement material: - It shall have wire reinforcement in braided form in between the lining & cover.

- Cover:- It shall be manufactured out of synthetic rubber compound resistant to abrasion, weather and natural gas. The cover color shall be orange.

- 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 DIMENSIONS & TOLERANCES

- Bore size

Nominal base (mm)	Minimum base diameter(mm)	Minimum bend radius(mm)
8mm	7.9	95

The Nominal bore size of the hose shall be accordance to table # 1 of IS 9573: 1998 shall be as given above table. It shall be tested/ checked as method defined in IS 4143.

- The Minimum thickness so lining & cover shall be 2 mm & 1 mm respectively.

- Length of hose shall be as defined in M.R. & the tolerances on length shall be permitted ±1%.

5.0 FEATURES

- **Mechanical properties**
  Tensile Strength (Lining & Cover) at break - 10 MPa (minimum)
  Elongation (Lining & Cover) in at break (%) - 200 & 250 respectively (minimum)

- **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.

- **Adhesion**
  The minimum adhesion between rubber lining & reinforcement, between layers of reinforcement and between reinforcement & cover shall be 2KN/m.

- **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.

- **Flexibility of Hose**

  The hose shall be capable of being bent empty to the radius 95 mm without flattening and suffering structural damages.

- **Ozone resistance**
  It shall be carried out as per clause no. 5.5.of IS 9573: 1978

- **Hydro static test**

  All hoses shall be leak tightness tested at 2 MPa for a period of 1 minutes and no leakage is permitted. This test shall be performed on each size of the hoses as per clause no. 5.5.5.1 of IS 9573: 1978.

- **Bursting pressure**
  It shall be carried out as per Clause 5.5.2 of IS 9573. The minimum burst pressure shall be 5 Mpa.

- **Grip strength test**

  The hose shall comply to the requirement of Clause no. 5.5.7 of IS 9573.

- **Burning behavior**

  The burning test shall be carried out on hose as per clause no. 5.5.8 of IS9573. The hose at least shall not burn till 45second.

6.0 MARKING

Each hose shall be indelibly marked as follows:

- Manufacturer's name or trade mark., if any
- Nominal bore
- Batch no. / Lot no.
- Month and year of manufacturer
- Type of hose i.e. Type 4
- BIS marking

7.0 PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured. Bidder shall submit the packaging details during offer and also complied with at the time of delivery.

8.0 INSPECTION/ DOCUMENTS

- Inspection shall be carried out as per design codes/standards, IGL Technical Specification and Inspection Plan/ Vendor's detailed QAP duly approved by owner/owner's representative.
- For all tests purposes, the minimum time between vulcanization & testing shall be 16h.
- IGL representative or third party inspection agency appointed by IGL shall carry out random inspection during manufacturing/ final inspection.
- 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 IGL Technical Specification, at the time of final inspection of each supply lot of material.

- Even after third party inspection, IGL reserves the right to select a sample of hose randomly from each manufacturing batch and have these independently tested. If the results of these tests fall outside the limits specified in IGL Technical specification, then IGL reserves the rights to reject all production supplied from the batch.
- Vendor shall prepare and submit the detail drawings of required steel reinforced rubber hose for approval by IGL before starting production.
- For any control test or examination required under the supervision of TPIA/owner/owner's representative, latter shall be informed in writing one (1) week in advance by vender about inspection date & place along with production schedule.

STANDARD SPECIFICATION FOR PURE POLYSTER POWDER COATING

CONTENTS

1.0 SCOPE

This Specification specifies the requirements for powder coating (Pure Polyester) of GI Pipes & fitting suitable to use for carrying Natural Gas directly expose to sunlight.

2.0 SPECIFICATION FOR POWDER COATING

Powder Material	:	Pure Polyester.
Application	:	Electrostatic Spraying (40 — 90 KV Manual/ Automatic)
Backing Schedule	:	180 ^{0}C to 200 ^{0}C for 10 mm (Metal Temperature)
Coating Thickness	:	50-60Microns

3.0 TESTING

Film Type	:	Glossy/Satin 86
Gloss60^{0}	:	95%
Cross Hatch Adhesion (ASTM D-5870)	:	GT = 0/100
Cylindrical bending Test (ASTM D -522) 5mm Rod dia	:	Passes
Enrichsen cupping (min)	:	8 Passes
Pencil Hardness(mm)	:	2H
Scratch Resistance (Kg. Mm)	:	3
Impact Resistance Kg. Min(ASTM D- 2794)	:	Direct 150 Indirect 150
Salt Spray Resistance (ASTM B-117)	:	1000 Hrs (min)
Porosity (DIN 53161)	:	Passes
Humidity Resistance	:	1000 Hrs(min)

4.0 MARKING

Each fitting shall be embossed with manufacture's name or trademark and the size designation. Each packing containing fittings shall carry the following stamped or written by indelible ink.

- Manufacturers name or trademark.
- Designation of fitting.
- Lot number.

Each fitting conforming to this standard shall also be marked with BIS standard mark.

5.0 INSPECTION/ DOCUMENTS

- Inspection shall be carried out as per OWNER Technical Specification.
- OWNER representative or Third Party Inspection Agency appointed by OWNER shall carry out stage wise inspection during manufacturing/final inspection.
- 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 Tech Spec. &- specified code for 100% material, at the time of final inspection of each supply lot of material.
- Even after third party inspection, OWNER/ OWNER REPRESENTATIVE reserves the rights to select a sample of fittings randomly from each manufacturing batch & have these independently tested. Should the results of these tests fall outside the limits specified in OWNER technical specification, then OWNER/ OWNER REPRESENTATIVE Reserves the rights to reject all production supplied from the batch. (ASTM D- 2247)

Weathering (sun test with water immersion, Xenon 150K.lux)	:60-70% Gloss retention after 1000Hrs.
Colour	: Light colour as approved by OWNER/CONSULTANT

STANDARD SPECIFICATION – WARNING MAT

CONTENTS

1.0 SCOPE

INDRAPRASTHA GAS LTD. (IGL) plans to augment the PNG Network. It supplies natural gas to domestic & commercial consumers in the city of NCT Delhi, Uttar Pradesh, Haryana & Rajasthan GA.
The present document covers the technical specifications for the procurement of Warning Mat. Warning mats shall be laid in the ground above the gas main line in order to indicate their presence.

2.0 DEFINATIONS

Owner	Shall mean Indraprastha Gas Ltd. (IGL).
Manufacturer	Means the Manufacturer of the Steel Reinforced Rubber Hose.
SS	Means the present <<Standard Specification>> and its appendix, if any.
Third Party Inspection Agency	Means the Inspection Agency to be appointed by IGL.

3.0 REFERENCE CODE

IS 10889	High Density Polyethylene Films
ASTM D - 638	Standard test method for tensile properties of plastics.

4.0 FEATURES

- **Material**

  Raw material of the warning mat shall be Virgin material.

  The material grade of Warning Mat shall be HDPE with warning sticker / stamp.

  a. Mechanical properties
  b. Tensile strength at break (Machine direction) - 300 Kgf /cm^2(minimum)
  c. Elongation in machine & Transverse direction (%)- 300 (minimum)

- **Colour**

  The Mat shall be of bright golden yellow colour. This colour must not take any appreciable alteration in the course of time.

- **Dimensions**

  Warning Mat shall have following dimensions:

Width	300 mm ± 5 mm
Thickness	1 mm (Minimum)

  Negative tolerance on thickness is not allowed.

- **Marking**

  a. Marking on the Mat shall be approved by owner. The warning Mat shall be provided with Chainage marking and the warning mat must be engraved with "Caution: High pressure gas pipeline below" in both English and Hindi along with IGL's Logo at a frequency of every meter.
  b. Vendor shall submit proposed Artwork to be marked on the Mat for the approval from Owner / Owner's representative.

- **Tests**

  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.

- **Packing**

  The warning mat shall be delivered in rolls of 50meters. Packing size to be mentioned to ensure uniformity in delivery conditions of the materials being procured. Bidder shall submit the packing details during offer and also compiled with at the time of delivery.

5.0 QUALITY ASSURANCE (QA)

Manufacturer shall prepare detailed QAP and submit for the approval from Owner / Owner's representative.

6.0 DEFECT LIABILITY

Defect liability period shall be as per the commercial volume I of II

7.0 APPENDIX - I

Vendor to submit the following Data along with BID.

SR.NO.	DESCRIPTION	UNIT	DATA	REMARKS
01.	Average gravimetric Thickness	mm		
02.	Tensile strength at Break (in machine direction)	Kg / cm^2		
03.	Tensile strength at Break (in Transverse direction)	Kg / cm^2		
04.	Elongation at Break (in Transverse direction)	%		
05.	Elongation at Break (in Transverse direction)	%		
06.	Color bleeding	-		
07.	Dimensional stability	% change		

STANDARD SPECIFICATION

FOR

HEALTH, SAFETY & ENVIRONMENT

Contents

1. SCOPE

This specification establishes the Health, safety and Environment (HSE) aspects to be complied with by the contractor during construction at site.

2. APPLICABLE SYSTEMS ANDPROCEDURES

The reference standard for setting Quality, Health, Safety and Environment Systems and procedures will be as linked below –

- Guidelines issued by PNGRB.
- ISO 9001 – 2008 - For Quality System.
- ISO 14001 – 2004 - For Environmental Management System
- (OSHAS) 18001-2007 -For occupational health and safety management Systems.

The Occupational Health & Safety Assurance Standard (OHSAS) 18001-2007 gives requirements for an occupational health and safety (OH&S) management system. It enables an organization to control its OH&S risks and improve its performance. It provides a basis for an organization to specify its OH&S performance criteria and design the management system.

OHSAS 18001 is compatible with the ISO 9001 (Quality) and ISO 14001 (Environmental) management systems standards. This facilitates integration of quality, environmental and occupational health and safety management systems by an organization.

Organization structure of the proposed CGD project includes a position for developing, installing and maintaining (with assistance by a specialist entity) Quality Assurance (QA) and Health, Safety and Environment (HSE) systems in line with ISO 9001-2008, OHSAS 18001-2007 and ISO 14001- 2004 Standards.

Documented Standard Operating Procedures (SOP) will be prepared by the Owner/Owner's representative for CGD entity for QA and HSE, for application across the organization. Development of the SOPs and implementation of the same at construction sites, control rooms, regional and corporate offices will be followed by an internal audit to verify conformance.

The CGD Network operating entity will thereafter regularly monitor, through periodic internal and mandatory external audits, effective implementation of the SOPs at the construction sites, control rooms regional and corporate offices as per systems and procedures.

3. REFERENCES

This document should be read in conjunction with following.

- General Condition of Contract (GCC)
- Special Condition of Contract (SCC)
- Job Specifications
- Relevant IS codes, OSHAS standard
- Reporting Formats

4. RESPONSIBILITY & ORGANISATION

Health, Safety and Environment activities at site shall be under Contractor's scope. Contractor shall be responsible for implementation of HSE provisions. The nominated or designated safety engineer/ officer shall assist and perform day to day HSE work as per his advice.

5. GENERAL REQUIREMENT

5.1. The contractor should follow HSE policy of owner as applicable to construction site.

5.2. The contractor shall ensure that HSE requirements are clearly understood & faithfully implemented at all level, at each site.

5.3. The contractor shall organize safety awareness programs regularly.

5.4. The contractor shall ensure his participation in every HSE meeting called by owner/owner representative.

5.5. The contractor shall ensure that necessary work permits shall be obtained before start of the work.

5.6. The contractor shall conduct daily tool box talk.

5.7. Contractor shall ensure that their safety supervisor must always be present at site.

5.8. Contractor shall take sufficient care in moving his plants, equipment's and materials from one place to another place so that they do not cause any damage to any person or the property of the owner or any third party.

5.9. Working after sunset is strictly prohibited.

5.10. Hygiene requirement must be met on site by providing fresh drinking water at each site

5.11. The contractor shall submit Monthly HSE reports (Form attached in ANNEXURES).

5.12. The contractor shall provide one four wheeler at site during working hour to meet any contingency.

5.13. The contractor shall adhere consistently to all provisions of HSE. In case of non- compliance or continuous failure the owner/ owner representative may impose stoppage of work for the serious HSE violation. All works shall be carried out in presence of Owner/Owner's Representative only.

6. TRAINING

The Contractor duties shall include conducting HSE training for all activities and personnel involved.

The Contractor shall ensure that their Personnel have been given the necessary HSE and work-related skills training in compliance with regulatory requirements prior to engaging the personnel for the work.

7. TOOL BOX TALKS

Contractor's Site Supervisor for specific work location shall conduct a tool box at the commencement of work on daily basis. If different team is working in different area, separate tool box talk covering location and hazard involved shall be carried out.

Each toolbox meeting shall cover the following agenda:

- Discuss safety issues of previous day
- Brief description of activities planned for the day &associated hazard
- Information & resources required to put controls in place
- Location specific hazard and instructions.
- Requirements Open

It is the responsibility of supervisor to convey PPE requirement to all workers and ensure compliance of the same and shall be checked during tool box talk before embarking on work.

Tool box talk report shall be prepared and kept at site within one hour of talk and it must be signed by all attendee to ensure participation of all in the talk. Tool box report shall be submitted to CONSULTANT/ OWNER

8. INCIDENT/ACCIDENT AND NEAR-MISS REPORTING, INVESTIGATION AND FOLLOW UP

8.1. Incident/Accident and Near-Misreporting

All incidents/accidents must be reported immediately. A report should be prepared by the Supervisor and submitted to the Site Manager within 12 hours of the occurrence and shall serve as a source for education of employee to prevent reoccurrence of similar incident/accident.

Contractor shall submit the Initial report of all Accidents/Incidents within 12 hrs.to Owner / Consultant and detail report within 24 hrs. For serious incidents and near misses, with the potential for fatality, serious injury or significant environmental or material damage, Contractor shall notify Owner/Consultant without delay and within twenty-four (24) hours.

8.2. Incident/Accident Investigation

All incidents/accidents must be reviewed and analyzed to establish root causes and type of injury, trends and practices.

Investigation shall begin promptly after the occurrence of the incidents/accidents. The completed incidents/accidents investigation report shall be submitted to the Contractor Site Manager within 7 days of the occurrence. A copy shall be submitted to Owner/Consultant.

8.3. Follow-up

All incidents/accidents, including investigation results and recommendations, shall be discussed in the Site HSE meeting and shall be brought to the notice of employees in toolbox meetings.

Key Risks Identification and Management Risks

Working at height is a critical activity. Following hazards are associated with Working at height:

- Person Fall from height
- Material falling From height
- Slips, trips and falls
- Concealed utilities (i.e. electric cable Telephone cable, water line, Drainage line}
- Electric shock

9. HAZARD IDENTIFICATION AND RISK ASSESSMENT SYSTEM (HIRA)

The Contractor shall prepare and implement comprehensive HIRA as part of the HSE Management Plan prior to Commencement of the work or services and during the execution of the work also.

10. SITE HSE INSPECTION/AUDIT

All Site HSE checklists/Inspection reports shall incorporate a follow–up procedure to ensure that any recorded HSE violations have been promptly attended to in a satisfactory manner.

The Site HSE Inspections/Audit shall be planned by the Contractor.

11. FIRST AID FACILITY

The contractor shall provide the first aid box at all the sites. The content of the first aid box shall include the following items:

- Twenty-four small sterilized dressings.
- Twelve medium size sterilized dressings.
- Twelve large size sterilized dressings.
- Twelve large size sterilized burn dressings.
- Twelve (15 gin) packets of sterilized cottonwood.
- One (200 ml) bottle of certified solution (1 per cent) or a suitable antiseptic solution.
- One (200 ml) bottle of mercurochrome (2 per cent) solution in water. (viii) One (200 ml) bottle of salt-volatile having the dose and mode of administration indicated on the label.
- One pair of scissors
- One roll of adhesive plaster (6 cm x 1in).
- Two rolls of adhesive plaster (2 cm. x 1in).
- Twelve pieces of sterilized eye pads in separate sealed packets.
- One polythene wash bottle (500 cc) for washing eyes.
- Twelve roller bandages 10 cm wide.
- Twelve roller bandages 5 cowhide.
- Six triangular bandages.
- One tourniquet.
- A supply of suitable splints.
- Two packets of safety pins.
- Kidney tray.
- One copy of first-aid leaflet issued by the Directorate General of Factory Advice Service and Labor Institutes, Government of India, Bombay.

All the content shall be kept in clearly marked and easy to remove cartons stored in such a manner that there is no rattling or spilling over even when the container is being moved Whenever applicable the cartons shall bear instructions for use, dosage etc.

12. FITNESS TO WORK

The objective of Medical Assessment for Fitness to Work (FTW) is to assess health of employees in relation to their specific jobs such as working at height, to ensure they could perform required task without risk to health and safety.

The Contractors workers (as per the above category) shall under go through FTW prior to start work at site. It will be the responsibility of the Contractor to ensure compliance to this requirement.

12.1. Medical Examination requirement for working at height

Below specific requirements are must for Medical examination of Contractors employees working at height:

- History of Epilepsy.
- Blood Pressure.
- ECG+ any History of any Seizures.
- Vision Check.
- Blood Sugar (fasting &PP).
- And other general tests.
- Physical Examination- to confirm the person is physically fit.
- Blood Group (One time Test).
- General check about fear of Heights.

12.2. Other Requirements:

- Contractor to ensure that persons involved in working at height are trained, certified and having Valid I Card.
- Carry out tool box talk before starting of the work.
- Carry out site specific risk assessment and identify risk control measures for specific site work. (Ref doc).
- Ensure that persons are physically & mentally fit for working at height.
- Ensure that equipment shall be used as per approved standard for working at height.
- Ensure that equipment shall have facility of emergency rescue operation.
- Ensure person involved in working at height are trained in emergency rescue operation.

- Ensure that all equipment and safety devices used are inspected, certified by competent authority & valid & suitable for use.
- Quality conformance shall be carried out prior to start of work for working at height equipment's.
- Life cycle of equipment shall be checked
- In case of any part of equipment is found damaged or defective, it will be destroyed. "Working at height equipment's shall never being repaired". The Records, showing reasons for all the defective and damaged material shall be available and shall be stored separately at Contractor's yards.
- Ensure that Personnel Protective Equipment are inspected & in good condition
- Ensure that equipment used is within Safe working load mentioned on equipment.
- Ensure all tools are secured or kept in Tool kit / bag and there are no loose objects or tools.

13. PERSONNEL PROTECTIVE EQUIPMENTS

The contractors shall provide sufficient numbers of following personnel protective equipment's (PPEs) to workmen and supervisors/engineers to use them properly at work site.
Following five numbers of Personnel protective equipment's are identified as MANDATORY for all.

- Safety Helmet
- Coverall
- Safety shoes/footwear
- Safety Glasses
- Hand Gloves (as per job requirement) Other PPEs shall be as per job requirement like Work at height- Full body harness (PETZL or equivalent make), Life line, Safety Net Arc Welding – Welding face shield Grinding – Grinding face shield Height work – Full Body harness (above 2 meters) Contractor to ensure proper use and selection of protective clothing / equipment for specialized jobs.

PPE's to be used shall be as per following Specification:

IS : 2925 – 1984 : Industrial Safety Helmets.

IS : 4770 – 1968 : Rubber gloves for electrical purposes

IS : 6994 – 1973	
(Part – I)	: Industrial Safety Gloves (Leather& Cotton)
IS : 1989 – 1986	
(Part – I &	: Leather safety boots and shoes
IS : 3738 – 1975	: Rubber knee boots
IS : 5557 – 1969	: Industrial and Safety rubber knee boots
IS : 6519 – 1971	: Code of practice for selection, care and repair of Safety footwear
IS : 11226 – 1985	: Leather Safety footwear having direct molding sole
IS : 5983 – 1978	: Eye protectors
IS : 9167 – 1979	: Ear protectors.
IS : 3521 – 1983	: Industrial Safety belts and harness

Technical Standard for working at height equipment's shall be as per following standard:

Quality Standards

Sr. No.	Name of equipment's	EN Standard
1	Energy absorbers	365
2	Slings	566
3	Retractable type fall arresters	360
4	Guide Type fall arresters on a rigid	353-1
5	Connectors	362
6	Dynamic mountaineering rope	892
7	Descended device	341
8	Anchor device Type-A/B	795
9	Fall arrester harness	361
10	Sit harness	813
11	Lanyards	354
12	Pulleys	12278
13	Fall arrester system	363
14	Work positioning belt	358

14. EQUIPMENT LIST AND INSPECTION CERTIFICATE

Equipment list must be made available and must be certified for safety as per the requirement of Factory Act. Tools and Tackles should be calibrated from the approved agency only.

List of Tools and Tackles

Item	Inspection/Calibration Date
Full body harness	Once in six Month
Rope Grab fall arrestor	Once in six Month
First Aid Box	Once in Month
Fire Extinguisher (10 Kg.)	Once in a Year
Extension board(without cable Joint with Socket) with Circuit Breaker	Monthly
Nylon tie line for tools	Once in a day

15. HSE REQUIREMENTS AT SITE

Contractor may conduct survey to assess the requirement of GI riser for high rise building.

For Work at Height: Contractor shall provide PETZL or equivalent system/metallic scaffolding as a working platform and full body harness with self-locking arrangement. Full body harness with self-locking arrangement shall be used for ascending/descending/work rest.

PETZL system or equivalent system/metallic scaffold should comply with relevant IS/EN/BS standard.

Only certified trained plumber undergone practical training on work at height shall be deployed.

15.1. Any working at height related activities has to be carried out with Permit system.

Work at Height

Working at Height is performing work at height where workers can fall 1.8m or more from where they stand or sit to perform work. This includes gaining access to working at height if there is a risk of falling 1.8m or more.

Examples of Working at Height are:

- Working on temporary platform more than 1.8mhigh
- Working on top of vehicles/tankers or building more than 1.8 m high Risk of Working at Height
- Fall from height
- Falling objects

Safety net, fall arrest system and two lanyard full body harness when working at height While working at height, all loose tools shall be kept inside a container and good housekeeping shall be maintained.

All Working at Height shall comply with Working at Height Procedures Safety Net System.

"Safety net systems" Safety net systems and their use shall comply with the following provisions.

Safety nets shall be installed as close as practicable under the walking/working surface on which workers are working, but in no case more than 30 feet (9.1 m) below such level. When nets are used on bridges or similar kind, the potential fall area from the walking/working surface to the net shall be un obstructed.

Vertical distance from working level to horizontal plan of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 5 feet	8 feet
More than 5 feet up to 10 feet	10 feet.
More than 10 feet	13 feet

- Safety nets shall be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force.
- Safety nets and safety net installations shall be drop-tested at the jobsite after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at 6-month intervals if left in one place. If drop test not possible designated competent person shall certify that the net and net installation is in compliance with the requirement by preparing a certification record prior to the net being used as a fall protection system. The certification record must include an identification.
- Determined that the identified net and net installation were in compliance and the signature of the person making the determination and certification. The most recent certification record for each net and net installation shall be available at the jobsite for inspection.
- Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. Defective components shall be removed from service. Safety nets shall also be inspected after any occurrence which could affect the integrity of the safety net system.
- Materials, scrap pieces, equipment, and tools which have fallen into the safety net shall be removed as soon as possible from the net and at least before the next work shift.
- The maximum size of each safety net mesh opening shall not exceed 36 square inches (230 cm) nor be longer than 6 inches (15 cm) on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not be longer than 6 inches (15 cm). All mesh crossings shall be secured to prevent enlargement of the mesh opening.
- Each safety net (or section of it) shall have a border rope for webbing with a minimum breaking strength of 5,000 pounds (22.2kN).
- Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than 6 inches (15 cm) apart.

15.6.1 Lifeline

- Horizontal or vertical life line shall be used while working on suspended platform or similar type of platform or working at thereof/edge
- Horizontal/Vertical lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains safety factor of at least two.

- Lanyards and vertical life line shall have a minimum breaking strength of 5,000 pounds (22.2kN).
- When vertical lifelines are used, each worker shall be attached to a separate lifeline.

15.6.2 Full Body Harness

- Ensure that the full body harness must be inspected prior tousle.
- Ensure that full body harness must be worn by the workmen while working at height.
- Full body harness lanyard must be anchored with a strong member.
- While climbing up or climbing down, one of the hooks of lanyard must be locked alternatively all the time.

15.6.3 Working Platform

Every working platform more than 1.8 mtr. High from which a person is likely to fall shall be of steel plates/planks/cage and shall be:

- Closely boarded, planked or plated.
- At least 700 mm wide if the platform is used as a footing only and not for the deposit/ keeping of materials.
- At least 900 mm wide if the platform is used for the deposit of materials.
- At least 1100 mm wide if the platform is used for the support of higher platform.
- Two metal/planks shall not have 25 mm gap between them the distance between two consecutive transoms or other supports on which a platform rests shall be fixed with due regards to the anticipated load and the nature of platform flooring. As a general rule such transoms shall not be placed more than 1.0 mtr. apart.

15.6.4 Scaffold

Scaffold Inspector (Project Field Officer)

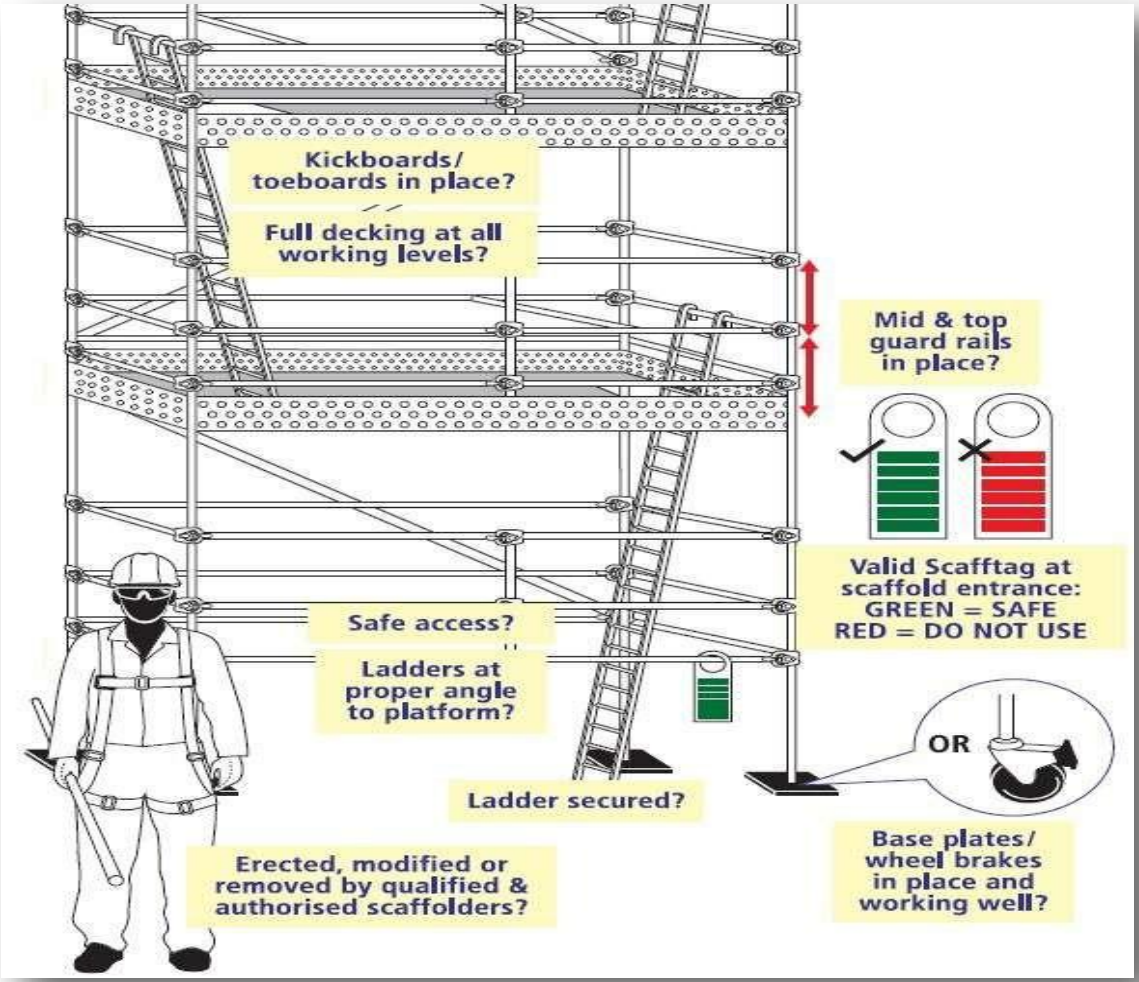
This is the competent individual who shall inspect scaffolding prior to each use and perform full inspections as per the Inspection procedure. He will accept the Scaffold after ensuring the followings;

- The scaffold erected complies with legislation.

- The permissible loads per deck and the working distance between the scaffold and the work surface are examined.
- Materials used for the scaffold are in a proper condition and in throughout the time it is in place.
- Existence and proper installation of collective protective equipment and means of access.
- Clear display of details of permissible loads on the scaffold.
- Acceptance is carried out prior to the scaffold being made available for the first time and is repeated after any alterations.
- Inspection is repeated at the frequency of 7 days. Issues scaffold tag (Green Tag) before its first use.

Scaffold Contractor

This refers to the company involved in the installation (erection, dismantling and alteration) and/or design of the scaffolding on behalf of CONTRACTOR.



- The erection contractor shall ensure that the scaffolding is erected in compliance with the OHSAS/IS standards. Worksite specifications and considerations shall be incorporated into any such plan.
- Ensure availability of competent staff and certified material all the time.
- Scaffolding may be erected, dismantled or altered only under the supervision of a competent individual who has received adequate specific training for the intended operations, specifically including the following:
- Understanding the erection, dismantling and alteration plans for the scaffolding
- Ensure PPEs and Safety at work during erection ,dismantling and alteration of the scaffolding.
- Measures designed to prevent the risk of falling person's and objects.
- Safety measures applicable in the event of a change in weather conditions.
- Permissible structural load criteria.
- Any other risk that may be entailed by erection, dismantling and alteration operations.
- Scaffold material: Safe handling, and storage.

Scaffold User

- The User shall ensure that acceptance of the scaffold has been properly carried out; green Tag is issued and provide notification of any alterations. Work from tagged scaffolds only. Comply with special conditions/additional controls noted on the access tag.
- It shall observe all restrictions on use (particularly permissible loads). Its requirements should be taken into consideration in the specifications during erection.
- Use scaffolds only for their intended purpose.
- Do not use unstable objects or makeshift devices to increase the working height of the scaffolds.
- Use portable ladders as a means of increasing the working height only after the competent person has determined that the stability of the structure has not been compromised, and adequate fall protection is in place.

- Do not straddles, stand on, or work outside of the guardrail.
- Use designed access means to descend or ascend a scaffold (stairs, attached ladder, or specially designed end frames). Do not uses cross bracing or side rail
- Keep only the tools and materials on the platform that are necessary to perform the task. Control all slipping and tripping hazards by removing or securing the tools/materials.
- Do not modify or remove a scaffold system/component or status tag.
- Notify supervision immediately if a scaffold is damaged, weakened, or otherwise deficient.
- Scaffold users/ Scaffold erectors shall use IS and EN standard double lanyard safety harness with absorbent.

Inspection Points

To ensure the integrity and proper installation of scaffolding, a certain number of points shall be inspected. Inspection of these points ensures a basic level of safety. Following fundamental inspection points are as follows:

- Environment and location
- Supports and soleplates
- Structure and posts
- Decks
- Scaffold Capacity Standards
- Working levels
- Access
- Signs and signage

Mobile Scaffolding

- Mobile scaffolds are identical in design to fixed scaffolds, except that their tubular structure is lighter and in terms of support, the wheels do not offer the same load-bearing area as footplates on fixed scaffolds.
- Erection is simple and shall be carried out using personal protective equipment. Lastly, during erection, dismantling and use, the brakes shall also be applied. Care should be taken to ensure that mobile scaffolds are installed on flat surfaces.

- Mobile scaffolds are highly practical for short jobs at relatively low heights.
- Acceptance is carried out after erection has been completed.
- They are moved as the work being carried out progresses. No fresh acceptance is required after each move, but the workstation shall be verified (working distance, brakes applied)
- A freestanding scaffold shall be considered safe when the total height is equal to or less than four times the minimum or least base dimension.
- Rules for use
- Do not extend the base to increase the height.
- Brace each frame level as per the manufacturer’s instructions.
- Do not raise work surfaces by placing decks on rails or midribs.
- Do not climb on the guardrails or other structural components.
- Observe the manufacturer's guidelines governing the installation of brackets, material hoists etc.
- Stay clear of power lines and observe safety distances. (If any)

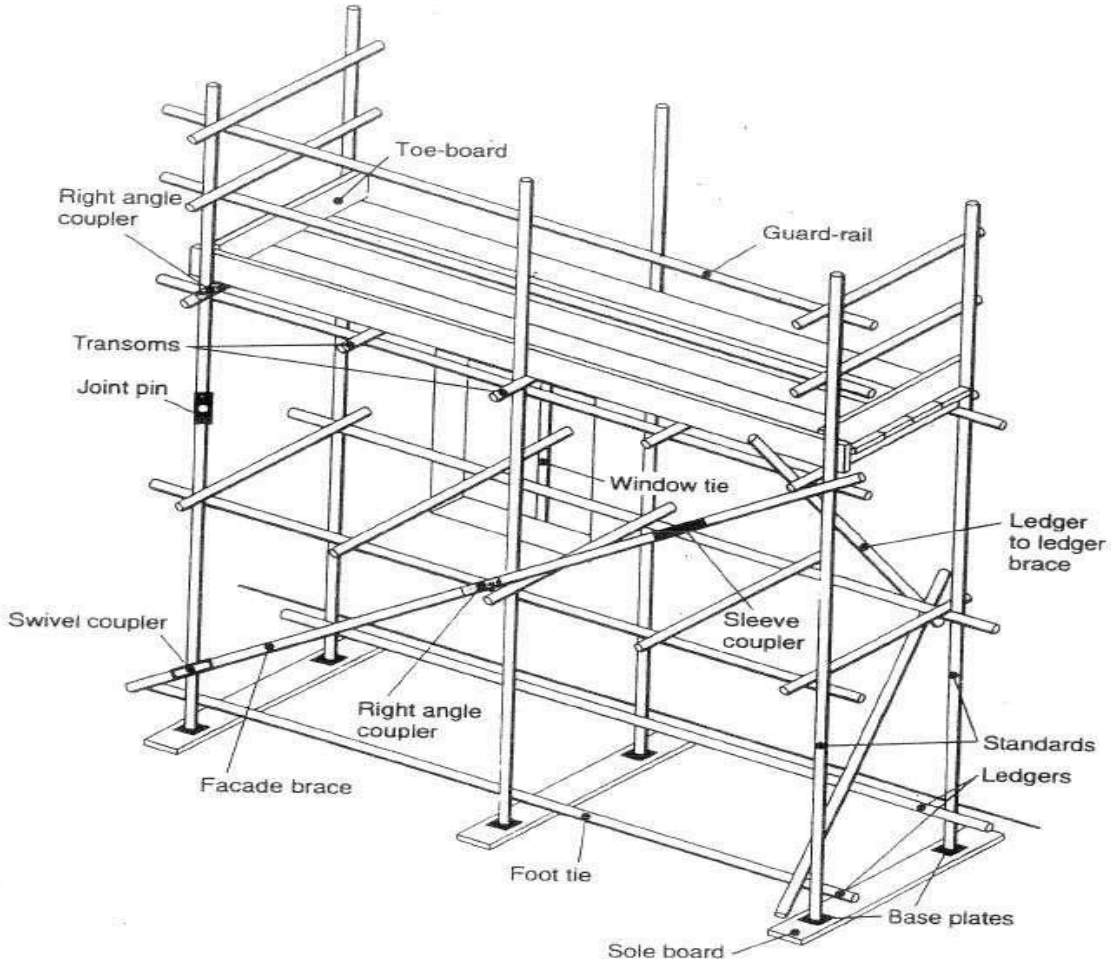
Scaffold safety

The following safety tips are as guidelines in avoiding job-site situations that could prove dangerous to scaffold workmen.

- The Scaffold to the Building: Scaffolding should be tied to the structure using heavy wire or tie-in devices. The first vertical tie should be at the maximum height of 4 times the narrowest base dimension. Additional ties are not to exceed 26 feet vertically. Maximum horizontal distance between ties is not to exceed 30feet.
- Don't Overload Scaffolding: Follow the safe load capacities as given by the scaffold manufacturer. There's a limit even to what steel cansupport.A4-to-1-safetyfactor must be figured on scaffolding.
- Use Metal Catwalks, Platforms; where available. If wood plank is used, it must be scaffold grade or better. Inspect thoroughly before every job to make sure it is free from breaks, knots, and cracks or warp age. Decking should be full width.
- All working platform must be constructed with the specific requirement of job.
- If the working platform is not permanent then safety belt must be used.
- There shall be firm foundation for all scaffoldings. All scaffolding shall be made of sound material.

- Scaffolding material shall be inspected and used, only if found in good condition.
- Provide metal base plate is used under all upright or standard scaffoldings. Correct type of couplers shall be used for all connections.
- Plumb and level scaffoldings as erection proceeds, so that braces will fit without forcing.
- Fasten all braces securely.
- Working platforms shall be provided with guards. This should consist of top rail, mid rail, and toe board. The toe board shall be of minimum height 100 mm, while the mid rail and top rail shall be at heights of 600 mm and 1200 mm respectively.
- Do not use ladders or makeshift devices on top of scaffoldings to increase the height.
- Shall be placed at least 75 deg. to the floor.
- Fall arrestor to be used where ever applicable.
- The following safety tips are as guidelines in avoiding job-site situations that could prove dangerous to scaffold workmen.
- Don't Ride Moving Scaffold; and remember scaffold units are limited in height to 4* times
- Their narrowest base dimension (unless base is widened by outriggers or more end frames; or tied into building.) Always keep casters locked. (except tore-spot)
- Don't Climb Braces: Use the steps provided on most steel scaffolds to climb up to or down from work levels. Use scaffold climbing ladders where required.
- Protect Working Levels: Use overhead canopies to protect workers on lower work levels when work is being done overhead. Rope off un safe areas underneath scaffold or provide wire mesh around work area.
- Use Double Guard Rails; and toe board so exposed side sat platform heights of 1.8 meter or more.

Illustration of a Sample Independent Scaffold



15.6.5 Ladders

- Fall protection is not needed when climbing up or down ladders less than 20 feet/6.1 meters, using 3 points of contacts.
- Portable ladders, steps and trestles should only be used for light duties of short duration. Otherwise, properly constructed means of access should be provided.
- Aluminum ladders can generate sparks when struck against rusty iron, so it must be used in Hazardous Areas with special care.
- Aluminum ladders must not be used in areas where they might be splashed with acids or alkalis ; e.g. Utilities Area

- Ladders with metal reinforced, Damaged or rotten stiles, Missed footing on ladder rungs must not be used.
- Over-reaching and over-balancing is not allowed.
- Every time before use, the user will carry out inspection of ladder.
- If the work to be done necessitates the use of both hands, a safety belt must be used.
- Tools and materials must not be hand carried by persons ascending or descending ladders. Where applicable light tools should be carried in pockets, tool belts or shoulder bags, provided they do not impair movement and are held securely.
- Rungs, stiles, or treads to be checked for bending, twisting or signs of abuse or undue wear.
- Feet to be fitted with various types of bases and in good order. Synthetic non-slip, wooden or metal.
- Non-slip stair treads mats of stepladders, should be fitted and in good condition.
- In case of moving ladders fitted with wheels, Hinges and locking devices to be secure and in good working order.
- All portable ladders must be in good condition as per the site norms.
- Ladder shall extend 3' to 4'above the point of Landing and topmost 3 rungs shall not be used.
- Ladder is checked visually for defects before every use.
- Ladders shall not be used in a horizontal position as runways or scaffoldings.
- Ladders shall not be placed in front of a door that opens toward the ladder unless the door is locked, blocked or guarded.

15.6.6 User Ladder Safety Checklist

The following check list specifies the main points to remember when using ladders:

- Do not erect:
- On sloping ground
- On top of movable objects
- In high wind
- In front of a door which may be opened
- Against a slippery or unstable surface

- At a shallow angle, or use horizontally as a plank or bridge
- Leaning to onside

15.6.7 Donor

- Drop things from ladder.
- Straddle from the ladder to a nearby foothold..
- Allow more than one person up a ladder at time.
- Use a ladder which is too short.
- Use a makeshift or 'home-made 'ladder.
- Over-reach (generally always keep hips within the stiles).
- Slide down ladder.
- No ladder should be used if it has: A missing, loose or defective rung or tread.
- A defective stile side member.
- A defective rope or associated fitting (rope operated extension ladders).
- Any sign of warping.
- Missing fastenings or rivets, guide or latching hooks.
- Always Return ladders to store as soon as they are finished with.
- Inspect a ladder immediately after any fall or overload.

