LAYING OF MDPE NETWORK AND GI/Cu INSTALLATION WORK FOR DOMESTIC, COMMERCIAL AND INDUSTRIAL CUSTOMERS FOR CUGL GA'S IN JHANSI IN THE STATE OF UTTAR PRADESH

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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 EN 1057.

10.0 MARKING

Each tube shall be permanently marked every meter with Owner's Logo, manufactures name & size and specification of the tube.
Each packing containing tubes shall carry the following, stamped or written in indelible ink.

a) Manufacturers name or trademark
b) Designation of tubes (OD x wall thk)
c) Lot number.
d) No. of the standard (EN 1057)

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

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

ii. Inspection agency shall carry out stage wise inspection during manufacturing/ final inspection.

iii. Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification and specified code for 100% material, at the time of final inspection of each supply lot of material.

iv. Even after third party inspection, OWNER 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 OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.

v. 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.

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PE ACCESSORIES
for underground networks for natural gas distribution

C	06/09/02	Updated (see revision marks)	MRT	MRY	MRT
B	21/08/02	Updated	MRT	MRY	MRT
A	13/08/02	First Issue	MRT	MRY	MRT
Rev.	Date	Subject of revision	Author	Checked	Approved

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1. SUBJECT AND AREA OF APPLICATION

This specification has been established to define the requirements that must be met by injected moulded polyethylene accessories (PE) destined for the construction or the maintenance of underground networks for natural gas distribution where the maximum operating pressure (MOP) is equal to 5 bars.

It also defines some of the more general characteristics of materials used for accessory manufacturing and includes the appropriate classification model.

The specification also includes testing method parameters for the material in question.

All accessories included in these specifications are listed as follows :

- Electrofusion welded accessories
- Electrofusion welded saddles
- Accessories equipped with insertion connection for end to end welding and assembly using electrofusion-welded sleeve coupling.

This specification is limited to accessories with a nominal diameter of 225 mm and a working temperature between -20°C and +40°C.

PE and steel accessories with a tapered section and front section connections are not included in these specifications.

2. REFERENCE STANDARDS AND SPECIFICATIONS

EN 682	Air-tight rubber seals - specification for air-tight seal materials for gas and hydrocarbon fluid transfer piping
EN 1555-1	Plastic piping systems for combustible gas distribution. Polyethylene (PE). Part 1. General information
EN 1555-3	Plastic piping systems for combustible gas distribution. Polyethylene (PE). Part 3 . Accessories
EN 1555-7	Plastic piping systems for combustible gas distribution. Polyethylene (PE). Part 7. Conformity evaluation.
ISO DIS 11413	Preparation of test assemblies between a polyethylene (PE) pipe and an electrofusion fitting.

ISO DIS 11414	Preparation of test assemblies between a pipe/pipe or pipe/fitting polyethylene (PE) by butt fusion
ISO DIS 12093	Format for a technical brochure for electrofusion joint characteristics
ISO TR 13950	Electrofusion identification methods
CEI 60335-1	Safety standards for household appliances and similar equipment.
CEI 364	Electrical installations on buildings (including building sites and other temporary installations)
CEI 449	Voltage domains for building electrical installations.
70000/740/GTS/0008 to 70000/740/GTS/0010	Tractebel technical specification: polyethylene piping for underground networks for natural gas distribution
70000/740/GTS/0012	Tractebel technical specification: raw materials for manufacturing piping and accessories for underground networks for natural gas distribution.
70000/740/GTS/0013	Tractebel specification sheets: program execution. Polyethylene pipe laying.

3. DEFINITIONS

3.1. ELECTROFUSION ACCESSORY

This term covers all injected moulded polyethylene accessories equipped with a heated element designed to transform electrical energy into heat to create self-welding.

In certain exceptional cases, an accessory can present one or more smooth ends. In this case the accessory will provide for the requirements of each connection end as regards shape, measurement, and technical characteristics.

3.2. ELECTROFUSION SADDLE

This term covers a saddle shaped injection moulded PE accessory that is equipped with one or several heating elements that convert electrical energy into heat. The released heat provides a fusion surface sufficiently large to ensure correct saddle-pipe assembly.

Electrofusion saddles can be subdivided into two categories:

Wrap around Electrofusion saddle whose upper shell is brought against the pipe during welding using a fastening stirrup located on the lower part of the accessory to guarantee that the welding pressure is sufficient. Generally the stirrup is left in place after welding.

Top load Electrofusion saddle where the welding pressure is obtained by pressing down on the saddle head using a fixing system (clamp) that is removed after welding is completed.

There are four different saddle types:

Support This is an accessory designed for joining branch pipes and is equipped with a drill bit made to pierce the wall of the pipe; this bit remains in the saddle body after installation.

Branch piping saddle This accessory is designed for joining branch piping where an additional bit is necessary to pierce the wall of the main pipe next to the branch.

Ballooning saddle This accessory provides the positioning of a sealing (or blocking) balloon and that can be filled again after work completion.

Repair saddle This accessory will seal/block any leaks on the pipe or will reinforce piping in the case of localised deterioration.

According to their leakage flow, the supports are divided into two model categories:

Model 1	Supports whose maximum immediate external leak flow is practically equal to zero at 5 bar pressure in the piping.
Model 2	Supports whose maximum immediate external leak flow never exceed 200 litres an hour at 5 bar pressure in the piping.

3.3. END TO END WELDING ACCESSORIES

This term describes injection moulded polyethylene accessories with smooth ends but not equipped with integrated heating elements. These are connected to the network by end-to-end welding using electrofusion sleeves.

In certain exceptional cases, an accessory can also present one or more electrofusion ends. In this case the accessory will provide for the requirements of each connection end in shape, measurement, and technical characteristics.

4. GENERAL SPECIFICATIONS

This specification is based on the series of EN 1555 standards, which standardise all the gas distribution network plastic piping systems.

The accessories described in this document comply with all prescriptions included in EN standard 1555-3, as well as all complementary requirements and/or options described in these Tractebel specifications.

The accessories are destined for use in gas distribution networks in piping in compliance with Tractebel specification 70000/740/GTS/0008 to 70000/740/GTS/0010

The pipes are laid and welded as described in our specification sheet for pipe laying 70000/740/GTS/0013.

5. MATERIALS

5.1. GENERAL INFORMATION

The materials used for the manufacturing of the accessories must conform to the requirements demanded for components used in gas fuel distribution networks.

The accessory material that is in contact with the PE piping must not be composed of any material that will provoke a reduction in pipe performance, nor must it provoke cracking under stress.

All equipment will marked with inscription/description and specification in English language.

5.2. RAW MATERIAL SPECIFICATIONS

The raw material PE, used for accessory production, is in compliance with all prescriptions in EN 1555-1 standards. It must be approved according to the prescriptions in Tractebel specification 70000/740/GTS/0012.

The raw material belongs to class PE100.

The following are strictly forbidden:

- use of recycled raw materials
- mixing of different raw materials
- The addition of supplementary additives to the raw material.

5.3. SPECIFICATIONS FOR COMPONENTS MADE OF MATERIALS OTHER THAN POLYETHYLENE

5.3.1. Metal parts

All metal parts subject to corrosion must be protected in an adequate manner

Metal parts must conform to prescribed standards of that particular material for gas distribution, for quality levels, size/gauge and measurements.

Cast iron, aluminium and its alloys are not authorised for use.

5.3.2. Elastomers

Elastomer air and watertight seals, like all other elements manufactured in this material, must comply with the prescriptions of EN 682 standards.

5.3.3. Other materials

All other materials used are in compliance with the prescriptions described in paragraph 5.1. The accessories included in the paragraph comply with the requirements of this specification and are adapted for all general use for natural gas distribution.

6. GENERAL ACCESSORY CHARACTERISTICS

6.1. TECHNICAL INFORMATION

The manufacturer must supply a technical information dossier composed and including the same material and presented in the same manner, in compliance with the prescriptions of the ISO DIS standard12093.

This dossier must mention all of the following information for each accessory:

- PE raw material used
- Measurements and tolerances
- Domain of application (temperature and pressure limits, SDR and ovalisation)
- Assembly instructions
- Welding instructions (welding parameters and limits)
- Test results attesting to the accessory conformity standard: c.f. EN standard 1555-3 for test descriptions.

For electrofusion accessories, the manufacturer must also supply the SDR series for the pipes, which will be used together with their accessory, according to their thickness.

In addition, for the saddles:

- The attaching method (tools necessary and/or lower shell)
- saddle category (refer to 3.2)
- Maximum saddle height (H in figure 2)
- the height of the branch pipe for supports (h in figure 2)

For all smooth ended accessories, the manufacturer must also supply the SDR series of connections; the accessory must be guaranteed for use on piping of the same class.

In the case of welding parameter modification, size or raw material changes, the manufacturer must include a new technical dossier providing proof that the accessory in question is still compliant with the specification prescriptions.

Testing assemblies will take into consideration manufacturing tolerance, assembly tolerance and the variations in environmental temperature corresponding with the conditions where the accessories will be in use. The manufacturer must observe all methods recommended for polyethylene accessory installation as shown in the Tractebel specifications.

The accessories will be tested exclusively using piping in compliance with Tractebel specifications concerning PE piping (70000/740/GTS/0008 to 70000/740/GTS/0010).

The assembly of piping and accessories manufactured and used in the tests must be in compliance with the manufacturer's technical instructions and the limits of use conditions. When the test assemblies are carried out, the manufacturing and assembly tolerances must be taken into consideration. Samples destined for assembly testing with electrofusion accessories must be prepared according to standard ISO DIS 11413. End-to-end welded samples must be prepared according to standard ISO DIS 11414.

6.2. APPEARANCE AND FINISH

The internal and external surfaces of the accessories must be smooth, clean and free of all scratching, pitting and other surface faults that can possibly reduce accessory and assembly performance.

No element of any accessory must show any signs of damage: scratching, scraping, piercing, blisters, bloating, denting, holes, cracks or other faults that can reduce required performance.

It must be possible to place the accessory on the pipe or on another accessory without moving the electric winding or the air/water tight seals etc. and this must respect the tolerance permitted for piping and accessories.

6.3. COLOUR

All accessories will be black. If agreed previously, they can also be coloured yellow or orange.

6.4. JOIN APPEARANCE

After welding, when examined visually without a magnifying glass, the internal and external surfaces of the pipes and accessories must appear free of welding exudation outside the accessory limits (unless identified by the accessory manufacturer as normal, or carried out deliberately as a welding test, but on condition that there is no wiring position change inside the electrofusion accessories that could provoke a short-circuit). Internal surfaces of all adjacent piping must remain identical to the previous condition before welding.

6.5. ELECTROFUSION ACCESSORY ELECTRICAL CHARACTERISTICS

6.5.1. General information

The accessories include an electrical system as described in the standards CENELEC 60335-1, CEI 364 and CEI 449.

This system is equipped with an appropriate electrical protection for the voltage and intensity of the current in use, and adapted to the characteristics of the electrical supply line.

For voltage over 24 V protection is essential against direct contact with the active parts (conductors on line). The type of protection in question depends on the local site conditions.

6.5.2. Classification

Electrofusion accessories are divided into three classes according to the voltage and/or current characteristics.

Class A Electrical supply based on voltage set between 8V and 42 V

Class B Electrical supply based on voltage set between 42 V and 220 V

Class C Electrical supply based on power supply settings.

All supplies, unless otherwise stipulated in the order, concern Class A accessories.

The power required for electrofusion accessory welding must not exceed 3kW during welding operations.

Unless stipulated otherwise in the order, only “wrap-around” saddles can be supplied (refer to par. 3.2.)

Unless otherwise agreed between Tractebel and the supplier, all electrofusion accessories must be “single wire“ type.

6.5.3. Connectors

Electrical connectors installed on electrofusion accessories must comply with the diagram included in Annex 1 with these specifications, also including constant current supply where this is the case. The state of the connector terminal surface must offer the minimum possible contact resistance during voltage cable joining.

6.5.4. Protection against overheating

Electrofusion accessories that can only be welded once are equipped with a lock system which prevents re-welding.

Electrofusion accessories that cannot be re-welded immediately after initial welding are equipped with an incorporated security system in their welding program: that is they cannot weld while the wire is still hot.

If the welding program does not possess this lock system, the electrofusion accessory must absolutely be protected against a second or several welding cycles whatever the temperature of the winding wire.

6.6. SUPPORT DRILLING EQUIPMENT

The support drilling equipment has been designed so that during drilling the maximum immediate leak flow will never exceed 200 litres per hour at 5 bar pressure, in the main pipe. According to this flow rate, the supports are divided into two categories:- models 1 and 2 (refer to par. 3.2.) The required model will be specified when ordered.

The bell drill is equipped with a manoeuvring opening for the insertion of a 17 mm hexagonal spanner.

The bell drill path is limited at the top and bottom by a limit block.

The drill mechanism is designed so that no additional tools (except the hexagonal spanner described above) are necessary for carrying out drilling operations.

6.7. BRANCHING SUPPORT AND SADDLE LOAD LOSS UNDER LOW PRESSURE

The maximum load loss measured with natural gas at an inlet pressure of 20 mbar must not exceed the values listed below.

Flow m^3 /hr	**Saddle Type**	**Maximum load loss Mbar**
10	63 x 32	1.0
10	110 x 32	1.0
10	160 x 32	1.0
10	200 x 32	1.0
40	63 x 63	2.0
40	110 x 63	1.0
40	160 x 63	1.0
40	200 x 63	1.0

6.8. ELECTROFUSION SLEEVE B LOCK

All electrofusion sleeves are equipped with an immovable block in the centre of the sleeve.