15.6.8 Activities Allowed on Ladder

- A ladder is considered to be suitable for access of personnel to an elevated area only. No significant works may be carried out from a ladder. In particular, activities such as those below may not be carried out on ladder:
- Carrying tools (other than those which might clip onto a tool belt) up to an elevated level.
- Activities involving heavy manual labour.
- Activities requiring reaching or stretching such that the body is no longer centered over the ladder.
- For these types of jobs, a work platform such as a scaffold is required. The safe working position from a ladder is to have both thighs and hips within the styles.

15.6.9 Color code and inspection

- Color code of the year shall be painted on one style only and equal to one rung spacing.

15.2. Roof work

- All roof-work operations should be pre-planned and properly supervised.
- Roof work should only be undertaken by workers who are physically and psychologically fit and have the necessary knowledge and experience for such work.
- Work on roofs shouldn't be carried on in weather condition that threaten the safety of workers.
- Crawling boards, walkways and roof ladders should be securely fastened to a firm structure.
- Roofing brackets should fit the slope of the roof and be securely supported. Where it is necessary for a person to kneel or crouch near the edge of the roof, necessary precautions should be taken.
- On a large roof where work have to be carried out at or near the edge, a simple barrier consisting of crossed scaffold tubes supporting a tubing guardrail may be provided.
- All covers for openings in roofs should be of substantial construction and be secured imposition.
- Roofs with a pitch of more than 10 should be treated as sloping.
- When work is being carried out on sloping roofs, sufficient and suitable crawling boards or roof ladders should be provided and firmly secured imposition.
- During extensive work on the roof, strong barriers or guardrails and toe-boards should be provided to stop a person from falling off thereof.
- Where workers are required to work on or near roofs or other places covered with fragile material, through which they are liable to fall, they should be provided with suitable roof ladders or crawling boards strong enough and
- When spanning across the supports for the roof covering to support those workers.
- A minimum of two boards should be provided so that it is not necessary for a person to stand on a fragile roof to move a board or a ladder, or for any other reason.

15.3. Electrical Safety

- Only authorized electrical engineer / electricians are permitted to do the electrical work.

- Do not use extension cords or electric hand tools with exposed wires.
- To switch-off electrical supply in case of an emergency must be enabled at all times.
- All temporary electrical installations carried out on the site must be in accordance with the local regulations and specifications.
- The installations must be inspected regularly by a competent person (e.g. electrical engineer/supervisor) to ensure that they are in safe condition and working faultlessly.
- Each electrical power tools and electrical equipment must be under protection of earth leakage/residual current protective device(ELCB/RCCB).
- Portable power tools used on site must have protective insulation ("double insulation").
- All electrical machines, tools and appliances must be inspected by a competent person (e.g. electrician) to ensure that all equipment's are in safe condition and working faultlessly. To confirm that the inspection was conducted the equipment must be labeled or marked clearly and registered. The documentation must be submitted to TE for records.
- Assume that all circuits are live until they have been thoroughly checked and proven dead. Never work on a live circuit.
- When using electrical equipment in an environment with electrical conductivity (e.g. in confined spaces like case pipes, containers, towers) the voltage used may at maximum be 24 Volt AC. (fed from a safety low voltage transformer)
- Never use a fuse heavier than the capacity of the circuit. Also never attempt to bridge abuse.
- Never tamper with any electrical wiring or apparatus.
- Do the cable laying as per standard specifications and requirement; do not lay down power cables adjacent to secondary cables of welding machine.
- Assess overhead power line hazard and keep safe distance from it.
- All electrical equipment's, motors, transformers, welding machines, etc. to be provided with earth connections.

15.4. Power & Hand Tool Operation

- All portable tools are to be connected through control bus with ELCB.
- All contractors should ensure proper Earthling of all electrical equipment's used by

them. Suitable earthling pits must be made if required.

- Examine electric cable for defects before use.
- Do not ever insert free ends of wires into sockets and hold them in place with matchsticks / other means. Always use industrial three pin plugs.
- Check the RPM rating of grinding wheels. The RPM rating must be greater than or same to that of the driver. Wheel guard should be used in proper position before grinding. Also proper PPEs must be ensured (goggles &hand gloves).
- Do not tie electric cords to metal rods or nails.
- No cable should run under the ground. It must run overhead at a 2 m height to avoid pinch point and creating trip hazard
- All tools and Tackles must be examined daily before commencing work and record to be maintained.
- Defective tools are to return to store.
- All electrical tools must be inspected at regular intervals by an authorized electrical person and record to be maintained.
- The weight, size & type of tool should be selected to suit the job carried out.
- The handles of tools should be intact and properly tightened. Split handles should be replaced. To avoid slippage, grease and oil should be wiped off.
- Insulated and non-conducting tools shall be tested for electrical resistance.
- Wrenches should not be pushed but pulled. Chisels struck by others should be held by tongs and not by hands.
- Chipping should always be done away from self.
- Hand tools should not be allowed to lie down on benches, scaffoldings etc. from where they can fall. They should be properly stored.

15.5. Welding

The metal frames and cases of mains-powered welding rectifiers, transformers and voltage regulators and of engine driven welding machines must be positively earthed locally throughout the work.

- Welding leads and return leads must be protected against physical damage.
- Insulated electrode holders and cable lugs / protectors must be used.
- The return lead must be attached to the work place as close as reasonably practicable to the welding point.
- If mains power is used, the work piece must be positively earthed using a well-protected earth wire connected at both ends by bolted lugs or secure screw clamps.

- Bolted joints in pipelines and structures must not be relied upon to provide adequate electrical continuity for welding currents.
- Electric arc welding should not be carried out on equipment suspended from a crane because of the risk of damage to lifting wires from uncontrolled stray currents.
- Welders must not wear metal rings, bracelets or necklaces during the work as induced currents from the welding equipment might heat these.
- Dry, non-conductive gloves should be worn.
- The welder must always disconnect the electrode holder from the supply before attempting to replace an electrode.
- The welder should not lean against an earthed conductor whilst manipulating live electrodes.
- Welders working with electrodes fed from different phases of a three-phase supply should not work in close proximity to one another.
- Ensure that welding machine is in order and approved by site engineer.
- Ensure that welding cables are in order.
- Remove all combustible material from welding area to avoid fire.
- Place a fire extinguisher nearby welding premises.
- Ensure welding holder, cable and its lugs in good condition and use only industrial power socket and plugs (3 Pin) to avoid electricity risk.
- Make sure that welding machine is provided with ON/OFF switch and is earthed/grounding.
- Do not over load electrical appliances and cable, shocked pined.

15.6. Gas Cutting

- Gas cylinders must be secured in the vertical position to prevent them being knocked or pulled over.
- Long lengths of hose should be avoided, but;-
- Cylindersmustbekeptfarenoughawayfromtheweldingorcuttingoperationsto prevent contact with sparks, flames and metals platter.

- Cylinders must be placed where they are unlikely to be damaged by stray electric currents or falling objects.
- Cylinders must not be taken into confined spaces.
- The torch must always be lit from a lighter provided for the purpose. There should be no attempt to light it from hot metal.
- Check the cylinder and its valve or leakage and move out any leaking cylinder immediately.
- Ensure that flash back arresters are installed with torch and NRV (Non return valve) on the gas cylinders side.
- Ensure cylinder is far away from fall of sparks and hot metal.
- Check the regulator and torches that they are inspected prior to every use.
- Check for leaks around regulators, hoses/fittings & nozzle with soap solution.
- Check the entire hose length if it is cracked or worn out cut that length of hose or replace the hose.
- Check that flash back arrester used for the purpose is of approved make/specification only.
- Place a fire extinguisher nearby welding premises.

15.6.1. Gas Cylinders

The handling of gas cylinders must comply with local legislation and TE's regulations as per particulars given below:

- Gas cylinders must be stored protected from excessive heat, fire, dangerous corrosion, mechanical damage or access by unauthorized.
- Gas cylinders must not be stored together with flammable materials.
- Gas cylinders must be secured to prevent them from falling over.
- Gas cylinders must be capped and operated upright.
- Use cylinder trolley / cage for the transportation of gas cylinders at site.
- Never use oil or grease on the regulator of a cylinder valve.
- Store gas cylinders in ventilated area.
- Don’t keep LPG cylinder in confine/below ground area.

- Gas stores must not be set up in critical areas such as stairways, corridors, emergency routes, garages or passages for person's or vehicles.
- Never transport by rolling them on the ground or use them as rollers or supports.
- Never attempt to repair cylinder.
- Leaking regulators, cylinder valves, hose pipes or other equipment should be taken out of service.

15.7. Grinding Operation

- Grinding wheels should be stored in dry place.
- After expiry date, grinding wheel must be condemned, broken in to pieces.
- Power supply cable of adequate current carrying capacity shall be used and it should be in good workable condition without abrasions, cuts or puncture in outer insulation.
- Socket pin provided at supply end and On/off switch in working condition.
- Proper earthling of the body in case of metallic body.
- Wheel guard properly fitted imposition.
- Machine body without any damage like cricket.
- Moving part (wheel) must be properly fixed to the machine with the help of spanner.
- Grinding wheel must be of suitable size as per the speed of grinding machine.
- Grinding wheel without manufacturer's stickers having size, speed and expiry date must be condemned.
- Don't use portable grinding machine as bench grinder.
- Don't fit over size wheel than recommended size by machine/wheel manufacturer.
- Don't grind small, unstable object without fixing it in the vice.
- Don't over press the grinding wheel against the job for fast removal of metal.
- Put OFF the main switch, while machine is not in use (tea breakneck.).
- Don't chip off grinding/cutting wheel for achieving fast cutting rate.

PPEs:

- Use of helmet, face shield or safety goggles (where face shield is not possible.) and hand gloves.

15.8. Use of Power Tools and Cables

- All electrical equipment and tools used by the contractors and their employees shall be properly checked by contractor's supervisor before use.
- All power tools must have proper guard at all-time.
- Leads /cables must be placed so that they do not create a trippig hazard.

15.9. Pressure / Leak Testing

Hydrostatic and Pneumatic Test

Access to the test area shall be limited to essential personnel only. before the test commences compliance is required with the following points:

- Persons supervising pressure or leak tests must have sufficient knowledge and experience of testing to fully understand the hazards of the activity and the precaution, which must be taken.
- Effective communication, including formal procedures, must be established between sites whenever the test envelope extends beyond one site, for example, pipelines.
- The area shall be cordoned off (using tape, shields or barriers, etc.) at an adequate distance from the equipment to be tested, as specified on the Permit to Work
- Warning signs shall be posted at access ways, at other strategic positions, and on the equipment to be tested (including the doors of test workshops or other designated areas.
- Pressuring equipment shall be provided with suitably calibrated pressure control/regulator devices
- Pressuring equipment shall not be left unattended at any time during the test.
- Pressuring equipment shall be isolated from the equipment under test and where practicable disconnected, when the test pressure has been reached.
- Care must be taken to ensure that materials of construction have the required ductility at the test temperature to prevent brittle fracture.
- A safety valve should be fitted to the equipment/system being tested, set to relieve at a pressure that will prevent over pressurization.
- Sufficient venting / draining points shall be provided in order to prevent trapping of pressurizing medium behind non-return valves, check valves, between isolation valves, or within dead legs of the pressure envelope.

- The equipment/plant to be pressure tested must be subjected to thorough examination prior to testing. It may be necessary to 100% inspect all welds using visual, radio graphic or other NDT techniques.
- The gas supply must be isolated when test pressure has been achieved.
- The pressure envelope must contain sufficient vents, to a safe location.
- De-pressurization after pneumatic testing must be gradual.

15.10. Barricades and Warning Signs

- Area where work is being carried out above man height or below 1' ground depth must be barricaded. Linked barrier with link chains must be provided by the contractor for cordoning the area at ground level, during GI work.
- Follow the instruction of all types of warning signs like "NO SMOKING" "NOENTRY" "DANGER" "Work at height", "Inconvenience to member of public regretted/work in progress","
- Name of the Contractor and contact details"

15.11. Basic Safety Rules For The Construction Site

- The construction site shall be considered a restricted area and unauthorized entry into the site is strictly prohibited. Anyone found trespassing should be asked to leave the site immediately.
- All persons of CLIENT/Consultant/Contractor shall be responsible for their own safety in plant or work sites.
- Nobody authorized to touch any valve, switch, or interfere with plant/site activities.
- Children below 18 years are not allowed inside plant / worksite.
- Never walk on the pipes, equipment, structure etc.
- Always use stairs, handrails & walkover platforms.
- Never carry sharp or pointed tools in pockets.
- Alcoholic beverages will not be consumed, brought into, or manufactured on the work sites or inside the plant.
- Drugs/intoxicant substances will not be used, brought into, or manufacture don't he site or plant.

- Cigarette, beedi smoking is not allowed except in the designated smoking booths.
- Firearms, explosives, knives or other types of weapons will not be allowed on the site.
- Gambling or any other form of betting games is prohibited.
- Discrimination on the basis of race, sex or national origin is prohibited.
- Horseplay, Fight, Practical jokes, Aggressive or abnormal behavior is prohibited.
- Individuals under the influence of alcohol or drugs will not be permitted entry to the site.
- Safety helmet, safety shoes, ear plug or ear muff, hand gloves, safety goggles, safety harness &clothing for body protection are mandatory in the plant or work site.
- Use other personal protective equipment as displayed in plan/site.
- It is strictly not allowed to use non-intrinsically safe equipment or instruments in the operational area of site.
- All vehicles for use on the site shall conform to the requirements of the Vehicle Entry Permit. Maximum Speed limit inside complex is 10km/Hr.
- In case of Emergency dial appropriate agency like Fire, Hospital, Security etc as displayed.

Violation of the Rules and Regulations might result in removing the person(s) concerned from the premises and denying the person(s) concerned from any future access to the site. The site in-charge will judge whether permanent removal of the individual from the premises is justified depending on the seriousness of the violation(s). All Indian laws shall be complied with at all the time.

15.12. Site Emergency Preparedness and Response

The CONTRACTOR shall establish, what are the arrangements in the event of an emergency.

The CONTRACTOR shall ensure that their Personnel are familiar with the essential emergency equipment, the use of which shall be demonstrated and practiced in drills.

The CONTRACTOR shall check the emergency procedures and the location and condition of the emergency equipment.

The CONTRACTOR personnel will be instructed of the actions to take in the event of serious personal injury, gas or toxic release, fire, explosion, heavy rains, wind storms, chemical spillage, land slide, scaffolding or structure collapse, critical damage to operating equipment, etc. and other emergency situations during the induction training and other ongoing training sessions.

These situations may demand adequate rescue and relief measure to handle such events quickly and effectively.

In an emergency, or on hearing the alarm, every supervisor shall ensure the following;

- All work is stopped atone.
- All equipment vehicles and tools are shut down (all sources of ignition).
- All men are evacuated to a pre-determined Muster point.
- A roll call is taken and every man is accounted for.
- No one is permitted to return to work until notification has been received from the CONTRACTOR representative that it is safe to dose.

15.12.1. Emergency Preparedness

The basic and essential features of any emergency Preparedness are to analyses and plan for the potential risk. This includes;

- Establishing and maintaining effective communications.
- Liaison with local emergency services and authorities.
- Action Procedure (evacuation routes and assembly pointed.).
- Appointment of key personnel and specifying their duties and responsibility.
- Emergency Response Drills

15.12.2. Emergency Response Drills

Effectiveness and comprehensiveness of Emergency Response Plan must be tested on a regular basis. Drills which reflect the conditions induced from the more likely emergency occurrences must be conducted. CONTRACTOR should conduct such drill on periodic basis. All emergency drills, exercises and responses to actual incidents shall be fully documented and followed by a complete review and when necessary, procedure revision process.

Initiate any required procedural changes, and initiate the dissemination of any lessons learned through the Site HSE communication system.

15.13. Road Safety Norms

- For roadside working site to be barricaded..
- Only eligible driver can drive required vehicle inside site
- Speed limit norms of site must be followed
- No riding or travelling on the back of open end vehicle, fork lift or trailers should be done.

15.14. Environment

The CONTRACTOR shall pay due regard to the environment by preserving air, water, soil, animal and plant life from adverse effects of the CONTRACTOR's activities and minimizing any nuisance which may arise from such operations.

All waste generated by the CONTRACTOR shall be contained and disposed of in accordance with the legal requirement on waste management.

15.15. Labor Welfare &Legal Requirement

- All mandatory provisions with regard to safety as prescribed under contract Labor (Abolition & Regulation) Act 1970 and Rules made there under are applicable.
- Workmen compensation insurance and registration under ESI should be maintained.
- Time to time, all rules and regulations suggested by safety committee of site must be followed and implemented

ANNEXURES

ANNEXURE – A

RELEVANT IS-CODES FOR PERSONNEL PROTECTION

IS : 2925 – 1984	:Industrial Safety Helmets
IS : 4770 – 1968	:Rubber gloves for electrical purposes
IS : 6994 – 1973	:Industrial Safety Gloves (Leather & Cotton)
(Part – I)	
IS : 1989–1986	:Leather safety boots and shoes
(Part – I & III)	
IS : 3738 – 1975	:Rubber knee boots
IS : 6519 – 1971	:Code of practice for selection, care and repair of Safety footwear
IS : 11226 – 1985	:Leather Safety footwear having direct molding sole
IS : 5983 – 1978	:Eye protectors
IS : 9167 – 1979	:Ear protectors.
IS : 3521 – 1983	:Industrial Safety belts and harness

ANNEXURE – B

FORMAT - 1.0

1.0 : HEALTHY, SAFETY & ENVIRONMENT (HSE) PLAN

Project : ----------

Contractor:----------

Date : ----------

Owner: ……

(To be prepared & submitted by each Construction Agency)

Activity Description	Procedure/ W.I./ Guidelines	Code of Conformance	Performing Function			Audit Function
			Performance	Checker	Approver	Customer Review/ Audit Requirements

PREPARED BY REVIEWED BY APPROVED BY

SUPPLEMENTARY ACCIDENT, INCIDENT&NEAR MISS REPORT

Project:_____Supplementary to report No._____

Site : _____Date:_____

Contractor: _____

NAME OF THE INJURED……

FATHER'S NAME……

SUB-CONTRACTOR M/S……

DATE & TIME OF ACCIDENT……

LOCATION……

BRIEF DESCRIPTION & CAUSE OF A ACCIDENT

NATURE OF INJURY / DAMAGE

COMMENTS FROM MEDICAL PRACTITIONER WHO ATTENDED THE VICITIM/INJURED

SUGGESTED IMPROVEMENT IN THE WORKING CONDITION IF ANY

LOSS OF MANHOURS AND IMPACT ON SITE WORKS

ANY OTHER COMMENT BY SAFETY OFFICER

Date:_____/_____/_____ SIGNATURE OF CONTRACTOR WITH SEAL

To : OWNER …… 1 COPY

: RCM/SITE-IN-CHARGE…… 1 COPY

ACCIDENT REPORT

(To be submitted by Contractor after every accident within 2 hours of accident)

Report No._____Date:____
Name of Site:_____COTRACTOR_____

NAME OF THE INJURED……..
FATHER'S NAME……SUB-CONTRACTOR M/S…….

DATE & TIME OF ACCIDENT……
LOCATION…….

BRIEF DESCRIPTION OF ACCIDENT

CAUSE OF ACCIDENT

NATURE OF INJURY / DAMAGE

MEDICAL AID PROVIDED / ACTIONS TAKEN

INTIMATION TO LOCAL AUTHORITIES

Date :_____/_____/_____ SIGNATURE OF CONTRACTOR WITH SEAL

To	:	OWNER……	1 COPY
	:	RCM/SITE-IN-CHARGE	1 COPY

PIPING SPECIFICATION

SPECIFICATION NO
1C1
SHEET 1 OF 6
REV 0

BASIC PIPING SPECIFICATION DATAS		MAXIMUM DESIGN CONDITIONS			
		TEMPERATURE ° C		PRESSURE bar g	
PRIMARY FLANGE RATING	150#-RF	**NG**	**0 to 60**	**NG**	**19.00**
		AG	**60**	**AG**	**19.00**
BASIC MATERIAL	CARBON STEEL				
CORROSION ALLOWACE	1.6 mm				
X-RAYS	100%				
SIZE RANGE	1/2"-12"				
CODE	**ANSI B 31.8**				

FLUIDS

NG : NATURAL GAS

AG : ACTUATING GAS

REV	DESCRIPTION	DATE	AUTHOR	CHECKER	APPROVED
0	**FIRST ISSUE**	**20.06.2017**	**MD**	**ADE**	**AD**

			PIPING SPECIFICATIONS				SPECIFICATION NO 1C1 SHEET 2 OF 6 REV 0
ITEM	**SHORT CODE**	**SIZE FROM-THRU**	**END CONNECTION**	**RATING AND/OR SCHED.**	**DIMENSION STANDARD**	**MATERIAL**	**REMARKS**
PIPES	**P**	1/2" - 2" 3" - 12"	BE-ANSI B16-25 BE-ANSI B16-25	40 40	ANSI B36-10 ANSI B36-10	ASTM A 106 Gr. B ASTM A 106 Gr. B	SEAMLESS SEAMLESS
ELBOWS 90 LR	**E**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
ELBOWS 46 LR	**E46**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
ELBOWS 30 LR	**E30**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
ELBOWS 22.5 LR	**E22.6**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
ELBOWS 16 LR	**E16**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
REDUCERS	**RC**	3/4"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
REDUCERS	**RE**	3/4"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
TEES EQUAL	**T**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
TEES RED	**TR**	3/4"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
WELDOLETS	**WEL**	1.1/2"-12"	BW - ANSI B16-25	SEE PIPE	MANUFACTURER	ASTM A 105	SEAMLESS
CAPS	**C**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
NIPPLES	**NBEP** **NOET** **NBET**	1/2" - 1.1/2" 1/2" - 1.1/2" 1/2" - 1.1/2"	BOTH ENDS PLAIN ONE END THRD-MNPT OTH ENDS THRD-MNP	80 80 80	ANSI B36-10 ANSI B36-10 ANSI B36-10	ASTM A 106 Gr. B ASTM A 106 Gr. B ASTM A 106 Gr. B	SEAMLESS-LG=100mm SEAMLESS-LG=100mm SEAMLESS-LG=100mm
FULL COUPLINGS THRD	**CF**	1/2" - 1.1/2"	FNPT ANSI B1-20-1	1500#	ANSI B16-11	ASTM A 105	SEAMLESS
CAPS THRD	**C2**	1/2" - 1.1/2"	FNPT ANSI B1-20-1	1500#	ANSI B16-11	ASTM A 105	SEAMLESS
PLUGS THRD	**PL**	1/2" - 1.1/2"	MNPT ANSI B1-20-1	1500#	ANSI B16-11	ASTM A 105	SEAMLESS

			PIPING SPECIFICATIONS				SPECIFICATION NO 1C1 SHEET 3 OF 6 REV 0
ITEM	**SHORT CODE**	**SIZE FROM-THRU**	**END CONNECTION**	**RATING AND/OR SCHED.**	**DIMENSION STANDARD**	**MATERIAL**	**REMARKS**
WN FLANGES	**F**	1/2"-12"		150# RF SEE PIPE	ANSI B16-5	ASTM A 105	WN to match with 1C1 pipe
ORIFICE FLANGES	**FO**	1" - 12"		150# RF SEE PIPE	ANSI B16-36	ASTM A 105	COMPLETE WITH GASKET BOLTS, NUTS JACK-SCREWS AND PLUGS
BLIND FLANGES	**FB**	1"-12"		150# RF	ANSI B16-5	ASTM A 105	
DRIP RINGS	**DR**	1" - 12"		150# RF	MANUF STD.	ASTM A 105	3/4" FNPT OUTLET CONNECTION
SPECTACLE BLINDS	**SB**	1" - 12"		150# RF	ANSI B16-5	ASTM A 515 GR 70	
RESTRICTION ORIFICES	**RO**	1" - 12"		150# RF	ANSI B16-5	ASTM A240 GR 304	
MONOLITHIC INSULATING JOINTS	**IJ**	2"-12"	BW - ANSI B16-25	150#	ANSI B16-5	PIPE PUPS: ASTM A 106 Gr.B	REFER DATA SHEET
STUD BOLTS	**B**	1/2" - 12"		150# RF	ANSI B18.2.1 ANSI B18.2.2	ASTM A 193 B 7 HEXAGONAL NUTS ASTM A194 GR 2H	
GASKETS SPIRAL WOUND	**G**	1/2"-12"		150# RF	API 601 MSS SP 44	WINDING ANSI 304 FILLING PURE GRAPHITE CENTERING RING CS	4.5 mm THK

PIPING SPECIFICATIONS

SPECIFICATION NO
1C1
SHEET 4 OF 6
REV 0

ITEM	SHORT CODE	SIZE FROM-THRU	END CONNECTION	RATING AND/OR SCHED.	DIMENSION STANDARD	MATERIAL	REMARKS
BALL VALVES	**VBA**	1/2" - 11/2"	FLGD RF:ANSI B16-5	600#	ANSI B16-10	BODY: ASTM A 105 BALL: ASTM A218 WCB / A 234 WPA / A 395 WITH ENP (75 microns)	FULL BORE WRENCH OPERATED. FIRE SAFE
		2"- 3"	FLGD RF:ANSI B16-5	150#	ANSI B16-10	BODY: ASTM A 216 WCB BALL: ASTM A 216 WCB / A 234 WPB / A 395 with ENP (75 microns)	FULL BORE WRENCH OPERATED. FIRE SAFE
		4"- 8"	FLGD RF:ANSI B16-5	150#	ANSI B16-10	BODY: ASTM A 216 WCB BALL: ASTM A 216 WCB / A 234 WPB / A 395 with ENP (75 microns)	FULL BORE GEAR OPERATED FIRE SAFE
GLOBE VALVES	**VGL**	1/2"-1 1/2"	FLGD RF:ANSI B16-5	600#	ANSI B16-10	BODY: ASTM A 105 TRIM: ASTM A182 F6	HANDWHEEL FIRE SAFE
		2" - 8"	FLGD RF:ANSI B16-5	150#	ANSI B16-10	BODY: ASTM A 216 WCB TRIM: ASTM A 182 F6	HANDWHEEL FIRE SAFE
SWING CHECK VALVES	**VCH**	1/2" - 11/2"	FLGD RF:ANSI B16-5	600#	ANSI B16-10	BODY: ASTM A 105 TRIM: ASTM A182 F6	HORIZONTAL INSTALLATION VERTICAL INSTALLATION FLOW UPWARDS
		2"-18"	FLGD RF:ANSI B16-5	150#	ANSI B16-10	BODY: ASTM A 216 WCB TRIM: ASTM A182 F6	HORIZONTAL INSTALLATION VERTICAL INSTALLATION FLOW UPWARDS

REDUCERS CHART

SMALL SIZE

LARGE SIZE

	1/2"	3/4"	1"	1.1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	32"	36"
1/2"																				
3/4"	X																			
1"	X	X																		
1.1/2"	X	X	X																	
2"		X	X	X																
3"				X	X															
4"				X	X	X														
6"						X	X													
8"							X	X												
10"							X	X	X											
12"								X	X	X										
14"																				
16"																				
18"																				
20"																				
24"																				
28"																				
30"																				
32"																				
36"																				
42"																				

LEGEND

X :CONCENTRIC AND ECCENTRIC REDUCERS-BW

	PIPING SPECIFICATIONS	SPECIFICATION NO 1C1
		SHEET 6 OF 6
		REV 0

BRANCH CHART

BRANCH SIZE

HEADER SIZE	1/2"	3/4"	1"	1.1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	32"	36"
1/2"	T																			
3/4"	TR	T																		
1"	TR	TR	T																	
1.1/2"	W	TR	TR	T																
2"	W	W	TR	TR	T															
3"	W	W	W	TR	TR	T														
4"	W	W	W	W	TR	TR	T													
6"	W	W	W	W	W	TR	TR	T												
8"	W	W	W	W	W	BW	TR	TR	T											
10"	W	W	W	W	W	BW	BW	TR	TR	T										
12"	W	W	W	W	W	BW	BW	BW	TR	TR	T									
14"																				
16"																				
18"																				
20"																				
24"																				
28"																				
30"																				
32"																				
36"																				

LEGEND

T : TEE EQUAL-BW

TR : REDUCING TEE-BW

W : WELDOLET- BW

BW : BRANCH WELD-CHECK IF REINFORCING PLATE IS NECESSARY ACCORDING ANSI B 31.8

DATA SHEET FOR MANUAL GLOBE VALVES ABOVE GROUND SERVICE (1C1)	DATA SHEET NO.
	Page 1 OF 2

I. PROCESS DATA

- PIPE CLASS : 1C1
- FLUID : Natural Gas Fluid Symbol :NG
- OPERATING CONDITIONS
  - Pressure (barg) : 4 Barg
  - Temperature (°C) : 03 to 48 (°C)
- DESIGN CONDITIONS
  - Pressure (barg) : 19 Barg
  - Temperature (°C) : -20 to 60 (°C)

II. VALVE DATA

- CONSTRUCTION DESIGN : BS 1873
- TYPE : HIGH RESISTANCE TO VIBRATIONS AND HIGH DIFFERENTIAL PRESSURE
  : UNIDIRECTIONAL
  : GLAND TYPE-BOLTED BONNET-NON ROTATING STEM
  PATTERN : STRAIGHT THROUGH GLOBE
- END CONNECTION : FLANGED RF - ANSI B16.5, 150#
- FACE TO FACE : ANSI B16.10
- BODY MATERIAL :

Below 2"	2"& above
ASTM 105	ASTM or ASTM A 216 Gr WCB

- DISC MATERIAL : ASTM 216 Gr. WCB +STELLITED or Equivalent/Superior
- SEAT : ASTM 216 Gr. WCB +STELLITED or Equivalent/Superior
- TRIM : ASTM A182 F6 or Equivalent/Superior
- STEM : ASTM A182 F6 or Equivalent/Superior
- GASKET : GRAPHITE or Equivalent/Superior
- PACKING : GRAPHITE or Equivalent/Superior
- OPERATOR : Wrench Upto 4", Gear for above 4"
- EXTENSION STEM : NO
- **PAINTING**
  - Surface preparation : SA 2.5
  - Primer : 30 - 40 µm
  - Finish : 30 - 40 µm
  - Final Paint DFT : 300 µm (min.)
- INSULATION : No

DATE	REV	BY	CHK	APP	REMARK	DATA SHEET FOR MANUAL GLOBE VALVES (1C1)

III. VALVE INSPECTION AND TESTING

- SHELL TEST : SEE API 598
- BACKSEAT TEST : SEE API 598
- LOW -PRESSURE CLOSURE TEST : SEE API 598
- HIGH-PRESSURE CLOSURE TEST : SEE API 598
- VISUAL EXAMINATION OF CASTINGS : SEE API 598
- HIGH-PRESSURE PNEUMATIC SHELL TEST : SEE API 598
- FIRE SAFE TEST : N/A

IV. QUALITY CONTROL

- MATERIAL CERTIFICATES : EN 10204 - 3.1
- ALL NECESSARY CERTIFICATES : ALL TEST CERTIFICATE INCLUDING FIRE SAFE. ANTISTATIC, PHYSICAL, IMPACT, CHEMICAL, PAINTING ETC.

NOTE :

1 Unless otherwise stated, all tests will be witnessed by the purchaser.

2 For detail of Painting, refer Painting Table

I. PROCESS DATA

- **FLUID**	:	Natural Gas
- **FLUID SYMBOL**	:	NG
- **OPERATING CONDITION**	:	A/G
- **TEMPERATURE (˚C)**		0-50 °C
- **PRESSURE (Barg)**		04 barg
- **DESIGN CONDITION**	:	A/G
- **TEMPERATURE (˚C)**		0-60 °C
- **PRESSURE (Barg)**		19 barg

II SPECIFICATION

- **DIMENSIONAL STANDARD**		ANSI B 16.10
- **CONSTRUCTION DESIGN**	:	API 6D
- **PIPE CLASS**	:	1C1
- **RATING**	:	150#
- **TYPE**	:	SWING CHECK
- **END CONNECTION**	:	FLANGED (RF) ANSI B 16.5
- **BODY MATERIAL**	:	ASTM A 350 Gr. LF2/ASTM A352 or LCB or Equivalent/Superior
- **WEDGE**	:	ASTM A 350 Gr. LF2/ASTM A182 F6 or Equivalent
- **DISC**	:	ASTM A 350 Gr. LF2/ASTM A182 F6 or Equivalent
- **HINGE PIN**	:	ASTM A 182 F6
- **GASKET**	:	GRAPHITE
- **PUPS (Applicable only for BW end)**		
- **LENGTH**	:	At least 2.0 D for size below 6" & 300mm for 6" and above size valves
- **MATERIAL OF CONSTRUCTION**		Suitable to Connecting pipe material in terms of strength and thickness
- **PAINTING (Refer Annexure II of PTS)**		A/G
- **SURFACE PREPARATION**	:	SA 2.5 Type of paint, DFT and total DFT shall be as per paint system number
- **PRIMER**	:	Choose from table AS ISO 12944-5 suitable for highly corrosive environment
- **FINISH**	:	Final shade of valve shall be as per atached painting table. Final Paint DFT - 300 microns minimum
- **INSULATION**	:	NO

DATE	REV	BY	CHK	APP	REMARKS

III. TEST :

- **HYDROSTATIC SHELL TEST**
- Test pressure : 1.5 x Design Pressure

- **HYDROSTATIC SEAT TEST**
- Test pressure : 1.1 x Design Pressure

- **AIR SEAT TEST :**
  Test pressure : 6 barg

- **HIGH PRESSURE CLOSURE TEST** : API 598
- **LOW PRESSURE CLOSURE TEST** : API 598
- **LEAK TEST** : API 598
- **FIRE TEST** : API 6FA
- **VISUAL AND DIMENSIONAL EXAMINATION TEST** : YES

IV. QUALITY CONTROL :

- **MATERIAL CERTIFICATES** : EN 10204-3.1
- **ALL TEST CERTIFICATES** : TEST CERTIFICATES INCLUDING, FIRE SAFE, ANTISTATIC, PHYSICAL IMPACT, CHEMICAL, PAINTING

CLIENT : INDRAPRASTHA GAS LIMITED	**DATA SHEET (1C1)** **Y-TYPE STRAINER** FOR ABOVE GROUND (A/G) SERVICES	**DATA SHEET No. :** **Page 1 of 2**

I. PROCESS DATA :

- FLUID	:	Natural Gas
- FLUID SYMBOL	:	NG
- **OPERATING CONDITION**		
- FLOW RATE (m^3/hr)	:	NA
- TEMPERATURE (^oC)	:	0 to 60
- PRESSURE (Barg)	:	04
- **DESIGN CONDITION**		
- FLOW RATE (m^3/hr)	:	
TEMPERATURE (^oC)	:	-20 to 65
- PRESSURE (Barg)		19

II. STRAINER DATA :

- DIMENSIONAL STANDARD	:	ASME B16.5, B16.9, B16.11, B16.20, B18.2.1 & B18.2.2
- CONSTRUCTION DESIGN	:	AS PER CODES AND TECHNICAL SPECIFICATION DOC. NO. 14588-CD-SS-001, PMS
- PIPE CLASS	:	1C1
- ANSI PRESSURE RATING	:	150#
- TYPE	:	Y-TYPE
- SIZE	:	1"
- END CONNECTION	:	FLANGED (RF) AS PER ASME B16.5
- BODY MATERIAL		ASTM A 216 Gr. WCB
- CAP / PLUG	:	ASTM A105
- SCREEN MESH		SS-304, CYLINDRICAL WIRE MESH WITH PERFORATED SHEET
- FILTRATION SIZE		100 MICRON
- STUD BOLTS / NUTS		ASTM A193-B7 / ASTM A194 2H (GALVANISED)
- GASKET		SS-304 SPIRAL WOUND, GRAPHITE FILLED, 4.5MM THK. WITH CS OUTER RING

III TESTS

- **HYDROSTATIC BODY TEST :**

Test pressure	:	1.5 x Design Pressure
Test Duration	:	1/2 HR

NOTES:-

1 Unless otherwise stated, all tests will be witnessed by the purchaser/authorised inspector
2 Net opening area of element shall be minimum 3 times X sectional area of inlet
3 Strainer body casting shall be defect free and shall be MPI/DP tested.

DATA SHEET-PRESSURE GAUGE

UNITS: Flow<-> Liquid- m*3/hr Gas- Sm*3/hr Steam- kg/hr Pressure-> kg/cm*2 G Temperatu**re<-> oC Level/Length<-> mm**

1	Type:-	Direct	
2	Mounting:-	Local	
3	Dial Size:-	150 mm	
	Colour:-	White with black inscriptions	
4	Case Material:-	SS316	
5	Bezel Ring:-	Beyonet type SS316/Screwed	
6	Window Material:-	Shatterproof glass	
7	Enclosure:-	WP to IP 65 as per IEC 60529 / IS 2147	
8	Pressure Element:-	Bourdon	
9	Element Material:-	SS316	
10	Socket Material	SS316	
11	Accuracy:-	+/-1% of FSD	
12	Zero adjustment:-	Micropointer	
13	Connection:-	1/2" NPT(M)	
	Connection Location:-	Bottom	
14	Movement:-	SS316	
15	Diaphargm Seal:-	--	
	Type:-	--	
	Wetted Parts Material:-	--	
	Others Material:-	--	
	Process Connection: Size & Rating	--	
	Facing & Finish:-	--	
	Capillary Material:-	--	
	Armour - Flexible Material:-	--	
	Capillary Length:-	--	
	Flushing/Filling connection with:-	--	
16	Over Range Protection:-	130% of FSD	
17	Blow Out Protection:-	Yes	
18	Options :-	a) Snubber	
	b) Syphon	c) Gauge Saver	
	d) Liquid Filled casing	e) Vaccum Protection	
	f) Solid front		
	g) Two valve manifold	Yes	
19	Quantity :-	*	

SL. NO.	TAG NO.	RANGE	PRESSURE kg/cm2			TEMPERATURE ºc			SERVICE	OPTIONS
			OP.	MAX.	DES.	MIN	MAX	DES.		
	*	*	0-40	-	49	-	65	-	Natural Gas	e,f,g

NOTES:

'*' Venodr to furnish

1 Since the natural gas is saturated with water and has corrosive constituents CO2-2.08%, the wetted parts of the instruments shall be suitable for that accordingly.
2 Vendor shall furnish Make and Model No. with product catalogues along with the offer.
3 Above data-sheet is typical for all Pressure Gauges used in the respective P&ID.Vendor shall submit the individual data sheet of each pressure gauge .
4 Make of the PG shall be Waree / A N Instruments / General Instruments.

☐ DEVIATION ☐ NO DEVIATION ☐ VENDOR'S SIGNATURE WITH SEAL

QUALITY CONTROL TABLES
GI PIPES CONFORMING TO IS:1239 (PART-1):2004 (Latest edition)

S.NO.	COMPONENTS /OPERATIONS	CHARACHTERISTICS	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	VENDOR	TPIA
1	2	3	4	s	6	7	8	9	10	11
1	**Raw Material Inspection**									
1.1	RAW MATERIAL (Steel Tube Heavy Duty Class C)	IDENTIFICATION	Major	Co-relation with MTC.	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	T.C.	p	R
		CHEMICAL COMPOSITION	Major	Chem. Analysis	One Per Heat	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	T.C.	p	R
		PHYSICAL PROPERTIES (T.S., Y.S., % Elongation)	Major	Lab. Test	One Per Heat	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	T.C.	P	R
		VISUAL & DIMENSIONS	Major	Visual & Measurement	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	T.C.	P	R
2	**IN PROCESS INSPECTION**									
2.1	PIPE MANUFECTURING	SURFACE DEFECT	Major	Visual	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	R
		DIMENSIONS (O.D., THK., LENGTH etc.)	Major	Measurement	As Per Relevant Std.	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	R
		MASS (Kg/ Mtr .)	Major	Measurement	As Per Relevant Std.	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	R
2.2	END PREPARATION	END TYPE & DIMENSIONS	Major	Visual & Measurement	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	R
2.3	PHYSICAL PROPERTIES	TENSILE STRENGTH , ELONGATION & BEND TEST/ FLATTENING TEST AS APPLICABLE	Major	Lab. Test	As Per Relevant Std.	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	lIR	p	R
2.4	LEAK TEST	HYDRAULIC	Critical	Leak Test	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	w
2.5	GALVANIZING	ZINC COATING UNIFORMITY & MASS	Major	Mass of Zinc Coating & Uniformity	One sample at every hour & As per relevant Stand.	IS: 4736	IS: 4736 & IS: 2633	IIR	p	w
2.6	FINISH, PAINTING & MARKING	OVERALL FINISH, PAINTING & MARKING	Major	Visual	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	lIR	p	R

		QUALITY CONTROL TABLES GI PIPES CONFORMING TO IS:1239 (PART-1):2004 (Latest edition)								
S.No.	**COMPONENTS OPERATIONS**	**CHARACHTERISTICS**	**CLASSIFICATION**	**TYPE OF CHECK**	**QUANTUM OF CHECK**	**REFERENCE DOCUMENTS**	**ACCEPTANCE NORMS**	**FORMAT OF RECORD**	**VENDOR**	**TPIA**
1	**2**	**3**	**4**	**s**	**6**	**7**	**8**	*9*	**10**	**11**
3	**POWDER COATING TEST**									
3.1	POWDER COATING TEST	SALT SPRAY RESISTANCE	Major	Visual	1000 Hrs (MIN.)	IS: 13871	IS: 13871	IIR	P	R
3.2		POROSITY	Major	Visual	-	IS: 13871	IS: 13871	IIR	P	R
3.3		HUMIDITY RESISTANCE	Major	Visual	1000 Hrs (MIN.)	IS: 13871	IS: 13871	IIR	P	R
3.4		WEATHERING GLOSS RETENTION AFTER 1000 Hrs.(Sun Test with Water Impression , Xenon 150 K lux)	Major	Visual	60 - 70%	IS: 13871	IS: 13871	IIR	P	R
3.5		COLOUR	Major	Visual	CANARY YELLOW	IS: 13871	IS: 13871	IIR	P	R
4	**FINAL INSPECTION**									
4.1	FINISHED PRODUCT	FINISH DIMENSIONS	Critical	Visual & Measurement.	Random As Per IS:47ll	IS:1239/P.O. Spec./PTS	IS:1239/P.O. Spec./PTS	Dimensional IR	P	W
		PHYSICAL PROPERTIES (TENSILE STRENGTH, ELONGATION & BEND TEST/ FLATTENING TEST AS APPLICABLE)	Critical	Lab Test	Random As Per IS 4711	IS:1239/P.O. Spec./PTS	IS:1239/P.O. Spec./PTS	Physical IR	P	W
		MASS OF ZINC COATING, UNIFORMITY & ADHESION TEST	Critical	GALV. TEST(LAB Test)	AS PER IS: 4736	IS 4736	IS 4736	GALV. REPORT	P	W
		LEAK TEST (HYDRAULIC TEST)	Critical	Leak Test	100% by MFR.	IS:1239/P.O. Spec./Tender Spec	IS:1239/P .O. Spec./Tender Spec	IR	P	RW (Min 10% per lot by TPIA)
		REVIEW OF ALL TEST CERTIFICATE I REPORTS & VENDOR'S llR	Major	Review	All TC	IS:1239/P.O. Spec./Tender Spec., EN 10204	IS:1239/P.O. Spec./Tender Spec , EN 10204	R	P	R
		Coating Thickness	Major	Visual	Random as per IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IIR	P	W

		QUALITY CONTROL TABLES GI PIPES CONFORMING TO IS:1239 (PART-1):2004 (Latest edition)								
S.No										
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	***9***	**10**	**11**
4.2	POWDER COATING TEST	GLOSS 60 DEG.	Major	VISUAL	AS PER IS: 4711/ IS:13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		CROSS HATCH ADHESION	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		CYLINDRICAL BENDING TEST	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		ENRICHSEN CUPPING	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		PENCIL HARDNESS	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		SCRATCH RESISTANCE	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		IMPACT RESISTANCE	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
4.3	-	IDENTIFICATION & MARKING	Major	VISUAL	IS: 4711	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	-	P	W
4.4	-	WORKMANSHIP	Major	VISUAL	IS: 4711	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	-	P	R
4.5	-	PERFORMANCE OF INSTRUMENTS	Major	CALIBERATION	EACH INSTRUMENT	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	CALIBERATION CERTIFICATE	P	R

LEGENDS H-HOLD P-PERFORMANCE R-REVIEW W-WITNESS TC-TEST CERTIFICATE IIR-INTERNAL INSPECTIONR EPORT CA-CONTROL AUTHOIRTY TPIA - THIRD PARTY INSPECTION AGENCY

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 I 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'srepresentativeincludingTPIAwillhavetherighttoinspectanyactivityofmanufacturingatanytime.**
7. **All reference Codes / Standards. Documents, P.O. Copies shall be arranged by vendor I 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, dispatch clearance note & MTC.**

QUALITY CONTROL TABLES GI FITTINGS

SR. No	DESCRIPTION	COMPONENT	CHARACTERISTICS	QUANTUM OF CHECK	REF. DOC.	ACCEPTANCE NORMS	RECORD	INSPECTION			REMARKS
								MANUF.	TPIA	CA	
1	Chemical composition of material	Test Bar	Marking and correlation with TC	IS: 14329 Grade BM 300	PO, Material specification	IS 14329/ PO, Material specifications	Mill TC	R	R	R	
2	Chemical composition of Final product	Fitting	Chemical properties	IS: 14329 Grade BM 300	PO, Material specification	IS 14329/ PTS	TC	P	E	R	
3	Cleaning and Flushing	Fitting	Descaling / Peel off	100%	IS 14329/ PTS	IS 14329/ PTS	Inspection Report	P	RW	R	
4	Destructive Testing (Tensile, Elongation & Hardness)	Fitting	Mechanical Properties	IS 14329	IS 14329/ PTS	IS 14329/ PTS	Lab Report	P	W	RW	
5	Compression Test	Fitting	Malleability	Three samples per Heat	IS 1879/ PTS	IS 1879/ PTS	Inspection Report	P	W	RW	
6	Pressure Test	Fitting	Pneumatic	IS 1879	IS 1879/ PTS	IS 1879/ PTS	Inspection Report	P	W	RW	As per sampling procedure of IS 1839
7	Alignments of Thread	Fitting	ASME B1.20.1/NPT	IS 1879	IS 1879/ PTS	IS 1879/ PTS	Inspection Report	P	W	RW	
8	Galvanizing	Fitting	Integrity of galvanized coating	As listed in IS 4759	IS 4736/ PTS	PTS	Inspection / Lab Report	P	W	RW	
9	Powder Coating	Fitting	Coating	IS: 13871/PTS	IS: 13871/PTS	IS: 13871/PTS	Inspection Report	P	W	RW	
10	Final inspection	Fitting	Visual, Dimensions, Finish, weld bevel, Bore, Marking, Powder Coating Thickness*	IS 1879	IS 1879/ PTS	IS 1879/ PTS	Inspection Report	P	W	R	
11	Marking	Fitting	PTS	100%	PTS	PTS	Inspection Report	P	R	R	
12	Documentation	-	-	-	As per the terms and conditions of the PO & PTS	As per the terms and conditions of the PO & PTS	Compliance certificate	-	-	-	

*60 Microns Minimum

LEGENDSH-HOLD P-PERFORMANCE R-REVIEW W-WITNESS TC-TEST CERTIFICATE IIR-INTERNAL INSPECTION REPORT CA-CONTROL AUTHOIRTY TPIA-THIRD PARTY INSPECTION AGENCY

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 I 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 procedure shave 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 I supplier for reference of TPIA / IGL at the time of inspection.
8. At the time of deleivery of material in stores, vendor will submit copy of all related document of inspection along with release note, dispatch clearance note & MTC.

QUALITY CONTROL TABLES COPPER TUBE

SR. No	DESCRIPTION	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA (As per EN 1057/ PTS)	FORMAT OF RECORD	INSPECTIO VENDOR	INSPECTIO TPIA/ CLIENT	REMARKS
1	Raw material: Chemical Requirement	As per EN 1057	As per EN 1057	Material grade Cu-DHP/ CW 024A Cu + Ag : Min 99.9% P: 0.0015% TO 0.040%	MTC	P	R	
2	Final product: Chemical Requirement	As per EN 1057	As per EN 1057		Inspection Report	P	W	
3	Physical test (Tensile, Elongation, Hardness etc.)	As per EN 1057	As per EN 1057	UTS- Min. 250 N/ Sq.mm Elongation - Min 30% Hardness- 75 to 100 HV	Inspection Report	P	W	
4	Carbon film tets	As per EN 1057	As per EN 1057	Maximum Residual carbon- 0.20 mm/ sq. dm	Inspection Report	P	W	
5	Carbon content test	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	W	
6	Drift expanding test	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	W	
7	Hydrostatic test	As per EN 1057	As per EN 1057	Min 35 bar/ 10 second	Inspection Report	P	W	
8	Eddy current test	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	W	
9	Dimensional Inspection (O.D, Wllthk, Length etc.)	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	W	
10	Visual Inspection (Free from defect)	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	R	
11	Marking	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	R	
12	Documentation	-	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	R	

LEGENDS H-HOLD W- WITNESS P- PERFORM TPIA- THIRD PARTY INSPECTION AGENCY CA- CONTROL AUTHOIRTY

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 specification.
2. The supplier shall submit their own detailed ITP prepared on the basis of above I 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
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
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 I 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, dispatch clearance note & MTC.

QUALITY CONTROL TABLES COPPER FITTINGS

SR. No	DESCRIPTION	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA (As per EN 1057/ PTS)	FORMAT OF	INSPECTIO VENDOR	TPIA/ CLIENT	REMARKS
1	Raw material: Chemical Requirement	one in each heat	As per EN 1254	Material grade Cu-DHP/ CW 024A Cu + Ag : Min 99.9% P: 0.0015% TO 0.040%	MTC	P	R	
2	Final product: Chemical Requirement	one in each heat	As per EN 1254		Test Report	P	W	
3	Carbon in bore tests (Carbon film test, carbon content test)	one in each heat	As per EN 1254	As per EN 1254/ PTS	Test Report	P	W	
4	Stress corrosion resistance test	one in each heat	As per EN 6957	As per ISO 6957/ PTS	Test Report	P	W	
5	Hydrostatic pressure test	100%	As per EN 1254	Min 37.5 bar @ 15 min.	Test Report	P	W	
6	Pneumatic pressure test	100%	As per EN 1254	Min 6 bar @ 10 second	Test Report	P	W	
7	Dimensional Inspection (O.D, Wll thk, Length etc.)	100%	As per EN 1254	As per EN 1254/ PTS	Test Report	P	W	
8	Visual Inspection (Free from defect)	100%	As per EN 1254	As per EN 1254/ PTS	Test Report	P	R	
9	Marking	100%	As per EN 1254	As per EN 1254/ PTS		P	R	
10	Documentation	-	As per EN 1254	As per EN 1254/ PTS	Inspection Report	P	R	

LEGENDS H-HOLD W-WITNESS P-PERFORM TPIA- THIRD PARTY INSPECTION AGENCY CA- CONTROL AUTHOIRTY

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 specification.
2. The supplier shall submit their own detailed ITP prepared on the basis of above I 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
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
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 I 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, dispatch clearance note & MTC.

QUALITY CONTROL TABLES BRASS FITTINGS

SR. No	DESCRIPTION	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA (As per EN 1057/ PTS)	FORMAT OF RECORD	INSPECTION		REMARKS
						VENDOR	TPIA/ CLIENT	
1	Raw material: Chemical/ Physical Requirement	one in each heat	As per EN 2164	As per EN 12164/ PTS	MTC	P	W	Preferably witness by CA
2	Final product		As per EN 2164			P	W	
3	Resistance dezincification	one in each heat	As per EN 6957	As per EN 1254	Test Report	P	W	
4	Carbon bore test	one in each heat	As per EN 2164	As per ISO 6957/ PTS	Test Report			
5	Stress corrosion resistance test	one in each heat	As per EN 2164	As per ISO 1254/ PTS	Test Report	P	W	
6	Hydrostatic pressure test	100%	As per EN 2164	Min 37.5 bar @ 15 min.	Test Report	P	W	Preferably witness by CA
7	Pneumatic pressure test	100%	As per EN 12164	Min 6 bar @ 15 second	Test Report	P	W	Preferably witness by CA
8	Visual Inspection (Free from defect)	100%	As per EN 12164	As per EN 1254/ PTS	Test Report	P	R	
9	Dimensional Inspection (O.D, Wll thk, Length etc.)	100%	As per EN 12164	As per EN 1254/ PTS	Test Report	P	W	
10	Marking	100%	As per EN 12164	As per EN 1254		P	R	
11	Documentation	-	PO/ PTS	PO/ PTS	Test Report	P	H	

LEGENDS H-HOLD W-WITNESS P-PERFORM TPIA- THIRD PARTY INSPECTION AGENCY CA- CONTROL AUTHOIRTY

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 specification.
2. The supplier shall submit their own detailed ITP prepared on the basis of above I 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
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
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 I 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, dispatch clearance note & MTC.

QUALITY CONTROL TABLES STEEL REINFORCED RUBBER HOSE

SR. No	DESCRIPTION	TEST PARAMETERS	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA (As per EN 1057/ PTS)	CERTIFICATE	INSPECTION		REMARKS
							VENDOR	TPIA/ CLIEN	
1.	Raw Material	Chemical &Mech. Test of material or Steel Reinforced Rubber Hose (Lining, Reinforced material & cover)	100%	IS 9573	IS 9573	MTC	P	R	
2.	Final Product								
2.1	Final Inspection	Mechanical Properties	one (1) per batch	Tensile Strength = 10Mpa (Min.) El (Lining & Cover) is 200 & 250 resp. (Min.)	PTS & IS 9573	Inspection Report	P	W	
2.2		Resistance of Lining to n-pentane	one (1) per batch	Shall not exceed 10% absorbed & 5% extractable as per Cl. No. 5.2 of PTS	Cl. 5.4.3.2 of IS 9573	Inspection Report	P	W	
2.3		Adhesion Test	one (1) per batch	Min. Adhesion shall be 2 KN/m as Cl. No. 5.3 of PTS	Cl. 5.5.1 of IS 9573	Inspection Report	P	W	
2.4		Low Temperature Flexibility Test	One (1) per batch	Conditioned at -40 deg for 50 hours and bent at 180 deg around mandrel of dia 12 times the Nominal Bore of hose as per Cl no. 5.4 of PTS	Cl. 5.5.2 of IS 9573	Inspection Report	P	W	
2.5		Flexibility of hose at 1.5 x design pressure	one (1) per batch	Bend empty to radius 95 mm without Flattening & suffering structural damages.	Cl. 5.5.3 of IS 9573	Inspection Report	P	W	Witness by CA
2.6		Ozone Resistance Test	one (1) per batch	Cl. No 5.9 of PTS	Cl. 5.5.4 of IS 9573	Inspection Report	P	W	Witness by CA
2.7		Hydrostatic/ Proof Pr. Test	100%	2MPa for 1 min. as per Cl. No. 5.7 of PTS	Cl. 5.5.1 of IS 9573	Inspection Report	P	W	Witness by CA
2.8		Burst test	one (1) per batch	Cl. No. 5.9 of PTS	Cl. 5.5.2 of IS 9573	Inspection Report	P	W	
2.9		Grip Strength test	one (1) per batch		Cl. 5.5.7 of IS 9573 & Annex A of IS 9573	Inspection Report	P	W	
2.10		Burning Test	one (1) per batch	Shall not burn till 45 sec. as per Cl. No. 5.10	Cl. 5.5.8 of IS 9573	Inspection Report	P	W	
2.11		Visual & dimensional check	100%	Cl. No. 4.0 of PTS & IS 9573	IS 9573	Inspection Report	P	R	
2.12		Cover color- Orange	100%	Cl. No. 5.2.3 of PTS	PTS & IS 9573	Inspection Report	P	R	
3	End Fittings (Adaptors, nuts, washer)	-	100%	As per Cl. No. 6.0 of PTS	PTS & IS 9573	Inspection Report		R	
4	Marking	-	100%	As per Cl. No. 7.0 of PTS	PTS & IS 9573	Inspection Report	P	R	
5	Documentation	-	-	term & conditions of P.O & PTS	As per term & conditions of P.O & PTS	3.2 Certification as per EN 1024	P	H	

LEGENDSH-HOLD W-WITNESS P-PERFORM TPIA- THIRD PARTY INSPECTIONAGENCY CA- CONTROL AUTHOIRTY

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 specification.
2. The supplier shall submit their own detailed ITP prepared on the basis of above I 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
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
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 I 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, dispatch clearance note & MTC

	INSPECTION AND TEST PLAN – FLANGES SPECTACLE BLINDS & DRIP RINGS	

INSPECTION AND TEST PLAN – FLANGES SPECTACLE BLINDS & DRIP RINGS

0		ISSUED AS STANDARD	GS	ADE	AD
REV	**DATE**	**DESCRIPTION**	**PREP**	**CHK**	**APPR**

ABBREVIATIONS

CE	Carbon Equivalent	NPSH	Net Positive Suction Head
DFT	Dry Film Thickness	PO	Purchase Order
DPT	Dye Penetrant Testing	PESO	Petroleum Explosive Safety Organization
DHT	De-hydrogen Heat Treatment	PQR	Procedure Qualification Record
ERTL	Electronics Regional Test Laboratory	PR	Purchase Requisition
FCRI	Fluid Control Research Institute	PMI	Positive Material Identification
HT	Heat Treatment	RT	Radiography Testing
HIC	Hydrogen Induced Cracking	SSCC	Sulphide Stress Corrosion Cracking
ITP	Inspection and Test Plan	TC	Test Certificate
IP	Ingress Protection	TPI or TPIA	Third Party Inspection Agency
IHT	Intermediate Heat Treatment	UT	Ultrasonic Testing
IC	Inspection Certificate	VDR	Vendor Data Requirement
IGC	Inter Granular Corrosion	WPS	Welding Procedure Specification
MRT	Mechanical Run Test	WPQ	Welders Performance Qualification
NDT	Non Destructive Testing	MPT / MT	Magnetic Particle Testing

1.0 SCOPE:

This Inspection and Test Plan covers the minimum testing requirements of Flanges, Spectacle blinds& Drip Rings.

2.0 REFERENCE DOCUMENTS:

PO/PR/ Standards referred there in/ Job specifications /Approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS:

SL. NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	TPIA
1.0	**Procedure**						
1.1	Heat Treatment, NDT and Other Procedures	Documented Procedures	100%	Procedure Documents	-	H	R
1.2	WPS,PQR & WPQ	Welding Parameters & Qualification Record	100%	WPS,PQR &WPQ	-	H	W- New R- Existing
2.0	**Material Inspection**						
2.1	Raw Material Inspection	Chemical & Mechanical Properties	100%	Test Certificates	-	H	R

3.0	**In Process Inspection**						
3.1	Welding / Forging	Forging /Welding Parameters	100%	Inspection Reports	-	H	-
3.2	Heat Treatment	Stress Relieving, Normalising, Tempering, Solution Annealing, Stabilization Heat Treatment etc. as applicable	100%	HT chart	-	H	R
3.3	Identification of Test Samples	Product Chemical, Mechanical, Impact, IGC and Other test as applicable	100%	Test Reports	-	H	H(Note-1)
3.4	Product Analysis (As applicable	Chemical Composition	As per PR/Purchase Specification	Test Reports	-	H	R
3.5	Destructive Testing	Mechanical, Impact, IGC and Other test as applicable	100%	Test Reports	-	H	H(Note-1)
3.6	NDT as applicable	Surface *&* Internal Imperfections	As per PR/Purchase Specification	NDT Reports	-	H	R
3.7	Galvanizing (If Applicable)	Integrity Of Galvanised Coating	100%	Inspection Report	-	H	-
4.0	**Final Inspection**						

4.1	Final Inspection	1. Visual 2. Dimensions 3. Hardness 4. Marking etc	100%	Inspection report	-	H	H(Note-1)
4.2	PMI Check	Chemical Check	As Per Spec.	Inspection report	-	H	RW
4.3	Final Stamping	Stamping of accepted Items	Stamping of Items which are witnessed by TPIA.	Inspection report	-	H	H(Note-1)
5.0	**Painting**						
5.1	Rust Preventive Coating & Colour Coding	Visual Inspection & Colour Coding as applicable	100%	Inspection report	-	H	-
6.0	**Documentation & IC**						
6.1	Documentation & Inspection Certificate(IC)	Review of Stage Inspection Reports / Test Reports & Issue of IC	100%	Supplier TC & IC	-	H	H

Legend:

H - Hold (Do not proceed without approval),

P - Perform,

RW - Random Witness (As specified or 10% [min.1 no. of each size and type of Bulk item]),

R - Review,

W - Witness (Give due notice, work may proceed after scheduled date).PR- PURCHASE REQUISITION

NOTES (As applicable):

1. For Non NACE & Non Hydrogen service Carbon Steel Flanges, Spectacle Blinds & Drip Rings up to size 24"-300ANSI Class Will be accepted on review of Supplier Test Certificates. Supplier Test Certificate to be reviewed by TPIA.

2. This document describes the generic test requirements. Any additional test or Inspection scope if specified in contract documents shall also be Applicable (unless otherwise agreed upon).

3. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.

4. For orders placed on stockist, items shall be accepted based on manufacturer's TC with EN310204 type 3.2 certification from / OWNER approved suppliers.

QUALITY ASSURANCE PLAN
ISOLATION VALVE

SR. NO.	INSPECTION AND TESTING	QUANTUM OF CHECK / TEST	PROCEDURE	ACCEPTANCE CRITERIA AND CERTIFICATE	FORMAT OF RECORD	INSPECTION BY		REMARKS
						Manufacturer	TPIA	
1.0	Raw Material							
1.1	Metallic Parts (Chemical / Physical Requirement)	One in each heat	As per ASTM B 283 (ALLOY UNS C37700) / EN 331	As per ASTM B 283 (ALLOY UNS C37700) / EN 331	MATERIAL TEST CERTIFICATE	P	R	
1.2	Seat & Stem Seal	One in each heat	As per EN 331 / Manufacturer's Standard	As per EN 331 / Manufacturer's Standard	MATERIAL TEST CERTIFICATE	P	R	
2.0	Final Product :							
2.1	Gas Tightness Test	100%	As per EN 331	As per EN 331	TEST REPORT	P	W = Ten nos. per size per Lot	
2.2	Bending Test	One no. per Heat per Size	As per EN 331	As per EN 331	TEST REPORT	P	W = One no. per size per Lot	
2.3	Turning Torque Test	One no. per Heat per Size	As per EN 331	As per EN 331	TEST REPORT	P	W = One no. per size per Lot	
2.4	Temperature Resistance Test	One no. per Heat per Size	As per EN 331	As per EN 331	TEST REPORT	P	W = One no. per size per Lot	
2.5	Flow Capacity Test	One no. per Heat per Size	As per EN 331	As per EN 331	TEST REPORT	P	W = One no. per size per Lot	
3.0	Visual Inspection (Free from defects)	100%	As per EN 331	As per EN 331	INSPECTION REPORT	P	W = Ten nos. per size per Lot	
4.0	Dimension Tolerances (Min. length of engagement , OD , wall thk.)	100%	As per Approved Drawing	As per Approved Drawing	INSPECTION REPORT	P	W = Ten nos. per size per Lot	
5.0	Marking	100%	As per EN 331	As per EN 331	INSPECTION REPORT	P	W = Ten nos. per size per Lot	
6.0	Final Documentation		As per P.O. / SS	As per P.O. / SS	EN 10204 3.2 CERTIFICATE	P	H	

LEGEND: R - Review, W - Witness, 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 Standard Specification (SS)

2 The supplier shall submit their own detailed QAP prepared on the basis of above / Standard 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 supplier.

4 Contractor shall in coordination with Supplier/Sub vendor shall 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.

9 All Tests shall be carried out as per EN-331 (Latest Edition).

QUALITY CONTROL TABLES
GI PIPES CONFORMING TO IS:1239 (PART-1):2004 (Latest edition)

S.NO.	COMPONENTS /OPERATIONS	CHARACHTERISTICS	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	VENDOR	TPIA
1	2	3	4	s	6	7	8	9	10	11
1	**Raw Material Inspection**									
1.1	RAW MATERIAL (Steel Tube Heavy Duty Class C)	IDENTIFICATION	Major	Co-relation with MTC.	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	T.C.	p	R
		CHEMICAL COMPOSITION	Major	Chem. Analysis	One Per Heat	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	T.C.	p	R
		PHYSICAL PROPERTIES (T.S., Y.S., % Elongation)	Major	Lab. Test	One Per Heat	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	T.C.	P	R
		VISUAL & DIMENSIONS	Major	Visual & Measurement	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	T.C.	P	R
2	**IN PROCESS INSPECTION**									
2.1	PIPE MANUFECTURING	SURFACE DEFECT	Major	Visual	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	R
		DIMENSIONS (O.D., THK., LENGTH etc.)	Major	Measurement	As Per Relevant Std.	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	R
		MASS (Kg/ Mtr .)	Major	Measurement	As Per Relevant Std.	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	R
2.2	END PREPARATION	END TYPE & DIMENSIONS	Major	Visual & Measurement	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	R
2.3	PHYSICAL PROPERTIES	TENSILE STRENGTH , ELONGATION & BEND TEST/ FLATTENING TEST AS APPLICABLE	Major	Lab. Test	As Per Relevant Std.	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	lIR	p	R
2.4	LEAK TEST	HYDRAULIC	Critical	Leak Test	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	IIR	p	w
2.5	GALVANIZING	ZINC COATING UNIFORMITY & MASS	Major	Mass of Zinc Coating & Uniformity	One sample at every hour & As per relevant Stand.	IS: 4736	IS: 4736 & IS: 2633	IIR	p	w
2.6	FINISH, PAINTING & MARKING	OVERALL FINISH, PAINTING & MARKING	Major	Visual	100%	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	lIR	p	R

		QUALITY CONTROL TABLES GI PIPES CONFORMING TO IS:1239 (PART-1):2004 (Latest edition)								
S.No.	**COMPONENTS OPERATIONS**	**CHARACHTERISTICS**	**CLASSIFICATION**	**TYPE OF CHECK**	**QUANTUM OF CHECK**	**REFERENCE DOCUMENTS**	**ACCEPTANCE NORMS**	**FORMAT OF RECORD**	**VENDOR**	**TPIA**
1	**2**	**3**	**4**	**s**	**6**	**7**	**8**	*9*	**10**	**11**
3	**POWDER COATING TEST**									
3.1	POWDER COATING TEST	SALT SPRAY RESISTANCE	Major	Visual	1000 Hrs (MIN.)	IS: 13871	IS: 13871	IIR	P	R
3.2		POROSITY	Major	Visual	-	IS: 13871	IS: 13871	IIR	P	R
3.3		HUMIDITY RESISTANCE	Major	Visual	1000 Hrs (MIN.)	IS: 13871	IS: 13871	IIR	P	R
3.4		WEATHERING GLOSS RETENTION AFTER 1000 Hrs.(Sun Test with Water Impression , Xenon 150 K lux)	Major	Visual	60 - 70%	IS: 13871	IS: 13871	IIR	P	R
3.5		COLOUR	Major	Visual	CANARY YELLOW	IS: 13871	IS: 13871	IIR	P	R
4	**FINAL INSPECTION**									
4.1	FINISHED PRODUCT	FINISH DIMENSIONS	Critical	Visual & Measurement.	Random As Per IS:47ll	IS:1239/P.O. Spec./PTS	IS:1239/P.O. Spec./PTS	Dimensional IR	P	W
		PHYSICAL PROPERTIES (TENSILE STRENGTH, ELONGATION & BEND TEST/ FLATTENING TEST AS APPLICABLE)	Critical	Lab Test	Random As Per IS 4711	IS:1239/P.O. Spec./PTS	IS:1239/P.O. Spec./PTS	Physical IR	P	W
		MASS OF ZINC COATING, UNIFORMITY & ADHESION TEST	Critical	GALV. TEST(LAB Test)	AS PER IS: 4736	IS 4736	IS 4736	GALV. REPORT	P	W
		LEAK TEST (HYDRAULIC TEST)	Critical	Leak Test	100% by MFR.	IS:1239/P.O. Spec./Tender Spec	IS:1239/P .O. Spec./Tender Spec	IR	P	RW (Min 10% per lot by TPIA)
		REVIEW OF ALL TEST CERTIFICATE I REPORTS & VENDOR'S llR	Major	Review	All TC	IS:1239/P.O. Spec./Tender Spec., EN 10204	IS:1239/P.O. Spec./Tender Spec , EN 10204	R	P	R
		Coating Thickness	Major	Visual	Random as per IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IIR	P	W

		QUALITY CONTROL TABLES GI PIPES CONFORMING TO IS:1239 (PART-1):2004 (Latest edition)								
S.No										
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	***9***	**10**	**11**
4.2	POWDER COATING TEST	GLOSS 60 DEG.	Major	VISUAL	AS PER IS: 4711/ IS:13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		CROSS HATCH ADHESION	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		CYLINDRICAL BENDING TEST	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		ENRICHSEN CUPPING	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		PENCIL HARDNESS	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		SCRATCH RESISTANCE	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
		IMPACT RESISTANCE	Major	VISUAL	AS PER IS: 13871	IS: 13871/ PTS	IS: 13871/ PTS	IR	P	W
4.3	-	IDENTIFICATION & MARKING	Major	VISUAL	IS: 4711	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	-	P	W
4.4	-	WORKMANSHIP	Major	VISUAL	IS: 4711	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	-	P	R
4.5	-	PERFORMANCE OF INSTRUMENTS	Major	CALIBERATION	EACH INSTRUMENT	IS: 1239 / P.O. Spec./PTS	IS: 1239 / P.O. Spec./PTS	CALIBERATION CERTIFICATE	P	R

LEGENDS H-HOLD P-PERFORMANCE R-REVIEW W-WITNESS TC-TEST CERTIFICATE IIR-INTERNAL INSPECTIONR EPORT CA-CONTROL AUTHOIRTY TPIA - THIRD PARTY INSPECTION AGENCY

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 I 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'srepresentativeincludingTPIAwillhavetherighttoinspectanyactivityofmanufacturingatanytime.**
7. **All reference Codes / Standards. Documents, P.O. Copies shall be arranged by vendor I 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, dispatch clearance note & MTC.**

QUALITY CONTROL TABLES GI FITTINGS

SR. No	DESCRIPTION	COMPONENT	CHARACTERISTICS	QUANTUM OF CHECK	REF. DOC.	ACCEPTANCE NORMS	RECORD	INSPECTION			REMARKS
								MANUF.	TPIA	CA	
1	Chemical composition of material	Test Bar	Marking and correlation with TC	IS: 14329 Grade BM 300	PO, Material specification	IS 14329/ PO, Material specifications	Mill TC	R	R	R	
2	Chemical composition of Final product	Fitting	Chemical properties	IS: 14329 Grade BM 300	PO, Material specification	IS 14329/ PTS	TC	P	E	R	
3	Cleaning and Flushing	Fitting	Descaling / Peel off	100%	IS 14329/ PTS	IS 14329/ PTS	Inspection Report	P	RW	R	
4	Destructive Testing (Tensile, Elongation & Hardness)	Fitting	Mechanical Properties	IS 14329	IS 14329/ PTS	IS 14329/ PTS	Lab Report	P	W	RW	
5	Compression Test	Fitting	Malleability	Three samples per Heat	IS 1879/ PTS	IS 1879/ PTS	Inspection Report	P	W	RW	
6	Pressure Test	Fitting	Pneumatic	IS 1879	IS 1879/ PTS	IS 1879/ PTS	Inspection Report	P	W	RW	As per sampling procedure of IS 1839
7	Alignments of Thread	Fitting	ASME B1.20.1/NPT	IS 1879	IS 1879/ PTS	IS 1879/ PTS	Inspection Report	P	W	RW	
8	Galvanizing	Fitting	Integrity of galvanized coating	As listed in IS 4759	IS 4736/ PTS	PTS	Inspection / Lab Report	P	W	RW	
9	Powder Coating	Fitting	Coating	IS: 13871/PTS	IS: 13871/PTS	IS: 13871/PTS	Inspection Report	P	W	RW	
10	Final inspection	Fitting	Visual, Dimensions, Finish, weld bevel, Bore, Marking, Powder Coating Thickness*	IS 1879	IS 1879/ PTS	IS 1879/ PTS	Inspection Report	P	W	R	
11	Marking	Fitting	PTS	100%	PTS	PTS	Inspection Report	P	R	R	
12	Documentation	-	-	-	As per the terms and conditions of the PO & PTS	As per the terms and conditions of the PO & PTS	Compliance certificate	-	-	-	

*60 Microns Minimum

LEGENDSH-HOLD P-PERFORMANCE R-REVIEW W-WITNESS TC-TEST CERTIFICATE IIR-INTERNAL INSPECTION REPORT CA-CONTROL AUTHOIRTY TPIA-THIRD PARTY INSPECTION AGENCY

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 I 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 procedure shave 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 I supplier for reference of TPIA / IGL at the time of inspection.
8. At the time of deleivery of material in stores, vendor will submit copy of all related document of inspection along with release note, dispatch clearance note & MTC.

QUALITY CONTROL TABLES COPPER TUBE

SR. No	DESCRIPTION	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA (As per EN 1057/ PTS)	FORMAT OF RECORD	INSPECTIO VENDOR	INSPECTIO TPIA/ CLIENT	REMARKS
1	Raw material: Chemical Requirement	As per EN 1057	As per EN 1057	Material grade Cu-DHP/ CW 024A Cu + Ag : Min 99.9% P: 0.0015% TO 0.040%	MTC	P	R	
2	Final product: Chemical Requirement	As per EN 1057	As per EN 1057		Inspection Report	P	W	
3	Physical test (Tensile, Elongation, Hardness etc.)	As per EN 1057	As per EN 1057	UTS- Min. 250 N/ Sq.mm Elongation - Min 30% Hardness- 75 to 100 HV	Inspection Report	P	W	
4	Carbon film tets	As per EN 1057	As per EN 1057	Maximum Residual carbon- 0.20 mm/ sq. dm	Inspection Report	P	W	
5	Carbon content test	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	W	
6	Drift expanding test	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	W	
7	Hydrostatic test	As per EN 1057	As per EN 1057	Min 35 bar/ 10 second	Inspection Report	P	W	
8	Eddy current test	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	W	
9	Dimensional Inspection (O.D, Wllthk, Length etc.)	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	W	
10	Visual Inspection (Free from defect)	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	R	
11	Marking	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	R	
12	Documentation	-	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	R	

LEGENDS H-HOLD W- WITNESS P- PERFORM TPIA- THIRD PARTY INSPECTION AGENCY CA- CONTROL AUTHOIRTY

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 specification.
2. The supplier shall submit their own detailed ITP prepared on the basis of above I 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
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
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 I 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, dispatch clearance note & MTC.

QUALITY CONTROL TABLES COPPER FITTINGS

SR. No	DESCRIPTION	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA (As per EN 1057/ PTS)	FORMAT OF	INSPECTIO VENDOR	TPIA/ CLIENT	REMARKS
1	Raw material: Chemical Requirement	one in each heat	As per EN 1254	Material grade Cu-DHP/ CW 024A Cu + Ag : Min 99.9% P: 0.0015% TO 0.040%	MTC	P	R	
2	Final product: Chemical Requirement	one in each heat	As per EN 1254		Test Report	P	W	
3	Carbon in bore tests (Carbon film test, carbon content test)	one in each heat	As per EN 1254	As per EN 1254/ PTS	Test Report	P	W	
4	Stress corrosion resistance test	one in each heat	As per EN 6957	As per ISO 6957/ PTS	Test Report	P	W	
5	Hydrostatic pressure test	100%	As per EN 1254	Min 37.5 bar @ 15 min.	Test Report	P	W	
6	Pneumatic pressure test	100%	As per EN 1254	Min 6 bar @ 10 second	Test Report	P	W	
7	Dimensional Inspection (O.D, Wll thk, Length etc.)	100%	As per EN 1254	As per EN 1254/ PTS	Test Report	P	W	
8	Visual Inspection (Free from defect)	100%	As per EN 1254	As per EN 1254/ PTS	Test Report	P	R	
9	Marking	100%	As per EN 1254	As per EN 1254/ PTS		P	R	
10	Documentation	-	As per EN 1254	As per EN 1254/ PTS	Inspection Report	P	R	

LEGENDS H-HOLD W-WITNESS P-PERFORM TPIA- THIRD PARTY INSPECTION AGENCY CA- CONTROL AUTHOIRTY

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 specification.
2. The supplier shall submit their own detailed ITP prepared on the basis of above I 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
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
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 I 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, dispatch clearance note & MTC.

QUALITY CONTROL TABLES BRASS FITTINGS

SR. No	DESCRIPTION	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA (As per EN 1057/ PTS)	FORMAT OF RECORD	INSPECTION		REMARKS
						VENDOR	TPIA/ CLIENT	
1	Raw material: Chemical/ Physical Requirement	one in each heat	As per EN 2164	As per EN 12164/ PTS	MTC	P	W	Preferably witness by CA
2	Final product		As per EN 2164			P	W	
3	Resistance dezincification	one in each heat	As per EN 6957	As per EN 1254	Test Report	P	W	
4	Carbon bore test	one in each heat	As per EN 2164	As per ISO 6957/ PTS	Test Report			
5	Stress corrosion resistance test	one in each heat	As per EN 2164	As per ISO 1254/ PTS	Test Report	P	W	
6	Hydrostatic pressure test	100%	As per EN 2164	Min 37.5 bar @ 15 min.	Test Report	P	W	Preferably witness by CA
7	Pneumatic pressure test	100%	As per EN 12164	Min 6 bar @ 15 second	Test Report	P	W	Preferably witness by CA
8	Visual Inspection (Free from defect)	100%	As per EN 12164	As per EN 1254/ PTS	Test Report	P	R	
9	Dimensional Inspection (O.D, Wll thk, Length etc.)	100%	As per EN 12164	As per EN 1254/ PTS	Test Report	P	W	
10	Marking	100%	As per EN 12164	As per EN 1254		P	R	
11	Documentation	-	PO/ PTS	PO/ PTS	Test Report	P	H	

LEGENDS H-HOLD W-WITNESS P-PERFORM TPIA- THIRD PARTY INSPECTION AGENCY CA- CONTROL AUTHOIRTY

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 specification.
2. The supplier shall submit their own detailed ITP prepared on the basis of above I 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
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
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 I 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, dispatch clearance note & MTC.

QUALITY CONTROL TABLES STEEL REINFORCED RUBBER HOSE

SR. No	DESCRIPTION	TEST PARAMETERS	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA (As per EN 1057/ PTS)	CERTIFICATE	INSPECTION		REMARKS
							VENDOR	TPIA/ CLIEN	
1.	Raw Material	Chemical &Mech. Test of material or Steel Reinforced Rubber Hose (Lining, Reinforced material & cover)	100%	IS 9573	IS 9573	MTC	P	R	
2.	Final Product								
2.1	Final Inspection	Mechanical Properties	one (1) per batch	Tensile Strength = 10Mpa (Min.) El (Lining & Cover) is 200 & 250 resp. (Min.)	PTS & IS 9573	Inspection Report	P	W	
2.2		Resistance of Lining to n-pentane	one (1) per batch	Shall not exceed 10% absorbed & 5% extractable as per Cl. No. 5.2 of PTS	Cl. 5.4.3.2 of IS 9573	Inspection Report	P	W	
2.3		Adhesion Test	one (1) per batch	Min. Adhesion shall be 2 KN/m as Cl. No. 5.3 of PTS	Cl. 5.5.1 of IS 9573	Inspection Report	P	W	
2.4		Low Temperature Flexibility Test	One (1) per batch	Conditioned at -40 deg for 50 hours and bent at 180 deg around mandrel of dia 12 times the Nominal Bore of hose as per Cl no. 5.4 of PTS	Cl. 5.5.2 of IS 9573	Inspection Report	P	W	
2.5		Flexibility of hose at 1.5 x design pressure	one (1) per batch	Bend empty to radius 95 mm without Flattening & suffering structural damages.	Cl. 5.5.3 of IS 9573	Inspection Report	P	W	Witness by CA
2.6		Ozone Resistance Test	one (1) per batch	Cl. No 5.9 of PTS	Cl. 5.5.4 of IS 9573	Inspection Report	P	W	Witness by CA
2.7		Hydrostatic/ Proof Pr. Test	100%	2MPa for 1 min. as per Cl. No. 5.7 of PTS	Cl. 5.5.1 of IS 9573	Inspection Report	P	W	Witness by CA
2.8		Burst test	one (1) per batch	Cl. No. 5.9 of PTS	Cl. 5.5.2 of IS 9573	Inspection Report	P	W	
2.9		Grip Strength test	one (1) per batch		Cl. 5.5.7 of IS 9573 & Annex A of IS 9573	Inspection Report	P	W	
2.10		Burning Test	one (1) per batch	Shall not burn till 45 sec. as per Cl. No. 5.10	Cl. 5.5.8 of IS 9573	Inspection Report	P	W	
2.11		Visual & dimensional check	100%	Cl. No. 4.0 of PTS & IS 9573	IS 9573	Inspection Report	P	R	
2.12		Cover color- Orange	100%	Cl. No. 5.2.3 of PTS	PTS & IS 9573	Inspection Report	P	R	
3	End Fittings (Adaptors, nuts, washer)	-	100%	As per Cl. No. 6.0 of PTS	PTS & IS 9573	Inspection Report		R	
4	Marking	-	100%	As per Cl. No. 7.0 of PTS	PTS & IS 9573	Inspection Report	P	R	
5	Documentation	-	-	term & conditions of P.O & PTS	As per term & conditions of P.O & PTS	3.2 Certification as per EN 1024	P	H	

LEGENDSH-HOLD W-WITNESS P-PERFORM TPIA- THIRD PARTY INSPECTIONAGENCY CA- CONTROL AUTHOIRTY

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 specification.
2. The supplier shall submit their own detailed ITP prepared on the basis of above I 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

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
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 I 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, dispatch clearance note & MTC.