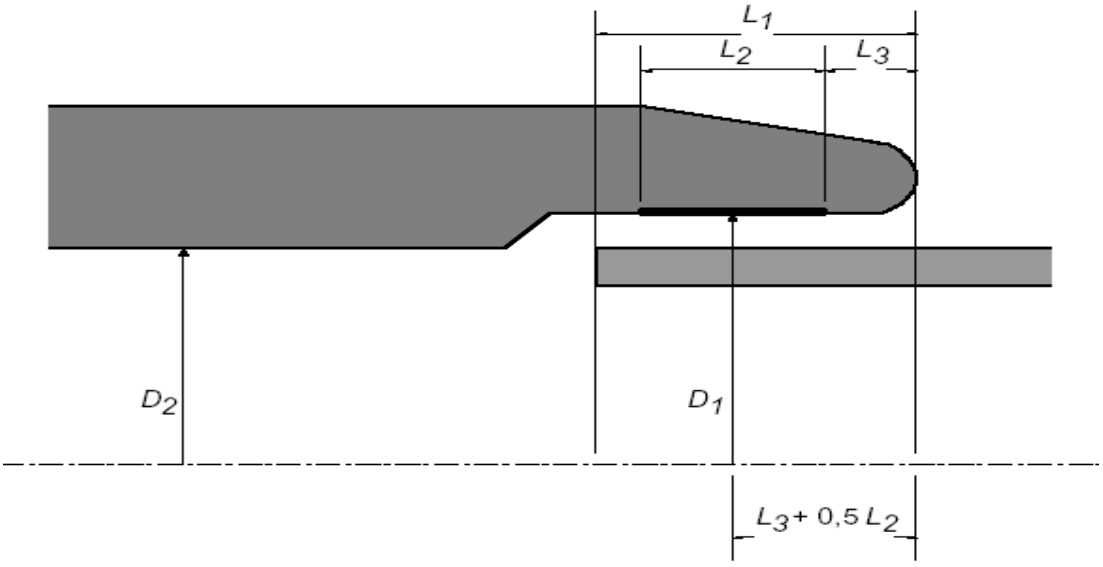
7. GEOMETRICAL CHARACTERISTICS

7.1. SIZE OF ELECTROFUSION SLEEVES

The sizes of the electrofusion accessory sleeves and their tolerance limits are described in chapter “Geometrical characteristics” of EN standard 1555-3.

They are controlled according to the method described in the specification standard. Any possible sealing plugs are removed from the sleeve 4 hours before the size control check. Measurements are controlled without the plugs inserted.

The main symbols are shown in the figure 1 below:



D_1 The “average internal diameter in the welding zone” – that is: the average internal diameter measured in a parallel plane to the opening plane, at a distance of $L_3 + L_2/2$ of the latter.

D_2 “Minimum drilling/boring” – that is the minimum diameter of the draining canal through the body of the accessory.

L_1 “penetration depth” of the pipe or the inserted (male) end of the accessory

L_2 “Nominal length of the welding zone” that corresponds with the length subject to heating.

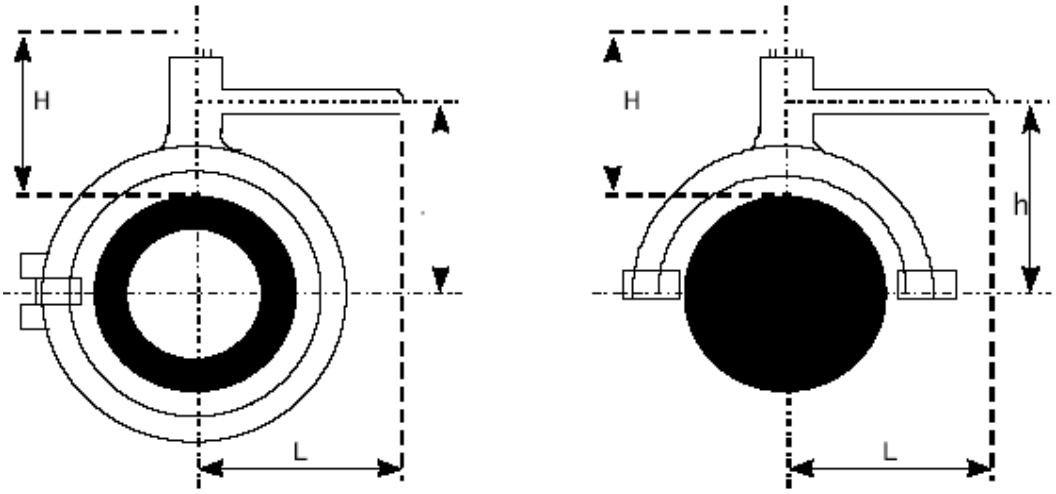
L_3 “Nominal non-heated entry/inlet length of the sleeve”. This refers to the distance between the tip of the accessory and the beginning of the welding zone.

7.2. ELECTROFUSION SADDLE MEASUREMENTS

The measurements of the electrofusion saddles and their tolerance limits are described in EN standard 1555-3

They are controlled according to the method described in the specification standard. Any possible sealing plugs are removed from the sleeve 4 hours before the size control check. Measurements are controlled without the plugs inserted.

The main symbols are shown in the figure 2 below:



H — The "height of the saddle" – that is the distance between the upper generator of the main pipe and the top of the branch pipe saddle

h — The "height of the branch pipe" – that is the distance between the axis of the main pipe and the axis of the branch pipe

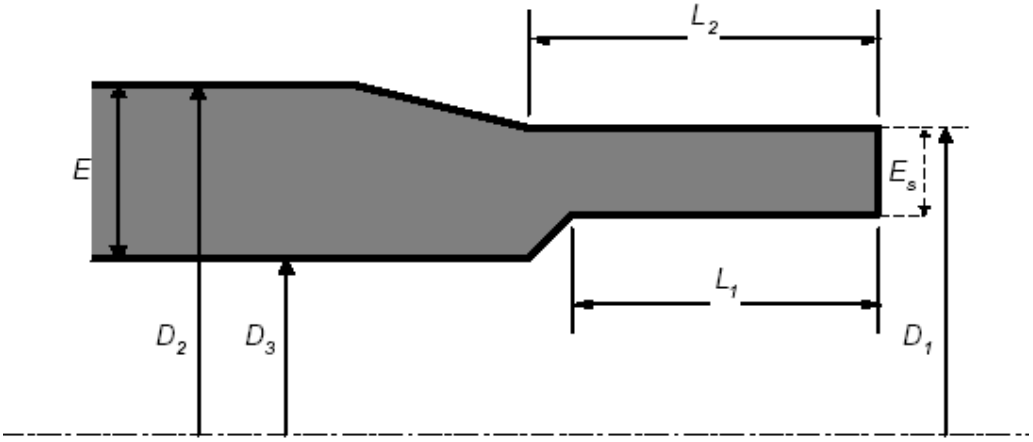
L — The "width of the branch pipe saddle" – that is the distance between the axis of the pipe and the surface plane of the branch pipe opening

7.3. MEASUREMENTS OF ACCESSORY ENDS TO BE WELDED

The measurements of the ends and their tolerance limits are described in EN standard 1555-3.

They are controlled according to the method described in these specification standards. Any possible sealing plugs are removed from the sleeve 4 hours before the size control check. Measurements are controlled without the plugs inserted.

The measurements and main symbols used in this specification are shown in the figure 3 below:



D1 The "average external diameter of the end to be welded measured on any plane parallel to the inlet/entry plane at a distance where this plane does not exceed L_2 (tubular section).

D2 The "average external diameter of the body" of the tip of the accessory.

D3 "Minimum drilling/boring" – that is the minimum diameter of the passage through the body of the accessory. Measuring of the diameter must not include any ribbing due to welding.

E "Thickness of the accessory body wall" – that is: the thickness measured at any point of the accessory wall.

ES "Thickness of the end to be welded" measured at any point but where the distance does not exceed L_1 (length that can be cut) compared to the inlet/ entry plane, must be equal to the thickness of the nominal pipe wall.

L1 The "cuttable section" of the end to be welded – that is the initial depth of the tip of the insertion section, necessary for end-to-end welding or for starting an end-to end weld again.

L_2 The “tubular section” of the end to be welded – that is the initial length of this section. This tubular section permits the following in all types of combination :

- Use of the clamp stirrups, as is essential for end-to-end welding, or for electrofusion.
- Assembly using electrofusion sleeves.

8. ACCESSORY MECHANICAL CHARACTERISTICS

All accessories must obey the requirements and tests described in the chapter concerning the mechanical characteristics of EN standard 1555-3. They must also comply with the hydrostatic test conditions described in the same standard.

They must be controlled as described in the same standard.

9. PHYSICAL CHARACTERISTICS

All accessories must obey the requirements and tests described in the chapter concerning the mechanical characteristics of EN standard 1555-3

They must be controlled as described in the same standard

10. PRODUCT APPROVAL

The product will be approved by the Owner if all results of the tests, controls and checking prescribed by this specification are satisfying.

The manufacturer will provide a complete approval dossier including all the product characteristics specified in 6.1. (technical dossier) and the results of tests prescribed in these specifications. The number of tests run on the product must comply with EN standard 1555-7. The results of these tests described in the approval dossier must be confirmed by the Owner authorised laboratory. Hydraulic testing must be continued until the rupture of at least two test samples for each set of tests. (max. 2000 hours).

All changes made to the approved product must be communicated to the Owner, and this entails further control checks for approval.

Any requirement not observed or test missing from this specification will result in the withdrawal of the product approval and can even result on annulment of contract.

11. MARKING

11.1. ACCESSORY MARKING

11.1.1. Identification marking will be made directly on the accessory. The system used to make the product must not provoke cracking or other faults. All marking must be permanently legible for the product life under standard stocking conditions, exposure to external weather conditions, treatment, installation, and use.

11.1.2. Where the products are printed, the colour of the printed identification mark must be different from that of the basic product colour.

11.1.3. Marking quality and size must be of a standard that can be read with the naked eye without magnification.

No marking must be printed on the minimum length of the insertion section of accessories.

11.1.4. 11.1.4. Each accessory must be marked with at least the obligatory details required by EN standard 1555-3. The marking must be printed on the accessory itself or on a label as shown in the standard described above

The SDR pipe range that are to be fitted with these accessories must be clearly marked on the fitting. Details must include: each SDR value, or the upper and lower value of the permitted SDR range.

11.2. COMPLEMENTARY INFORMATION

All complementary information on welding conditions (welding time and cooling time) can also be described on a label affixed to the accessory or delivered with the accessory.

12. PACKAGING AND DELIVERY

Normally all accessories are packed separately in plastic sheeting and/or cardboard boxes.

Sometimes they can be loosely packed together where there is no danger of damage or deterioration or loss of loose parts.

All boxes and plastic sheeting must be marked with at least one label showing the manufacturer's name, the product type, part measurements, and number of single parts contained in the box or bag, plus all details necessary for stocking and stock expiry dates.

All electrofusion accessories must be printed with a bar code and an individual magnetic card. The magnetic card contains the welding parameters that have been encoded in the magnetic track, as well as the bar code printed on the card. Coding must be carried out according to prescriptions included in ISO TR 13950 standards.

With regard to stocking guarantee, accessories must correspond with the prescriptions of the local laws & regulations if any. If the guarantee period decided by the manufacturer is shorter that that in these document, the Owner must be informed in writing at the time of the offer.

13. QUALITY CONTROL

13.1. GENERAL RULINGS

13.1.1. Manufacturer's responsibility

The manufacturer is entirely responsible for the quality of the PE accessories manufactured by his firm.

All control checks prescribed above do not relieve him of this responsibility.

To ensure that all PE accessories are in compliance with the specification in all aspects, they must be controlled by the plant control service, which must be independent from the manufacturing department.

All PE accessories supplied are guaranteed for a one-year period after application for use, that is a maximum of three years after the date of production.

13.1.2. Quality assurance

The manufacturer must have some form of quality control to ensure that products comply with EN standards 29001 or 29002. The quality assurance manual must be madeavailable to the Owner Control Service or an external Control laboratory appointed byhim.

The system of quality assurance must be certified by an authorised body.

13.2. CONTROLS

13.2.1. Control testing b y the manufacturer

13.2.1.1. By material batch.

The manufacturer demands a certificate from the raw material manufacturer including the following :

- Fluid index
- Water content
- Volume mass
- Carbon black or yellow stabilising agent content
- Carbon black or yellow stabilising agent quality
- OIT value (thermal stability)

13.2.1.2. By accessory batch

The manufacturer must run control checks as follows :

- Appearance / colour
- Measurements
- Hydraulic testing
- Electrical resistance
- Printing/marking.

Control checks and the number of tests must be carried out according to the prescriptions of the EN standard 1555-3

Also refer to table N° 8, paragraph 4.2.3. “Lot release tests” of EN standard 1555-7.

The results must be written out in documents that contain the complete identification of the accessory batch.

These documents must be made immediately available for the Owner representative.

13.2.2. Plant Reception by the Owner Control Service representative

13.2.2.1. General information

All quality controls must be run in the presence of the Owner Control Service representative.

All tests and control checks must comply with appropriate standard prescriptions and with the specific specifications established with the order.

At each visit by the Owner representative, the manufacturer must provide, free of charge, all means and personnel necessary for running the established control checks.

While the order is under production, the Owner representative must have access to stocking installations of all raw materials before manufacturing, manufacturing and control installations, as well as the accessory stocking areas for any control checks he is responsible for.

During his visits, the Owner representative will receive a certificate as soon as he reaches the plant for each batch of accessories presented for reception.

Each time this is requested by the Owner representative, the manufacturer must provide recent reports of all control checks and measuring instrument results and testing results.

13.2.2.2. Convocation for reception

Convocation instructions for reception are to be defined with the order.

13.2.2.3. Reception control checks

For each accessory batch or any fractions of the batch, minimal batch sampling is established in annexed enclosure 3. These control checks and tests are to be run according to the prescriptions of EN standard 1555-3

13.3. ACCEPTANCE OR REFUSAL

13.3.1. Appearance, measurements and marking

Any requirements not supplied will lead to the refusal of the complete batch. However in the case where a batch is refused, it can be presented for approval again after a control check, on agreement with the Owner Control Service.