	LIST OF RECOMMENDED VENDORS FOR BOUGHT OUT ITEMS		
		TOTAL SHEETS	29
DOCUMENT NO		VL	001

LIST OF RECOMMENDED VENDORS FOR BOUGHT OUT ITEMS

INDEX

MECHANICAL & FIRE FIGHTING EQUIPMENT

i) Pipe Carbon Steel To Indian Standards

1. A.S.T. Pipes Pvt. Ltd. (AST Group)
2. Advance Steel Tube Ltd.
3. Apl Apollo Tubes Ltd. (Er. Bihar Tubes Ltd.
4. Asian Mills Pvt. Ltd.
5. Asrani Tubes Limited
6. Dadu Pipes (P) Ltd.
7. Essar Steel Limited (Er Hazira Pipes Mill)
8. Gaurang Products Pvt Ltd. (Ast Group)
9. Goodluck Steel Tubes Ltd.
10. Hi-Tech Pipes Limited
11. Indus Tube Limited
12. Jindal Industries Ltd
13. Jindal Pipes Ltd.
14. Jindal Saw Ltd (Kosi Works)
15. Jotindra Steel & Tube Ltd
16. Lalit Pipes And Pipes Ltd.
17. Maharashtra Seamless Ltd.
18. Man Industries (India) Ltd. - Pithampur
19. Man Industries (India) Ltd. Anjar
20. Mukat Tanks & Vessels Ltd.
21. Nezone Tubes Limited
22. North Eastern Tubes Limited
23. Pratibha Industries Limited
24. Pratibha Pipes & Structural Ltd.
25. Psl Ltd (Chennai)
26. Psl Ltd (V1, V2 & Nc)
27. Rama Steel Tubes Ltd.
28. Ratnamani Metals And Tubes Ltd.
29. Ravindra Tubes Limited
30. Samshi Pipe Industries Limited
31. Surya Roshni Ltd.
32. Swastik Pipes Ltd.

33. Utkarsh Tubes & Pipes Ltd. (Formly Bmw)
34. Welspun Corp. Limited (Dahej)
35. Zenith Birla (India) Limited

ii) Pipe & Tubulars To A.P.I. Standards

1. Arcelormittal Tubular Products Roman Sa, Romania
2. Bhel (Trichy), India
3. Dalmine Spa (Enquiry To Tenaris), UAE
4. Eewkorea Co. Ltd (Germany), Korea
5. Eew Korea Co. Ltd. (Korea), Korea
6. Eisenbau Kramer Gmbh, Germany
7. Hyundai Rb Co. Ltd. South Korea
8. Ilva Lamiere E Tubi Srl (Enq To Ilva Spa, Italy
9. Inox Tech. Spa, Italy
10. Ismt Ltd. Ahmedngr, India
11. Ismt Ltd. Baramati, India
12. Jindal Pipes Ltd., India
13. Jindal Saw Ltd. (Kosi Works), India
14. Jindal Saw Ltd. (Nashik Works), India
15. Lalit Pipes And Pipes Ltd. India
16. Maharashtra Seamless Ltd., India
17. Man Industries (I) Ltd. (Pithampur), India
18. Mukat Tanks & Vessels Ltd., India
19. Pratibha Industries Limited, India
20. Ratnamani Metals And Tubes Ltd., India
21. Siderca S.A.I.C (Enquiry Totenaris), UAE
22. Sumitomo Metal Ind. Ltd., India
23. Surya Roshni Ltd., India
24. Swastik Pipes Ltd, India
25. Tata Steel UK Limited (Formerly C702)
26. Tubos De Acero De Mexico Sa (Enq. Tenaris), UAE
27. Tubos Reunidos Sa Spain
28. Umran Steel Pipe Inc (Turkey), Turkey
29. Valcovny Trub Chomutov, Czech Republic
30. Vallourec And Mannesmann Tubes, France

31. Welspun Corp Limited (Dahej), India

iii) Pipe/Tube CS (Seamless) To ASTM Stds

1. Arcelormittal Tubular Products Roman Sa, Romania
2. Bhel (Trichy), India
3. Changshu Seamless Steel Tube Co. Ltd., China
4. Dalmine Spa (Enquiry To Tenaris), UAE
5. Heavy Metals & Tubes Limited (Mehsana), India
6. Ismt Ltd. Ahmedngr, India
7. Ismt Ltd. Baramati India
8. Jfe Steel Corporation, UAE
9. Jindal Sdaw Ltd (Nashik Works) India
10. Klt Automotive And Tubular Products Ltd., India
11. Mahalaxmi Seamless Limited, India
12. Maharashtra Seamless Ltd, India
13. Products Tubulares S.A.U, Spain
14. Ratnadeep Metal Tubes Ltd., India
15. Staineest Tubes Pvt Ltd., India
16. Sumitomo Metal Ind. Ltd., India
17. Tubos Reunidos Sa Spain
18. Valcovny Trub Chomutov, Czech Republic
19. Vallourec Andmannesmann Tubes France
20. Yangzhou Chengde Steel Pipe Co. Ltd Dubai (UAE)

iv) Pipe Carbon Steel (Welded) To ASTM Stds

1. Eew Korea Co. Ltd. (Germany), Korea
2. Eew Korea Co. Ltd. (Korea), Korea
3. Eisenbau Kramer Gmbh, Germany
4. Hyundai Rb Co. Ltd., South Korea
5. Inox Tech. Spa, Italy
6. Jindal Saw Ltd (Kosi Works), India
7. Lalit Pipes and Pipes Ltd., India
8. Man Industeries (I) Ltd. (Pithampur), India
9. Man Industries (India) Ltd. Anjar, India
10. Mukat Tanks & Vessels Ltd., India

11. Ratnamani Metals And Tubes Ltd., India
12. Sumitomo Metal India Ltd., India
13. Tata Steel Uk Limited

v) Valve

a) Globe Valves

1. Datre Corpn (Calcutta)
2. BDK (New Delhi)
3. KSB Pumps (New Delhi)
4. L&T (New Delhi)
5. Neco Schuber & Salzer Ltd. (New Delhi)
6. Niton Valve (Mumbai)
7. Ornate Valves (Mumbai)
8. Panchavati Valves (Mumbai)
9. AV Valves Ltd.
10. BHEL (Trichy), India
11. Econo Valves Pvt Ltd, India
12. Fouress Engg (I) Ltd (Aurangabad)
13. Guru Industrial Valves Pvt Ltd
14. Leader Valves Ltd, India
15. NSSL Ltd. (Neco Schubert & Salzerltd)
16. Oswal Industries Ltd, India
17. Petrochemical Engineering Enterprises, India
18. Sakhi Engineers Pvt Ltd
19. Shalimar Valves Pvt Ltd
20. Steel Strong Valves India Pvt Ltd, India
21. Petro Valves Pvt. Limited, Ahmedabad
22. Hawa Engineers Limited, Ahmedabad
23. JC Valvulas India Pvt Ltd (JCVIPL)

b) Check Valves

1. Advance Valves Pvt. Ltd., Noida
2. Aksons & Mechanical Enterprises, Mumbai
3. Larsen & Toubro Limited (M/s Audco India Limited, Chennai)

4. AV valves Ltd., Agra
5. BDK engineering India Ltd., Hubli
6. BHEL, OFE&OE Group, New Delhi
7. Datre Coroportion Limited, Calcutta
8. Leader Valves Ltd., Jalandhar
9. Neco schubert &Salzer Ltd., New Delhi
10. Niton Valves Industries (P) Ltd., Mumbai
11. Precision Engg.Co., Mumbai
12. Econo Valves Pvt Ltd, India
13. Fouress Engg (I) Ltd (Aurangabad)
14. KSB Pumps Ltd (Coimbattore), India
15. NSSL Ltd. (Neco Schubert & SalzerLtd)
16. Oswal Industries Ltd, India
17. Panchvati Valves & Flanges Pvt Ltd, India
18. Petrochemical Engineering Enterprises, India
19. Sakhi Engineers Pvt Ltd
20. Shalimar Valves Pvt Ltd
21. Steel Strong Valves India Pvt Ltd, India
22. Hawa Engineers Limited, Ahmedabad

c) Plug Valves

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

d) Ball Valves

1. Hawa Valves (India) Pvt. Ltd, Navi Mumbai

2. Larsen & Toubro, Delhi
3. Microfinish Valves Pvt. Ltd., Noida
4. Oswal Industries Ltd., Gandhi nagar
5. Virgo Engineers Ltd., Delhi
6. Boteli Valve Group Co. Ltd., China
7. Cameron (Malaysia) SDN BHD, Malaysia
8. Dafram S.P.A., Italy
9. Fangyuan Valve Group Co. Ltd., China
10. Franz Schuck GmbH, Germany
11. O.M.S. Saleri (Italy)
12. Pibi Viesse S.P.A (Italy)
13. Nuovo Pignone (Italy)
14. Perar S.P.A (Italy)
15. Pietro Fiorentini (Italy)
16. Cooper Cameron Valv Italy SRL-FRM, Itly
17. Petrol Valves SRL
18. Tormene Gas Technology S.P.A (VALVITALIA)
19. Petro Valves Pvt. Limited, Ahmedabad
20. Hawa Engineers Limited, Ahmedabad
21. JC VALVULAS INDIA PVT LTD

vi) Flanges

1. Aditya Forge Ltd., Vadodara
2. Amforge Industries Ltd., Mumbai
3. CD Engineering Co., Ghaziabad
4. Echjay Forgings Pvt. Ltd. (Bombay), Mumbai
5. Echjay Industries Ltd., Rajkot
6. Forge & Forge Pvt. Ltd., Rajkot
7. Golden Iron & Steel Works, New Delhi
8. JK Forgings, New Delhi
9. Metal Forgings Pvt. Ltd., Mumbai
10. Perfect Marketings Pvt. Ltd., New Delhi
11. Sky Forge, Faridabad
12. S&G, Faridabad
13. Chaudhry Hammer Works Ltd, India
14. JAV Forgings (P) Ltd, India
15. Kunj Forgings Pvt Ltd, India
16. MS Fittings
17. R.N. Gupta & Co. Ltd, India
18. R.P. Engineering Pvt Ltd, India
19. Sanghvi Forgings & Engineering Ltd
20. Shri Ganesh Forgings Ltd., India
21. Uma Shankar Khandelwal & Co., India
22. Sawan Engineers, Baroda
23. Stewarts & Lloyds of India Ltd., Kolkata
24. Engineering Services Enterprises
25. Pipefit Engineers Pvt. Ltd.
26. Vivial Forge Pvt. Ltd.
27. Anandmayee Forgings Pvt. Ltd, Sahibabad (UP to 10”-300#)
28. United Forge Private Limited
29. Lal Metal
30. Jai Auto Pvt.Ltd, Ghaziabad

vii) Fittings

1. Commercial Supplying Agency, Mumbai
2. Dee Development Engineers Ltd.
3. Eby Industries, Mumbai
4. Flash Forge Pvt. Ltd., Vishakhapatnam
5. Gujarat Infra Pipes Pvt. Ltd., Vadodara
6. M.S. Fittings Mfg. Co. Pvt. Ltd., Kolkata
7. Stewarts & Lloyds of India Ltd., Kolkata
8. Teekay Tubes Pvt. Ltd., Mumbai
9. Pipe Fit,Baroda
10. Sky Forge, Faridabad
11. S&G, Faridabad
12. Sawan Engineers, Baroda
13. Eby Fasteners, India
14. Leader Valves Ltd, India
15. R.N. Gupta & Co. Ltd, India
16. Exten Engg Pvt Ltd
17. Sivananda Pipe & Fittings Ltd
18. Jindal Forging
19. Vivial Forge Pvt. Ltd.
20. United Forge Private Limited

viii) Gaskets

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

ix) Fasteners

1. Nireka Engg. Co. (P) Ltd., Calcutta
2. Precision Taps & Dies, Bombay
3. AEP Company, Vithal Udyoug Nagar
4. Fix Fit Fasteners, Calcutta
5. Precision Engg. Industries, Baroda
6. Echjay Forgings Pvt. Ltd., Bombay
7. Capital Industries, Bombay
8. Boltmaster India Pvt Ltd, India
9. Deepak Fasteners Limited, India
10. Fasteners & Allied Products Pvt Ltd, India
11. Hardwin Fasteners Pvt Ltd, India
12. J.J. Industries, India
13. Multi Fasteners Pvt Ltd, India
14. Nexo Industries, India
15. Pacific Forging & Fasteners Pvt Ltd, India
16. Pioneer Nuts & Bolts Pvt Ltd, India
17. Precision Auto Engineers, India
18. President Engineering Works, India
19. Sandeep Engineering Works, India
20. Syndicate Engineering Industries, India

x) Stud Bolts with Nuts

1. Multi Thread Fasteners, Baroda
2. Darukhanwala
3. Precision Engineers, Baroda
4. Unbrako
5. TVC

xi) Welding Electrodes

1. Lincon,
2. Böhler
3. D&H

xii) Warning Mat

1. Sparco Multiplast Pvt. Ltd., Ahmedabad
2. Singhal Industries, Ahemdabad
3. Puja Packing, Mumbai
4. Bina Enterprises, Mumbai
5. Shree Vijay Wire & Cable Industries

xiii) HDPE PIPES

1. Climax Synthetics (P) Ltd., Vadodra
2. Indian Poly Pipes, Calcutta
3. Jain Irrigation Systems Ltd., Jalgaon
4. Kirti Industries (India) Ltd., Indore
5. Ori Plast Limited, Calcutta
6. Phoel Industries Limited, Delhi
7. Sangir Plastics (P) Ltd., Mumbai
8. Veekay Plast, Jaipur
9. Kisan Irrigation
10. Dutron Polymers Ltd.
11. Manikya Plastichem (P) Ltd
12. Himalayan Pipe Industries
13. Dura Line India Pvt. Ltd.

xiv) Strainers

1. Bombay Chemical Equipments
2. Gujarat Auto filed
3. Multitex Filtration Engineering Limited
4. Grand Prix Engineering Limited

xv) FILTER ELEMENT

a. Peco – Facet
b. Velcon
c. Pall – Filterite
d. Burgress Manning

xvi) MDPE Fittings & MDPE Valves

1. AliAxis,
2. Geroge Fischer,
3. Al-Aziz,
4. Kimplas,
5. Banides,
6. Agru,
7. Friatech,
8. Plasson.

xvii) GI Pipe:

1) Swastik Pipe Ltd. (Authorised Distributor M/s Hareesh Steel & Pipe)
2) Jindal Industries Ltd.
3) Vishal Pipes Ltd.
4) Indus Tubes Ltd. (Authorised Distributor M/s Hareesh Steel & Pipe)
5) Advance Steel Tubes Ltd.
6) Good Luck Tubes Ltd.
7) Surya Roshni Limited
8) APL Apollo Tubes Limited
9) Jindal Pipes Limited

xviii) Forged GI Fittings (for High Rise Segment)

1. Jainsons Industries Ltd.
2. B.M. Meters Pvt. Ltd.

xix) Copper Tubes

1. Jay Banas
2. Mehta Tubes Limited- Trade Mark "MEXFLOW"
3. Rajco Metal (Tubes & Fittings)
4. Paras Industries
5. Mercure Metal & Alloys Pvt. Ltd. (Authorised Distributors: M/s 5hills alloys Pvt. Ltd & Hreesh Steel & pipes)

xx) Brass Fittings

1. Chandan Enterprises
2. Paras Industries Ltd.
3. Chokhawala Distributors- Brass Adaptor
4. Saumya Electricals Industries
5. Umesh Enterprises

xxi) Steel Re-inforced Rubber Hose (Type-4)

1. Super Seal Flexible Hose Ltd.
2. Suraksha Products Pvt. Ltd.
3. Vansh Industries
4. T & L Gases

xxii) Corrugated Flexible Metal Hoses (Anaconda)

1. KPC Flex Tubes
2. Vestas Hose Division
3. Alpha Flexi Tubes
4. Chandan Enterprises

NOTE:

1) For procuring bought out items from vendors other than those listed above, the same may be acceptable subject to the following: -
   a) The vendor/ supplier of bought out item(s) is a manufacturer/ supplier of said item(s) for intended services and the sizes being offered is in their regular manufacturing supply range.
   b) The vendor / supplier should not be in the Holiday list of CLIENT / / other PSU.
   c) Should have supplied at least one single random length (i.e. 5.5 meters to 6.5 meters) for item assorted pipes / tubes and for other items, which are to be supplied in quantity on number-basis (other than assorted pipes / tubes) minimum 01 (One) number of same or higher in terms of size and rating as required for intended services. The bidder should enclose documentary evidences i.e. PO copies, Inspection Certificate etc. for the above, along with their bids.

2) For any other item(s) for which the vendor list is not provided, bidders can supply those item(s) from vendors/ suppliers who have earlier supplied same item(s) for the intended services in earlier projects and the item(s) offered is in their regular manufacturing/ supply range. The bidder is not required to enclose documentary evidences (PO copies, Inspection Certificate etc.) along with their offer, however in case of successful bidder, these documents shall be required to be submitted by them within 30 days from date of Placement of Order for approval to CLIENT / .

3) The details of vendors indicated in this list are based on the information available with , Contractor shall verify capabilities of each vendor for producing the required quantity with. PMC does not guarantee any responsibility on the performance of the vendor. It is the contractor's responsibility to verify the correct status of vendor and quality control of each parties and also to expedite the material in time.

LIST OF MATERIALS OF RECOMMENDED BRAND AND/ OR MANUFACTURE (STRUCTURE)

Unless otherwise specifically mentioned in the Schedule of Items, Contractor has to use materials as listed below, of only these brand names/Company's names, which are mentioned in the RECOMMENDED list for structural items thereon.

1. STRUCTURE

Sl. No.	Items/Name of Products	Makes/Brands/Manufactures
1	Structural Steel	SAIL / TATA / RINL / IISCO / ESSAR / ISPAT
2	Structural Steel Tubes ISI Marked	TATA / JINDAL / SURYA / SWASTIK
3	Synthetic Enamel Paint Ist Quality only	ICI Paint (Deluxe), Asian Paint (Apcolite), Shalimar Paint (Superlac), Goodlass,Nerolac Paint(Nerolac), Berger Paints

Any materials not fully specified in these specifications and which may be offered for use in the works shall be subject to approval of Engineer, without which it shall not be used anywhere in the construction works.

INSTRUMENTATION

LIST OF MATERIALS OF RECOMMENDED BRAND AND/ OR MANUFACTURE

1. PRESSURE GAUGES

1. AN Instruments Pvt Ltd
2. Badotherm Process Instruments B.V.
3. Baumer Bourdon Haenni S.A.S
4. British Rototherm Co Ltd
5. Budenberg Gauge Co Ltd
6. Dresser Inc
7. Forbes Marshall (Hyd) Pvt Ltd
8. General Instrument Consortium
9. H. Guru Instruments (South India) Pvt Ltd
10. Manometer (India) Pvt Ltd
11. Nagano Keiki Seisakusho Ltd
12. Hirlekar Precision, India
13. Waaree Instruments Ltd
14. Walchandnagar Industries Ltd (Tiwac Divn)
15. Wika Alexander Wiegand & Co GmbH
16. Wika Instruments India Pvt Ltd
17. Ashcroft India Pvt Ltd.

2. TEMPERATURE GAUGES

1. AN Instruments Pvt Ltd.
2. Badotherm Process Instruments B.V.
3. Bourdon Haenni S.A.
4. Dresser Inc.
5. General Instruments Consortium
6. H. Guru Instruments (South India) Pvt Ltd
7. Nagano Keiki Seisakusho Ltd
8. Solartron ISA
9. Walchandnagar Industries Ltd (Tiwac Divn)
10. Wika Alexander Wiegand & Co GmbH
11. Wika Instruments India Pvt Ltd
12. Pyro Electric, Goa
13. Ashcroft India Pvt Ltd.

3. TEMPERATURE ELEMENTS, THERMO-WELLS

1. ABB Automation Ltd
2. Altop Industries Ltd
3. Bourdon Haenni S.A.
4. Detriv Instrumentation & Electronics Ltd
5. General Instruments Consortium
6. Japan Thermowell Co Ltd
7. Tecnomatic S.P.A
8. Tempsen Instrument India Ltd
9. Thermo Electric Co. Inc.
10. Thermo-Couple Products Co
11. Thermo-Electra B.V.
12. Wika Alexander Wiegand & Co GmbH
13. Altop Industries Ltd., Baroda
14. Nagman Sensors (Pvt.) Ltd.
15. Pyro Electric, Goa

PAINTING

LIST OF MATERIALS OF RECOMMENDED BRAND AND/ OR MANUFACTURE

Indian Vendors

1. Asian Paints (I) Ltd.
2. Berger Paints Ltd.
3. Goodlass Nerlolac Paints Ltd.
4. Jenson And Nicholson Paint Ltd & chokuGu Jenson & Nicholson Ltd.
5. Shalimar Paints Ltd.
6. Sigma Coating, Mumabai
7. CDC Carboline Ltd.
8. Premier Products Ltd.
9. Coromandel Paints & Chemicals Ltd.
10. Anupam Enterprises
11. Grand Polycoats
12. Bombay Paints Ltd.
13. Vanaprabha Esters & Glycer, Mumbai
14. Sunil Paints and Varnishes Pvt. Ltd.
15. Courtaulds Coating & Sealants India (Pvt.) Ltd.
16. Mark-chem Incorporated, Mumbai (for phosphating chemicals only)
17. VCM Polyurethane Paint (for polyurethane Paint only)

Foreign Vendors For Overseas Products

1. Sigma Coating, Singapore
2. Ameron, USA
3. Kansai Paint, Japan
4. Hempel Paint, USA
5. Valspar Corporation, USA
6. Courtaulds Coating, UK.

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Notes:

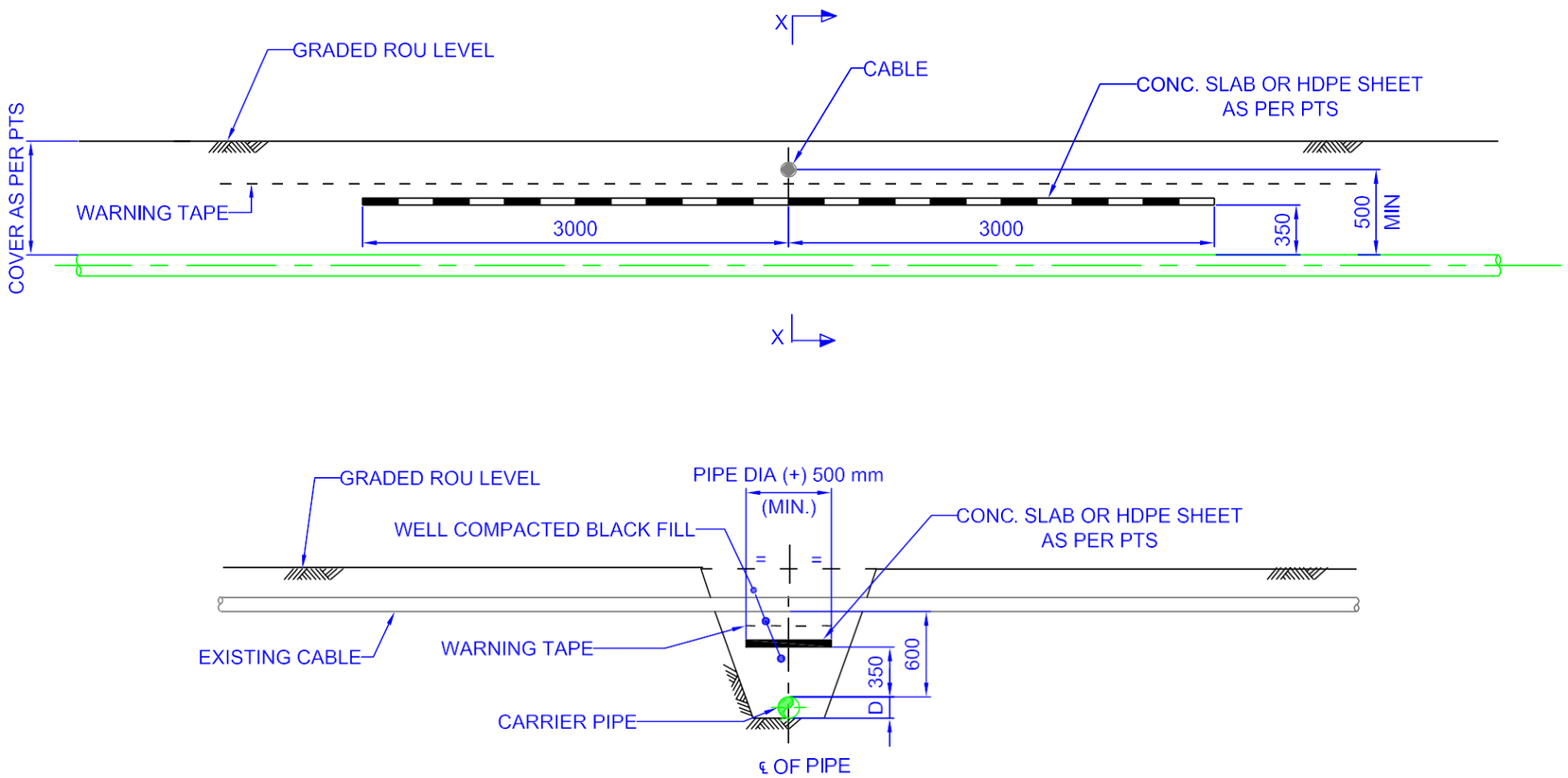
1. Bidder can select equipment of two different makes, selected from this VENDOR LIST and mention the same in the checklist for technical evaluation attached with the tender. The offered bid must include filled datasheet indicating make, model, size, rating of offered instrument/ equipment duly supported by sizing calculation of offered equipment (wherever applicable).

2. Vendors who have already supplied above equipment in other terminals of any CGD, shall also be considered qualified for this tender provided the supplied equipment are commissioned and running successfully and they have not been put on holiday.

3. Equipment / Instruments of any make which is offered by one bidder and acceptable to any CGD shall be accepted for other bidder also. After placement of order, on request of the successful bidder list of other qualified makes for a particular item (for which successful bidder wants to change the vendor) shall be provided.

4. Bidder shall take prior approval of the make / model no of the offered item and it shall be from the list given above. However additional vendors will be considered in exceptional cases, provided they have supplied for similar application to reputed gas transmission/distribution companies, in quantities at least half the numbers being supplied for this tender, and working satisfactorily for minimum 6 months. Documentary evidence substantiating above shall be submitted for taking approval.

Note : Above mentioned vendor list is tentative and further addition/deletion may be done as per discretion of IGL/.



SECTION X-X

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWINGS.
3. A MODIFIED PIPELINE WARNING SIGN SHALL BE INSTALLED CLOSE TO THE CROSSING.
4. IN CASE OF ARMOURED OFC CABLE, C.P. BONDING IS TO BE PROVIDED BETWEEN PIPELINE AND CABLE ARMOUR. IN CASE OF UNARMOURED CABLE, ARRANGEMENT FOR SHIELDING (BY PROVIDING CASING ON EITHER SIDE OF THE PIPELINE OR CABLE) SHALL BE CONSIDERED.
5. APPROVAL OF THE CROSSING SHALL BE OBTAINED FROM CONCERNED AUTHORITIES.

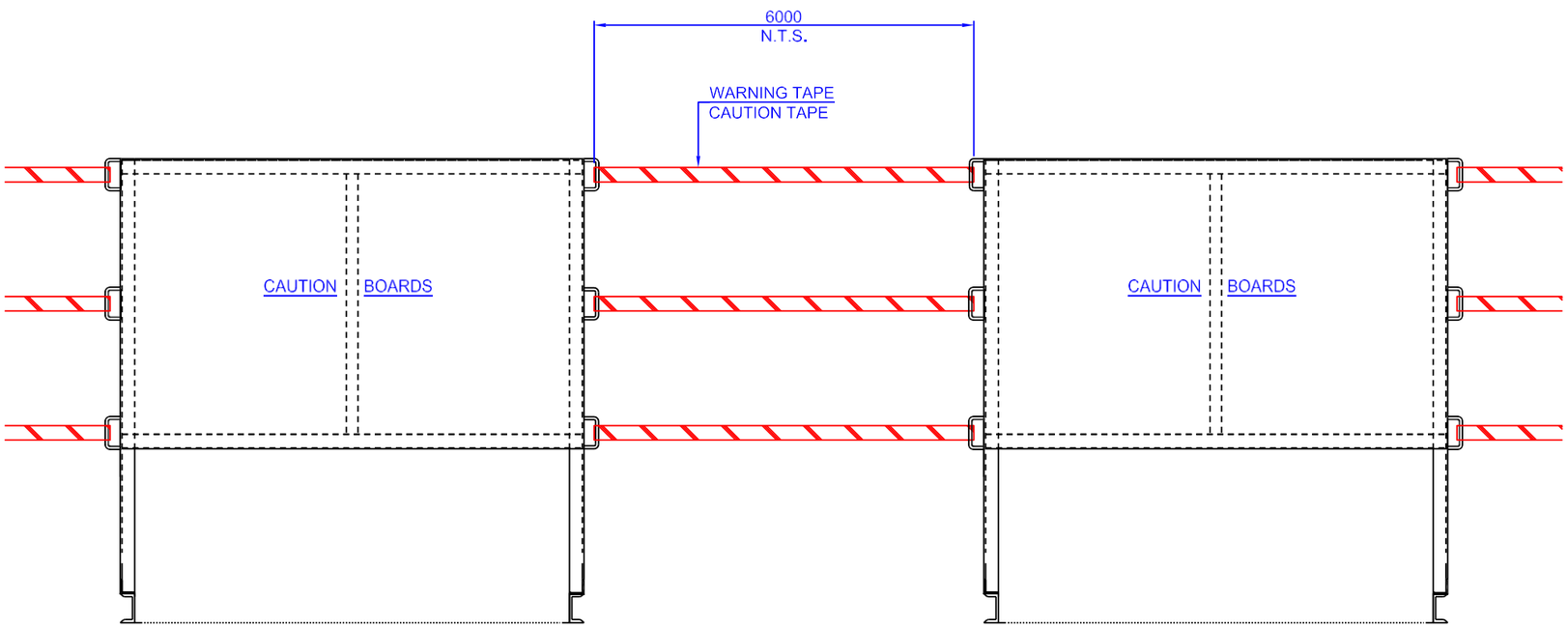
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL UNDERGROUND CABLE CROSSING DETAILS

SCALE	DATE	C/D FILE: DATE		
1:2			CAD	A3

DRG NO.

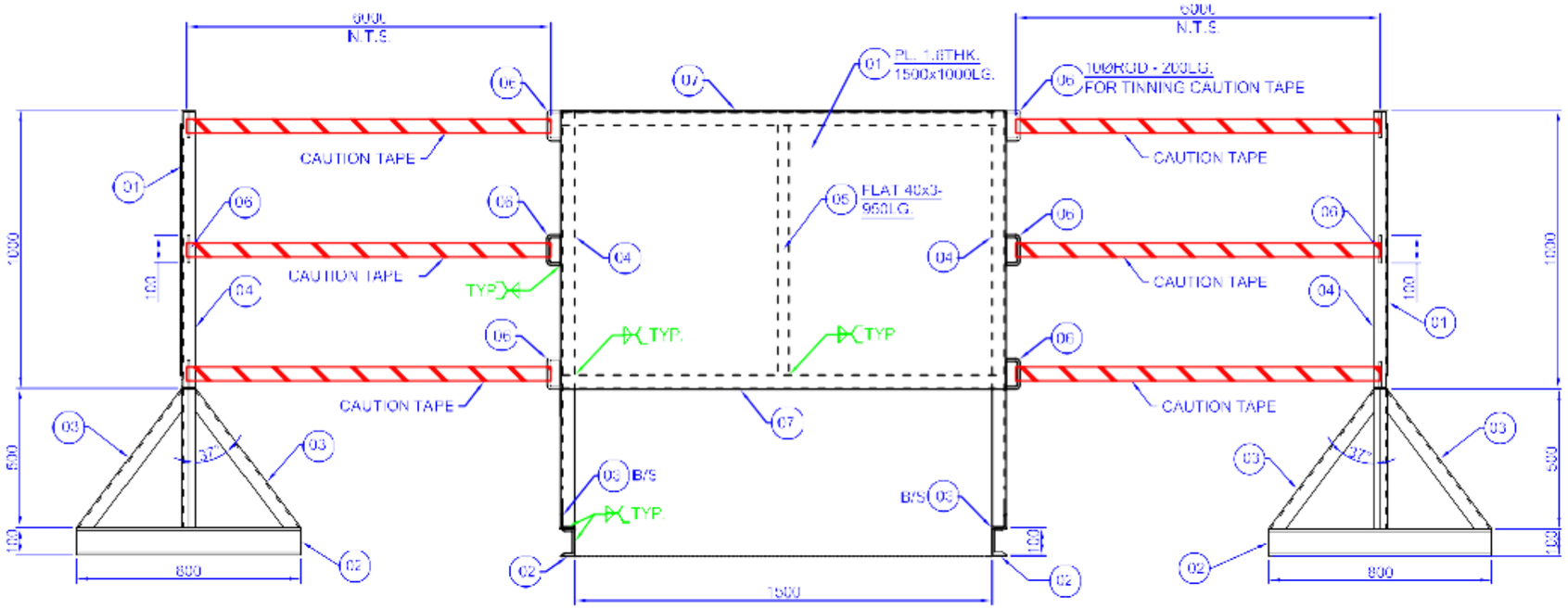


SCHEMATIC LAYOUT OF CAUTION BOARDS AND BARRICADING

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWINGS.

OWNER:	INDRAPRASTHA GAS LIMITED NEW DELHI
PMC:	.
PROJECT:	CITY GAS DISTRIBUTION PROJECT
TITLE:	BARRICADING
SCALE / DATE / CAD FILE: / DATE	CAD / A3
DRG. NO.	



ELEVATION B-B

ELEVATION A-A

ELEVATION B-B

NOTES:-

1. ALL DIVENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWINGS.

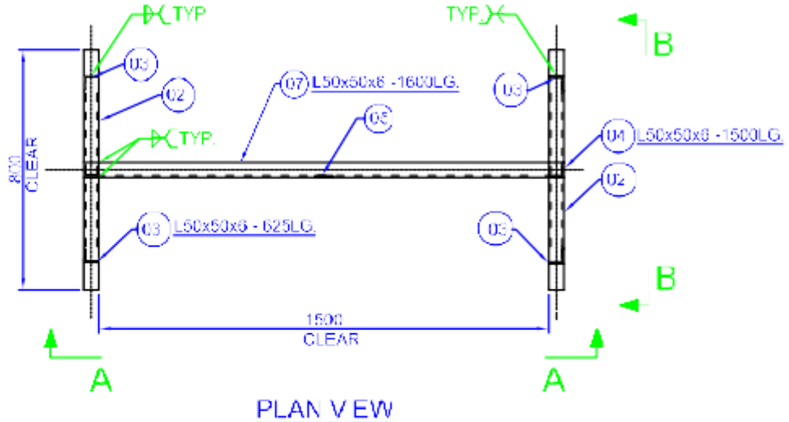
IN RED — **CAUTION** — CLIENT LOGO

WORK IN PROGRESS

IN BLACK

LAYING OF NATURAL GAS PIPELINE
CLIENT : OWNER'S NAME
CONTRACTOR NAME
DATE OF COMMENCEMENT:
DATE OF COMPLETION:
EMERGENCY PHONE NOS.:

TO BE PRINTED ON ITEM NO. C1



PLAN VIEW

BILL OF MATERIAL

Item Mkd.	Section	Width	Length	Item Qty. (All Marks)	Weight Kgs./M,M2	Total Weight In Kgs.
1.	PL. 1.6 THK.	1600	1000	1	12.56	20.10
2.	ISMC 100	--	800	2	9.20	14.72
3.	L50x50x6	--	625	4	4.50	11.25
4.	L50x50x6	--	1500	2	4.50	13.50
5.	Flat 3Thk.	900	40	1	0.94	0.03
6.	10Ø Rod	--	200	6	0.62	0.74
7.	L50x50x6	--	1600	2	4.50	14.40
				Grand Total (Kg)		**74.74**

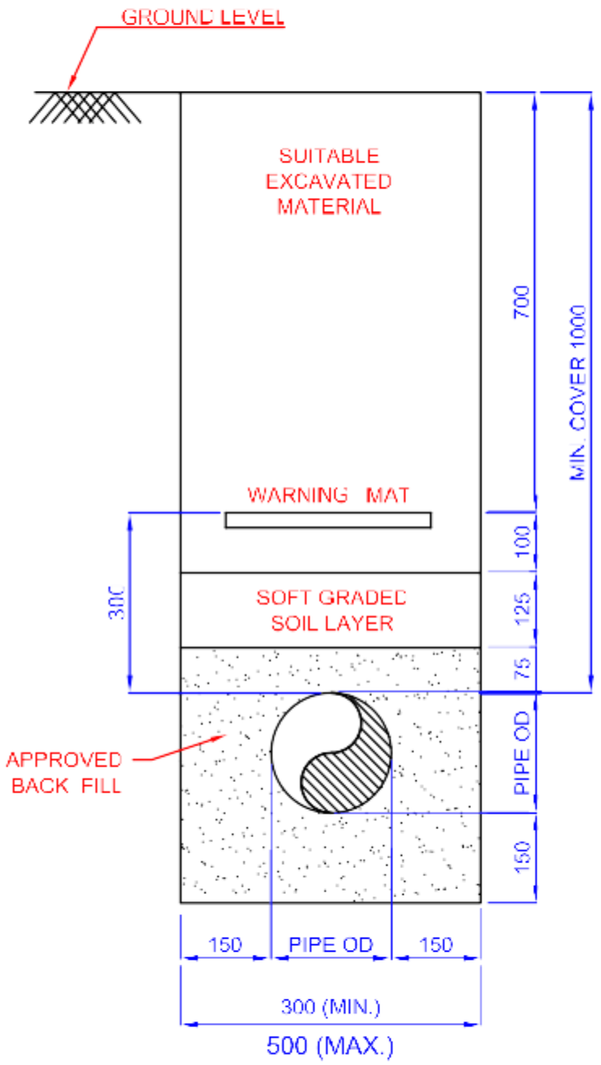
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

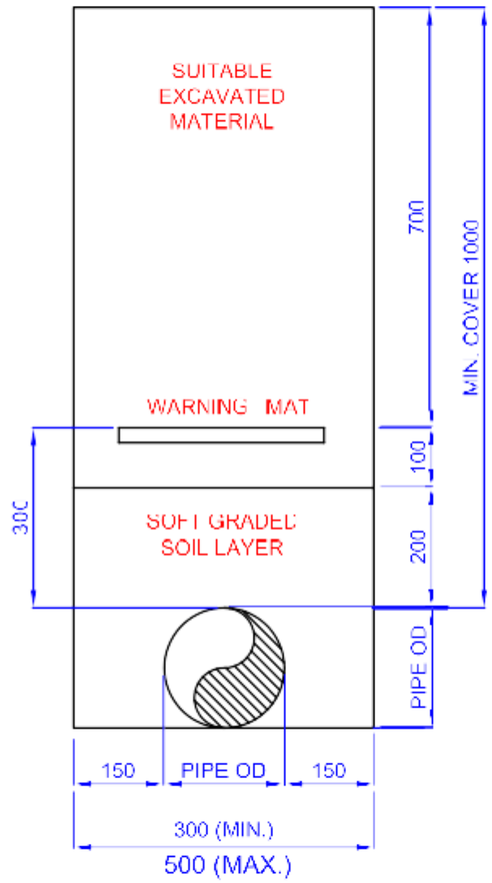
TITLE: CAUTION BOARD & TAPE ARRANGEMENT IN G.I. / RISER INSTALLATION

CAD | A3

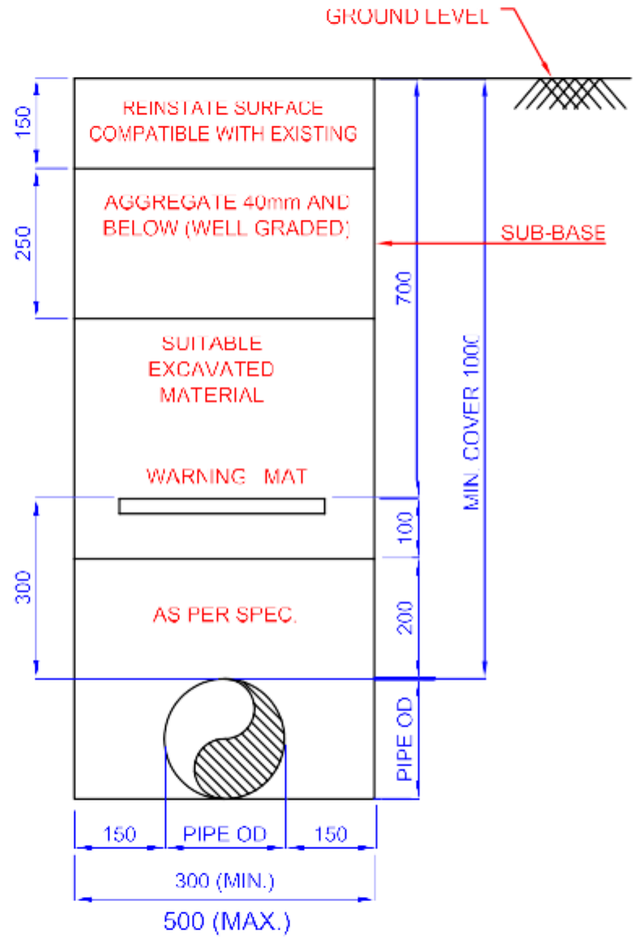
DRG. NO. -10-03-26A



TRENCH IN ROCKY STRATA
TYPICAL SECTION



TRENCH IN NORMAL SOIL
TYPICAL SECTION



TRENCH RESTORATION DETAIL
TYPICAL SECTION

NOTES:-

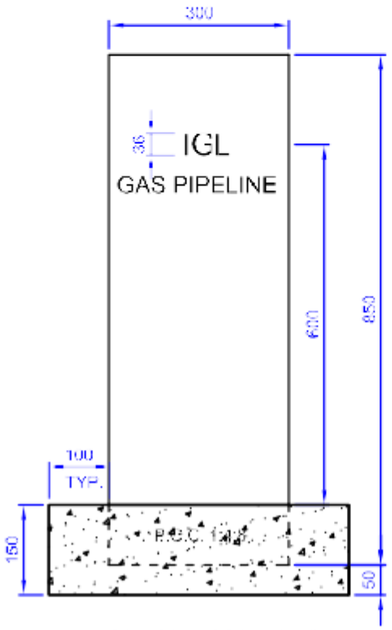
1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWING.
3. FOR ALL PIPELINE TO BE CONSTRUCTED IN THE LAND UNDER JURISDICTION OF GOVT. OF INDIA, THE MIN COVER TO BE ADOPTED SHALL BE 1000MM IN ACCORDANCE WITH GOVT. OF INDIA PETROLEUM PIPELINE (ACQUISITION OF RIGHT OF USER IN LAND) ACT NO. 50, 1962 AND AMENDMENT ACT NO. 13 OF 1977. ANY EXTRA COVER REQUIREMENT SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.
4. MIN. COVER REQUIREMENT SHALL BE SUBJECT TO APPROVAL OF CONCERNED AUTHORITIES WHEREVER REQUIRED.
5. EXTRA COVER REQUIREMENT SHALL BE ESTABLISHED AT ALL OVER BEARDS AND HORIZONTAL BENDS WHEREVER NECESSARY.
6. FOR MINIMUM COVER REQUIREMENT AT PIPELINE CROSSING ROADS, RAILWAY TRACKS, RIVER MARSHY AREAS, ETC., REFER RELEVANT STANDARDS.

OWNER:	INDRAPRASTHA GAS LIMITED NEW DELHI
PROJECT:	CITY GAS DISTRIBUTION PROJECT
TITLE:	TYPICAL TRENCH DIMENSIONS FOR PIPELINE
SCALE: 1:10	DATE
DRAWN	DATE
CAD	A3
DRG. NO.	-10-03-27 REV-0

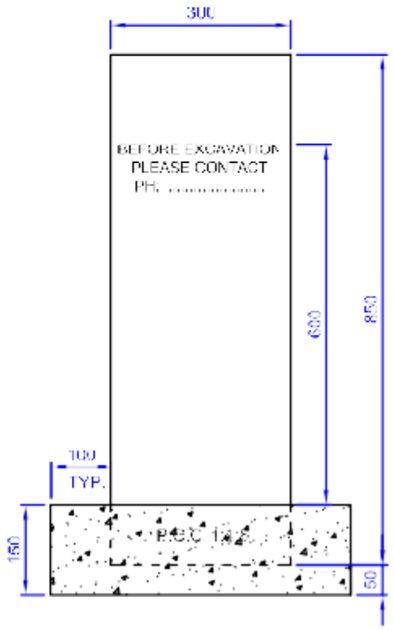
NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWINGS.

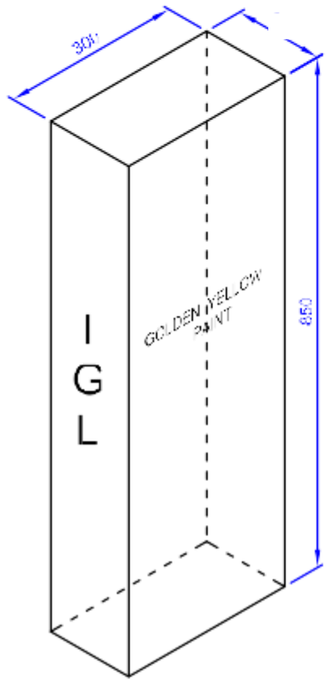
OWNER:	INDRAPRASTHA GAS LIMITED NEW DELHI
PROJECT:	CITY GAS DISTRIBUTION PROJECT
TITLE:	PLATE MARKER
SCALE: 1:2 / DATE: / CAD FILE: / DATE:	CAD / A3
DRG. NO.	-10-03-28 REV-0



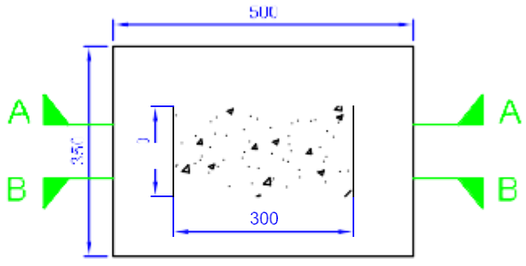
SECTION A-A



SECTION B-B



ISOMETRIC VIEW

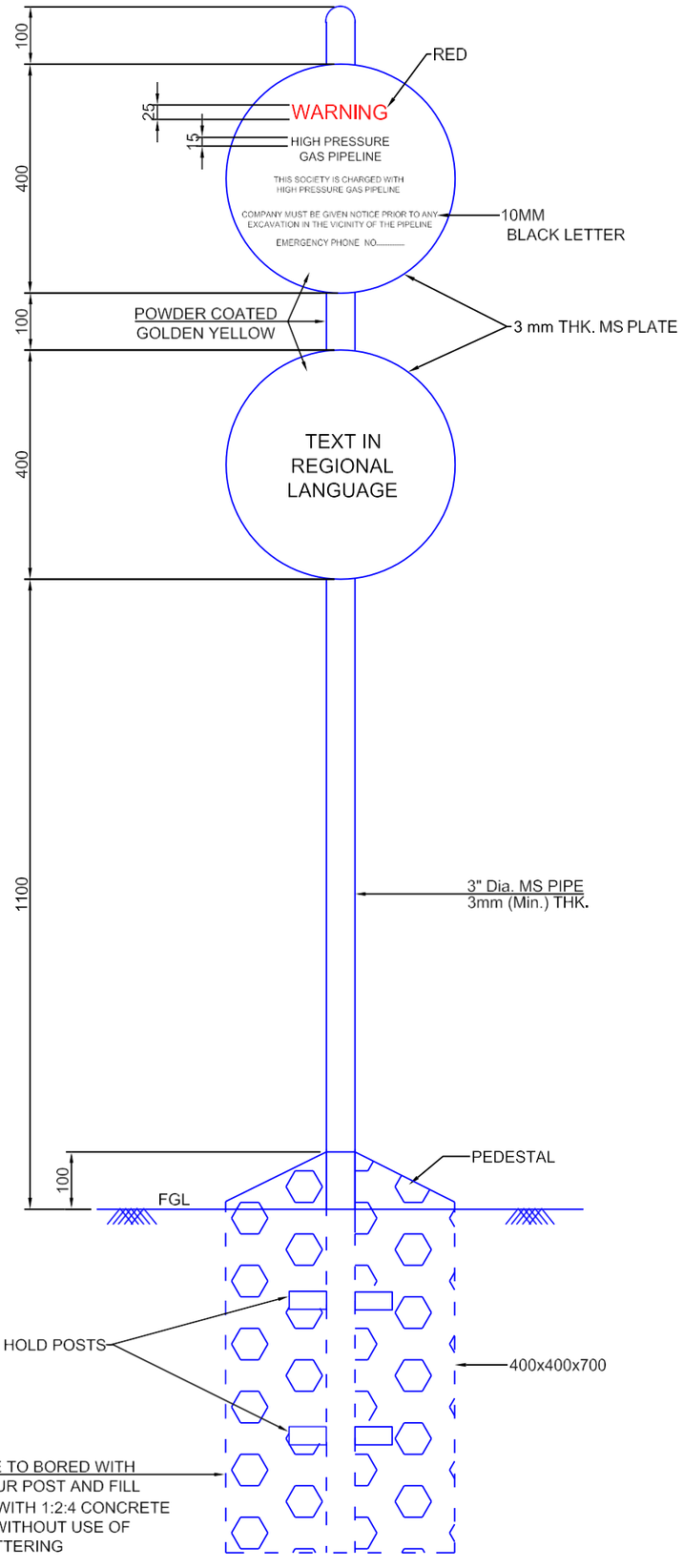


PLAIN VIEW

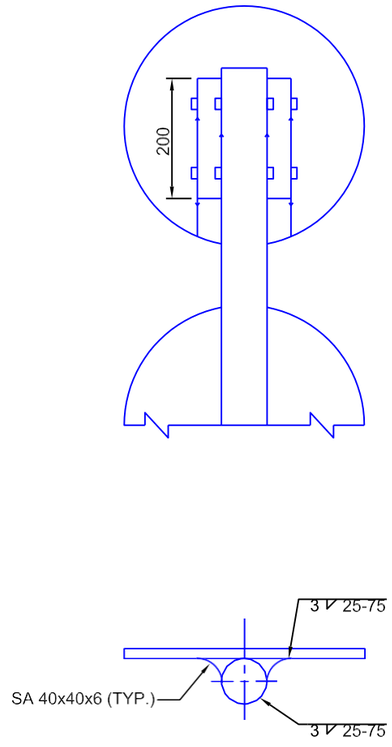
NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWING.
3. ALL TEXT SHOULD BE WRITTEN IN BLACK COLOR.

OWNER:	INDRAPRASTHA GAS LIMITED NEW DELHI
PROJECT:	CITY GAS DISTRIBUTION PROJECT
TITLE:	SKETCH FOR STONE MARKER
	CAD A3
DRG. NO.	-10-03-29 REV-0



FIXING DETAILS



NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. WARNING TEXT AND MARKER SIZES ARE INDICATIVE AND ARE SUBJECT TO THE APPROVAL BY OWNER / OWNER'S REPRESENTATIVE BEFORE FABRICATION.
3. SCHEME FOR POWDER COATING AND COLORING : ONE COAT OF PRIMER & TWO COATS OF SPECIFIED PAINTS. ALL LETTERS EXCEPT 'WARNING' TO BE PAINTED BLACK.
4. APPROVAL OF WARNING MARKER DESIGN SHALL BE OBTAINED BEFORE THE COMMENCEMENT OF WORK.

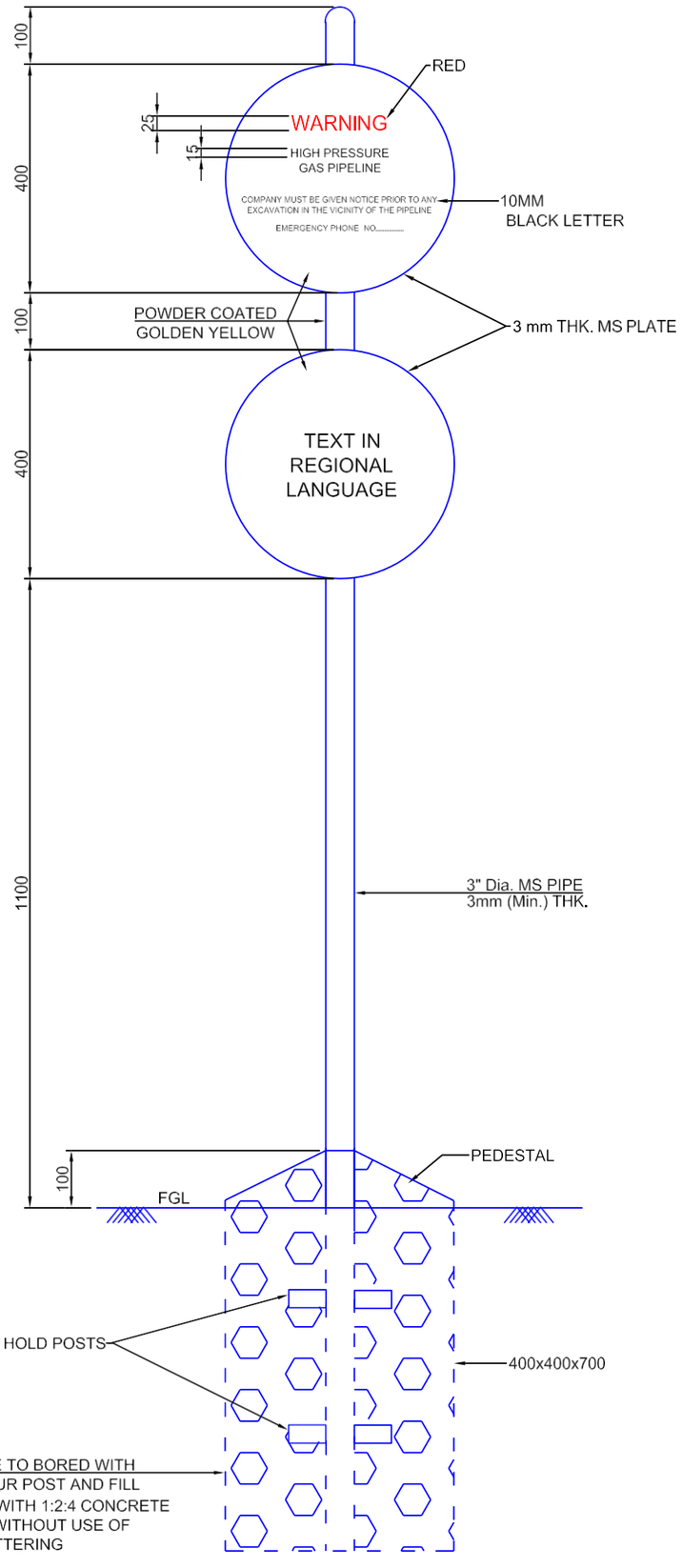
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

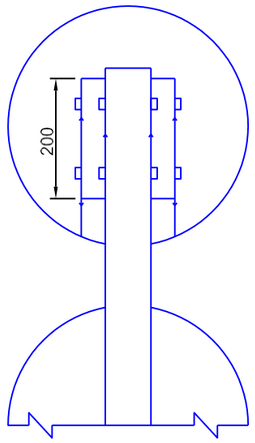
TITLE: POLE MARKER WITH FOUNDATION (INDIVIDUAL SOCIETIES / AREAS)

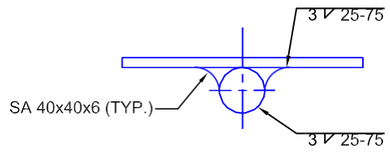
SCALE	DATE	CAD FILE: DATE		
1:10			CAD	A3

DRG. NO. -10-03-30 REV-0



FIXING DETAILS





NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. WARNING TEXT AND MARKER SIZES ARE INDICATIVE AND ARE SUBJECT TO THE APPROVAL BY OWNER / OWNER'S REPRESENTATIVE BEFORE FABRICATION.
3. SCHEME FOR POWDER COATING AND COLORING : ONE COAT OF PRIMER & TWO COATS OF SPECIFIED PAINTS. ALL LETTERS EXCEPT 'WARNING' TO BE PAINTED BLACK.
4. APPROVAL OF WARNING MARKER DESIGN SHALL BE OBTAINED BEFORE THE COMMENCEMENT OF WORK.

OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

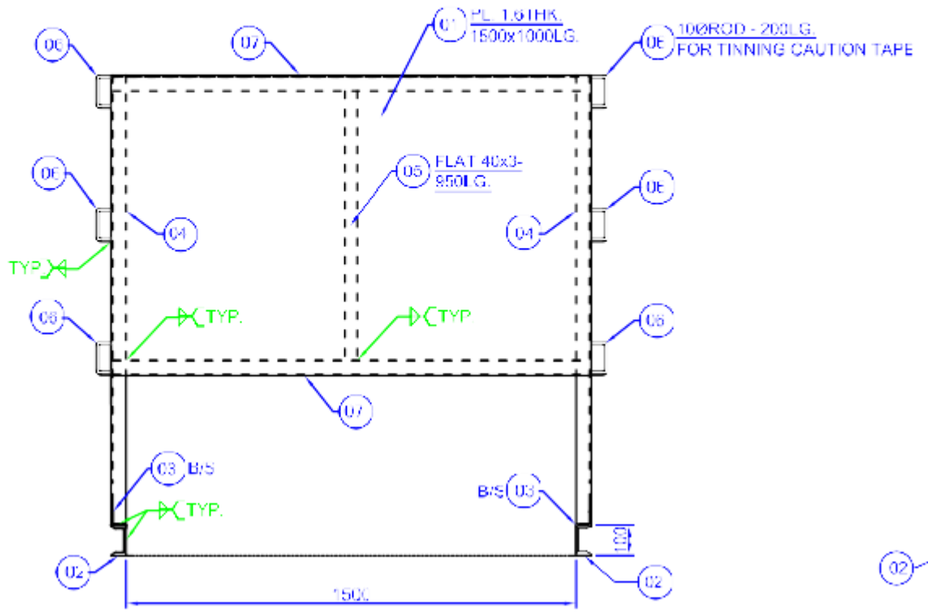
PMC:

PROJECT: CITY GAS DISTRIBUTION PROJECT

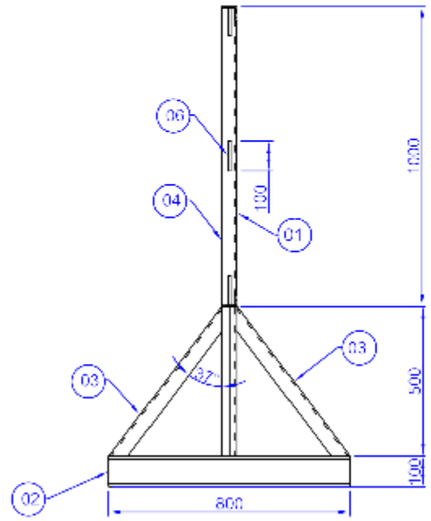
TITLE: POLE MARKER WITH FOUNDATION

SCALE	DATE	CAD FILE: DATE	CAD	A3
1:10				

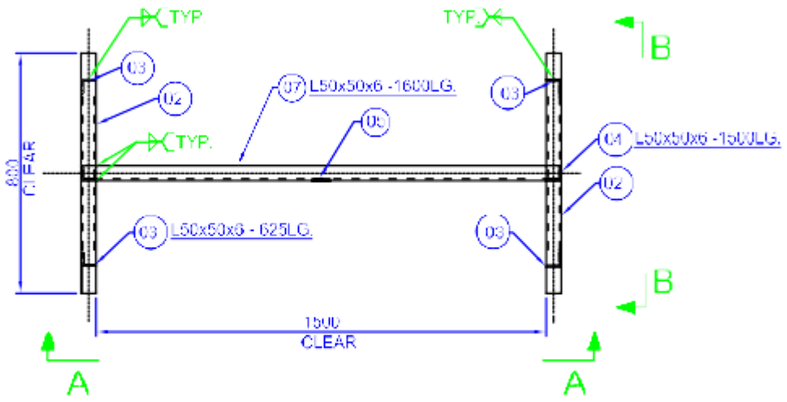
DRG. NO. -10-03-31 REV-0



ELEVATION A-A



ELEVATION B-B



PLAN VIEW

IN RED → CAUTION ← CLIENT LOGO

WORK IN PROGRESS

IN BLACK

LAYING OF NATURAL GAS PIPELINE
CLIENT : OWNER'S NAME
CONTRACTOR NAME:
DATE OF COMMENCEMENT:
DATE OF COMPLETION:
EMERGENCY PHONE NOS.:

TO BE PRINTED ON ITEM NO. 01

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWINGS.

BILL OF MATERIAL

Item Mkd.	Section	Width	Length	Item Qty. (All Marks)	Weight Kgs./M,M2	Total Weight In Kgs.
1.	PL. 1.6 THK.	1600	1000	1	12.56	20.10
2.	ISMC 100	--	800	2	9.20	14.72
3.	L50x50x6	--	625	4	4.50	11.25
4.	L50x50x6	--	1500	2	4.50	13.50
5.	Flat 3Thk.	900	40	1	0.94	0.03
6.	10Ø Rod	--	200	6	0.62	0.74
7.	L50x50x6	--	1600	2	4.50	14.40
				Grand Total (Kg)		74.74

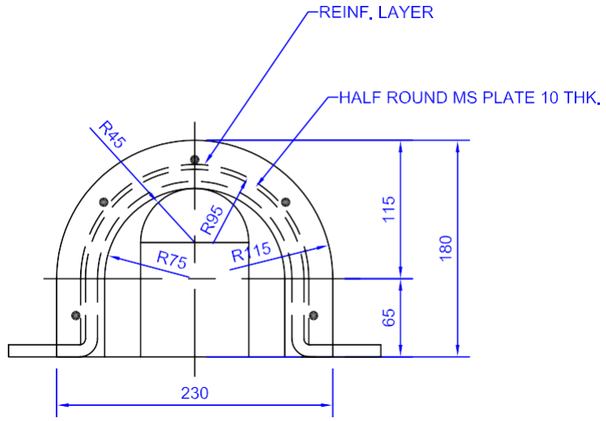
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

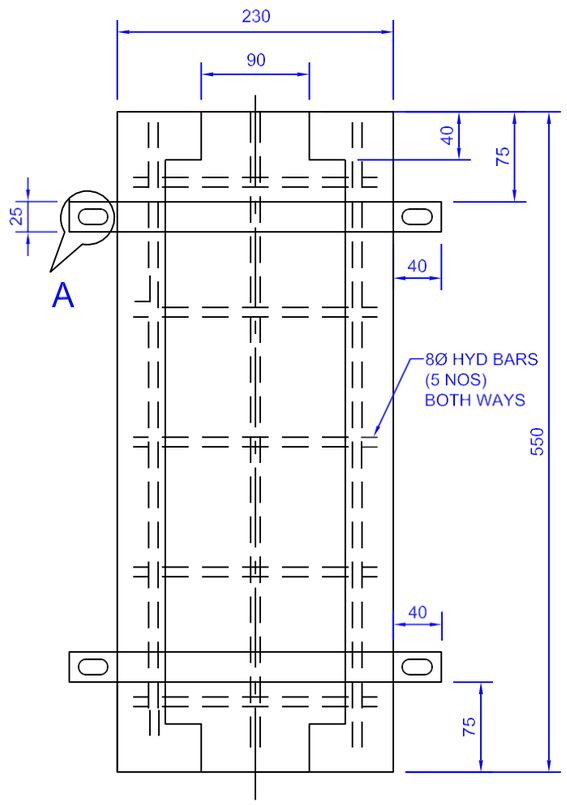
PROJECT: CITY GAS DISTRIBUTION PROJECT

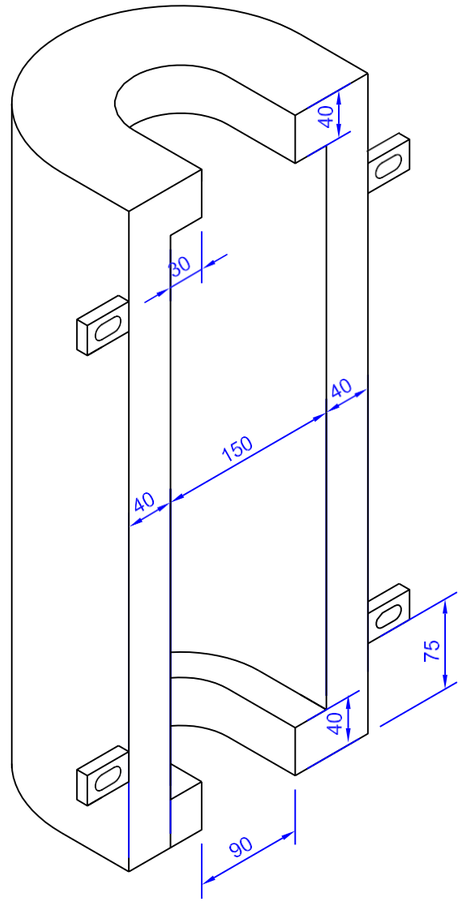
TITLE: CAUTION BOARD

			CAD	A3

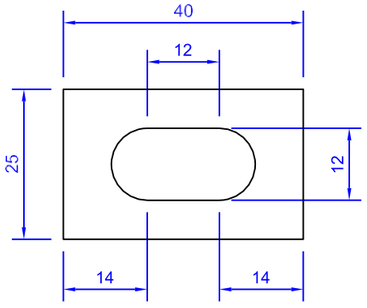
DRG. NO. -10-03-32 REV-0







ISOMETRIC VIEW



DETAIL-A

SCALE 1:1

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWING.
3. GRADE OF CONCRETE SHALL BE M25.
4. REINFORCEMENT IS HYD. TO IS:1786.
5. CONCRETE SLEEVE TO BE CLAMPED TO WALL WITH 10Ø ANCHOR BOLTS.

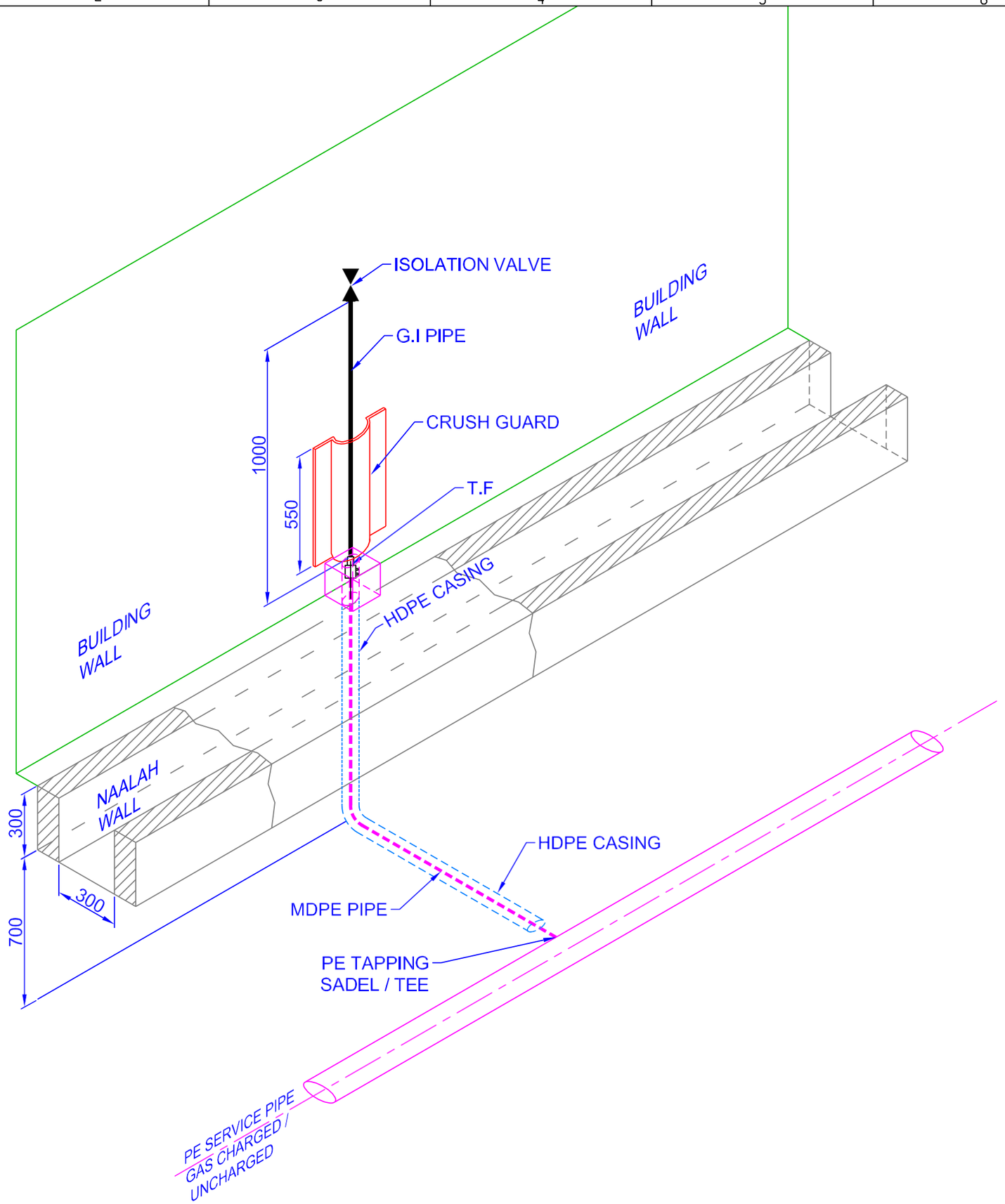
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: HALF ROUND CONCRETE SLEEVE

SCALE	DATE	C'D FILE DATE	CAD	A3
1:5				

DRG.NO. -10-03-33 REV-0



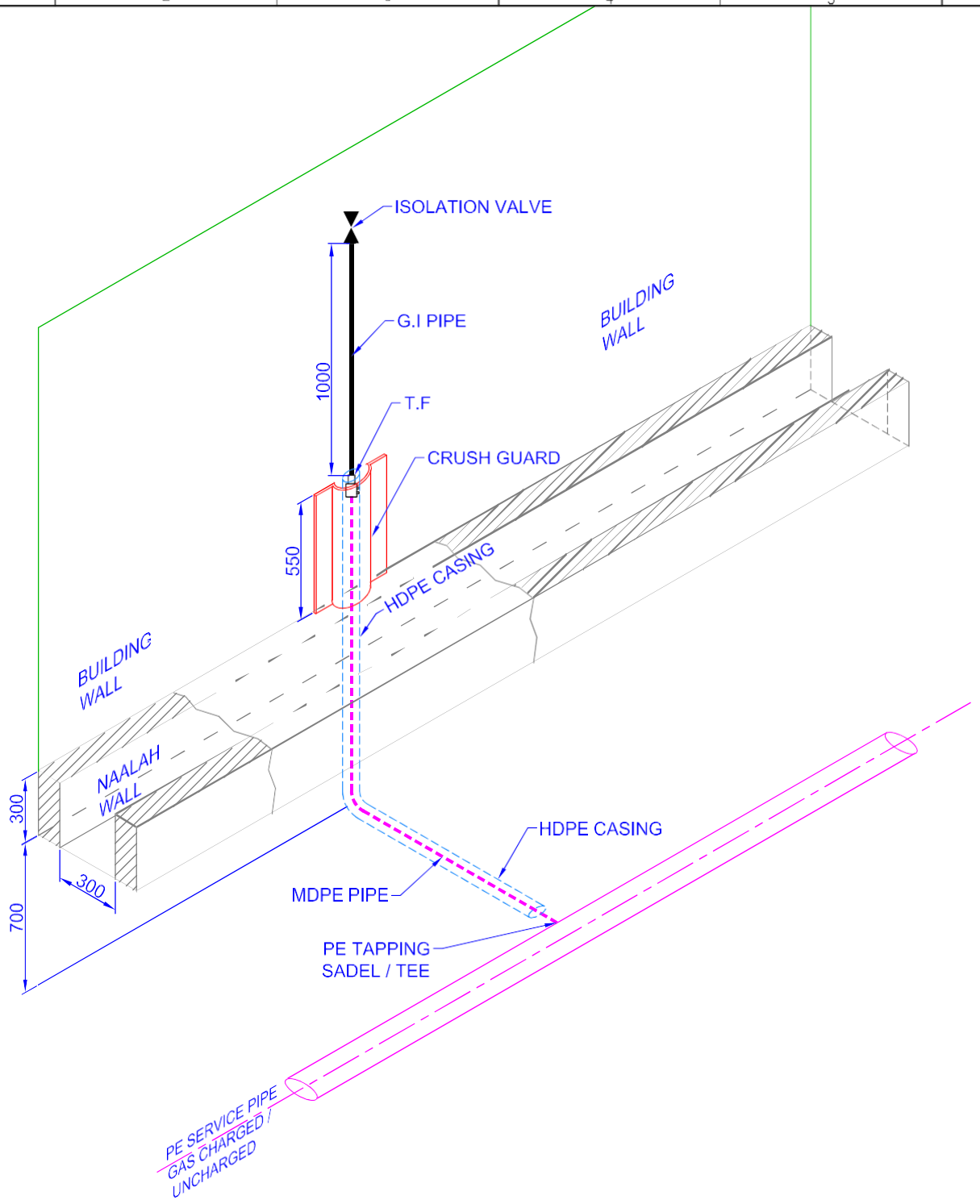
NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.

OWNER:	INDRAPRASTHA GAS LIMITED NEW DELHI
PMC:	
PROJECT:	CITY GAS DISTRIBUTION PROJECT
TITLE:	DRAIN CROSSING FOR LAYING OF SERVICE LINES WHERE PEDESTAL IS POSSIBLE

SCALE	DATE	CAD FILE: DATE	CAD	A3
N.T.S.				

DRG. NO. -10-03-44 REV-0



NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.