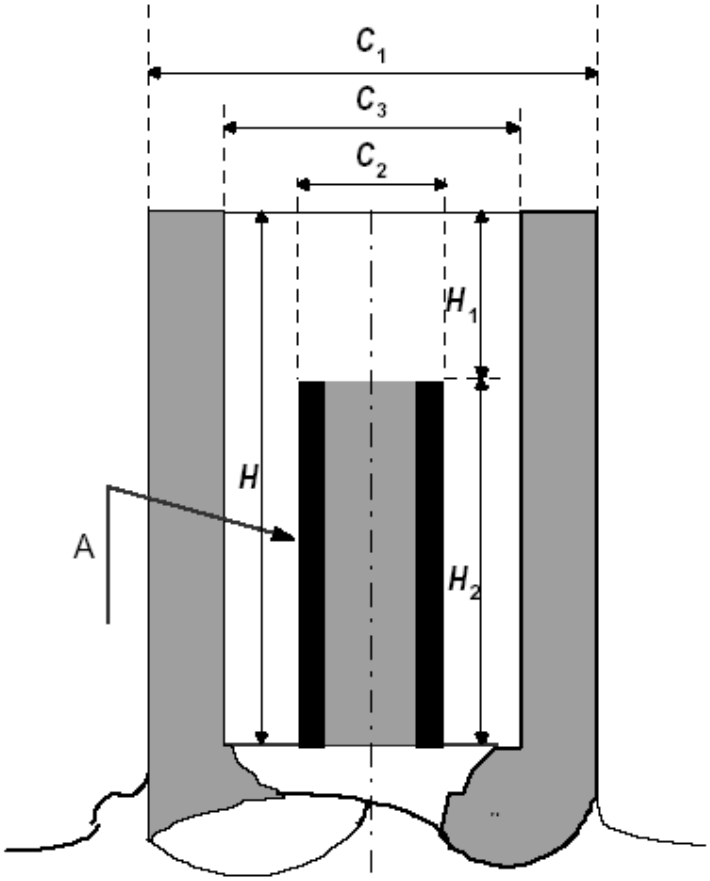
13.3.2. Control check on characteristics

All results that do not comply with the specification prescriptions and the particular specifications requested with the order, demand counter-testing on at least double the number of the samples previously tested. If the undesirable result is confirmed, then the batch is refused permanently. If the result is positive, then the batch will be accepted.

As a complementary control check, other analyses and/or tests can be run after common agreement, and at the manufacturer's cost.

ANNEX 1

CONNECTOR FOR ELECTROFUSION ACCESSORIES



Symbols

C_1	External diameter of connector	C1≥ 11,8 mm
C_2	Diameter of active part of connector	C2 = 4.0 ±0.03 mm
C_3	Internal diameter of connector	C3 = 9,5 ±1,0 mm
C_4	Max. Diameter of active part foot	C4 ≥ 6,0
H	Connector internal depth	H ≥ 12,0 H ≥ H1 + H2
H_1	Distance between upper part of connector and active part	H1 = 3,2 ± 0,5
H_2	Height of active part	H2 ≥7,0 mm
A	Active zone.	

RECEPTION AT MANUFACTURER'S PLANT.

Characteristics	Reference EN 1555-3	Minimum drill tests / frequency	N° of samples	N° of measure/ samples
Appearance /colour	5.2 /5.3	1 x /size / product type / internal space	10	1
Measurements	6	1 x /size / product type / internal space	10	1
Thermal stability (OIT)	8.2	1 x batch	1	1
Meltmass/flow rate (MFR)	8.2	1 x batch	1	1
Electrical resistance	5.6	1 x /size / product type / internal Space	5	1
Cohesion resistance	7.2	1 x /size / product type	2	1
End-to-end seam resistance to traction (cohesion resistance)	7.2	1 x /size / product type	2	1
Shock resistance	7.2	1 x /size / product type	1	1
Load loss	7.2	1 x /size / product type	1	1
Marking	10.2	1 x /size / product type	1	1

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Polyethylene compounds for manufacture of pipes and fittings for underground networks for natural gas distribution

Acceptance procedure

Rev.	Date	Subject of revision	Author	Checked	Approved
C	06/09/02	Updated (see revision marks)	MRT	MRY	MRT
B	21/08/02	Updated	MRT	MRY	MRT
A	13/08/02	First Issue	MRT	MRY	MRT

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1. SUBJECT

This specification describes the procedure to be followed for acceptance of a polyethylene (PE) compound for manufacture of natural gas underground distribution systems.

This specification also gives the minimum requirements which have to be met by PE compounds for manufacture of pipes, fittings and valves and for the construction of underground distribution systems for natural gas.

The compounds that meet this specification must at the minimum be PE 100.

The colour shall be black or orange in accordance with the local requirements.

2. REFERENCES: STANDARDS AND SPECIFICATIONS

This section contains the list of standards and specifications referred to in this specification.

EN 728: 1997	Plastics piping and ducting systems – Polyolefin pipes and fittings - Determination of oxidation induction time.
prEN 1555-1	Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 1: General
EN 1555-3 prEN 1555-7	Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 7: Assessment of conformity.
prEN 12099	Plastics piping systems - Polyethylene piping materials and components - Determination of volatile content.
prEN 12118	Plastics piping systems - Determination of moisture content in plastics by coulometry.
EN ISO 12162: 1995	Thermoplastics materials for pipes and fittings for pressure applications - Classification and designation - Overall service (design) coefficient.
EN ISO 13478: 1997	Thermoplastics pipes for the conveyance of fluids - Determination of resistance to rapid crack

	propagation (RCP) - Full-scale test (FST).
EN ISO 13479: 1997	Thermoplastics pipes for the conveyance of fluids - Determination of resistance to crack propagation (RCP) - Test method for slow crack growth on notched pipes (notch test).
EN 45001: 1990	General criteria for the operation of testing laboratories.
ISO 1133: 1997	Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics.
ISO 6964: 1996	Polyolefin pipes and fittings - Determination of carbon black content by calcination and pyrolysis - Test method and basic specification.
ISO/DIS 9080	Plastics piping and ducting systems - Determination of the long-term hydrostatic strength of thermoplastics materials in pipe from by extrapolation.
ISO 11420: 1996	Method for the assessment of the degree of carbon black dispersion in polyolefin pipes, fittings and compounds.
ISO 13477: 1997	Thermoplastics pipes for the conveyance of fluids - Determination of resistance to rapid crack propagation (RCP) - Small-scale-steady-state test (S4 test).
TBL 70000/740/GTS/0008 to 70000/740/GTS/0010	Polyethylene pipes for underground networks for natural gas distribution
TBL 70000/740/GTS/0011	PE Accessories for underground networks for natural gas distribution

3. DEFINITIONS AND SYMBOLS

3.1. LOWER CONFIDENCE LIMIT (LCL)

A quantity with the dimensions of stress, in megapascal, which can be considered as a property of the material under consideration and represents the 97.5% lower confidence limit of the predicted long-term hydrostatic strength at a temperature of 20°C for 50 years with internal water pressure.

3.2. MINIMUM REQUIRED STRENGTH (MRS 10)

Standardised class of compounds for which the LCL is equal to 10.

3.3. PE 100

Standard designation for PE compounds in class MRS 10.

For such PE compounds, the long-term hydrostatic strength – calculated and classified according to the standardised method (ISO 9080 and ISO 12162) for a temperature of 20°C, a period of 50 years and a reliability of 97.5 % – must be at least 10 MPa.

3.4. BATCH OF COMPOUND

By batch of compound is meant a homogeneous quantity of PE compound of the same origin and of a particular brand.

The batch must be registered under a single identification number (batch number) which leaves no doubt as to the origin, identity and date of manufacture of the compound.

3.5. BATCH OF PIPES

By batch of pipes is meant a homogenous lot of pipes with identical dimensions, made in a continuous process by the same extrusion machine and from the same batch of compound.

4. GENERAL SPECIFICATIONS

The PE compounds that are acceptable according to the requirements of this specification must conform to the requirements for PE 100 described in prEN1555-1.

If the proposed compound is destined for manufacture of pipes, then the acceptance procedure is carried out as described in this specification.

If the proposed compound is destined for manufacture of fittings, then the first stage (section 6) of this acceptance procedure is carried out, after which type tests are carried out on the fittings manufactured from the material concerned. An independent laboratory appointed by Owner will then evaluate whether conformity with the characteristics mentioned in the technical file has been proved, on the basis of the provisions of prEN 1555-7 and Tractebel specification TBL 70000/740/GTS/0011.

5. SUMMARY OF THE PROCEDURE

5.1. GENERAL

The acceptance procedure for PE compounds comprises two stages, namely the evaluation of the technical file and the confirmation tests. The different steps are carried out in the order described below.

The tests which form part of the technical file are carried out on pipes or samples supplied by the compounds manufacturer. In principle, all tests mentioned in the technical file are carried out on pipes from the same batch.

The tests mentioned in chapter 7 are carried out on pipes manufactured by a pipe manufacturer chosen by Owner.

The tests mentioned in chapter 6.1 (table 1), 6.2 and 7 are carried out in a laboratory appointed by Owner.

5.2. APPLICATION FOR APPROVAL

A manufacturer that wishes to have a certain PE compound classified for the manufacture of PE gas components must submit a written application to Owner.

This application must be accompanied by a clear description of the compound concerned, including the technical characteristics.

All correspondence must be in English.

6. TECHNICAL FILE

6.1. EVALUATION

If the application is taken into consideration by Owner, the compound manufacturer must submit a technical file to a laboratory appointed by Owner.

This technical file must include the following information:

- name and class of the PE compound;
- technical characteristics of the compound, with reference to the standard;
- a dossier with test results, from an independent laboratory, showing that the proposed compound meets the requirements of prEN 1555-1 for a PE 100 compound. The dossier must also state which tests have been carried out on the same batch of pipes or test samples, including the identification of their origin.

The laboratory chosen by Owner will also evaluate the conformity of this dossier, taking the following rules into account:

a) If the tests mentioned in the technical file have been carried out by a laboratory accredited according to EN 45001, and if the tests have been carried out on the same batch of pipes for the required diameter and wall thickness, then the evaluation will be limited to an examination of the dossier in accordance with the provisions of prEN 1555-1 and the quantity of test samples laid down in 1555-7;

b) If the tests mentioned in the technical file have been carried out by a laboratory that is not accredited according to EN 45001 and/or on different batches of pipes for the same diameters/wall thickness, then the evaluation will be done on the basis of further tests in order to confirm the characteristics mentioned in the technical file.

c) The characteristics for rapid crack propagation (RCP) and slow crack propagation (SCG), as mentioned in the technical file, must comply with the requirements of the standard. Furthermore, the requirements of table 1 must be met:

Table 1

Characteristic	Requirement	Standard
Pc S4	DN 250 – SDR 11 0^{O}c - > 3,5 BAR	ISO 13477
Pc FS	DN 250 – SDR 11 0^{O}c - > 15 BAR	EN ISO 13478
SCG	DN 250 – SDR 11 80^{O}c – σ4,6 - > 500 h	EN ISO 13479

The tests mentioned in table 1 must be carried out by an independent laboratory appointed by Owner. The three series of tests must be carried out on the same batch of pipes.

If it emerges from the evaluation of the technical file that conformity with prEN 1555-1 is guaranteed, then the next stage of the procedure can commence, as described in section 7.

6.2. ADDITIONAL TESTS

6.2.1. General

If from the evaluation it emerges that the dossier submitted is incomplete or does not offer the necessary guarantees of conformity with the standard, then additional tests will be carried out by the laboratory appointed by Owner, at the cost of the compound manufacturer.

The same procedure will be followed if the technical file has been drawn up by a laboratory that is not accredited and/or if several batches of pipes have been used for each diameter/wall thickness in carrying out the tests.

6.2.2. Delivery of the pipes

The required batch of pipes must be delivered by the compound manufacturer, the pipes having been produced by a pipe manufacturer who at that moment is a Owner supplier.

The number of pipes must be based on the numbers and frequencies mentioned in prEN 1555-7.

If the technical file is based on tests carried out by a non-accredited laboratory and/or carried out on several batches of pipes per diameter/wall thickness, then the tests will repeated on at least half of the required test samples; if the number thus calculated is not a whole number, the number of test samples taken will be equal to the next whole number.

6.2.3. Test results

If from the additional tests it appears that conformity with prEN 1555-1 is guaranteed, then the next phase of the procedure can commence, as described in section 7.

If despite the additional tests no unambiguous decision can be taken regarding the conformity of the compound, then further additional tests will be carried out, until the number of test samples is at maximum equal to the number specified in the standard concerned. For this purpose, the manufacturer must keep sufficient pipes of the same batch in reserve.

If the evaluation is still not positive after the maximum number of samples has been tested, then the compound will be considered as not accepted.

7. CONFIRMATION TESTS

The second stage of the acceptance covers the industrial production of pipes, the verification of the characteristics, the laying of the pipes and the fusion to existing PE systems.

This second stage of the acceptance is carried out by Owner.

Before this stage can commence, the manufacturer must provide Owner with a technical data sheet (see appendix 1) showing the limit values for the characteristics of the compound concerned.

For the purpose of carrying out this part of the procedure, Owner will order a batch of pipes from one of its pipe manufacturers. After verification of the characteristics in the factory and confirmation by an independent laboratory, the pipes will be installed in the Owner gas distribution network, taking into account the following aspects:

- Any problems with delivery and with extrusion of the compound will be noted.
- The limits of the characteristics mentioned in the technical data sheet.
- For characteristics not included in the technical data sheet, the measured value may
- deviate by max. 30% from the average values mentioned in the technical file, to the extent that these are relevant and not in conflict with the requirements of the standard.
- Any problems with laying or welding or connecting the pipes; these will be noted.

If from the test results it appears that the characteristics of the compound and/or pipes do not comply with the requirements, or if anomalies are found in laying and/or welding of the pipes, then the acceptance procedure will be provisionally suspended. The problems found will be analysed in consultation with the compound manufacturer, and an attempt will be made to find solutions which are acceptable to both parties. If this turns out to be impossible, then the compound will be considered as not accepted.