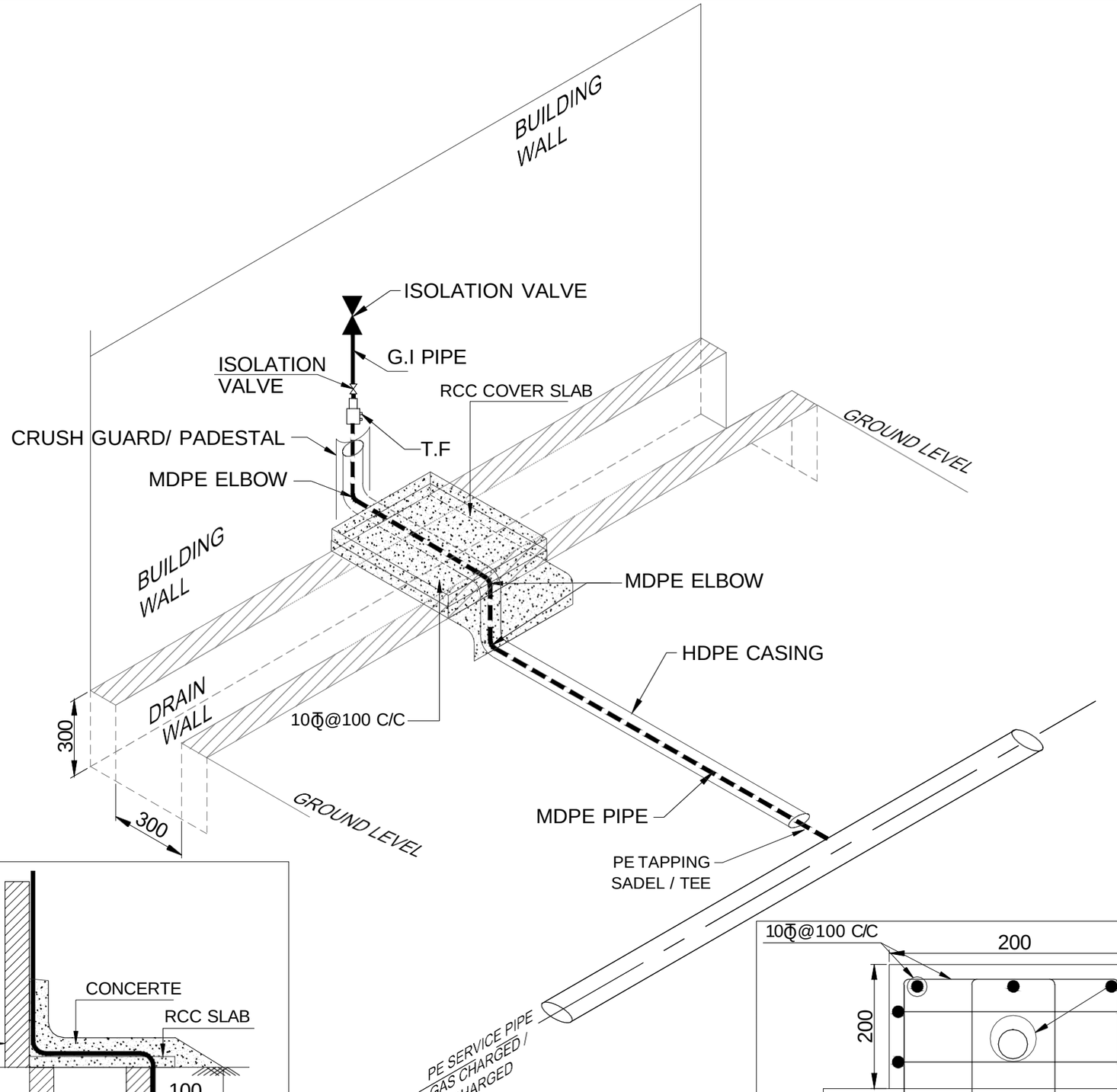
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

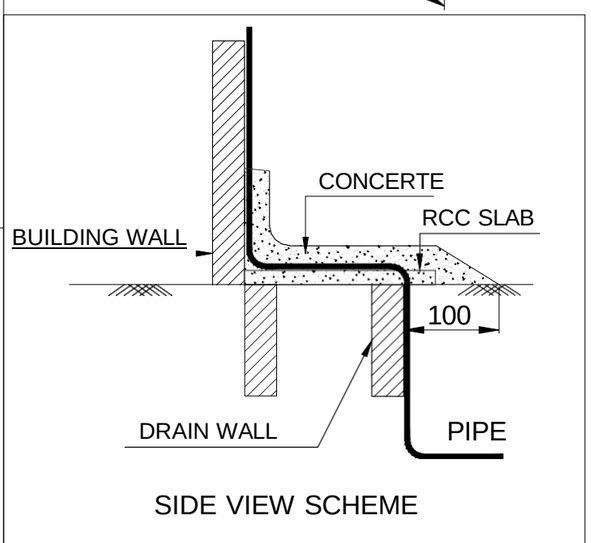
PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: DRAIN CROSSING FOR LAYING OF SERVICE LINES WHERE PEDESTAL NOT POSSIBLE

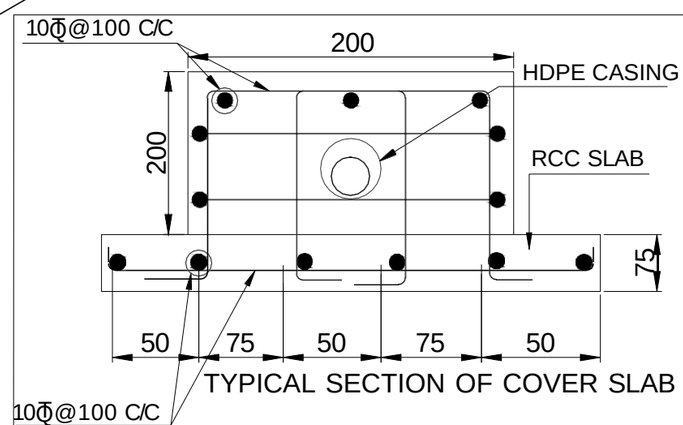
SCALE	DATE	CAD FILE		
N.T.S.		DATE	CAD	A3

DRG. NO. 14588-10-03-45 REV-0





SIDE VIEW SCHEME



TYPICAL SECTION OF COVER SLAB

NOTES:-

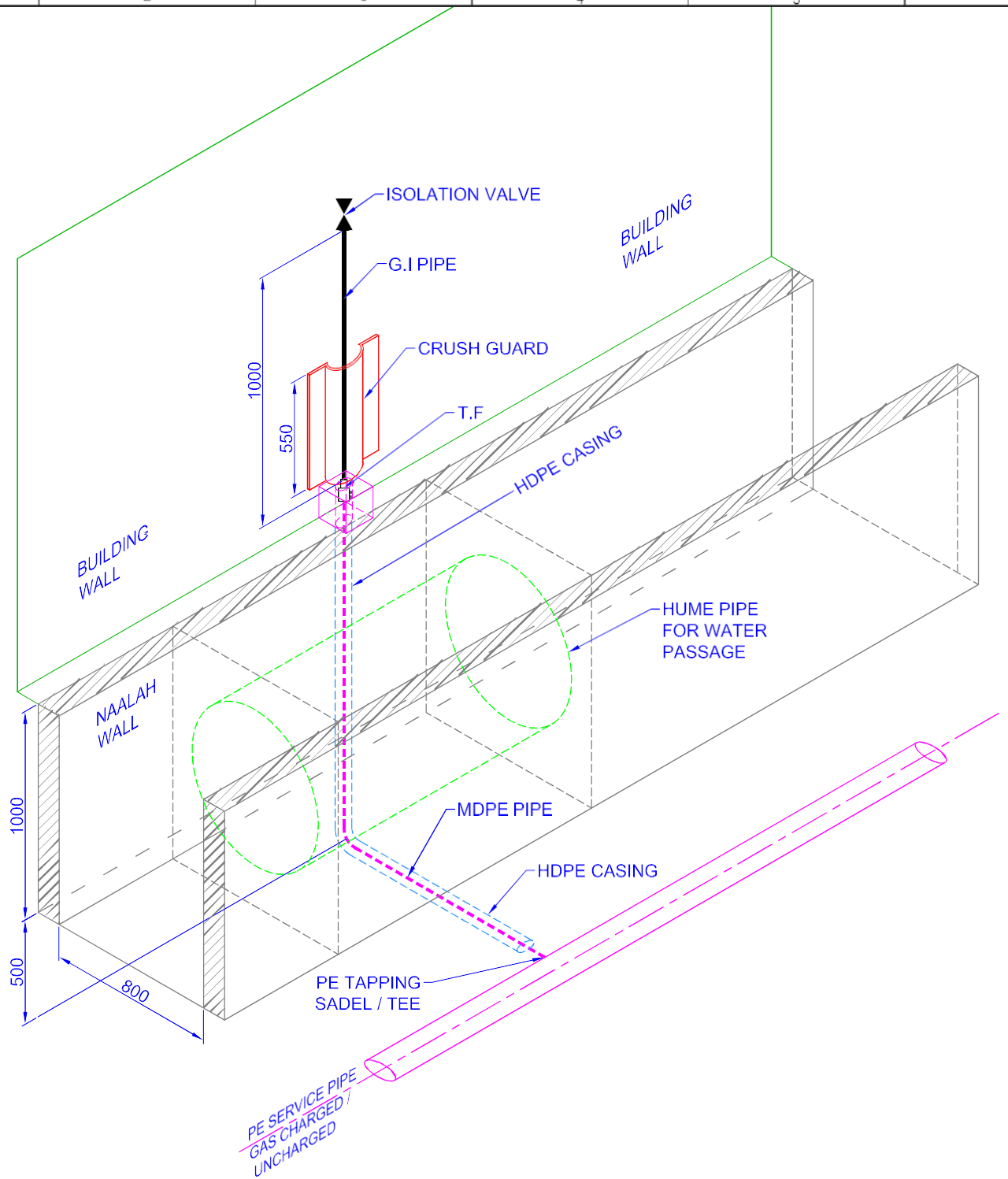
1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE GRADE OF CONCRETE FOR RCC WORKS SHALL BE M25 CONFORMING TO IS-456.
3. REINFORCEMENT SHALL BE HYSD BARS OF GRADE FE415 CONFORMING TO IS-1786.

REV.	DATE	DESCRIPTION	PREP.	CHKD.	APPD.
A	10.09.2018	REVISED AS PER NEW INPUT & ISSUED FOR REVIEW	KK	AN	MO/RKB
1	21.08.2018	ISSUED FOR CONSTRUCTION	US	AN	MO/RKB

CLIENT: INDRAPRASTHA GAS LIMITED (IGL)
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT
NCT OF DELHI & NCR

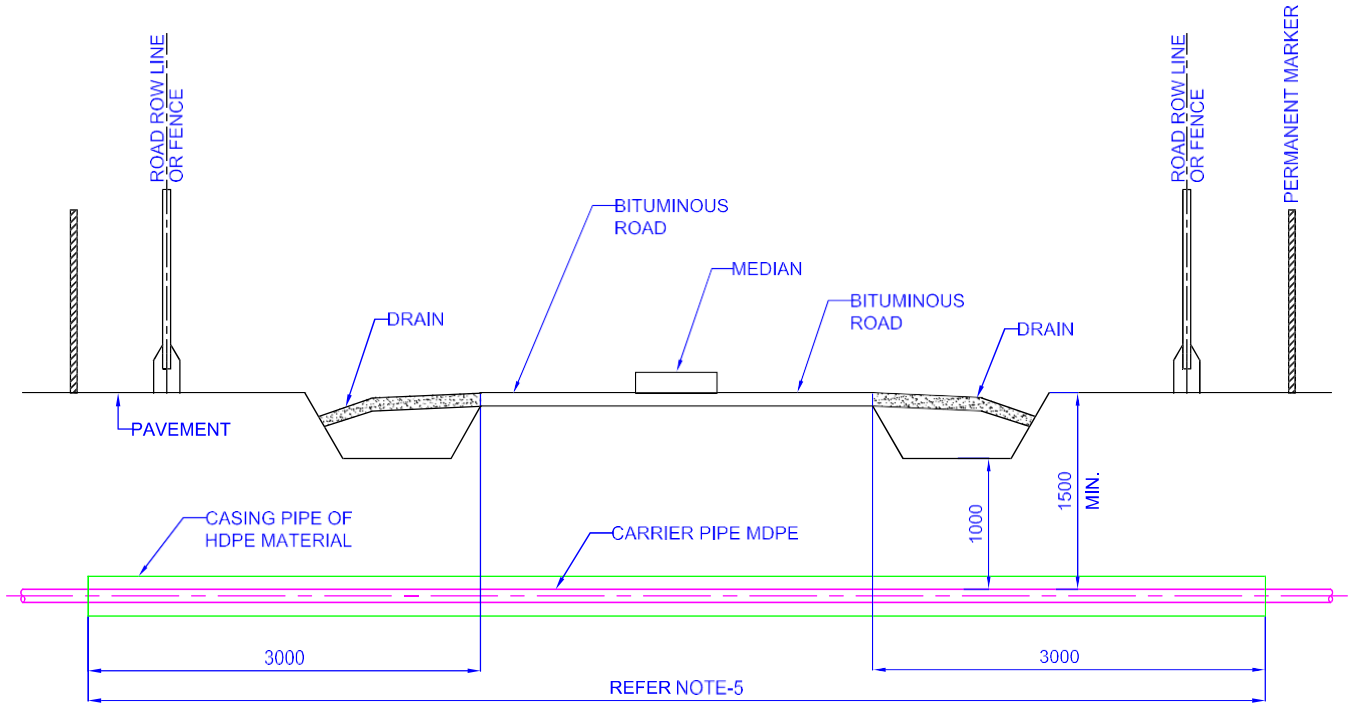
SCALE	TITLE			
NTS	DRAIN CROSSING FOR LAYING OF SERVICE LINES			
SIZE	CLIENT JOB NO.	DRAWING NUMBER	SHEET	REV.
A3		-10-03-46A	1 OF 1	1



NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.

OWNER:	INDRAPRASTHA GAS LIMITED NEW DELHI
PROJECT:	CITY GAS DISTRIBUTION PROJECT
TITLE:	NALLAH CROSSING FOR LAYING OF SERVICE LINES
SCALE: N.T.S. / DATE / CAD FILE / DATE	CAD / A3
DRG. NO.	14588 -10-03-46 REV-0



TYPICAL SECTION

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWINGS.
3. ROAD / HIGHWAY CROSSING SHALL BE RESTORED TO ORIGINAL CONDITION TO THE ENTIRE SATISFACTION OF OWNER AND CONCERNED AUTHORITIES HAVING JURISDICTION.
4. REFER API RP 1102 FOR OTHER DESIGN AND INSTALLATION REQUIREMENTS.
5. ANGLE OF INTERSECTION BETWEEN PIPELINE AND THE ROAD / HIGHWAY SHALL BE AS CLOSE TO 90° AS POSSIBLE BUT IN NO CASE LESS THAN 30°.
6. CONTRACTOR SHALL VERIFY THE ACTUAL DIMENSION WITH RESPECT TO SURVEY DETAILS OF EACH ROAD / HIGHWAY CROSSING AND PREPARE DETAILED DRAWINGS FOR INDIVIDUAL CROSSING TAKE ENGINEER-IN-CHARGE AND CLIENT'S APPROVAL BEFORE COMMENCEMENT OF CONSTRUCTION.
7. THE CASING PIPE SHALL BE OF SIZE MAINTAINED AS PER T.S. FOR PE LAYING.

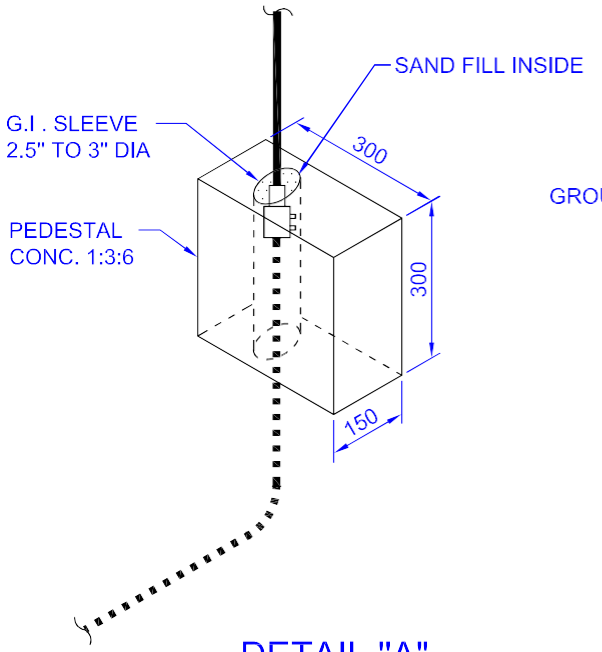
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

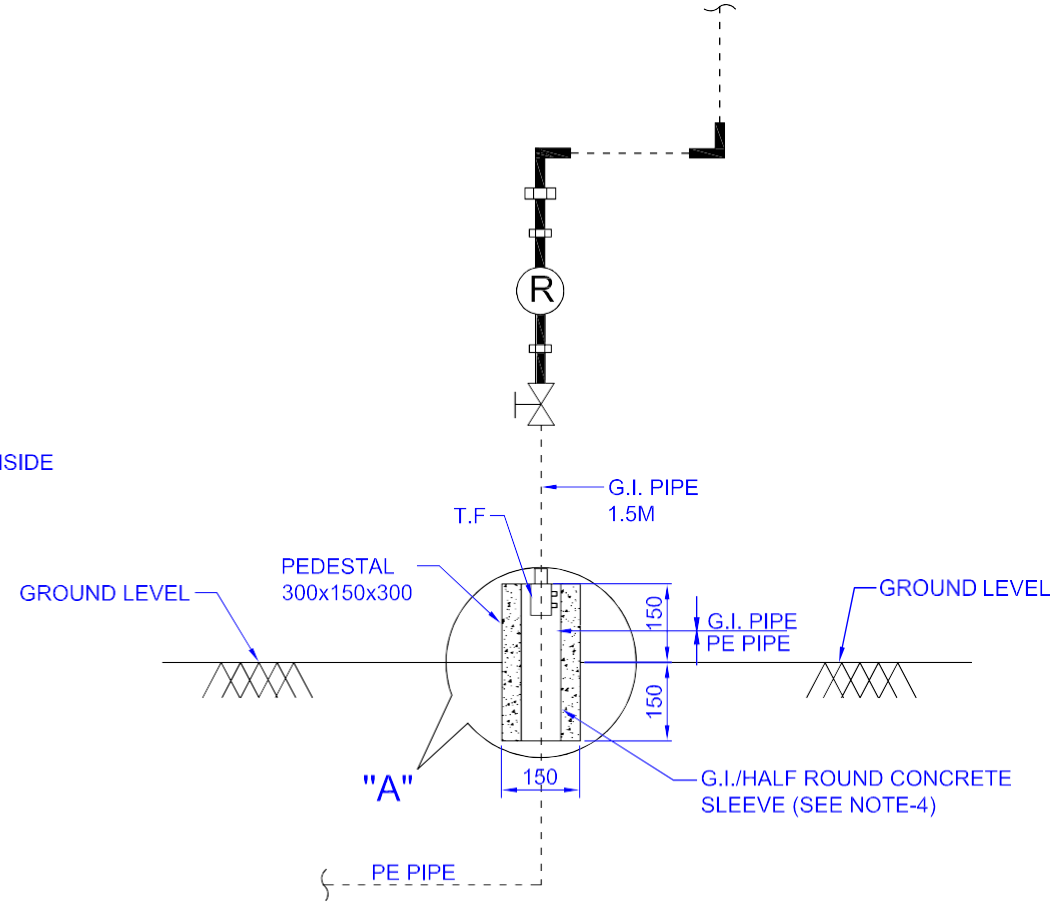
TITLE: ROAD / HIGHWAY CASED CROSSING FOR MDPE PIPE

SCALE	DATE	CAD FILE / DATE	CAD	A3
1:2				

DRG. NO. 14588-10-04-23 REV-0



DETAIL "A"



PEDESTAL

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWINGS.
3. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED WHILE DETAIL ENGINEERING.
4. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNERS REPRESENTATIVE AS PER SITE CONDITION.

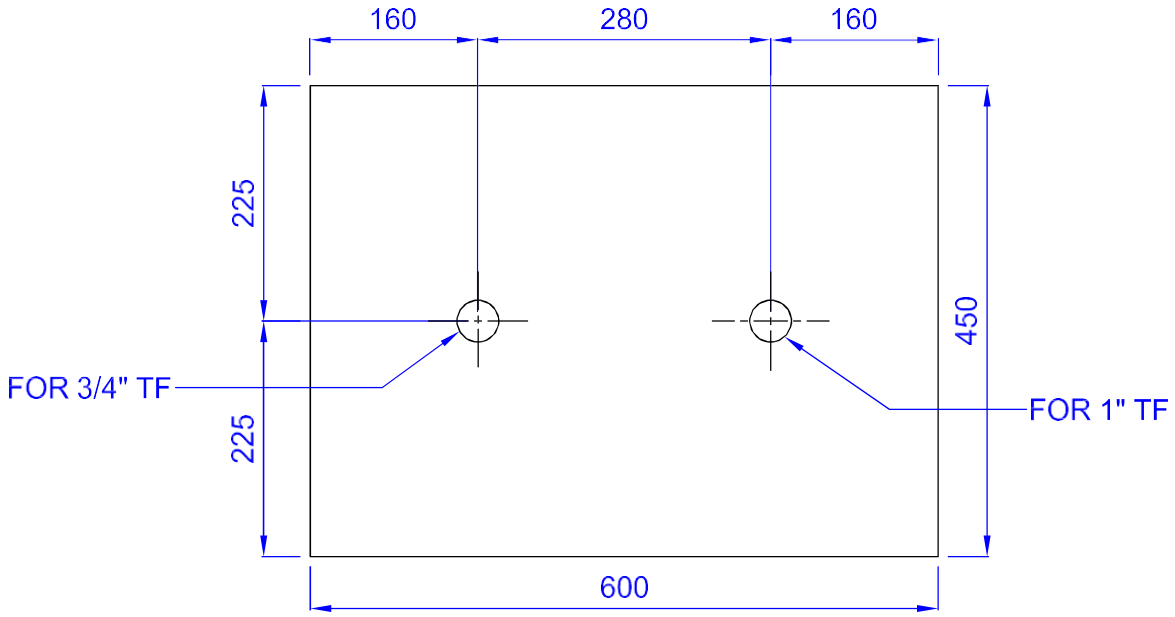
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

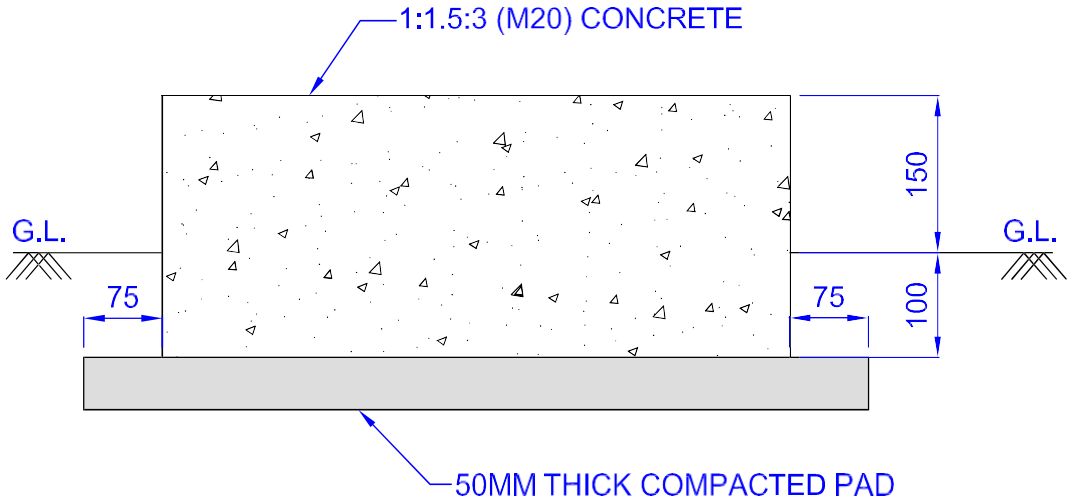
PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: G.I. PIPE SLEEVE

SCALE	DATE	CAD FILE / DATE	CAD	A3
1:10				

DRG. NO. 14588-20-03-18 REV-0





NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWING.

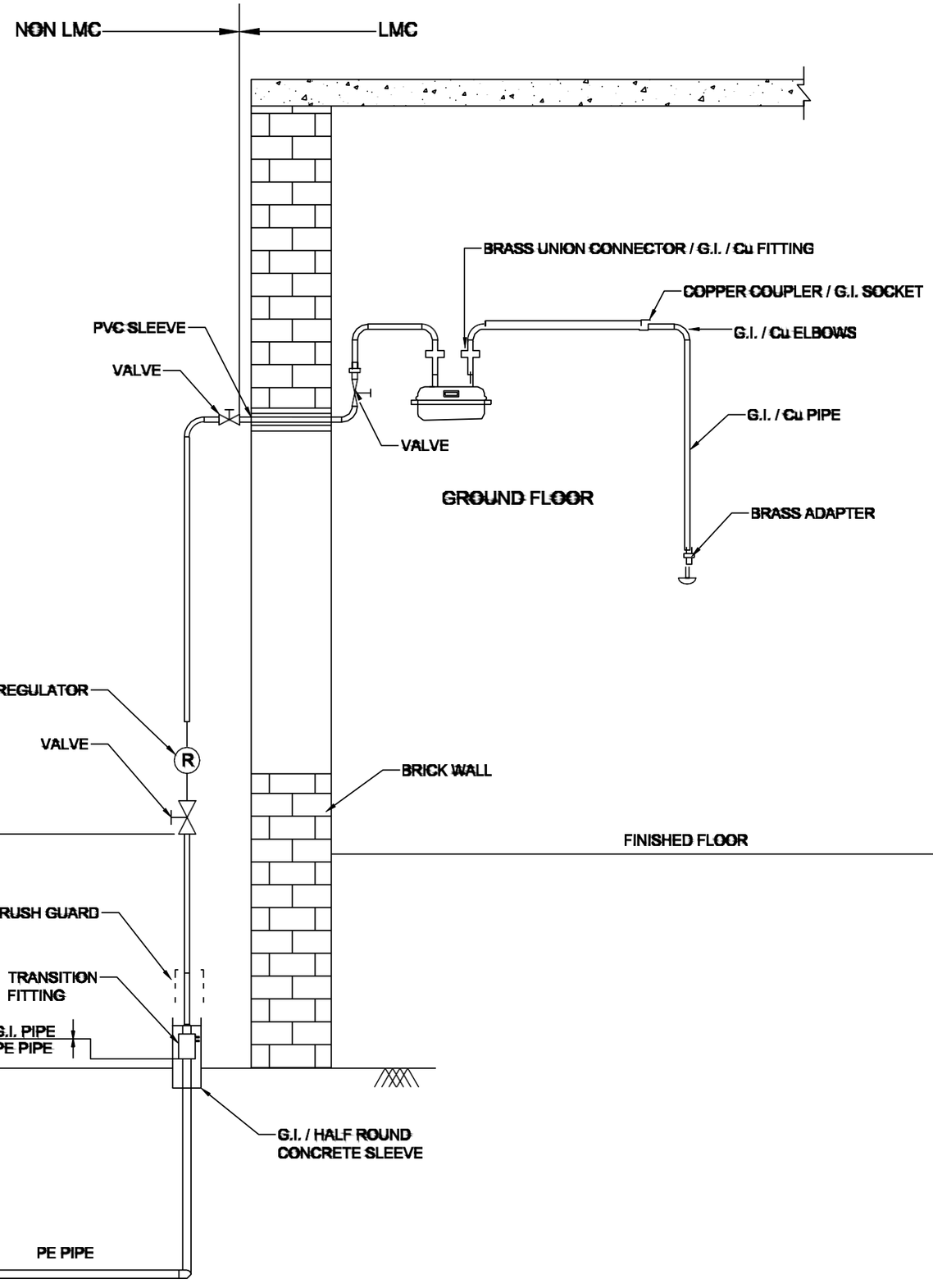
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: SCHEMATIC DIAGRAM OF FOUNDATION FOR SINGLE STREAM SERVICE REGULATOR

SCALE	DATE	CAD FILE	CAD	A3
1:5		DATE		

DRG. NO. 14588-20-03-39 REV-0



NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH [FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE] SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.
8. TAPPING SHALL BE LEFT NEAR OUTSIDE THE KITCHEN AS DIRECTED BY OWNER / OWNER'S REPRESENTATIVE..

THIS IS THE GENERAL LAYOUT.
FOR LMC AND NON-LMC

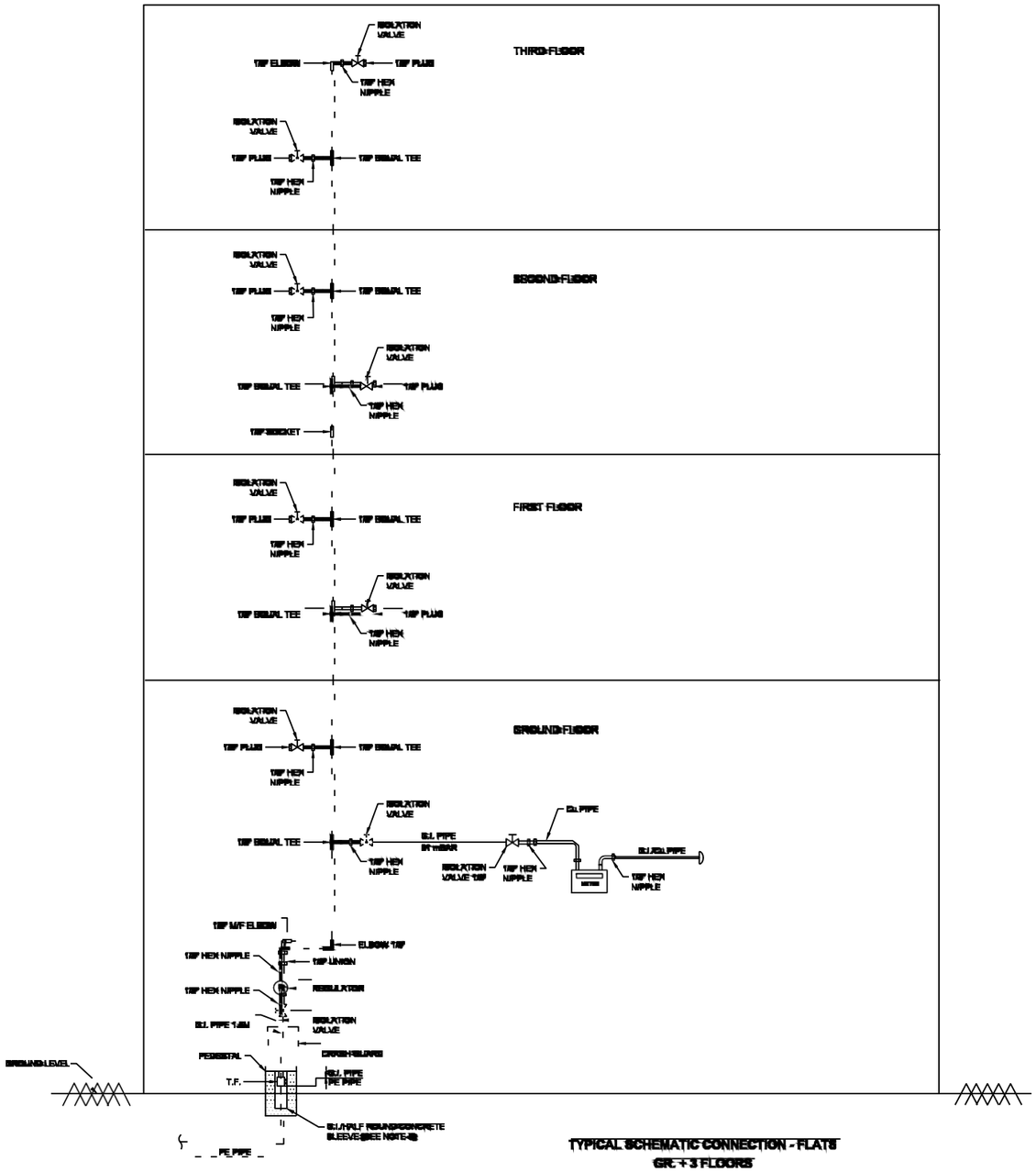
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL DOMESTIC CONNECTION LAYOUT OF NG DISTRIBUTION (NON LMC & LMC)

SCALE: | DATE: | CAD | A3

DRG. NO. -20-05-01 REV-0



TYPICAL SCHEMATIC CONNECTION - FLATS
GR. + 3 FLOORS

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.
8. METER CLAMP SHALL BE APPROVED FROM OWNER / OWNER'S REPRESENTATIVE..

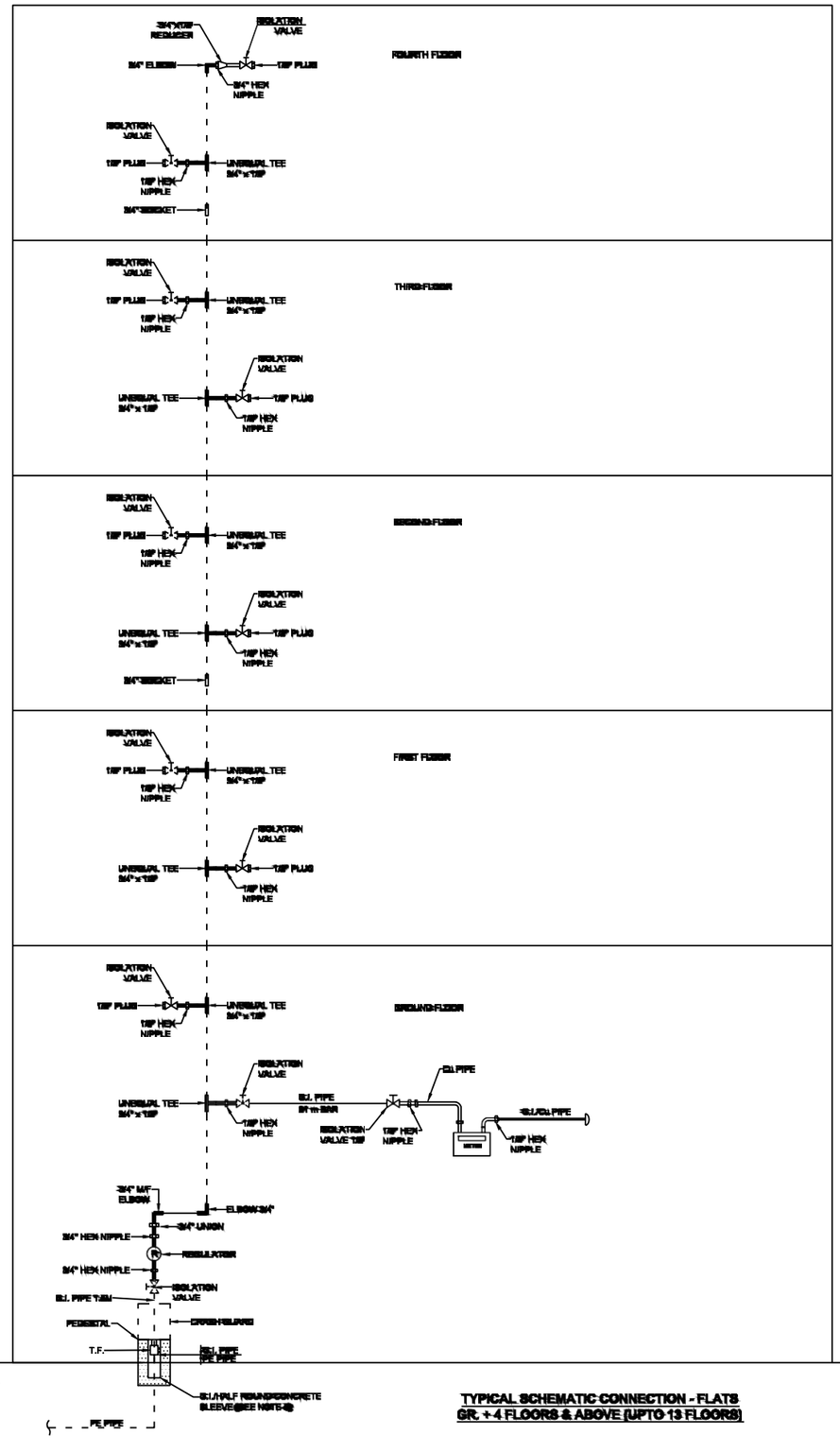
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL SCHEMATIC CONNECTION - FLATS GR. + 3 FLOORS

SCALE	DATE	CHECKED DATE	CAD	A3

DRG. NO. -20-05-02 REV-0



TYPICAL SCHEMATIC CONNECTION - FLATS
GR. + 4 FLOORS & ABOVE (UPTO 13 FLOORS)

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.
8. METER CLAMP SHALL BE APPROVED FROM OWNER / OWNER'S REPRESENTATIVE..

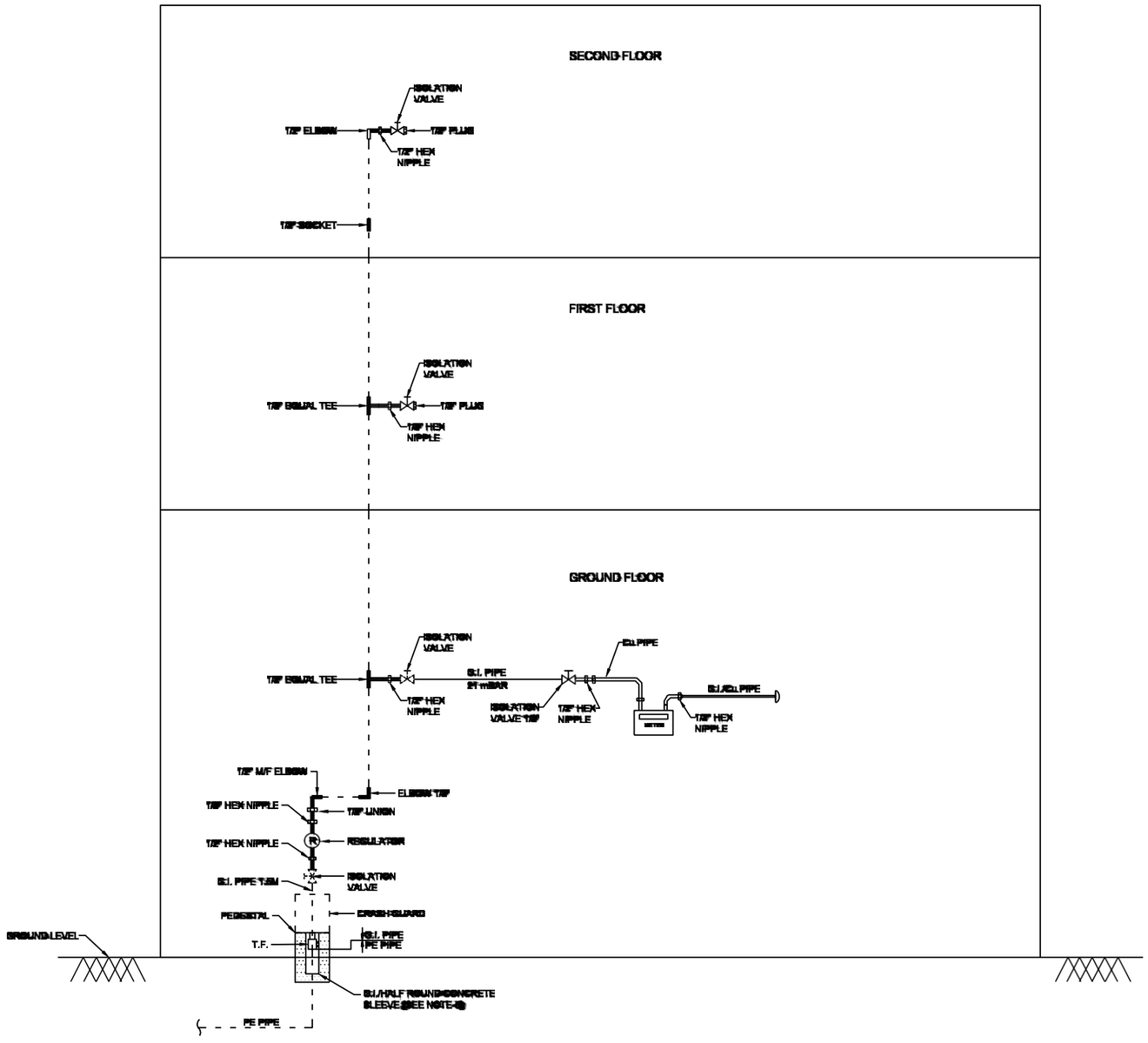
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL SCHEMATIC CONNECTION - FLATS GR. + 4 FLOORS & ABOVE (UPTO 13 FLOORS)

SCALE	DATE	CHECKED DATE	CAD	A3

DRG. NO. -20-05-03 REV-0



NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.
8. METER CLAMP SHALL BE APPROVED FROM OWNER / OWNER'S REPRESENTATIVE..

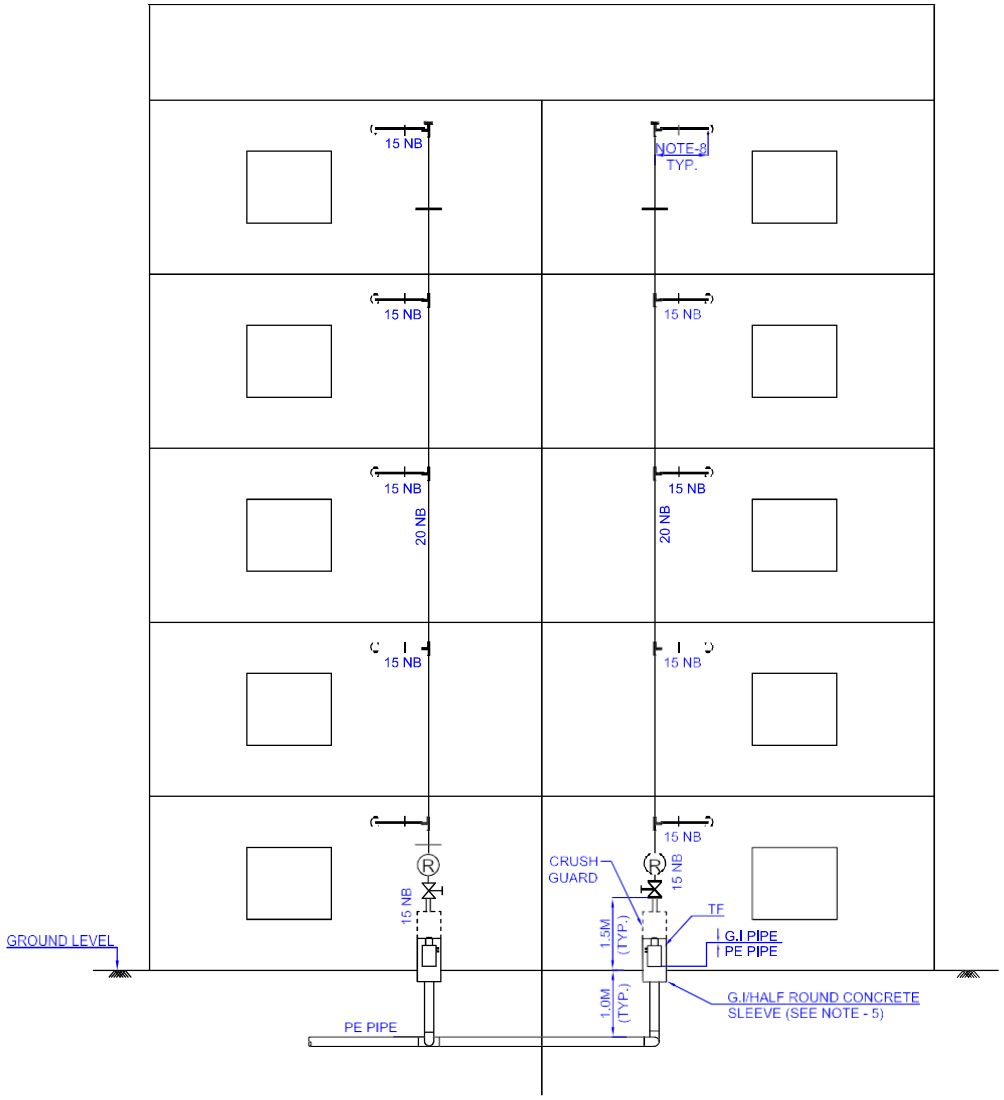
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL SCHEMATIC CONNECTION - KOTHI

			CAD	A3

DRG. NO. -20-05-04 REV-0



INDICATIVE RISER ARRANGEMENT IN GR+4 & ABOVE BUILDING
(METER INSTALLED INSIDE THE KITCHEN)

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.
8. TAPPING SHALL BE LEFT NEAR OUTSIDE THE KITCHEN AS DIRECTED BY OWNER / OWNER'S REPRESENTATIVE.
9. FROM TRANSITION FITTING TO THE ISOLATION VALVE, SHALL BE CONSIDERED IN THE OUTSIDE KITCHEN PIPING.