In such a case, the costs of the second stage could be charged to the compound manufacturer.

If the second stage of the procedure is successfully completed, then the compound is accepted and will be included in the list of “Approved PE Compounds”. This list is published in the Tractebel specifications for PE pipes (TBL 70000/740/GTS/0008 to 0010) and PE fittings (TBL 70000/740/GTS/0011). The materials will be included when the list is next published (around once every two year).

8. FOLLOW-UP

8.1. TECHNICAL DATA SHEET

The manufacturer must supply Owner with a technical data sheet, as described in Appendix 1, with permission for Owner to publish this technical data sheet in the specifications for PE pipes and fittings, for as long as the compound is included in the list of approved compounds.

The data entered on this data sheet apply as limit values for the compound concerned. Whenever one or more characteristics of a batch of compounds falls outside these limits, then the batch will be automatically refused for production of components destined for our gas network.

8.2. CONTINUITY OF THE COMPOUND

No alterations may be made to the compound without prior permission from Owner.

As mentioned in 8.1, the limits mentioned in the technical data sheet must be respected. Furthermore, in the case of characteristics not included in the technical data sheet, the measured values may not deviate by more than 30% from the average value mentioned

in the technical file, to the extent that these are relevant and not in conflict with the requirements of the standard.

Each change that affects the final characteristics of the compound can result in additional tests being carried out by the compound manufacturer in accordance with the provisions of prEN 1555-7 appendix A. The procedures for the test shall correspond to those described in section 6.1 of this specification.

APPENDIX 1

Technical Data Sheet

Characteristics of (*name of PE compound*)
as per prEN 1555-1

Characteristics	Standard	Specification
MRS	EN ISO 12162	> …. MPa
Density	Method D of ISO 1183	
min.		…. kg/m3
max.		…. kg/m3
MFR 190/5	ISO 1133	
min.		…. g/ 10 min
max.		…. g/ 10 min
Volatile content	prEN 12099	
max.		…. mg/kg
Water content	prEN 12118	
max.		…. mg/kg
Carbon black content	ISO 6964	
min.		…. %
max.		…. %
Carbon black dispersion	ISO 11420	
max.		≤ grade …
OIT at 210°C	EN 728	
min.		… min

Company .....

Person responsible .....

Position .....

Signature .....

Σ Σ Σ

POLYETHYLENE VALVES FOR NATURAL GAS DISTRIBUTION UNDERGROUND NETWORK

A	22/08/02	First Issue	MRT	MRY	MRT
Rev.	Date	Subject of revision	Author	Checked	Approved

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1. SCOPE AND FIELD OF APPLICATION

This General Technical Specification specifies the requirements for valves and its component made from extruded or injected moulded polyethylene (PE) and which are intended to be used for the Natural gas distribution systems where the maximum operating pressure (MOP) is equal to 5 bar.

In addition, it specifies some general properties of the materials from which these valves are made.

It applies to bi-directional valves with spigot ends or electrofusion sockets intended to be fused with polyethylene pipes in accordance with the TBL 70000/740/GTS/0008-0009-0010 and 0012 PE pipe specification and with spigot fittings in accordance with the TBL 70000/740/GTS/0011.

This specification is limited to valves with a nominal diameter (d_n) up to and including 225 mm.

2. NORMATIVE REFERENCES

prEN 1555-1	Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - part 1 : General
prEN 1555-4	Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - part 4 : Valves
prEN 1555-7	Plastics piping systems for the supply of gaseous fuels- Polyethylene (PE) - part 7 : Guidance for assessment of conformity
ISO CD 12176-4	Plastics pipes and fittings - Equipment for fusion jointingpolyethylene system - part 4 : raceability coding
ISO TR 13950	Plastics pipes and fittings - Automatic recognition systems for electrofusions
TBL 7000/740/GTS/0008	Polyethylene pipes for underground networks for Natural gas distribution - General requirements
TBL 70000/740/GTS/0009	Polyethylene pipes for underground networks for Natural gas distribution - Technical data sheet
TBL 70000/740/GTS/0010	Polyethylene pipes for underground networks for Natural gas distribution - Quality control of pipes
TBL 70000/740/GTS/0011	PE accessories for underground network for natural gas distribution
TBL 70000/740/GTS/0012	Polyethylene components for manufacture of pipes and fittings for underground networks for natural gas distribution - Acceptance procedure
TBL 70000/740/GTS/0013	Execution of works. Installation of polyethylene pipes

3. DEFINITIONS

3.1. NOMINAL SIZE DN/OD

Nominal size, related to the outside diameter.

3.2. NOMINAL OUTSIDE DIAMETER (d_n)

Specified outside diameter, in millimetre, assigned to a nominal size DN/OD.

3.3. NOMINAL WALL THICKNESS (e_n)

Numerical designation of the wall thickness of a component, which is a convenient round number, approximately equal to the manufacturing dimension in millimetre (mm).

Note : For thermoplastics components conforming to prEN 1555, the value of the nominal wall thickness en is identical to the specified minimum wall thickness at any point, e_{min}.

3.4. COMPOUND

Homogenous mixture of base polymer (PE) and additives, i.e. anti-oxidants, pigments, UV-stabilisers and others, at a dosage level necessary for the processing and use of components conforming to the requirements of this standard.

3.5. MAXIMUM OPERATING PRESSURE (MOP)

Maximum effective pressure of the fluid in the piping system, expressed in bar, which is allowed in continuous use. It takes into account the physical and the mechanical characteristics of the components of a piping system.

Note : It is calculated using the following equation : MOP = $\frac{(20xMRS)}{Cx(SDR-1)}$

3.6. VALVES

An obturating device designed to stop or restore the gas flow by operating the opening and closing mechanisms.

3.7. BASE PLATE

The valves are split into two models.

MODEL 1	Valve supply without base plate
MODEL 2	Valve supply with a base plate fixed or integrated

3.8. SPINDLE PROTECTION SLEEVE

A sleeve tube that protect the valve spindle. The protection sleeve exists in two models

VENTILATED	The sleeve is provided with opening and wrapped with textile fabric in order to let the gas escape and prevent the soil to go in.
NON VENTILATED	A normal sleeve tube without textile fabric.

3.9. EXTERNAL LEAK-TIGHTNESS

The tightness of the body enveloping the space containing the gas, with respect to the atmosphere.

3.10. INTERNAL LEAK-TIGHTNESS

The tightness between the inlet and the outlet of the valve, obtained by closing the operating mechanism.

3.11. LEAK-TIGHTNESS TEST

Test to determine

- the internal leak-tightness of the valve's closing seat when closed and pressurised from either side;
- the external leak-tightness of the valve when half open.

3.12. INITIATING TORQUE

Torque required to initiate movement of the obturator.

3.13. RUNNING TORQUE

Torque required to achieve full opening or closing of the valve at maximum allowable operating pressure.

3.14. LEAKAGE

Emission of gas through the body, sealing membrane or any other component of the valve.

4. GENERAL SPECIFICATION

The present specification is based on the European Standards EN 1555 series prepared by technical committee CEN/TC 155 plastic technical and ducting system.

The requirements of this General technical specification are chosen in order to guarantee a high quality gas system which will respond to the European Standards for gas supply systems.

- the valves described in this General technical specification comply with the standard prEN1555-4 and the complementary particular requirements or options of the present GTS.
- the valves are intended to be use in gas distribution networks made of PE pipes and accessories complying with TBL 70000/740/GTS/0008-0009-0010-0011-0012.
- the valves are laid and welded as specified in the TBL 70000/740/GTS/0013

5. MATERIAL PARTICULARITIES

5.1. GENERAL

All parts of the valve in contact with the gas stream shall be resistant to the gas, its condensates and other occurring substances such as dust.

All metallic parts of the PE valve shall resist to both internal and external corrosion.

5.2. PE COMPOUND FOR POLYETHYLENE VALVES BODIES

- The PE compound from which the valve body, with spigot end or electrofusion socket is made out, shall conform to prEN1555-1 and comply with the TBL 70000/740/GTS/0012 "acceptance procedure".
- The PE valves bodies are PE 100 class made from approved material as specified in the TBL 70000/740/GTS/0008 General requirements - appendix 1.

Are forbidden :

- use of recycled materials,
- mixture of different materials,
- addition of complementary materials.

5.3. SEALS

- The seals shall be homogeneous, without any inner crack, inclusion or impurities and cannot contain any component that can alter the properties of the materials they are in contact with, and prevent the non-conformity of those materials with the present specification.
- additives shall be distributed evenly.
- The rubber seal rings shall comply with standard EN 682.
- Other seals shall comply with the relevant standard and be suitable for gas service.

5.4. LUBRICANTS

Lubricants cannot have any adverse effects on the long-term performance of the valve parts.

5.5. OPERATING CAP

Operating cap are in plastic material or in metal, protected against corrosion.

6. VALVES GENERAL PARTICULARITIES

6.1. TECHNICAL FILE

The manufactures of the valves shall deliver for each type of valve a technical file which includes:

- Raw materiel used,
- drawings, dimensions and tolerances, including for the accessories,
- application range (temperature and pressure limits),
- running torque and initiating torque,
- pressure drop and flow diagram,
- test results and data proving the conformity of the valve in accordance with prEN1555-4 and prEN1555-7,
- the pipe elements used during valves testing have to be conform to the TBL 70000/740/GTS/0008,
- the assembly pipes/valves realised during testing shall be in conformity with the manufactures instructions and the extreme installation conditions.

- For the test assembly due consideration should be taken regarding the fabrication tolerances and the variation of the outside ambient temperature.

- The welding of the assembly will comply with TBL 70000/740/GTS/0013.

6.2. DESIGN

- The valves will be designed for a maximum operating pressure (MOP) equal to 10 bar.

- The wall thickness of the PE valve body shall be equal or greater than the minimum wall thickness of the corresponding SDR 11 series pipes.

- Valves body and valves ends form an indivisible whole.

- Except otherwise stated in the Owner purchase order, all valves will be "ball valve" type.

- The operating cap shall be designed in a way that it cannot be ejected "non blow out" type.

- The design of the extension spindle and the spindle protection sleeve will be such that they will never, in any case, even due to soil settlement, lay on the non reinforced part of the valve body or the valve ends. The spindle protection sleeve cannot turn during valve turning operation.

- The owner will specify if the spindle protection sleeve is a ventilated or non-ventilated type.

- The spindle protection sleeve ventilated type will have holes (min. diameter 10 mm) or slot type holes (min. width 1 mm) all around the sleeve in sufficient number in order to assure a maximum permeability for the gas.

- The sleeve will be covered by a non-waved geo-textile fabric (90 µm). The geo-textile fabric with a 50 mm overlap will be well secured on the sleeve;

- The valves should be equipped with a base plate. In order to achieve this, the valve body will be design with a flat base (model 1) or with an attached base plate or an integrated one (model 2). The Owner or his representative will specify the model.

- The operating mechanism and the stop wedges will be protected against water intrusion.

- The valve body is completely sealed except a passage for the spindle mechanism.

6.3. APPEARANCE AND COLOUR

- The internal and external surfaces of valves shall be smooth clean and shall have no scoring, cavities or other defects to an extend that would prevent non-conformity to the present GTS or to the standard prEN 1555-4.

- The colour of the PE valves shall be either yellow, black or orange.
- The colour of the valve shall be specify by the Owner or his representative in the purchase order;

6.4. DIMENSIONS

- The dimensions will be in conformity with the standard prEN1555-3 and prEN1555-4.
- The dimensions of the extensions spindle are detailed in appendix A.
- The operating cap will be design as per appendix B, C or D.
- The type of the operating cap will be specified by the Owner or his representative in the purchase order.
- The design of the extension spindle is such that the extension can be turn easily at
- any time to suit the site conditions.

7. MECHANICAL CHARACTERISTICS FOR ASSEMBLED VALVES

7.1. GENERAL

The valve shall have mechanical characteristics and be tested as specified in the standard prEN 1555-4.

7.2. RUNNING TORQUE

The running torque and the concept of the valve shall prevent the valve from being easily operated (by hand) without an operating key. To operate the valve designed with running torque as specified I the standard prEN 1555-4, the use of an operating key is requested.

Neither the operating cap nor the spindle shall be damaged when operating at maximum operating torque as specified in the standard prEN 1555-4;

7.3. INDIVIDUAL TEST (BATCH RELEASE TEST)

Before delivery each valves will be individually tested for mechanical strength and leaktightness as per standard prEN1555-4.

A combined mechanic resistance and leak-tightness test shall be performed in conformity with the prEN1555-4.

By batch of valves a supplementary leak-tightness test (25 mbar) shall be performed in conformity with the prEN 1555-4 on 3 valves taken at random.

7.4. PRESSURE DROP AT LOW PRESSURE

The drop of pressure is measured with natural gas as a medium and according to the diagram specified in the standard EN 12117 (fig.1).

The maximum drop of pressure measured with natural gas (inlet pressure 25 mbar) will be limited to 0,2 mbar for a nominal gas flow as per table below.

d_n	Flow m^3/h
32	10
40	15
63	60
90	180
110	250
160	600
200	1000

8. MARKING

At least the information given below shall be printed or formed directly on the valve :

a) Manufacturer's name and/or trademark;

b) Material and designation (e.g. PE 100);

c) Design application series (e.g. SDR 11);

d) Nominal diameter;

e) Internal fluid "gas";

f) Traceability code (valve and component) as per standard ISO/FDIS 12176-4;

g) Number of the system standard (e.g. prEN 1555-4) this information can be printed/formed directly on the valve or on a label associated with the valve or on an individual bag.

h) Production period, year and month;

The marking shall stay legible during normal manipulation, storage and installation.

The marking shall not adversely influence the performance of the valve and prevent the non-conformity of the valve.

No marking will be accepted at the valve spigot ends.

9. PACKAGING AND DELIVERY

The valve and its accessories shall be packaged individually in plastic bags in order to prevent them from deterioration. The valves ends shall be protected with external caps.

The cartons and/or individual bags shall bear at least one label with the manufacturer's name, type and dimensions of the part number, number of units in the box and, any special storage conditions and storage time limits.

10. GUARANTEE

The manufacturer will extend his guarantee for each part for 10 years after production. This guarantee period is valid if the parts are kept in proper conditions and in the original packaging.

The valves equipped with electrofusion sockets will be supply with a magnetic card and a code bar tag containing the welding parameters. The coding of the parameters shall be in conformity with the standard ISO TR 13950.

The operating manual (in English) will be inserted in the individual part package.

11. QUALITY CONTROL

11.1. GENERAL RULINGS

11.1.1. Manufacturer’s responsibility

The manufacturer is entirely responsible for the quality of the PE valves manufactured by his firm.

All control checks prescribed above do not relieve him of this responsibility.

To ensure that all PE valves are in compliance with the specification in all aspects, they must be controlled by the plant control service, which must be independent from the manufacturing department.

All PE valves supplied are guaranteed for 10 years after the date of production.

11.1.2. Quality assurance

The manufacturer must have some form of quality control to ensure that products comply with EN standards 29001 or 29002. The quality assurance manual must be made available to the Owner Control Service or an external Control laboratory appointed by him.

The system of quality assurance must be certified by an authorised body.

11.2. CONTROLS

11.2.1. Control testing by the manufacturer

11.2.1.1. By material batch.

The manufacturer demands a certificate from the raw material manufacturer including the following :

- Fluid index
- Water content
- Volume mass
- Carbon black or yellow stabilising agent content
- Carbon black or yellow stabilising agent quality
- OIT value (thermal stability)

11.2.1.2. By accessory batch

The manufacturer must run control checks as specified in the standard prEN 1555-4 and prEN 1555-7:

Control checks and the number of tests must be carried out according to the prescriptions of the EN standard 1555-4.

Also refer to table N° 8, paragraph 4.2.3. “Lot release tests” of standard prEN 1555-7.

The results must be written out in documents that contain the complete identification of the accessory batch.

These documents must be made immediately available for the Owner representative.

11.2.2. Plant Reception by the Owner Control Service representative

11.2.2.1. General information

All quality controls must be run in the presence of the Owner Control Service representative.

All tests and control checks must comply with appropriate standard prescriptions and with the specific specifications established with the order.

At each visit by the Owner representative, the manufacturer must provide, free of charge, all means and personnel necessary for running the established control checks.

While the order is under production, the Owner representative must have access to stocking installations of all raw materials before manufacturing, manufacturing and

control installations, as well as the accessory stocking areas for any control checks he is responsible for.

During his visits, the Owner representative will receive a certificate as soon as he reaches the plant for each batch of accessories presented for reception.

Each time this is requested by the Owner representative, the manufacturer must provide recent reports of all control checks and measuring instrument results and testing results.

11.2.2.2. Convocation for reception

Convocation instructions for reception are to be defined with the order.

11.2.2.3. Reception control checks

For each accessory batch or any fractions of the batch, minimal batch sampling is established in annexed enclosure 3. These control checks and tests are to be run according to the prescriptions of standard prEN 1555-4.

11.3. ACCEPTANCE OR REFUSAL

11.3.1. Appearance, measurements and marking

Any requirements not supplied will lead to the refusal of the complete batch. However in the case where a batch is refused, it can be presented for approval again after a control check, on agreement with the Owner Control Service.

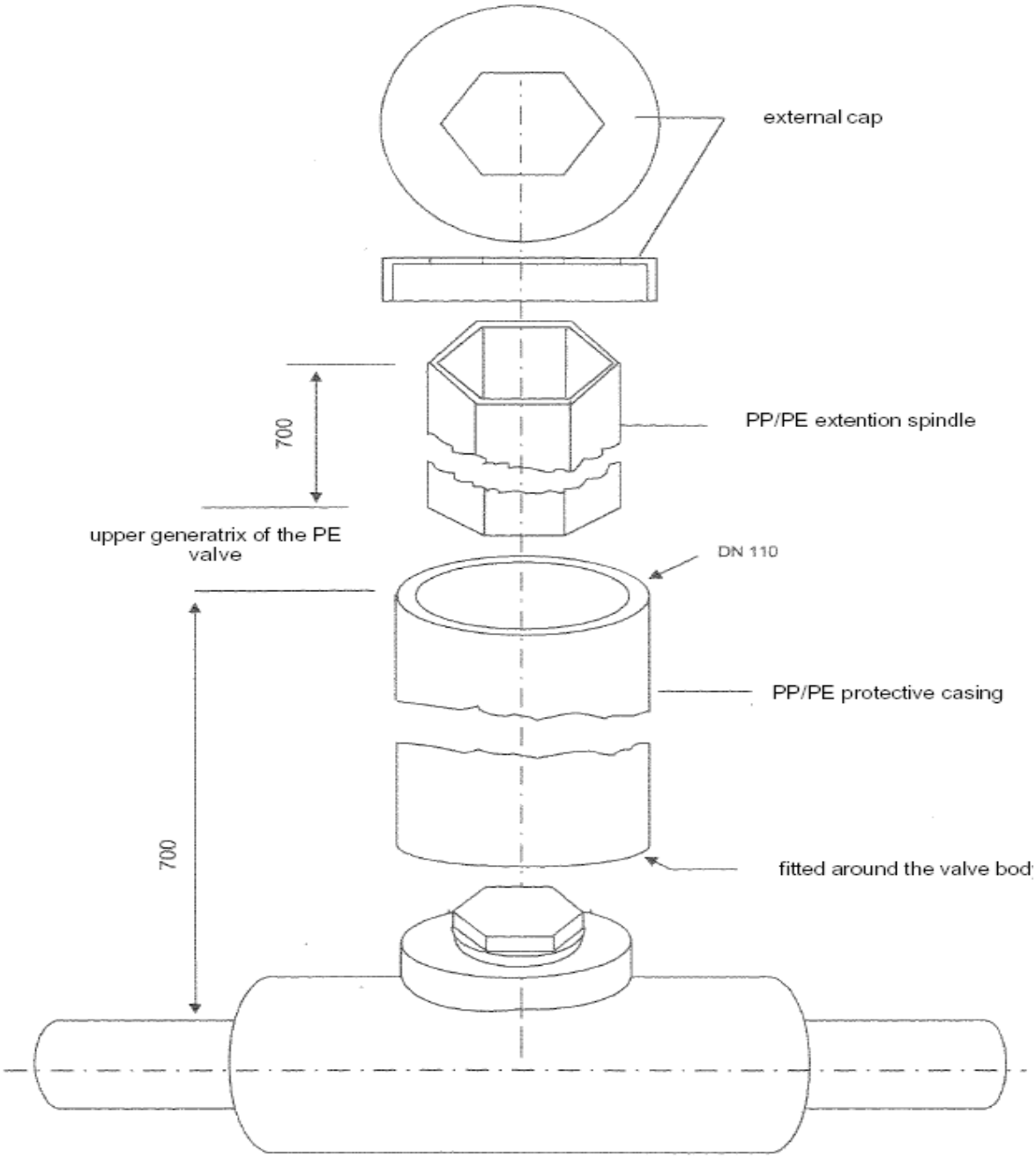
11.3.2. Control check on characteristics

All results that do not comply with the specification prescriptions and the particular specifications requested with the order, demand counter-testing on at least double the number of the samples previously tested. If the undesirable result is confirmed, then the batch is refused permanently. If the result is positive, then the batch will be accepted.

As a complementary control check, other analyses and/or tests can be run after common agreement, and at the manufacturer’s cost.