THIS IS THE GENERAL LAYOUT.
FOR LMC AND NON-LMC

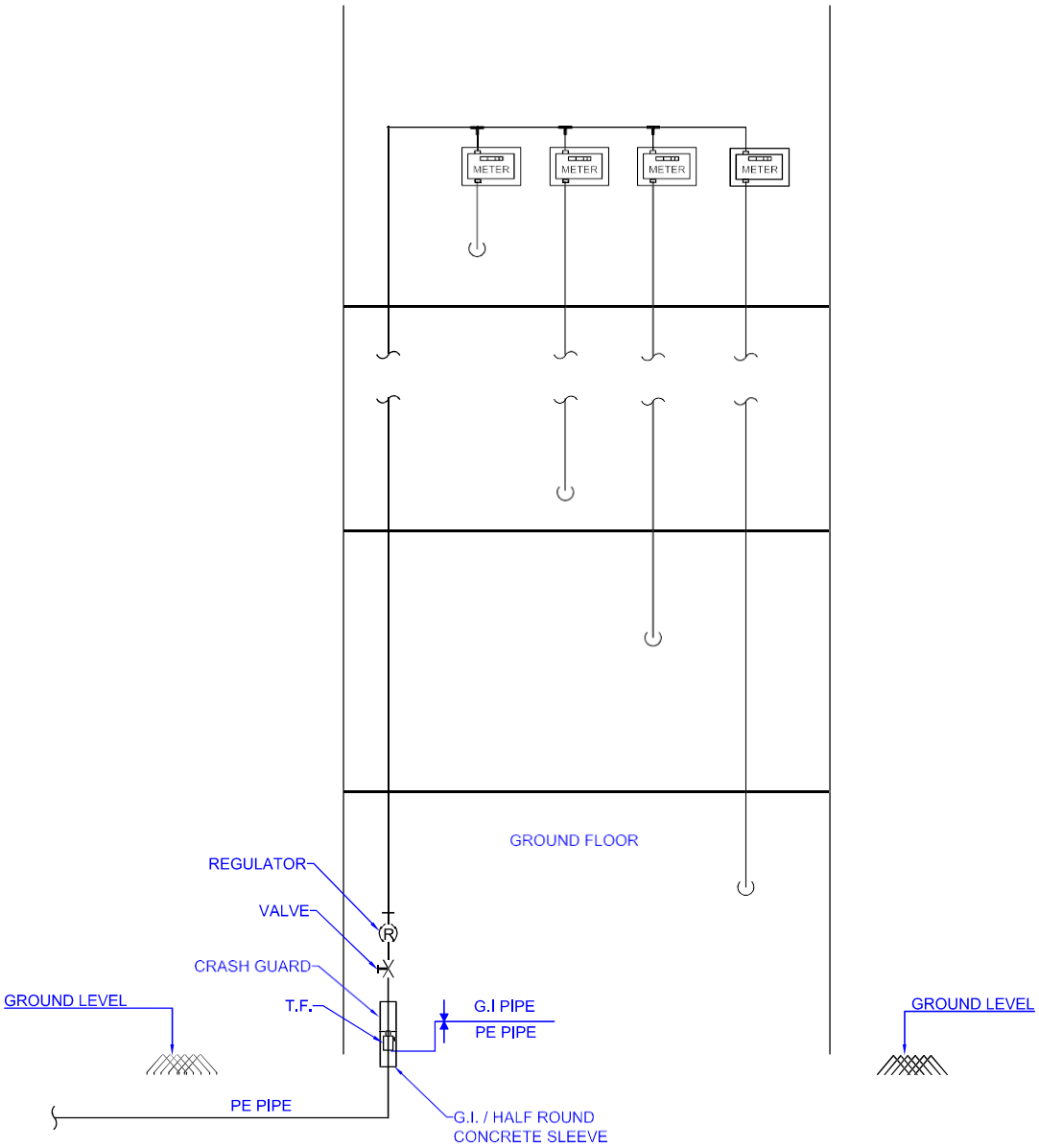
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL DOMESTIC CONNECTION LAYOUT OF NG DISTRIBUTION

SCALE	DATE	CAD FILE DATE	CAD	A3
1:4				

DRG. NO. 15792 -20-05-06 REV-0



INDICATIVE RISER ARRANGEMENT IN BUILDING,
IF METER IS INSTALLED AT TOP OF FLOOR

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.
8. TAPPING SHALL BE LEFT NEAR OUTSIDE THE KITCHEN AS DIRECTED BY OWNER / OWNER'S REPRESENTATIVE.
9. FROM TRANSITION FITTING TO THE ISOLATION VALVE, SHALL BE CONSIDERED IN THE OUTSIDE KITCHEN PIPING.
10. AT THE TIME OF MEASURING LENGTH OF G.I./COPPER PIPE G.I./COPPER FITTINGS SHALL BE COUNTED IN THE PIPE LENGTH.

THIS IS THE GENERAL LAYOUT.

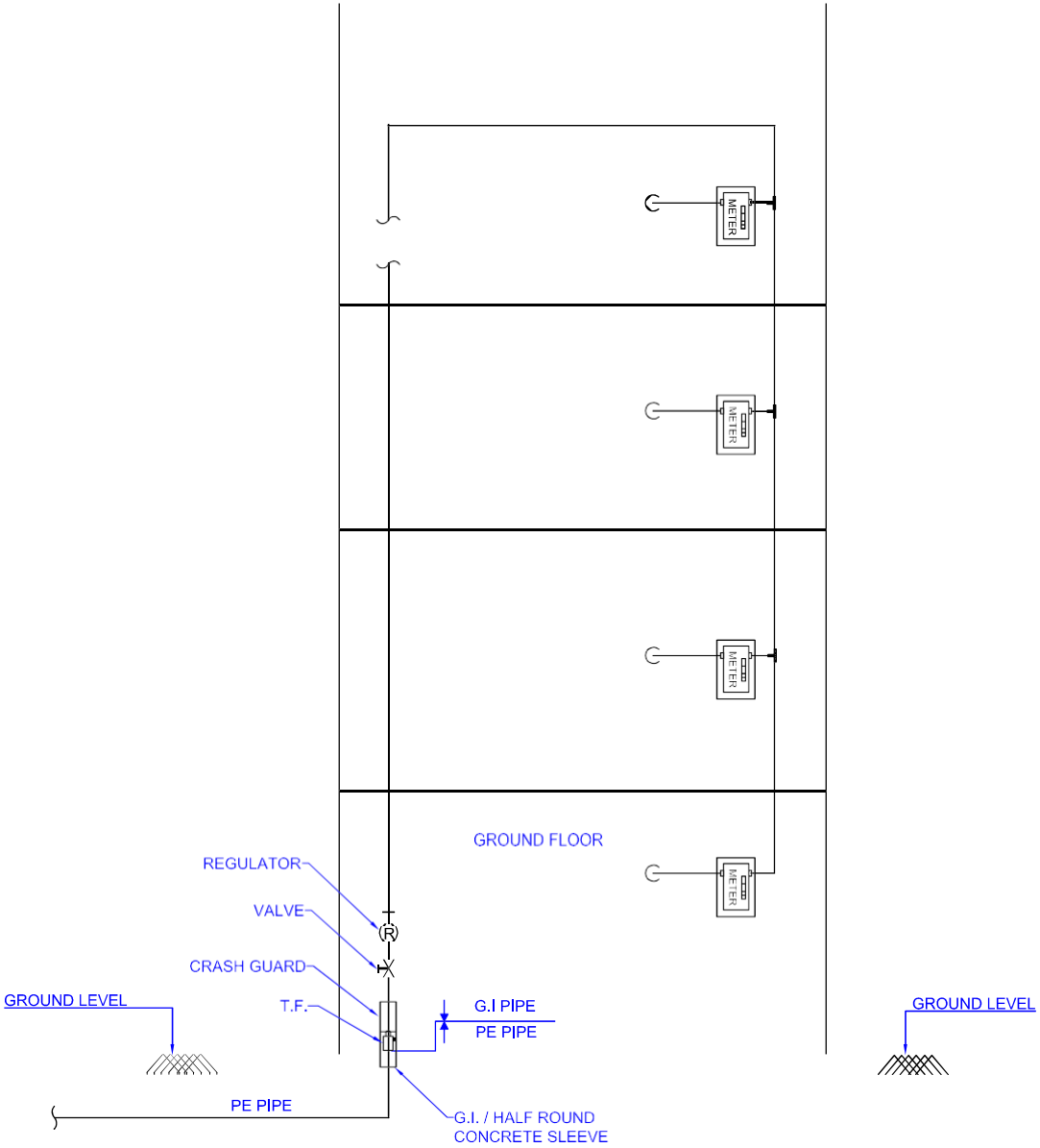
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL DOMESTIC CONNECTION LAYOUT OF NG DISTRIBUTION

SCALE	DATE	CAD FILE	CAD	A3
N.T.S.		DATE		

DRG. NO. 15792 -20-05-07 REV-0



INDICATIVE RISER ARRANGEMENT IN BUILDING,
IF METER IS INSTALLED AT EACH FLOOR

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.
8. TAPPING SHALL BE LEFT NEAR OUTSIDE THE KITCHEN AS DIRECTED BY OWNER / OWNER'S REPRESENTATIVE.
9. FROM TRANSITION FITTING TO THE ISOLATION VALVE, SHALL BE CONSIDERED IN THE OUTSIDE KITCHEN PIPING.
10. AT THE TIME OF MEASURING LENGTH OF G.I./COPPER PIPE G.I./COPPER FITTINGS SHALL BE COUNTED IN THE PIPE LENGTH.

THIS IS THE GENERAL LAYOUT.

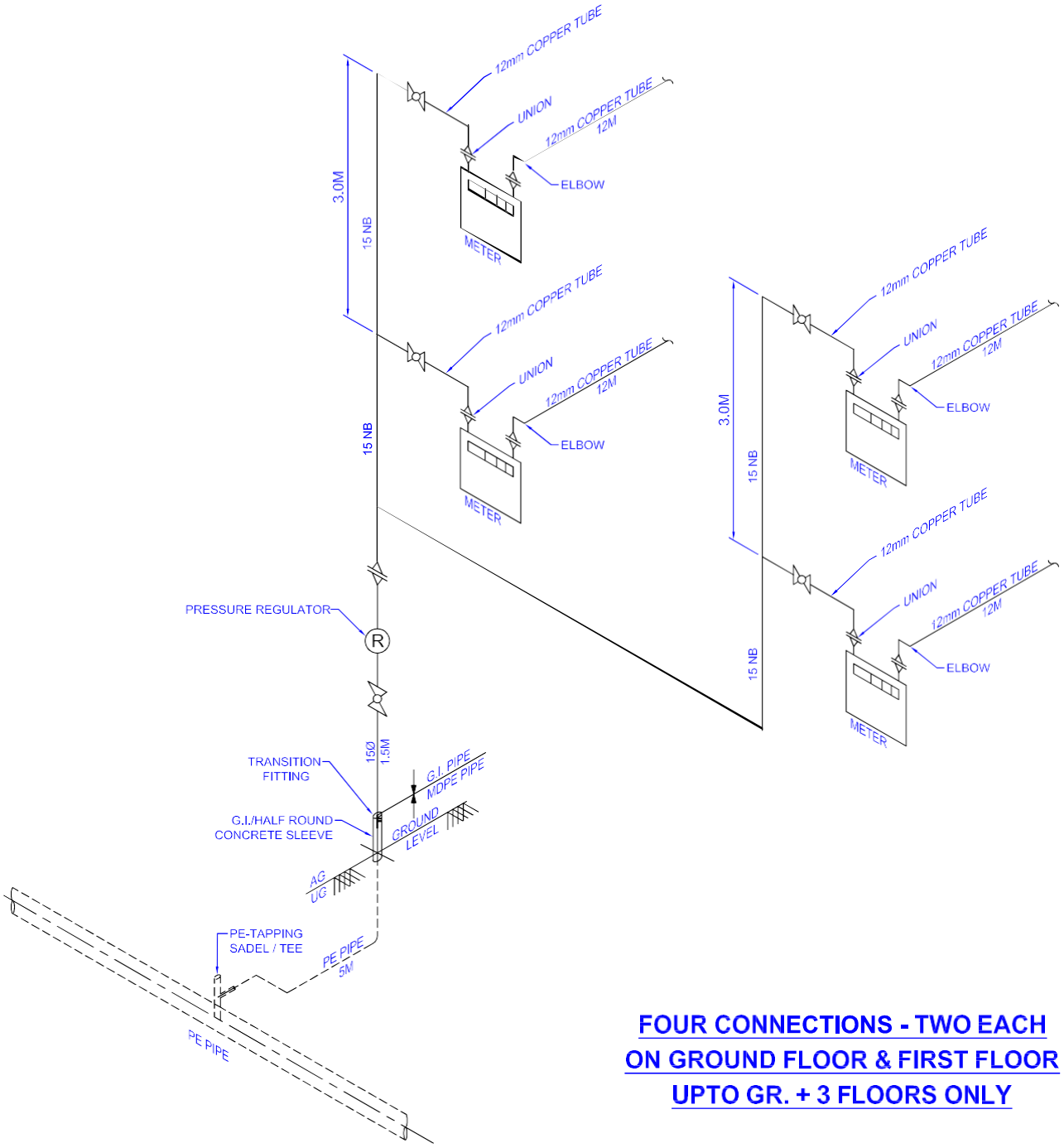
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL DOMESTIC CONNECTION LAYOUT OF NG DISTRIBUTION

SCALE	DATE	CAD FILE	CAD	A3
N.T.S.		DATE		

DRG. NO. 15792 -20-05-08 REV-0



FOUR CONNECTIONS - TWO EACH ON GROUND FLOOR & FIRST FLOOR UPTO GR. + 3 FLOORS ONLY

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.

THIS IS THE GENERAL LAYOUT.
FOR LMC AND NON-LMC

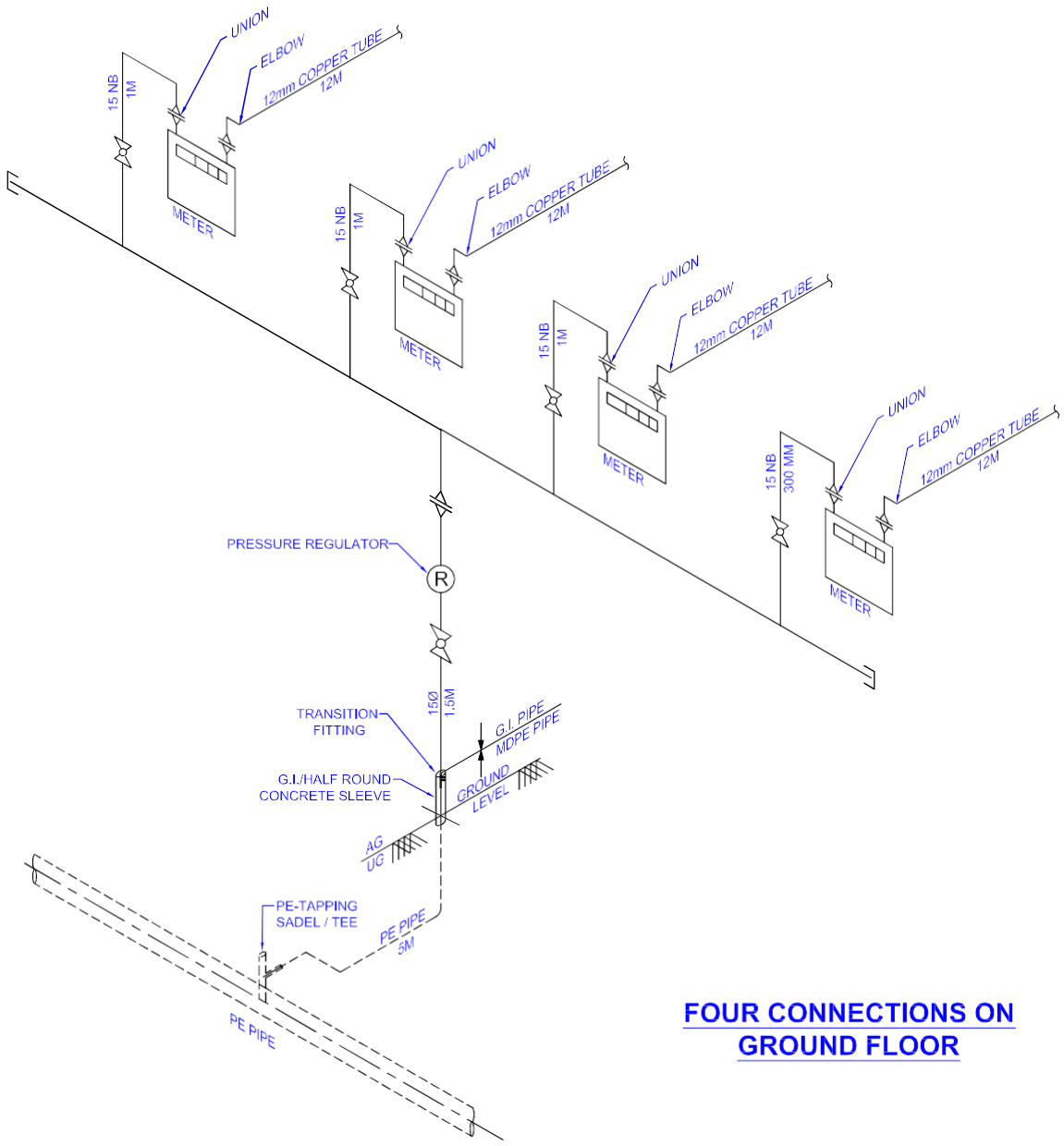
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL DOMESTIC CONNECTION LAYOUT OF NG DISTRIBUTION

SCALE	DATE	CAD FILE	
N.T.S.		DATE	CAD A3

DRG. NO. 15792 -20-05-10 REV-0



FOUR CONNECTIONS ON GROUND FLOOR

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.

THIS IS THE GENERAL LAYOUT.
FOR LMC AND NON-LMC

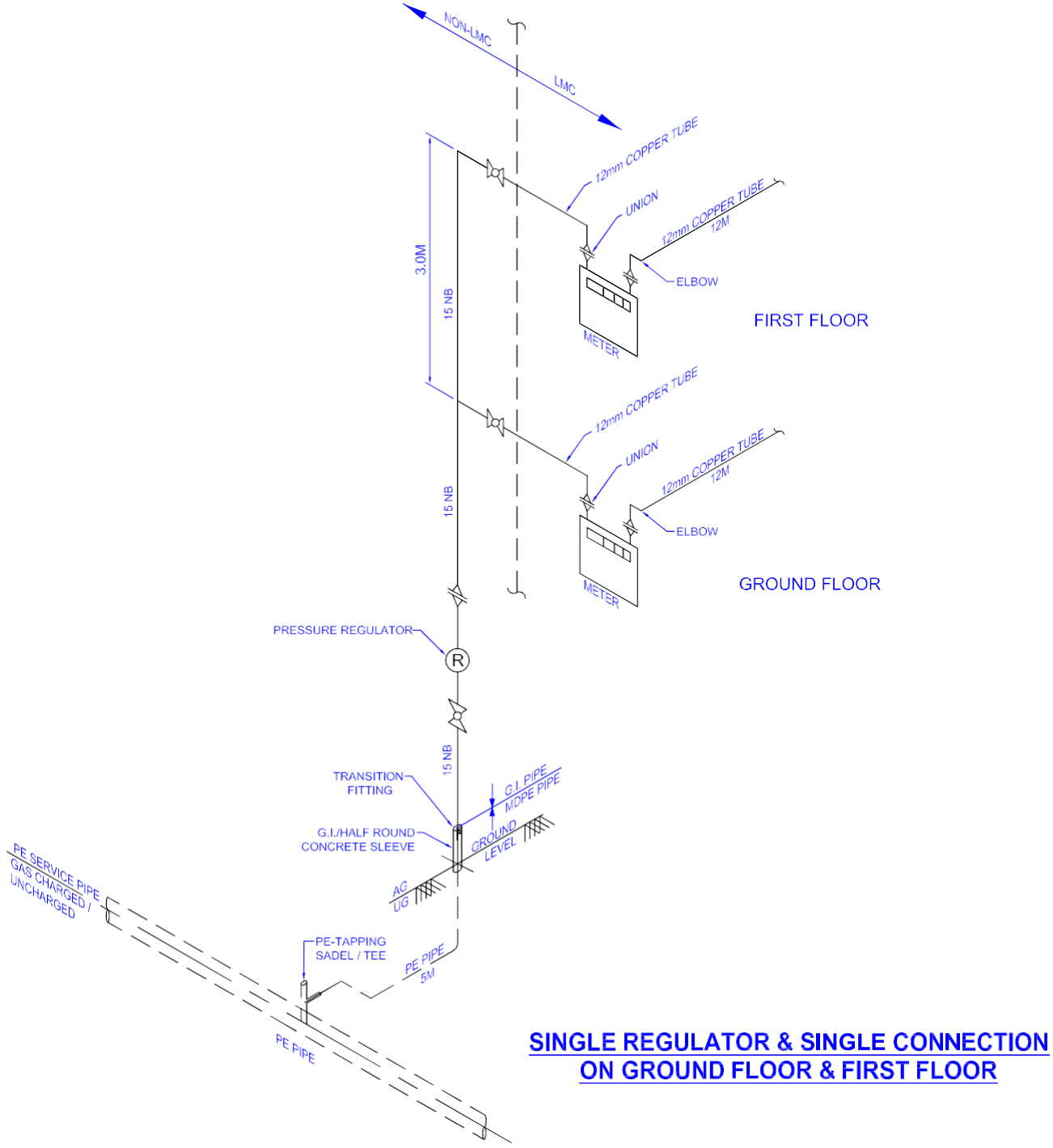
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL DOMESTIC CONNECTION LAYOUT OF NG DISTRIBUTION

SCALE	DATE	CAD FILE		
N.T.S.		DATE	CAD	A3

DRG. NO. 15792 -20-05-11 REV-0



SINGLE REGULATOR & SINGLE CONNECTION ON GROUND FLOOR & FIRST FLOOR

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE AND SHALL BE DECIDED AT THE TIME OF DETAIL ENGINEERING.
3. PIPING DOWNSTREAM METER SHALL BE COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTING TO INLET OF ISOLATION VALVE) SHALL BE 1.5M. ANY CHANGES IN RISER LENGTH SHALL BE AFTER APPROVAL FROM EIC.
5. G.I. INSTALLATION / METER INSTALLATION SHALL BE DECIDED BY OWNER / OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.
6. IF COPPER PIPE GOES TO THE APPLIANCE VALVE THEN BRASS FITTING SHALL BE USED AT THE OUTLET OF METER OR IF G.I. PIPE GOES TO THE APPLIANCE VALVE THEN G.I. FITTING SHALL BE USED AT THE OUTLET OF THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING IS USED IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150 MM AWAY FROM CENTER LINE OF THE FITTING AT EVERY SIDE. HOWEVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS / AS DIRECTED BY EIC.

THIS IS THE GENERAL LAYOUT.
FOR LMC AND NON-LMC

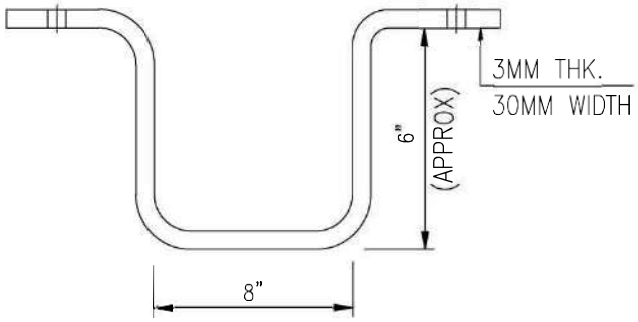
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

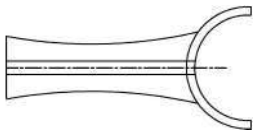
TITLE: TYPICAL DOMESTIC CONNECTION LAYOUT OF NG FOR FLAT

SCALE	DATE	CAD FILE		
N.T.S.		DATE	CAD	A3

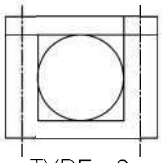
DRG. NO. 15792 -20-05-12 REV-0



BRACKET FOR METERS
(DOMESTIC)

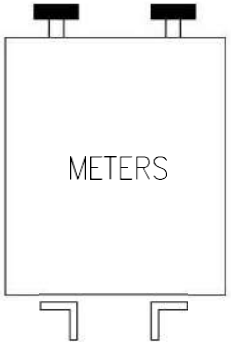


TYPE-1

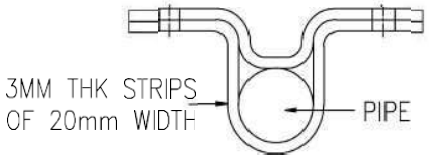


TYPE-2

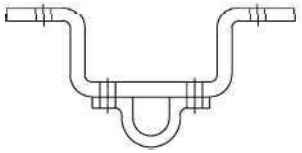
PE/PVC CLAMPS FOR COPPER PIPE



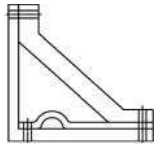
ANGLE BRACKETS 50x50mm
FOR NON DOMESTIC METERS



TYPE-1



TYPE-2



TYPE-3

MS CLAMPS FOR GI PIPE

NOTES

NOTES:-

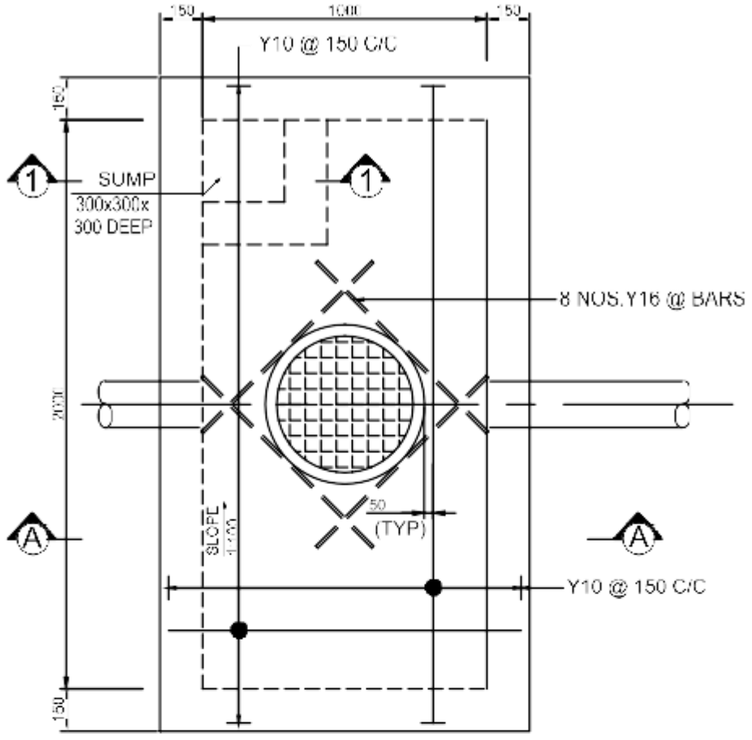
1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. CLAMP, REGULATOR BOX AND METER BRACKET ARE TO BE MADE AS PER DIRECTION AND APPROVAL OF EIC.
3. CLAMPS/BOXES BRACKETS TO BE TIGHTLY SECURED TO THE WALL WITH PROPER ROWEL PLUGS, SCREWS ETC. WOODEN BLOCK TO BE USED IN CASE ROWEL PLUGS DO NOT HOLD. PROPER THE AREA.
4. ALL CLAMPS SHOULD BE POWDER COATED AS PER STANDARD SPECIFICATION PROVIDED WITH TENDER DOCUMENTS.
5. CLAMPS ON PIPES TO BE FIXED AT MAXIMUM DISTANCE OF 1.5 mtrs AND AT BENDS.

CLIENT: INDRAPRASTHA GAS LIMITED (IGL)
NEW DELHI

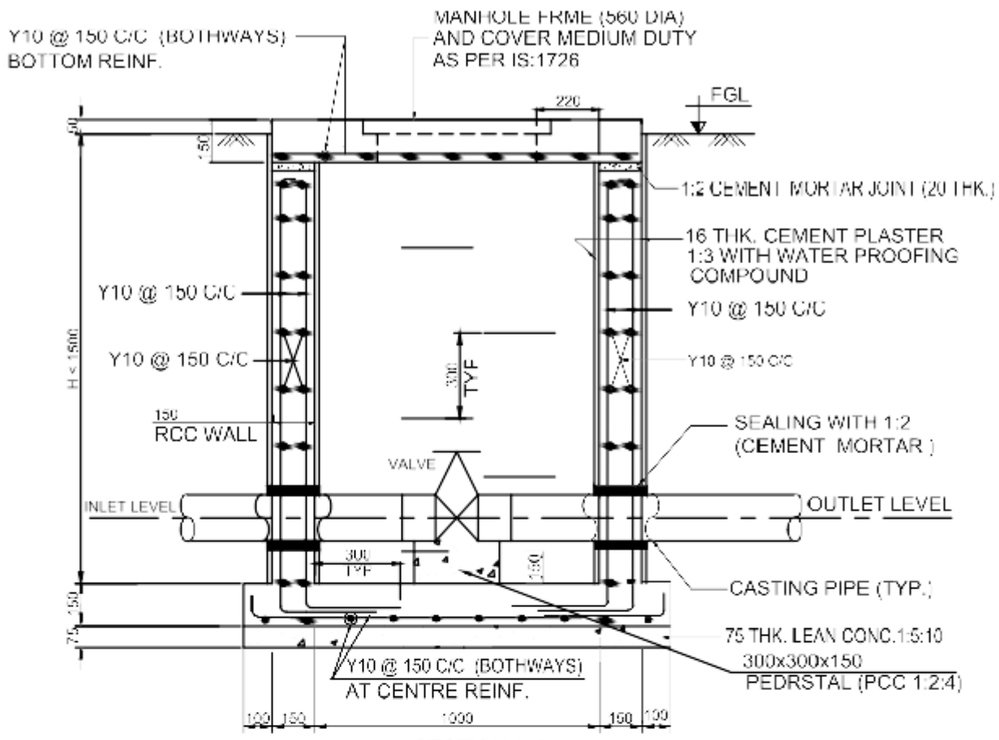
PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: TYPICAL DRAWING FOR BRACKET & CLAMPS

SIGN.	PMC	IGL	SCALE NTS	DATE	CAD FILE/ DATE	CAD	A4
			DRG. NO. 15792-20-05-05				



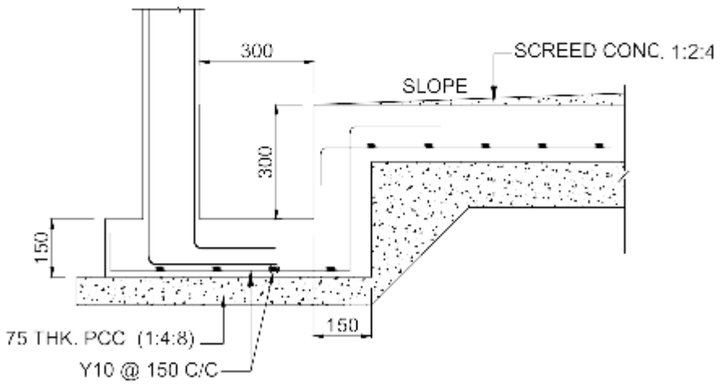
VALVE PIT PLAN
(SCALE 1:20)



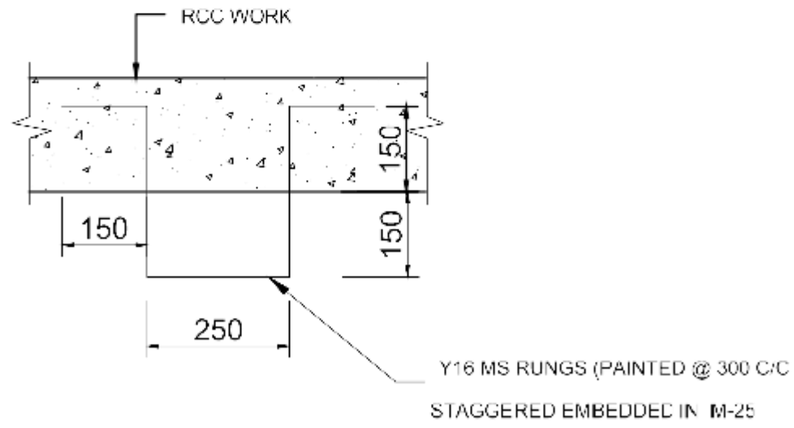
SECTION A-A
(SCALE 1:20)

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY, DO NOT SCALE THE DRAWING.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE 40 (SLAB 20mm
4. GRADE OF CONCRETE USED SHALL BE M 25 CONFORMING.
5. RE INFORCEMENT SHALL BE HYSD BARS OF GRADE Fe 415) CONFORMING TO IS: 1786.



SECTION 1-1
(SCALE 1:10)



TYPICAL DETAILS OF MS RUNGS
(SCALE 1:10)

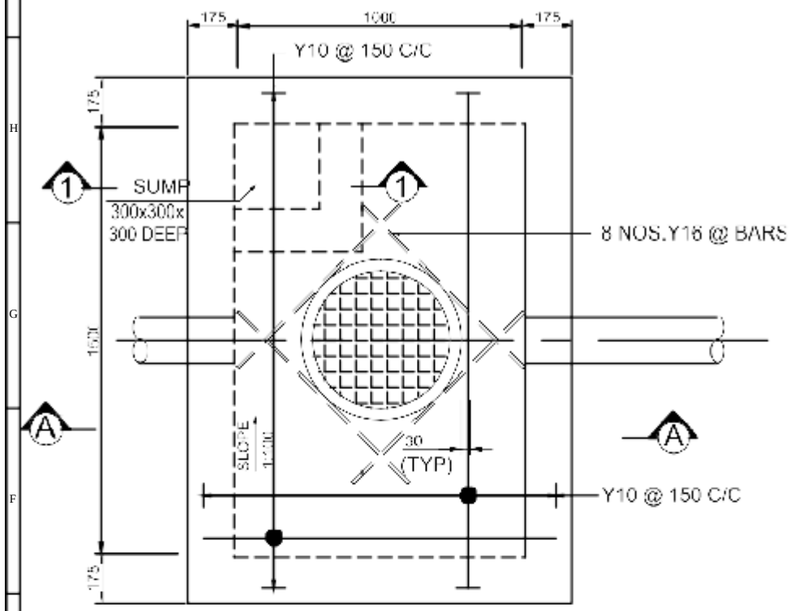
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

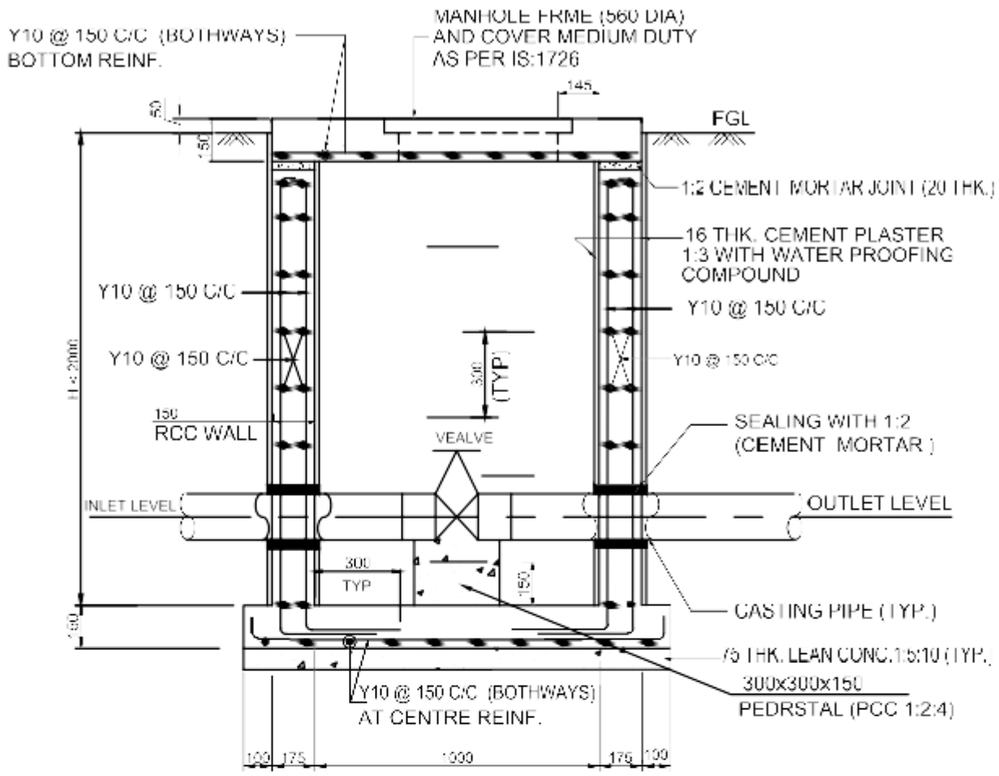
TITLE: STANDARD DETAIL OF RCC VALVE CHAMBER (TYPE-1)

SCALE	DATE	CAD FILE:		
AS SHOWN	01-07-2014	DATE	CAD	A3

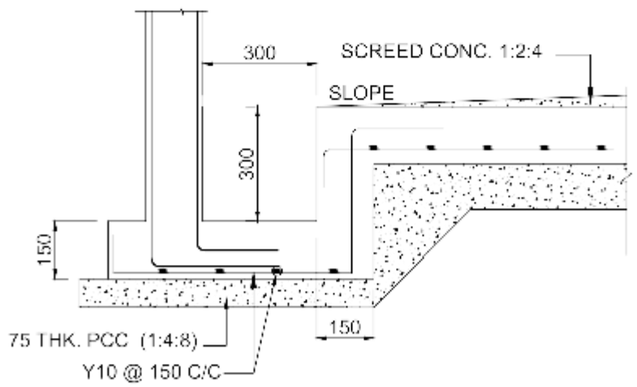
DRG. No. 15792-20-03-20 REV-0



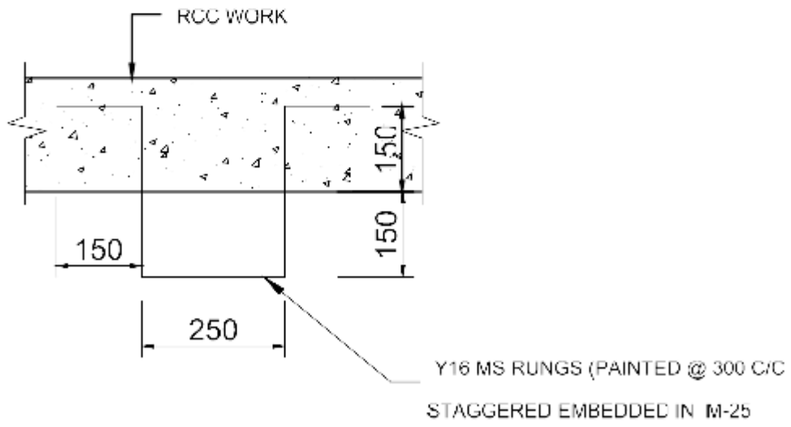
VALVE PIT PLAN
(SCALE 1:20)



SECTION A-A
(SCALE 1:20)



SECTION 1-1
(SCALE 1:15)



TYPICAL DETAILS OF MS RUNGS
(SCALE 1:10)

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY, DO NOT SCALE THE DRAWING.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE 40 (SLAB 25mm
4. GRADE OF CONCRETE USED SHALL BE M 25 CONFORMING.
5. RE INFORCEMENT SHALL BE HYSD BARS OF (GRADE Fe 415) CONFORMING TO IS:1786.