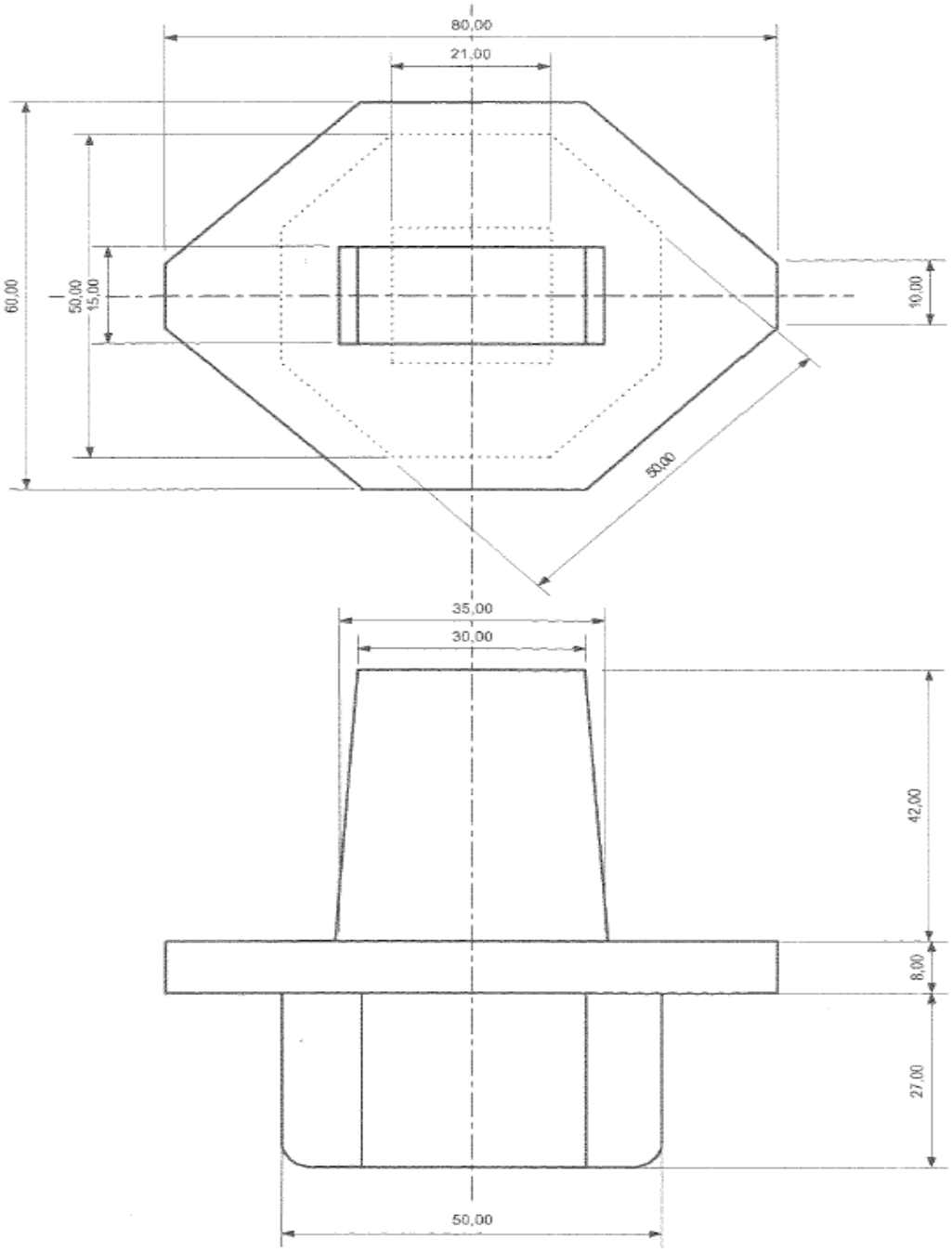
ANNEXE A

Dimensions of the extension spindle



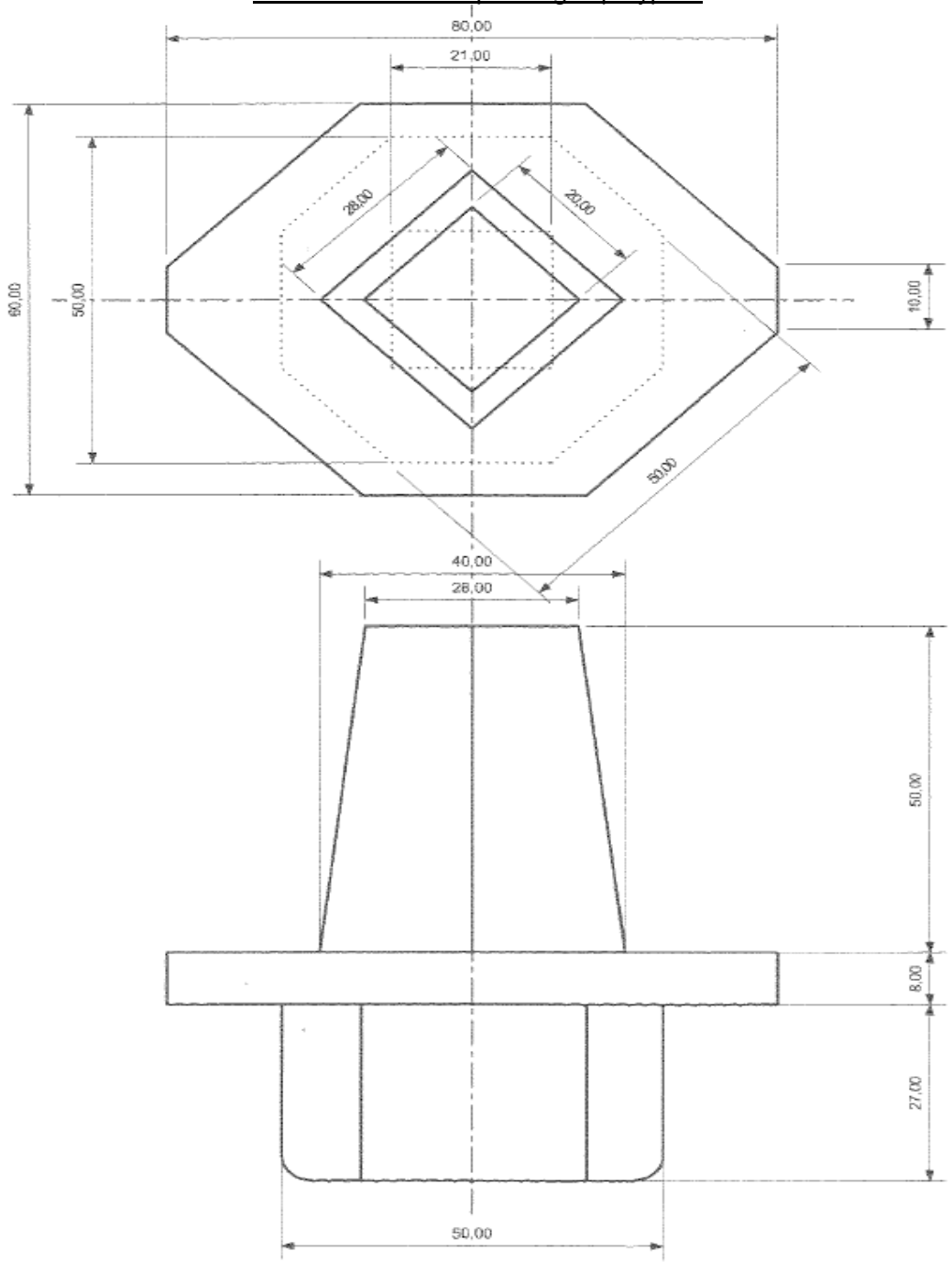
ANNEX B

Dimensions of the operating cap Type A



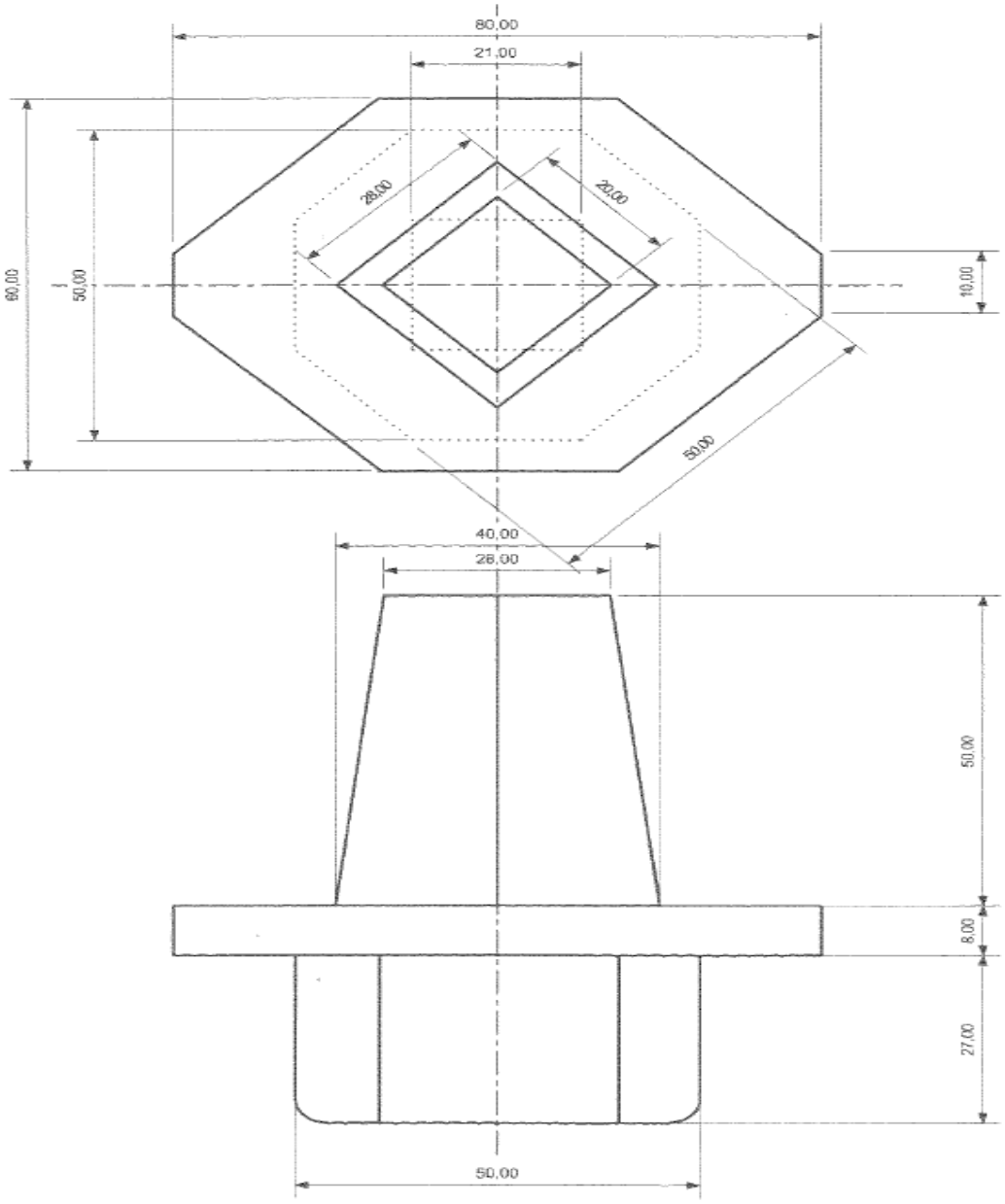
ANNEX C

Dimensions of the operating cap Type B



ANNEX D

Dimensions of the operating cap Type C



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CUGL Central U.P. Gas Limited	QUALITY CONTROL TABLE MDPE FITTINGS	QAP NO : P.014714 G 11031 086 Date:- 20.08.2021 TENDER NO. -P.014714 G11031 R009	TRACTEBEL ENGIE

S.No.	COMPONENTS/OPERATIONS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	VENDOR	CA/TPI	REMARKS
1	Pressure Drop		Each Batch certificate	Raw Material manufacturer's test certificate	Raw Material manufacturer's test certificate	Test Certificate	R	R	
2	Hydrostatic strength								
2.1	At 20º C	Strength test	As per EN 1555-7	EN 1555 - 3/ EN 921 / PTS / GTS	No leakage through the fittings during the test	Inspection report	P	W	
2.2	At 80º C	Strength test	As per EN 1555-7	EN 1555 - 3/ EN 921 / PTS / GTS	No leakage through the fittings during the test	Inspection report	P	W	
3	Cohesive Resistance								
3.1	Length of Initial rupture ≤ L2/3 in brittle failure	Mechanical properties	As per EN 1555-7	ISO 13954 / ISO 13955 / PTS / GTS	EN 1555 - 3	Inspection report	P	R	This test is applicable only for Electrofusion socket fittings
3.2	Surface of rupture ≤ 25% brittle failure	Mechanical properties	As per EN 1555-7	ISO / DIS 13956 / PTS / GTS	EN 1555 - 3	Inspection report	P	R	This test is applicable only for Electrofusion saddle fittings
4	Tensile strength for butt fusion	Mechanical properties	As per EN 1555-7	ISO / DS 13953/PTS	ISO / DS 13953/PTS		P	R	This test is applicable only for Spigot end fittings
5	Impact strength	Mechanical properties	As per EN 1555-7	EN 1716 / PTS / GTS	EN 1716 / PTS / GTS	Inspection report	P	R	This test is applicable only for Electrofusion saddle fittings
6	Pressure Drop	Air flow rate	As per EN 1555-7	EN 12117 / PTS	EN 12117 / PTS	Inspection report	P	R	This test is applicable only for Electrofusion saddle fittings
7	Electrical Resistance test		As per EN 1555-7	EN 1555 - 3 / PTS / GTS	EN 1555 - 3 / PTS	Inspection report	P	W	
8	Oxidation induction time(Thermal stability)		As per EN 1555-7	EN 1555 - 3 / EN 728 / PTS / GTS	> 20 min	Inspection report	P	W	
9	Meltmass/ Flow rate (MFR)		As per EN 1555-7	EN 1555 - 3 / ISO 4440 / GTS / PTS	(0.2 ≤ MFR ≤ 1.4) g / 10 min and after processing maximum deviation of ± 20 % of the nominated value declared by manufacturer.	Inspection report	P	W	
10	Dimensional Check	Dimensions	100%	As per EN 1555 -3 / PTS / GTS	As per EN 1555 -3 / PTS / GTS	Inspection report	P	RW	
11	Storage	Visual	All materials	-	Manufacturer Recommendation	Stock register	H	M	
12	Marking	Visual	100%	EN 1555 / PTS / GTS	EN 1555 -3	Inspection report	P	RW	
13	Documentation	All Inspection Reports and Certificates	-	EN 1555	All Inspection Reports and Certificates	Inspection Report	P	R	
	LEGENDS:	**H**-HOLD, **P**-PERFORMANCE, **W**-WITNESS, **RW** - RANDOM WITNESS, **TC**-TEST CERTIFICATE, **MTR**-MANUFACTURER TEST REPORT, **TPIA**-THIRD PARTY INSPECTION AGENCY, CA - OWNER/OWNER'S REPRESENTATIVE							

Notes :

1 The Above Testing and acceptance criteria are minimum requirements, however, manufacturer shall ensure that the product shall also comply to the additional requirements as per Particular Technical specifications(PTS)

2 Vendor 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.

3 Owner/ Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.

4 All reference Codes/ Standards, Documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA/CA at the time of Inspection

5 Only calibrated instruments shall be used for inspection.

6 Before dispatch of the materials to the contractors, manufacturer shall submit copy of all related document of inspection along with release note and MTC to the owner /PMC for the dispatch clearance.

7 Sampling Frequency of the testing shall be done as per EN 1555-7

CUGL Central U.P. Gas Limited	**STANDARD QUALITY ASSURANCE PLAN** **MDPE Valve**	QAP NO :P.014714 G 11031 087 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009	TRACTEBEL ENGIE

SL No.	Test Description	Type Of Check	Quantum Of Check	Ref. Document	Acceptance Norms	Format of Records	Inspection		Remarks
							Vendor	TPIA	
1	Raw Materials	Test Certificate for Raw Materials	Each Batch	EN 1555-1/ PTS	EN 1555-1/PTS	MTR	P	R	
2	Test of raw material inspection	Raw material Characteristics check	Each Batch	Test Certificate for Raw Materials	As per material test cert.	MTR	P	R	
3	Hydrostatic Strength (PE100) (At 20 °c and 80 °c)	Strength Test	100%	EN 1555- 4 & ISO 1167-1/4/PTS	As per EN 1555- 4 & ISO 1167-1/4/PTS (No failure and no leak during test period of any test piece)	Hydrotest Report	P	R	
4	Leak Tightness test	Mechanical Characteristics	100%	EN 1555- 4/ PTS	As per Table-1, EN 1555-4/ PTS (No Leakage)	MTR	P	R	
5	Operating Torque	Mechanical Characteristics	100%	EN 1555- 4/ PTS	As per Table-1, EN 1555-4/EN28233/ PTS	MTR	P	R	
6	Pressure Drop.	Mechanical Characteristics (Air flow rate)	100%	ISO 17778/ EN 1555-3/ PTS	ISO 17778/ EN 1555-3/ PTS	IR	P	R	
7	Oxidation Induction Time (Thermal Stability)	Physical Characteristics	Each Batch	EN 1555-3/ EN 728/ ISO 11357-6/ PTS	As per EN 1555-3/ EN 728/ ISO 11357-6/ PTS	MTR	P	R	
8	Melt mass flow Rate	Physical Characteristics	Each Batch	EN 1553-3/ EN ISO 1133/ PTS	As per EN 1553-3/ EN ISO 1133/ PTS	MTR	P	R	
9	Dimensional Check	Dimensional	Each Batch	EN 1555-3/PTS	As per EN 1555-3/ PTS	IR	P	RW	Min. 10 % by TPIA
10	Density	Physical Characteristics	100%	ISO 1183/PTS	0.926 to 0.94 g/cm3	MTR	P	R	
11	Volatile Content	Physical Characteristics	Each Batch	EN 12099/PTS	≤350mg/Kg	MTR	P	R	
12	Content Carbon Black	Physical Characteristics	Each Batch	ISO 6964/PTS	2.50 ± 0.5%	MTR	P	R	
13	Appearance, Color	General Characteristics	100%	EN 1555- 4/PTS	EN 1555- 4/PTS	IR	P	R	
14	Marking	Physical Characteristics	100%	EN 1555- 3/ PTS	EN 1555- 3/ PTS	IR	P	RW	Min. 10 % by TPIA
15	Visual	General Characteristics	Each Lot	EN 1555-7/PTS	EN 1555-7/PTS	IR	P	RW	Min. 10 % by TPIA

Legends:

R Review **H Hold** **TPIA Third Party Inspection Agency** **PTS Particular Technical Specification**
P Perform **W Witness** **MTR Material Test Report** **SS Standard Specification**

Note:

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 PTS/ SS.
2. The TPIA shall use this QAP for inspection against subject tender and may consider this document as approved.
3. 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.
4. Owner / Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.
5. All reference Codes/ Standards, Documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA at the time of Inspection
6. At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note & MTC.

CUGL Central U.P. Gas Limited	**STANDARD QUALITY ASSURANCE PLAN** **Electrofusion Fittings and Transition Fittings**	QAP NO : P.014714 G 11031 088 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009	TRACTEBEL ENGIE

							INSPECTION BY		
Sr. No	**Test Description**	**Type of Check**	**QUANTUM OF CHECK**	**REFERENCE DOCUMENT**	**ACCEPTANCE NORMS**	**Format of Record**	**Manufacturer**	**TPIA**	**REMARKS**
1	Raw Material	Review of test certificate	Each batch	EN 1555-1/ PTS	EN 1555-1/ PTS	MTR	P	R	
2	Hydrostatic Strength (PE100) (At 20 °c and 80 °c)	Strength Test	As per EN 1555-7	EN 1555-3 / ISO 1167 / PTS	As per EN 1555-3 / ISO 1167 / PTS (No failure and no leak during test period of any test piece)	Hydro test Report	P	R	
3	Decohesive resistance for Electrofusion Socket fittings	Length of initiation of rupture ≤ L2/3 in brittle failure	As per EN 1555-7	ISO 13954 / ISO 13955/ PTS	As per EN 1555-3	IR	P	R	
4	Decohesive Strength for Electrofusion Saddle fittings	Surface of rupture ≤ 25% brittle failure	As per EN 1555-7	ISO 13956 / PTS	As per EN 1555-3	IR	P	R	
5	Impact Resistance for Electrofusion Saddle fittings	Mechanical Properties	As per EN 1555-7	EN 1716/PTS	EN 1716/PTS	IR	P	R	
6	Tensile Strength for butt fusion	Mechanical Properties	As per EN 1555-7	ISO DS 13953 / PTS	ISO DS 13953 / PTS	IR	P	R	Applicable for spigot end fittings
7	Pressure Drop.	Mechanical Characteristics (Air flow rate)	As per EN 1555-7	ISO 17778 / EN 12117/ PTS	EN 12117/ EN 1555-3	IR	P	R	
8	Electrical Resistance Test	Electrical Characteristics	As per EN 1555-7	EN 1555-3	EN 1555-3	IR	P	R	
9	Oxidation Induction Time (Thermal Stability)	Physical Characteristics	As per EN 1555-7	EN 1555-3/ EN 728/ ISO 11357-6/ PTS	OIT > 20 Min./ 200°c	MTR	P	R	
10	Melt mass flow rate (MFR)	Physical Characteristics	As per EN 1555-7	EN 1553-3/ EN ISO 1133/ PTS	MFR 190°/5kg.0.20 – 1.20 gm./10 min. and after processing maximum deviation of ± 20% of the value measured on the batch used to manufacture the fitting	MTR	P	R	
11	Density	Physical Characteristics	1	ISO 1183	0.926 to 0.94 g/cm^3	MTR	P	R	
12	Dimensional check	Dimensions	As per EN 1555-7	As per EN 1555-3/PTS	As per EN 1555-3/PTS	IR	P	R	
13	Appearance, Color	Visual	As per EN 1555-7	EN 1555- 3/ PTS	EN 1555- 3/ PTS	MTR	P	R	
14	Marking	Physical Characteristics	As per EN 1555-7	EN 1555- 3/ PTS	EN 1555-3 / PTS	IR	P	RW	Min. 10% by TPIA
15	Visual	Visual	As per EN 1555-7	EN 1555- 3/ PTS	EN 1555-3 / PTS	IR	P	RW	Min. 10% by TPIA
16	Documentation	All Inspection Reports and Certificates	-	EN 1555	All Inspection Reports and Certificates	IR	P	R	

Legends:

R Review **H Hold** **TPIA Third Party Inspection Agency** **PTS Particular Technical Specification**
P Perform **W Witness** **MTR Material Test Report** **SS Standard Specification**

Note:

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 SS/ PTS along with applicable Codes &
2. The TPIA shall use this QAP for inspection against subject tender and may consider this document as approved.
3. 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.
4.Owner/ Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.
5.All reference Codes / Standards documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA at the time of inspection.
6. 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.

CUGL Central U.P. Gas Limited	STANDARD QUALITY ASSURANCE PLAN GI PIPES POWDER COATED CONFORMING TO IS:1239 (PART-1):2004 (Latest edition)	QAP NO : P.014714 G 11031 089 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009	TRACTEBEL ENGIE

									INSPECTION BY		
SR. No	COMPONENTS /OPERATIONS	CHARACHTERISTICS	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	Manufacturer	TPIA	REMARKS
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	REMARKS
		CHEMICAL COMPOSITION	Major	Chem. Analysis	One per Heat	IS: 1239 / P.O./ 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.	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	Measure.	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	IIR	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	R	
2.5	GALVANIZING	ZINC COATING UNIFORMITY & MASS	Major	Galv. Test (Mass of Zinc Coating & Uniformity)	As per STD.	IS: 4736	IS: 4736 & IS: 2633	IIR	P	R	
2.6	FINISH, PAINTING & MARKING	OVERALL FINISH, PAINTING & MARKING	Major	Visual	100%	IS:1239/P.O. Spec./PTS	IS:1239/P.O. Spec./PTS	IIR	P	R	
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:47II	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 / REPORTS & VENDOR'S IIR	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	
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	
4.6	-	Documentation	Major		As per the terms and conditions of the PO & PTS	As per the terms and conditions of the PO & PTS	Compliance certificate & TC		P	H	

LEGENDS: R - Review, W - Witness, H - Hold, P - Perform, TPIA - Third Party Inspection Agency, RW - Random witness, PTS- Particular Technical Specification, TR- Test Report, MTC- Material Test Certificate, T.C.- Test Certificate, IR- Inspection Report

Notes: -

1.The above testing and acceptance criteria are minimum requirements; however, manufacturer shall ensure that the product shall also comply to the applicable codes.

2.The TPIA shall use this QAP for inspection against subject tender and may consider this document as approved.

3.Mechanical & Chemical Testing shall be done in NABL Accredited Lab.

4.Procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specifications.

5.Owner/ Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.

6.All reference Codes / Standards documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA / IOCL at the time of inspection.

7.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.

CUGL Central U.P. Gas Limited	**STANDARD QUALITY ASSURANCE PLAN** **GI FITTINGS**	QAP NO : P.014714 G 11031 090 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009

								INSPECTION BY		
SR. No	**Item / Description**	**COMPONENT**	**CHARACTERISTICS**	**QUANTUM OF CHECK**	**REFERENCE DOCUMENT**	**ACCEPTANCE NORMS**	**RECORD**	**Manufacturer**	**TPIA**	**REMARKS**
1	Chemical composition of material	Test Bar	Marking and correlation with TC	As per IS: 14329 Grade BM 300	IS: 14329 Grade BM 300, PO, PTS, Material specification	IS 14329/ PO, PTS Material specifications	Mill T.C.	R	R	
2	Chemical composition of Final product	Fitting	Chemical properties	As per IS: 14329 Grade BM 300	IS: 14329 Grade BM 300, PO, PTS, Material specification	IS 14329, PO, PTS, Material specifications	T.C.	P	R	
3	Cleaning and Finishing	Fitting	Descaling/ Peel Off	100% by Manufacturer	IS 14329	IS 14329	Inspection Report	P	RW	As per sampling procedure of IS 1879 Table no.29
4	Destructive Testing (Tensile, Elongation & Hardness)	Fitting	Mechanical Properties	As per IS 14329	IS 14329	IS 14329	Lab Report	P	W	
5	Compression Test	Fitting	Malleability	Three samples per Heat Treatment Batch	IS 1879	IS 1879	Inspection Report	P	W	As per sampling procedure of IS 1879
6	Pressure Test	Fitting	Pneumatic	IS 1879	IS 1879	IS 1879	Inspection Report	P	W	As per sampling procedure of IS 1879
7	Alignments of Thread	Fitting	ASME B1.20.1/NPT	IS 1879	IS 1879	IS 1879	Inspection Report	P	W	As per sampling procedure of IS 1879
8	Galvanizing	Fitting	Integrity of galvanized coating	As listed in IS 4759	IS 4759	IS 4759	Inspection / Lab Report	P	W	As per sampling procedure of IS 4759
9	Final inspection	Fitting	Visual, Dimensions, Thread Gauge Alignment, Finish, weld bevel, Bore, Marking, Coating thickness*	IS 1879	IS 1879	IS 1879/ PTS	Inspection Report	P	W	
10	Marking	Fitting	Size, Owner & Manufacturer Logo	100%	IS 1879/PTS	IS 1879/ PTS	Inspection Report	P	R	
11	Documentation	-	-		As per the terms and conditions of the PO & PTS	As per the terms and conditions of the PO & PTS	Compliance certificate & TC	P	R	

*** Minimum 60 microns**

LEGENDS: R - Review, W - Witness, H - Hold, P - Perform, TPIA - Third Party Inspection Agency, RW - Random witness, PTS- Particular Technical Specification, TR- Test Report, MTC- Material Test Certificate, T.C.- Test Certificate, IR- Inspection Report

Notes: -

1.The above testing and acceptance criteria are minimum requirements; however, manufacturer shall ensure that the product shall also comply to the applicable codes.

2.The TPIA shall use this QAP for inspection against subject tender and may consider this document as approved.

3.Mechanical & Chemical Testing shall be done in NABL Accredited Lab.

4.Procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specifications.

5.Owner/ Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.

6.All reference Codes / Standards documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA / IOCL at the time of inspection.

7.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.

CUGL Central U.P. Gas Limited	**STANDARD QUALITY ASSURANCE PLAN** **WARNING MAT**	QAP NO :P.014714 G 11031 91 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009	TRACTEBEL ENGIE

							INSPECTION BY		
Sr. No	**Test Description**	**Type of Check**	**QUANTUM OF CHECK**	**REFERENCE DOCUMENT**	**ACCEPTANCE NORMS**	**Format of Record**	**Manufacturer**	**TPIA**	**REMARKS**
	Test on Warning Mat:								
1	Raw Material	Review of material test certificate	Each Batch	PTS	As per material test certificate / PTS	MTR	R	R	
2	Dimension & Tolerance Width & Thickness	Measurement	Four Samples From Each Lot / Batch	PTS	As per PTS Width:300mm_+5mm Thick:1mm(minimum)	TEST REPORT	P	W	
3	Test of Laying Characteristics (Flatness test)	Visual	Four Samples From Each Lot / Batch	PTS / EN 12613	Deflection ≤ Wo/4	TEST REPORT	P	W	
4	Material Identification by chemical method.	Measurement	One Samples To be tested from each Lot	Perform at Alekh Plastic Testing Centre (APTC) Ahmedabad	Test sample shall be tested & to be Confirmed PE / HDPE	TEST REPORT	W	R	
5	Text legend printing on Mat	Visual	Four Samples To be tested from each Lot.	PTS	Black & Red colour. Ink shall not be Removed	TEST REPORT	W	W	
6	Tensile strength at break	Measurement	Four samples from each lot.	PTS	Min. 200 kg/cm^2	TEST REPORT	P	W	
7	Test of Virginity	Measurement	Four Samples To be tested from each Lot.	PTS	As PTS	TEST REPORT	P	R	
8	Colour Fastness test after 15 day at 15° C in 20% Ammonium sulphite solution.	Review of TC	(Type Test)	Performed at APTC Lab/NABL Lab	Satisfactory, while comparing the test specimen with a sample specimen in cool light.	TEST REPORT	R	R	
9	Colour Fastness test for 24 Hrs	Visual	Four Sample per Lot	PTS	No Colour change by immersion in 10 % nitric acid solution by mass	TEST REPORT	P	W	
10	Colour Fastness test for 24 Hrs	Visual	Four Sample per Lot	PTS	No Colour change by immersion in 20 % sodium carbonate solution by mass	TEST REPORT	P	W	
11	Colour Fastness test for 24 Hrs	Visual	Four Sample per Lot	PTS	No Colour change by immersion in 20 % ammonium sulphide solution by mass	TEST REPORT	P	W	
12	Performance of printing stability	Visual	Four samples from each lot. Lot.	PTS/ EN 12613 & IEC 60898:1995	Pass. Marking shall be easily Legible after the test	TEST REPORT	P	W	
13	Visual Warning Characteristics	Visual	Four samples from each lot. Lot.	PTS/ EN 12613	As per EN 12613	TEST REPORT	P	W	

14	Anti-Rodent Test Non-Toxic, Non-Hazardous, Non-Biodegradable	Review of TC	Type Test	Testing at any independent Laboratory	5 days / 30 days' attack test should pass.Document /certificate issued by supplier for anti-Rodent master batch as per PTS-Toxicology data, RoHS Compliance & Non-biocidal product	TEST REPORT	R	R	
15	Colour	Each	PTS	As per PTS	Bright Yellow Colour	TEST REPORT	P	W	
16	Identification, Marking Art Work & Packing	Visual	Three samples from each Lot.	PTS	The warning mat shall be marked at intervals not exceeding 1 meter. The marking shall be legible and durable. The warning mat must be printed with "Caution: High Pressure Gas Pipeline Below" in both English and Hindi, marking shall include client name & logo, client's 24 Hours Emergency number, Warning Symbols with Safety Message. In addition, name or trademark of the manufacturer, year of manufacture, lot/batch no. and reference of code of manufacture of warning mat shall be included in the marking. Each roll of 100 meter long be packed in plastic woven sack.	TEST REPORT	W	W	
17	Documentation			PTS	PTS	Compliance Certificate, Test reports, MTC	P	R	

Legends:

R Review **H Hold** **TPIA Third Party Inspection Agency** **PTS Particular Technical Specification**
P Perform **W Witness** **MTR Material Test Report** **SS Standard Specification**

Note:

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 SS/ PTS along with applicable Codes & Standards.

2. The TPIA shall use this QAP for inspection against subject tender and may consider this document as approved.

3. 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.

4.Owner/ Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.

5.All reference Codes / Standards documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA at the time of inspection.

6. 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.

Central U.P. Gas Limited	**STANDARD QUALITY ASSURANCE PLAN** **COPPER TUBING**	QAP NO : P.014714 G 11031 092 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009	TRACTEBEL ENGIE

						INSPECTION BY		
Sr. No	**DESCRIPTION**	**QUANTUM OF CHECK**	**PROCEDURE**	**ACCEPTANCE CRITERIA (As per EN 1057/ PTS)**	**FORMAT OF RECORD**	**Manufacturer**	**TPIA**	**REMARKS**
1	Raw material: Chemical Requirement	As per EN 1057	As per EN 1057/PTS	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/PTS	Material grade Cu-DHP/ CW 024A Cu + Ag: Min 99.9% P: 0.0015% TO 0.040%	Inspection Report			
3	Physical test (Tensile, Elongation, Hardness etc.)	As per EN 1057	As per EN 1057/PTS	UTS- Min. 235 N/ Sq.mm Elongation - Min 30% Hardness- 75 TO 100 HV scale	Inspection Report	P	W	
4	Carbon film test	As per EN 1057	As per EN 1057/PTS	As per EN 1057/ PTS (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	RW	Min 10 % by TPIA
8	Eddy current test	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	RW	Min 10 % by TPIA
9	Dimensional Inspection (O.D, Wall thk, Length etc.)	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	RW	Min 10 % by TPIA
10	Visual Inspection (Free from defect)	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	RW	Min 10 % by TPIA
11	Marking	As per EN 1057	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	RW	Min 10 % by TPIA
12	Documentation	-	As per EN 1057	As per EN 1057/ PTS	Inspection Report	P	R	

Legends:

R	**Review**	**H**	**Hold**	**TPIA**	**Third Party Inspection Agency**
P	**Perform**	**W**	**Witness**	**MTR**	**Material Test Report**
PTS	**Particular Technical Specification**				
SS	**Standard Specification**				

Note:

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 SS/ PTS along with applicable Codes & Standards.