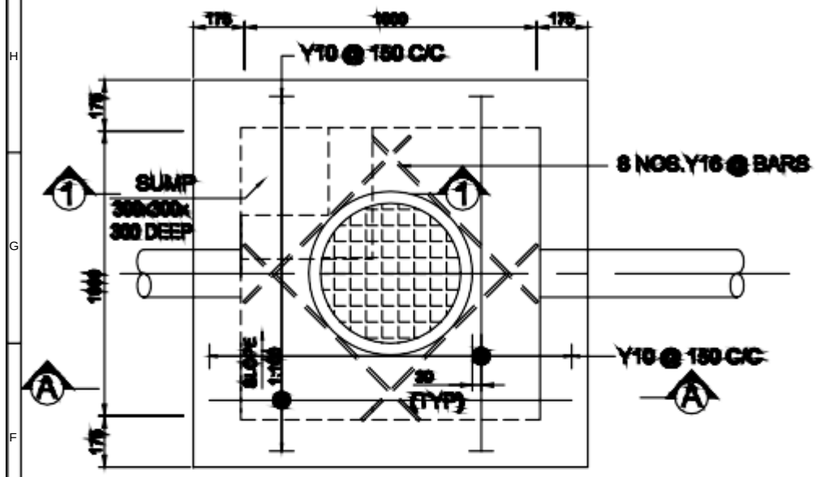
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

PROJECT: CITY GAS DISTRIBUTION PROJECT

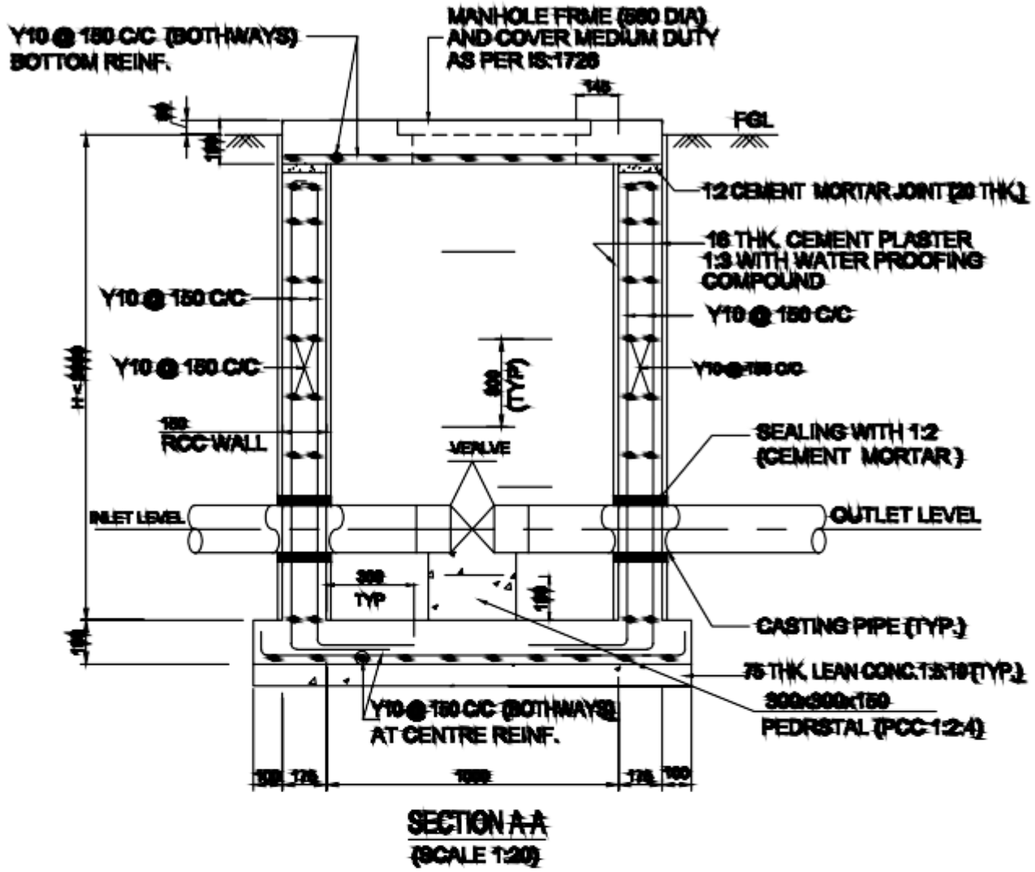
TITLE: STANDARD DETAIL OF RCC VALVE CHAMBER (TYPE-2)

SCALE	DATE	CAD FILE: DATE		
AS SHOWN	01.07.14		CAD	A3

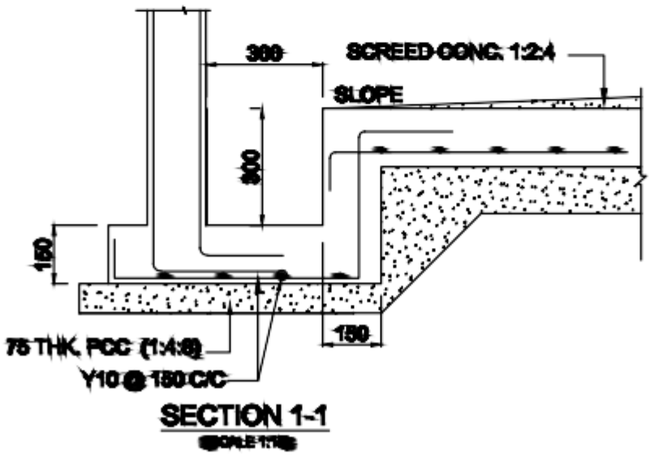
DRG. No. 14588-20-03-21 REV-0



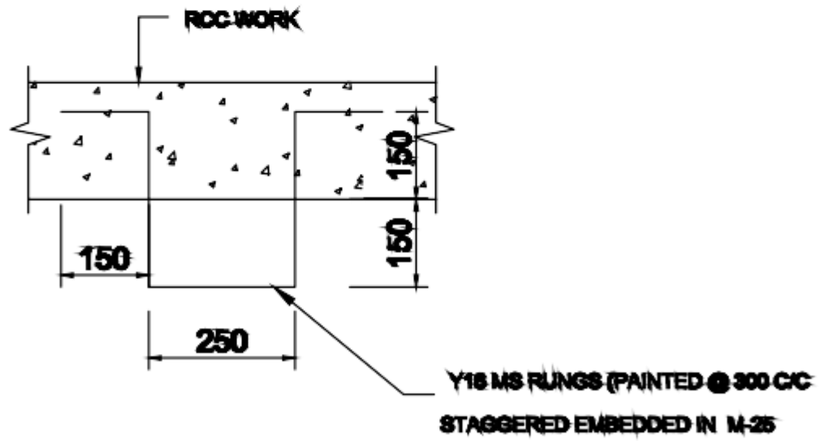
VALVE PIT PLAN
(SCALE 1:20)



SECTION A-A
(SCALE 1:20)



SECTION 1-1
(SCALE 1:10)



TYPICAL DETAILS OF MS RUNGS
(SCALE 1:10)

RCC VALVE CHAMBERS SIZES 1M x 1M

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWING.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE MIN 50 mm.
4. GRADE OF CONCRETE USED SHALL BE M-30 UNLESS NOTED.
5. REINFORCEMENT SHALL BE HYSD BARS CONFORMING TO IS 1786.

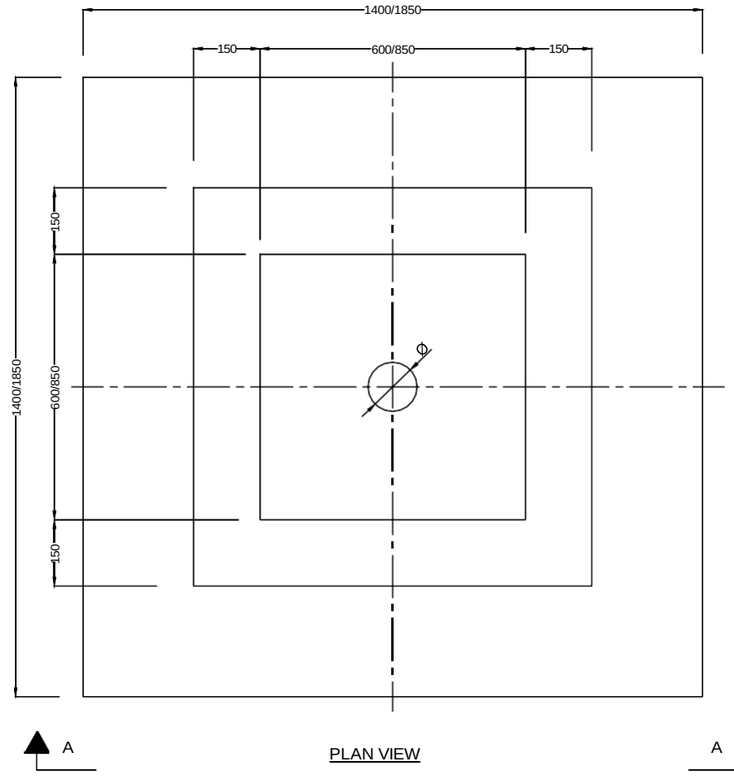
CLIENT: INDRAPRASTHA GAS LTD. (IGL)
NEW DELHI

PROJECT: PNG PROJECT DELHI

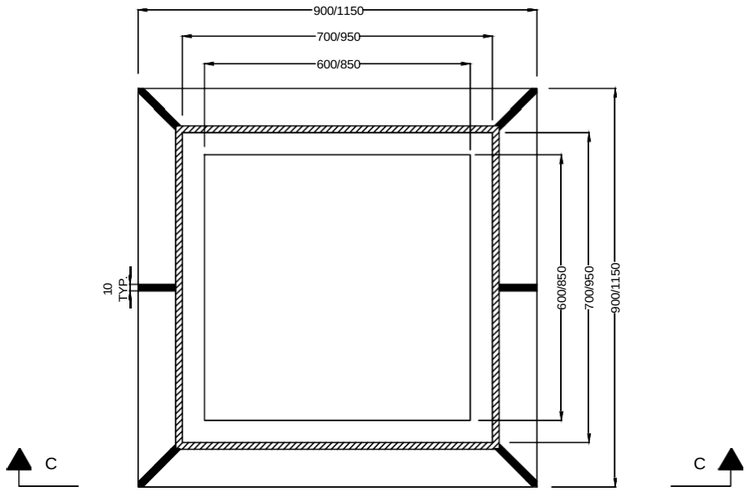
TITLE: STANDARD DETAIL OF RCC VALVE CHAMBER (TYPE-1)

SCALE: AS SHOWN | DATE | CAD FILE: DATE

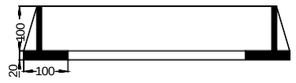
15792-21-04-2



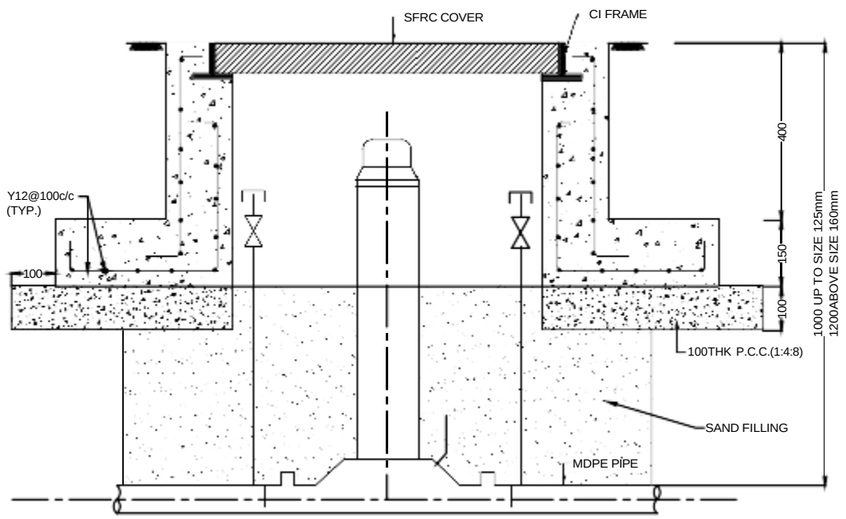
PLAN VIEW
(SKETCH-1)



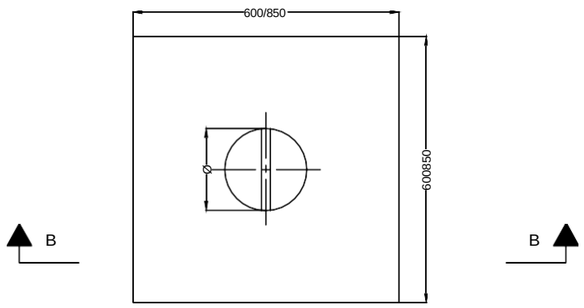
PLAN VIEW
(SKETCH-3)



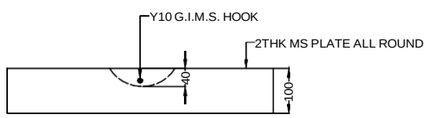
SECTION C-C



SECTION A-A



SECTION A-A
(SKETCH-2)



SECTION B-B

REFERENCE DRAWINGS		
S.NO.	DRAWING TITLE	DRAWING NUMBER

NOTES:-

FOR SKETCH 1:

FOR SKETCH 2:

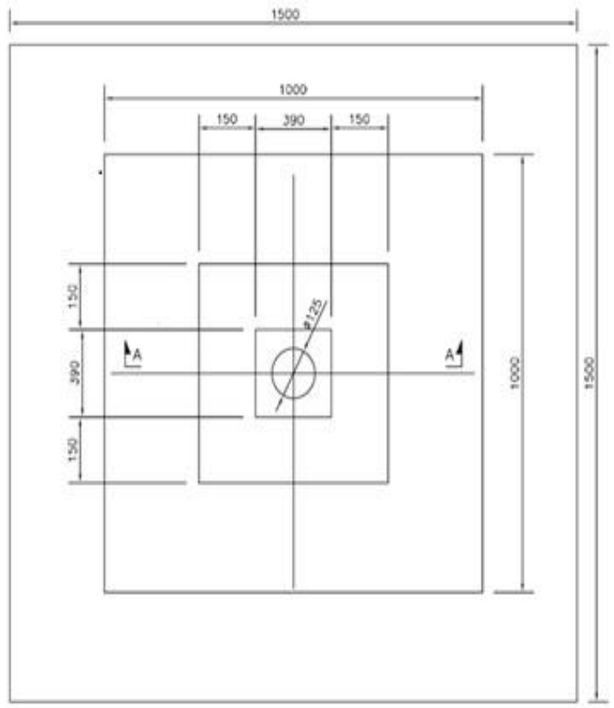
FOR SKETCH 3:

CLIENT: **INDRAPRASTHA GAS LIMITED**

PROJECT:

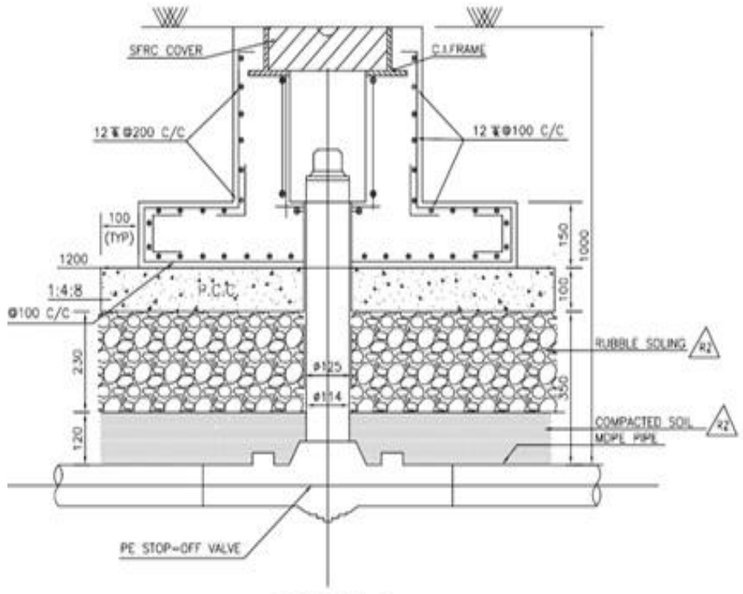
TITLE: **TYPICAL DETAILS OF RCC PRE-CAST VALVE CHAMBER WITH FRAME & COVER**

SCALE:		TOTAL NO. OF SHTS: 1OF1	
SIZE	JOB NO.	DRAWING NUMBER	REV.
A3	15792		0

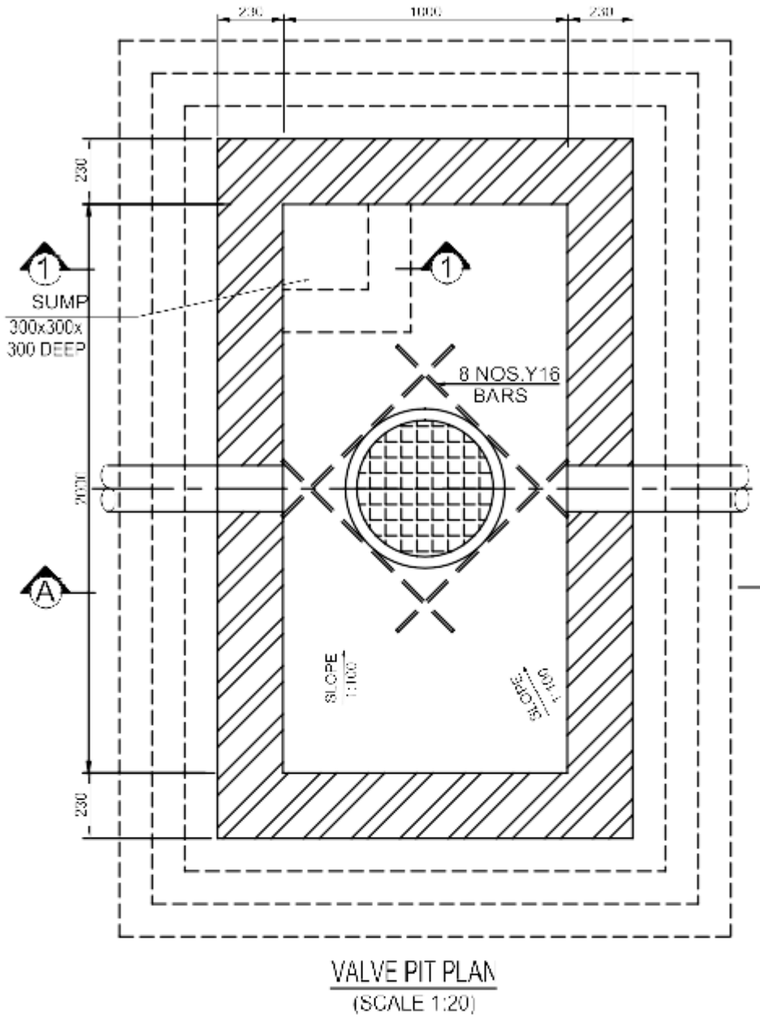


NOTES –

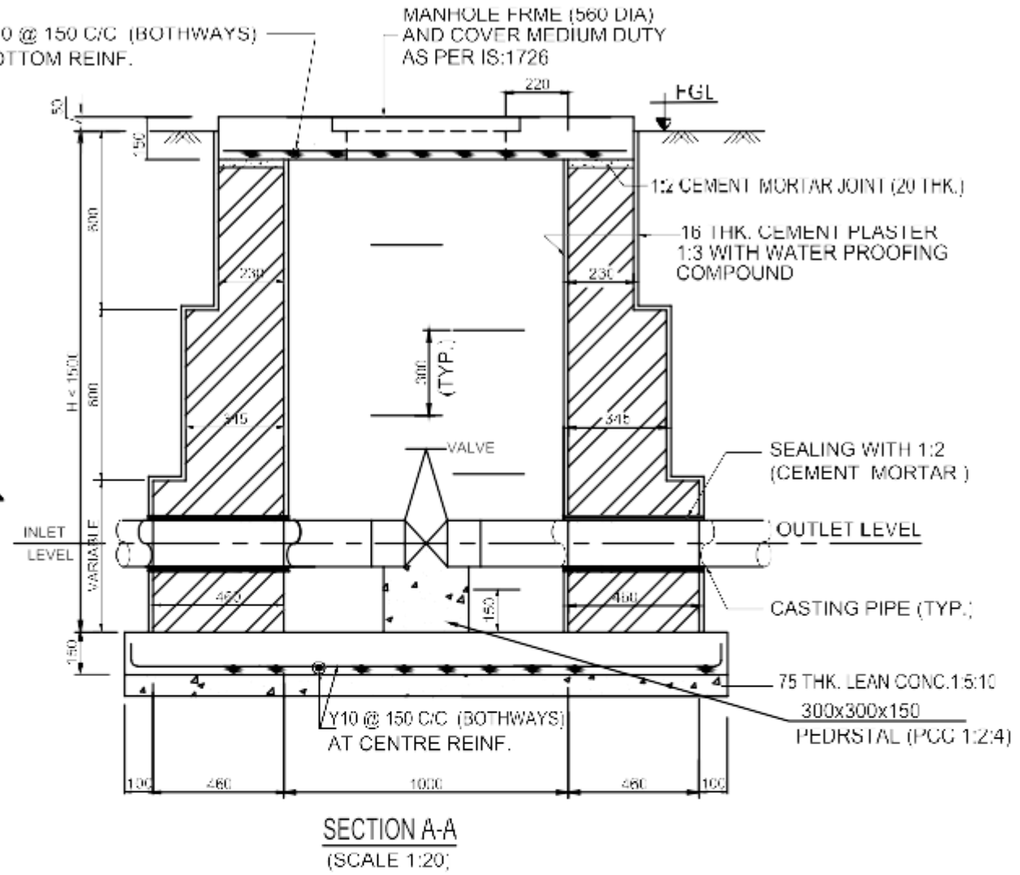
1. ALL DIMENSIONS ARE IN MM.
2. SOFT SOIL & RUBBLE SOILING SHALL BE USED FOR BACK FILLING AS SHOWN IN DWG.
3. 100MM THICK PCC(1:4:8) OF DIMENSION 1.2MX1.2M FOR SIZES OF VALVE FROM 63MM TO 125MM SHOULD BE PROVIDED FOR SUPPORTING PE STOP-OFF VALVE AT BASE.
4. THE CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 25N/MM^2 R2
5. THE COVER FOR REINFORCEMENT SHALL BE 40MM.
6. THE SFRC COVER SHALL HAVE REINFORCED CONCRET OF GRADE M-35 AS PER LATEST REVISION OF STANDARD IS:456
7. GASKET OF RUBBER OR ANY OTHER EQUIVALENT MATERIAL OF MATCHING DIMENSIONS SHALL BE SUPPLIED & USED BY THE CONTRACTOR TO PREVENT INGRESS OF WATER INTO THE VALVE PIT.



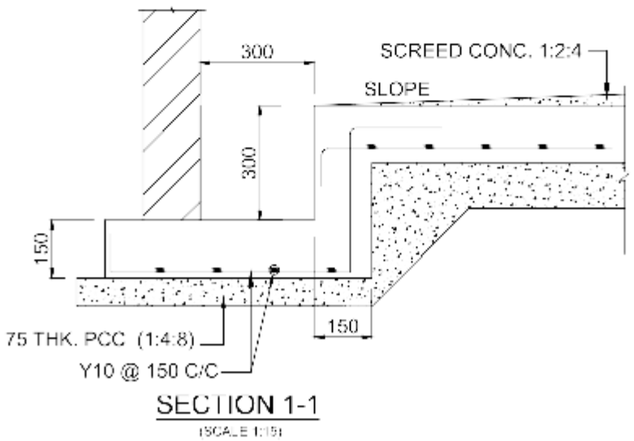
SECTION A-A



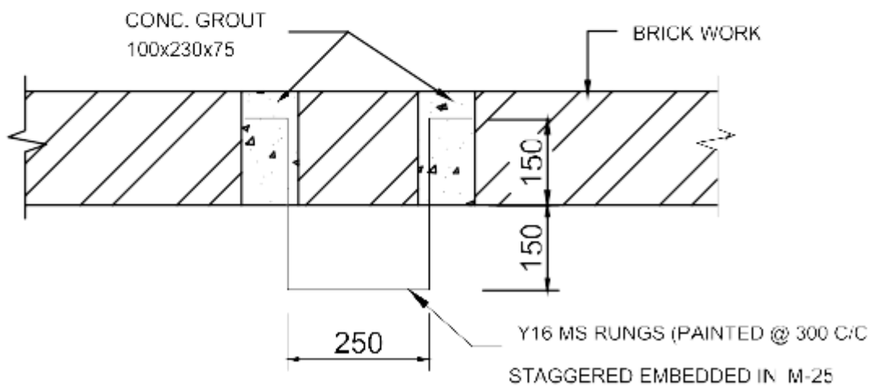
VALVE PIT PLAN
(SCALE 1:20)



SECTION A-A
(SCALE 1:20)



SECTION 1-1
(SCALE 1:10)



TYPICAL DETAILS OF MS RUNGS
(SCALE 1:10)

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY, DO NOT SCALE THE DRAWING.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE (a) SLAB 25mm
4. GRADE OF CONCRETE USED SHALL BE M 25 CONFORMING.
5. REINFORCEMENT SHALL BE HYSD BARS OF (GRADE Fe 415) CONFORMING TO IS 1786.

OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

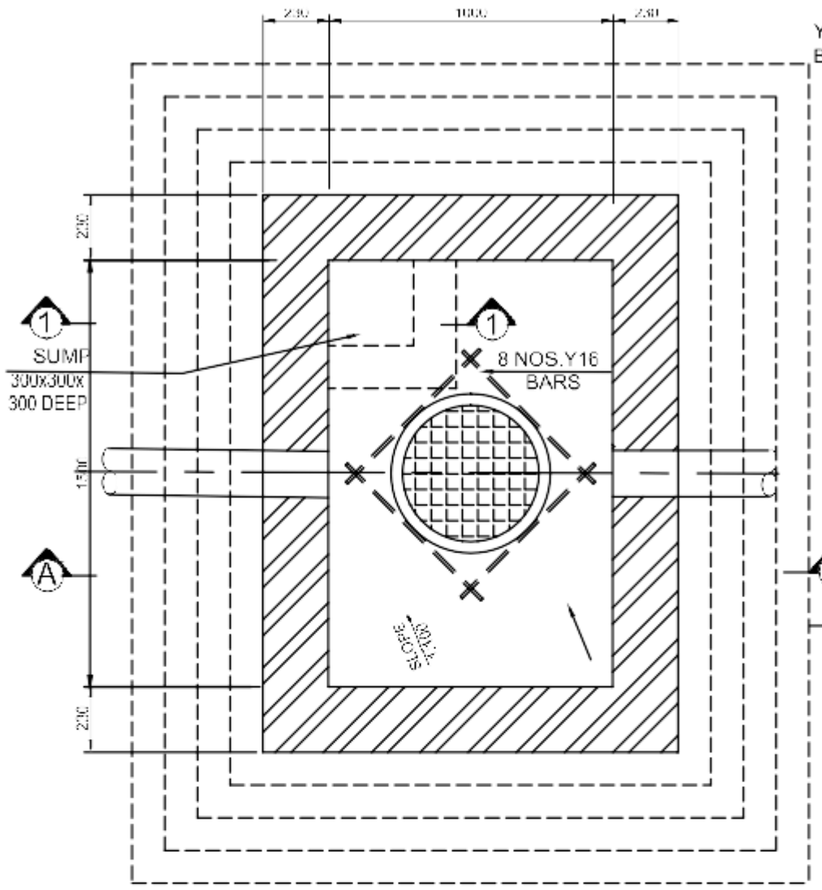
PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: STANDARD DETAIL OF BRICK VALVE CHAMBER (TYPE-1)

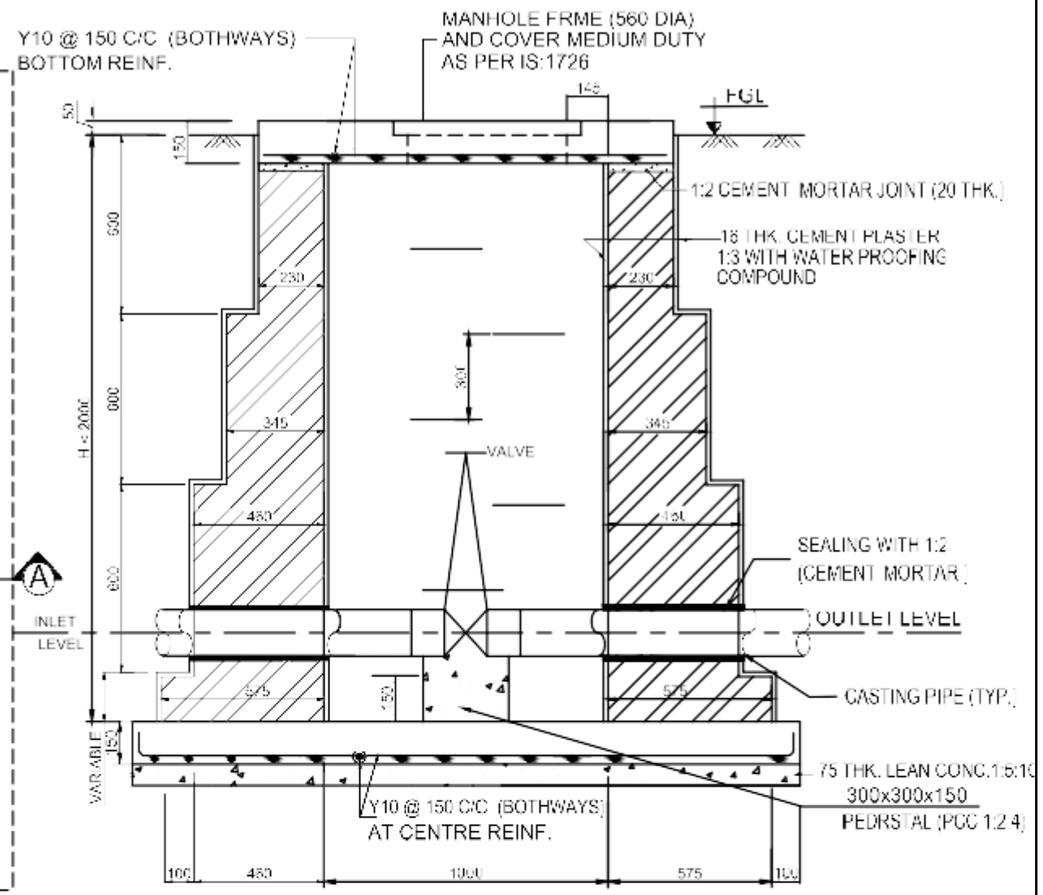
SCALE	DATE	CAD FILE: DATE		
AS SHOWN	01-07-2014		CAD	A3

DRG. No. 15792-20-03-24 REV-0

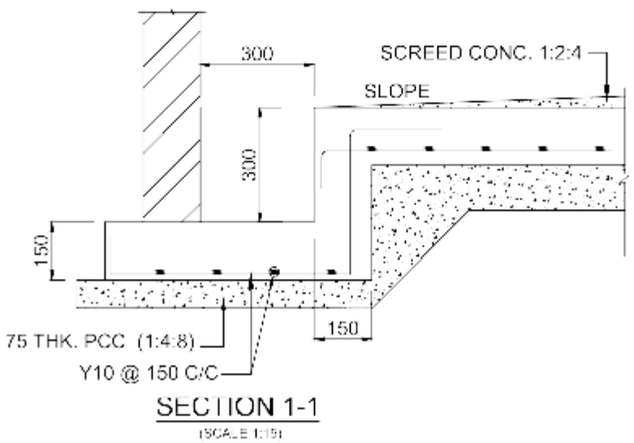
15792-20-03-22 REV-0



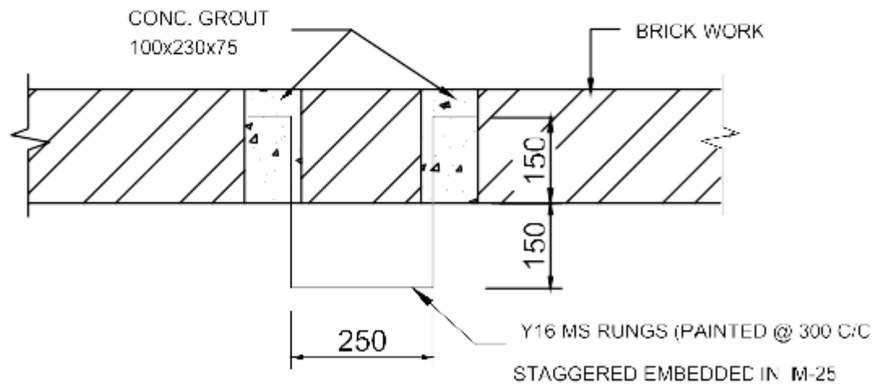
VALVE PIT PLAN
(SCALE 1:20)



SECTION A-A
(SCALE 1:20)



SECTION 1-1
(SCALE 1:10)



TYPICAL DETAILS OF MS RUNGS
(SCALE 1:10)

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY, DO NOT SCALE THE DRAWING.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE (a) SLAB 20mm
4. GRADE OF CONCRETE USED SHALL BE M 25 CONFORMING.
5. REINFORCEMENT SHALL BE HYSD BARS OF (GRADE Fe 415) CONFORMING TO IS 1786.

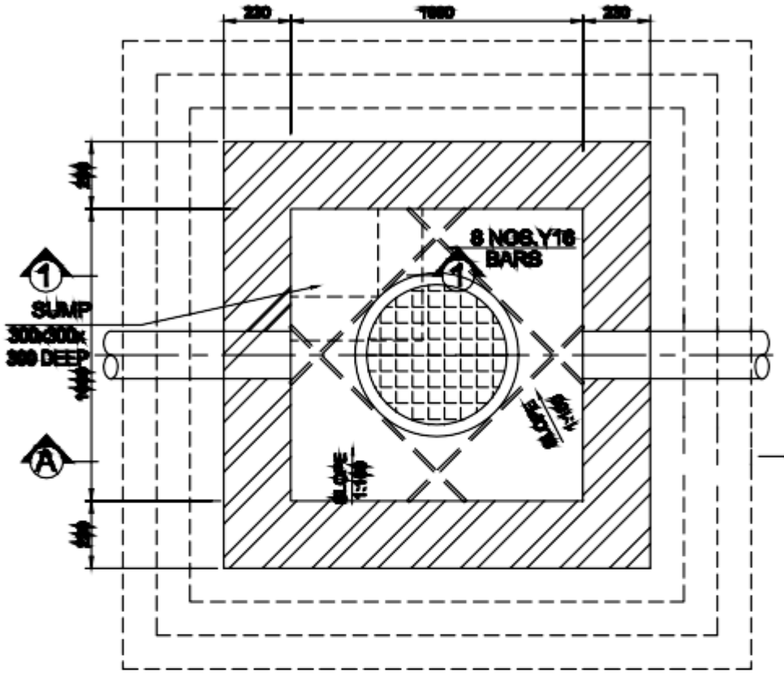
OWNER: INDRAPRASTHA GAS LIMITED
NEW DELHI

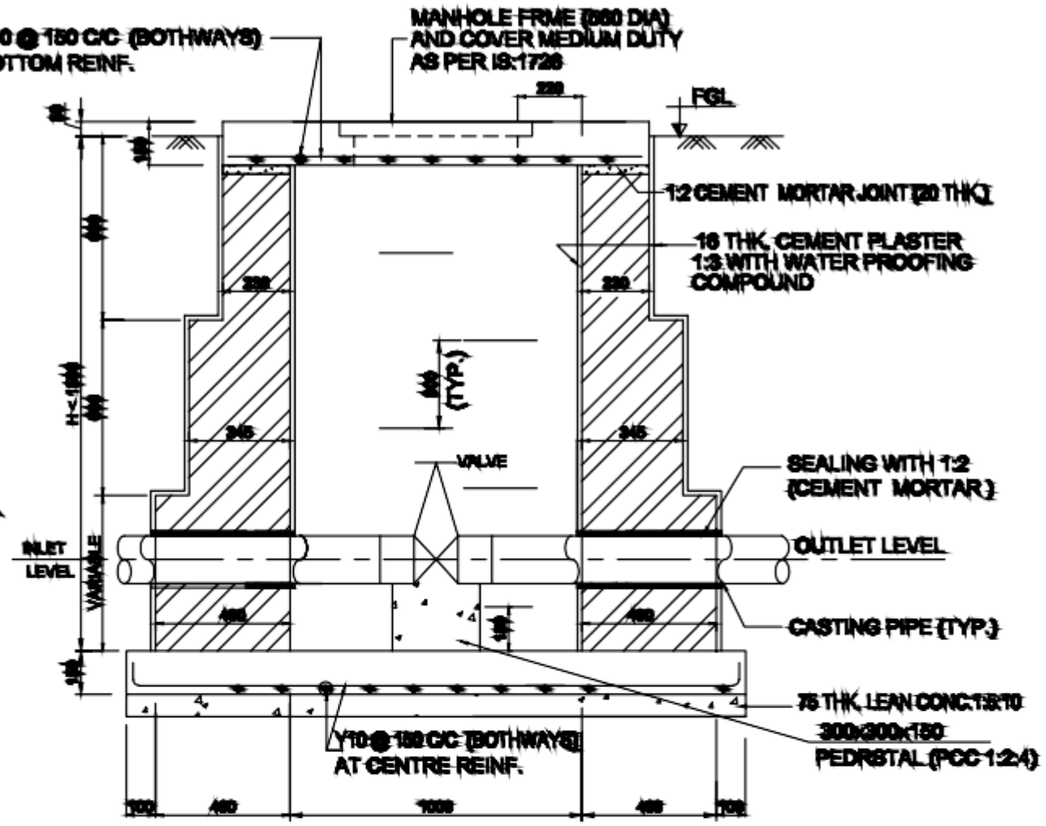
PROJECT: CITY GAS DISTRIBUTION PROJECT

TITLE: STANDARD DETAIL OF BRICK VALVE CHAMBER (TYPE-2)

SCALE	DATE	CAD FILE: DATE		
AS SHOWN	01-07-2014		CAD	A3

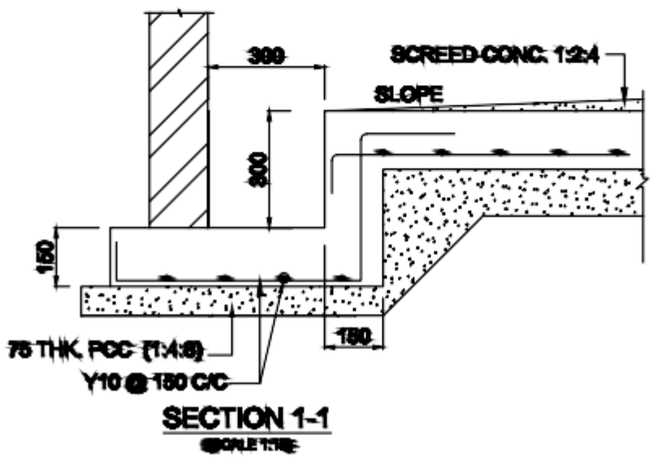
DRG. No. 15792-20-03-25 REV-0



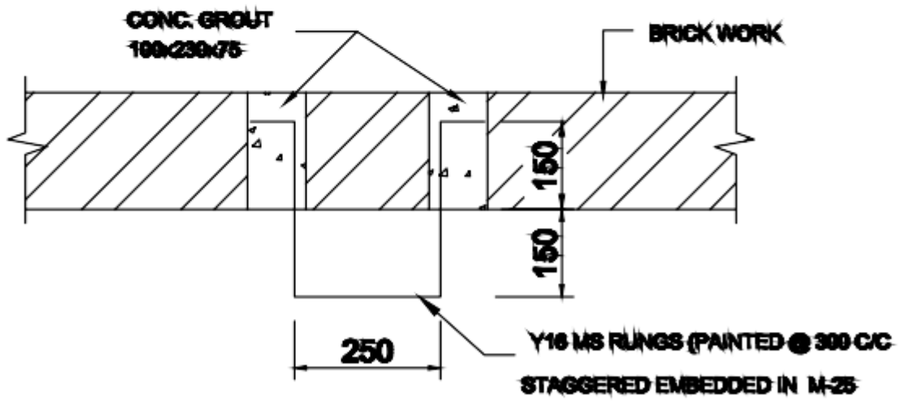


SECTION A-A
(SCALE 1:20)

VALVE PIT PLAN
(SCALE 1:20)



SECTION 1-1
(SCALE 1:10)



TYPICAL DETAILS OF MS RUNGS
(SCALE 1:10)

BRICK VALVE CHAMBERS SIZES 1M x 1M

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWING.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE 25mm.
4. GRADE OF CONCRETE USED SHALL BE M-25 OR HIGHER.
5. REINFORCEMENT SHALL BE HYSD BARS CONFORMING TO Fe-415 CONFORMING TO IS1786.

CLIENT: INDRAPRASTHA GAS LTD. (IGL)
NEW DELHI

PROJECT: PNG PROJECT DELHI

TITLE: STANDARD DETAIL OF BRICK VALVE CHAMBER (TYPE-1)

SCALE	DATE	CAD FILE:		
	16-04-2021	DATE	CAD	A3

DRG. No.