2. The TPIA shall use this QAP for inspection against subject tender and may consider this document as approved.

3. 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.

4.Owner/ Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.

5.All reference Codes / Standards documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA at the time of inspection.

6. 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.

CUGL Central U.P. Gas Limited	**STANDARD QUALITY ASSURANCE PLAN COPPER FITTINGS**	QAP NO :P.014714 G 11031 093 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009	TRACTEBEL ENGIE

						INSPECTION BY		
SR. No	**DESCRIPTION**	**QUANTUM OF CHECK**	**PROCEDURE**	**ACCEPTANCE CRITERIA (As per EN 1057/ PTS)**	**FORMAT OF RECORD**	**Manufacturer**	**TPIA**	**REMARKS**
1	Raw material: Chemical Requirement	One in each heat	As per EN 1254/ PTS	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/ PTS	Material grade Cu-DHP/ CW 024A Cu + Ag: Min 99.9% P: 0.0015% to 0.040%	Test Report	P	W	
3	Carbon in bore tests (Carbon film test, carbon content test)	One in each heat	As per EN 1254/ PTS	As per EN 1254/ PTS	Test Report	P	W	
4	Stress corrosion resistance test	One in each heat	As per EN 1254/ PTS	As per ISO 6957/ PTS	Test Report	P	W	Min. 10% by TPIA
5	Hydrostatic pressure test	100%	As per EN 1254/ PTS	Min 37.5 bar @ 15 min.	Test Report	P	RW	Min. 10% by TPIA
6	Pneumatic pressure test	100%	As per EN 1254/ PTS	Min 6 bar @ 10 second	Test Report	P	RW	Min. 10% by TPIA
7	Dimensional Inspection (O.D, Wall thk., Min. Length of engagement etc.)	100%	As per EN 1254/ PTS	As per EN 1254/ PTS	Test Report	P	RW	Min. 10% by TPIA
8	Visual Inspection (Free from defect)	100%	As per EN 1254/ PTS	As per EN 1254/ PTS	Test Report	P	RW	Min. 10% by TPIA
9	Marking	100%	As per EN 1254/ PTS	As per EN 1254/ PTS	-	P	RW	Min. 10% by TPIA
10	Documentation		As per EN 1254/ PTS	As per EN 1254/ PTS	Inspection Report	P	H	

LEGEND: R - Review, **W -** Witness, **H -** Hold, **P -** Perform, **TPIA -** Third Party Inspection Agency, **MTC –** MATERIAL TEST CERTIFICATE, **PTS-** PARTICULAR TECHNICAL SPECIFICATION

Notes: -

1.The above testing and acceptance criteria are minimum requirements; however, manufacturer shall ensure that the product shall also comply to the applicable codes along with additional requirement of PTS.

2. The TPIA shall use this QAP for inspection against subject tender and may consider this document as approved.

3. 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.

4. Owner/ Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.

5. All reference Codes / Standards documents, PTS shall be arranged by vendor / supplier for reference of TPIA at the time of inspection.

6. 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.

CUGL Central U.P. Gas Limited	**STANDARD QUALITY ASSURANCE PLAN** **Brass Fittings**	QAP NO : P.014714 G 11031 094 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009	TRACTEBEL ENGIE

						INSPECTION BY		
SR. No	**DESCRIPTION**	**QUANTUM OF CHECK**	**PROCEDURE**	**ACCEPTANCE CRITERIA (As per EN 1057/ PTS)**	**FORMAT OF RECORD**	**Manufacturer**	**TPIA**	**REMARKS**
1	**Raw material: Chemical/ Physical Requirement**	one in each heat	As per EN 12164 / PTS	As per EN 12164/ PTS	MTC	P	W	
2	**Final product**					P	W	
2.1	Resistance dezincification	one in each heat	As per EN 6509 / PTS	As per EN 6509 / PTS	Test Report	P	W	
2.2	Carbon bore test	one in each heat	As per ISO 6957 / PTS	As per ISO 6957 / PTS	Test Report	P	W	
2.3	Stress corrosion resistance test	one in each heat	As per ISO 6957 / PTS	As per ISO 6957 / PTS	Test Report	P	W	
2.4	Hydrostatic pressure test	100%	As per EN 1254/EN 12164	Min 37.5 bar @ 15 min.	Test Report	P	RW	Min 10 % by TPIA
2.5	Pneumatic pressure test		As per EN 1254/ EN 12164/ PTS	Min 6 bar @ 15 second	Test Report	P	RW	Min 10 % by TPIA
2.6	Visual Inspection (Free from defect)	100%	As per EN 12164/ EN 1254/PTS	As per EN 1254/ PTS	Test Report	P	RW	Min 10% by TPIA
2.7	Dimensional Inspection (O.D, Wall thk., Length etc.)	100%	As per EN 12164/EN 1254/PTS	As per EN 1254/ PTS	Test Report	P	RW	Min 10 % by TPIA
3	**Marking**	100%	EN 12164/ EN 1254	As per EN 1254		P	RW	Min. 10% by TPIA
4	**Documentation**	-	PTS	PTS	Test Report	P	H	

LEGEND: R - Review, **W -** Witness, **H -** Hold, **P -** Perform, **TPIA -** Third Party Inspection Agency, **MTC –** MATERIAL TEST CERTIFICATE

Notes: -

1. The above testing and acceptance criteria are minimum requirements; however, manufacturer shall ensure that the product shall also comply to the applicable codes.
2. The TPIA shall use this QAP for inspection against subject tender and may consider this document as approved.
3. 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.
4. Owner/ Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time.
5. All reference Codes / Standards documents, PTS shall be arranged by vendor / supplier for reference of TPIA at the time of inspection.
6. 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.

	STANDARD QUALITY ASSURANCE PLAN CORRUGATED FLEXIBLE METAL HOSE (ANACONDA)	QAP NO : P.014714 G 11031 095 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009	TRACTEBEL ENGIE

						INSPECTION BY		
SR. No	Item/Description	Test Parameters	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA/ FORMAT OF RECORD	Manufacturer	TPIA	REMARKS
1	**Raw Material**							
1.1		Chemical & Mech. Test of material of SS hose	100%	SS316 BS: 1449 PART -2	SS316 BS: 1449 PART -2/ MTC	P	W	
1.2		Chemical & Mech. Test of material of end fittings (Adaptors, Nuts, Washer)	100%	As per PTS	As per PTS / MTC	P	W	
1.3		Heat treatment	100%	As per BS: 6501 PART 1	As per BS: 6501 PART 1/ MTC	P	R	
2	**Final Product**							
2.1	Type test	Cyclic life/ static bend test at 1.5 x design pressure	One (1) per batch	As per Cl. No. 14 of BS: 6501 PART 1	As per BS: 6501 PART 1 No cracks permissible/ T.C.	P	W	
2.2	Type test	Yield and Burst test	One (1) per batch	As per Cl. No. 14 of BS: 6501 PART 1	As per BS: 6501 PART 1 / T.C.	P	W	
2.3	Production test	Pressure test (Pneumatic Test)	100%	As per Cl. No. 15 of BS: 6501 PART 1	As per BS: 6501 PART 1 / T.C	P	RW	Min. 10% by TPIA
2.4	Production test	Visual Inspection	100%	As per BS: 6501 PART 1	As per BS: 6501 PART 1/ TC	P	R	
2.5	Production test	Dimension	100%	As per PTS	As per PTS/ IR	P	RW	Min. 10% by TPIA
3	**End fittings (Adaptors, nuts, washer)**	Visual & dimensional check	100%	As per PTS	As per PTS/ IR	P	RW	Min. 10% by TPIA
4	**Marking**	-	100%	As per BS: 6501 PART 1/ PTS	As per BS: 6501 PART 1/ PTS/ TR	P	RW	Min. 10% by TPIA
5	**Final Documentation**	-	-	As per the term & conditions of P.O. & PTS	As per the term & conditions of P.O. & PTS / IR	P	H	

LEGENDS: R - Review, W - Witness, H - Hold, P - Perform, TPIA - Third Party Inspection Agency, RW - Random witness, PTS- Particular Technical Specification, TR- Test Report, MTC- Material Test Certificate, T.C.- Test Certificate, IR- Inspection Report

Notes: -

1.The above testing and acceptance criteria are minimum requirements; however, manufacturer shall ensure that the product shall also comply to the applicable codes along with additional requirement of PTS.
2. Mechanical & Chemical testing shall be done in NABL accredited lab.
3. 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.
4. Owner / Owner's representative including TPIA will have the right to inspect any activity of manufacturing at any time
5. All reference Codes/ Standards, Documents, P.O. Copies shall be arranged by vendor / supplier for reference of TPIA/GGL at the time of Inspection
6. At the time of delivery of material in stores, vendor will submit copy of all related document of inspection along with release note, despatch clearance note & MTC.
7. TPIA shall mention clause wise observations in IRN & IR.

CUGL Central U.P. Gas Limited / TRACTEBEL ENGIE	QUALITY CONTROL TABLE STEEL REINFORCED RUBBER HOSE	QAP NO :P.014714 G 11031 096 Date:- 20.08.2021 TENDER NO. - P.014714 G11031 R009

S. NO.	Item/Description	Test Parameters	QUANTUM OF CHECK	PROCEDURE	ACCEPTANCE CRITERIA	CERTIFICATE	INSPECTION		Remarks
							Vendor	TPIA	
1.1	**Raw Material**	Chemical & Mech. Test of material of Steel Reinforced Rubber Hose (Lining, Reinforcement 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 = 10 Mpa (Min.) El (Lining & Cover) is 200 & 250 resp. (Min.)	PTS & IS 9573	Inspection Report	P	W	
2.2		Resistence 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 per Cl. No. 5.3 of PTS	Cl. no. 5.5.1 of IS 9573	Inspection Report	P	W	
2.4		Low Temperature Flexibility Test	one (1) per batch	Conditioned at -40^0C for 5 hrs. & bent at 180^0 around mandrel of dia 12 times the Nominal Bore of hose as per Cl no. 5.4 of PTS	Cl. No. 5.5.2 of IS 9573	Inspection Report	P	W	
2.5		Flexibilty of hose at 1.5 x design pressure	one (1) per batch	Bent empty to radius 95 mm without flattening & suffering structural damages.	Cl. No. 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. No. 5.5.4 of IS 9573	Inspection Report	P	W	
2.7		Hydrostatic Test / Proof Pr. Test	100%	2 Mpa for 1 min. as per Cl. No. 5.7 of PTS	Cl. No. 5.5.5.1 of IS 9573	Inspection Report	P	W	Witness by CA
2.8		Burst test	one (1) per batch	Min Pressure shall be 5 MPA as per Cl. 5.8 of PTS	Cl. No. 5.5.5.2 of IS 9573	Inspection Report	P	W	Witness by CA
2.9		Grip Strength Test	4 specimen / Batch	Cl no. 5.9 of PTS	Cl no. 5.5.7 & 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 of PTS	Cl no. 5.5.8 of IS 9573	Inspection Report	P	W	
2.11		Visual & Dimensional Inspection	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	Marking	-	100%	As per Cl. No. 6.0 of PTS	PTS / IS 9573	Inspection Report	P	R	
4	Packaging	-	100%	As per Cl. No. 7.0 of PTS	PTS / IS 9573	Inspection Report	P	R	
5	Final Documentation	-	-	As per the term & conditions of P.O. & PTS	As per the term & conditions of P.O. & PTS	3.2 Cetificate as per EN 10204	P	H	

LEGENDS: 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 critera are minimum requirements, however, manufacturer shall ensure that the product shall also comply to the additional requirements as per Particular Technical specifications(PTS)
2 The supplier shall submit their own detailed ITP prepared on the basis of above / Technical specification for approval of Owner/Owner's representative.
3 Owner/Owner representative shall review/approve all the documents related to ITP/Quality manuals/Drawings etc.submitted by supplier.
4 Contractor shall in coordination with Supplier/Sub vendor shall issue detailed Production and Inspection schedule indicating the dates and the locations to facilitate Owner/Owner's representative and TPIA to organise 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/Owner 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, despatch clearance note & MTC.

CENTRAL U.P. GAS LIMITED (CUGL)

LAYING OF MDPE NETWORK AND GI / Cu INSTALLATION WORK FOR DOMESTIC, COMMERCIAL & INDUSTRIAL CUSTOMERS FOR CUGL, JHANSI IN THE STATE OF U.P.

RECOMMENDED VENDOR LIST

0	20.08.2021	Issued for Tender	Pulkit Mishra	Nitish Nandi	Nitish Nandi
Rev.	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

RECOMMENDED VENDOR LIST

ITEM CODE / DESCRIPTION	**GI Pipe**
VENDOR NAME	**REMARKS**
M/s P S Steel Tubes	
M/s Jindal Industries Ltd.	
M/s Vishal Pipes Ltd.	
M/s Indus Tubes Ltd.	
M/s Advance steel Tubes Ltd.	
M/s Surya Roshni Limited	
M/s. Rama Steel Tubes	
M/s Swastik Pipe Ltd.	
ITEM CODE / DESCRIPTION	**GI Fittings**
VENDOR NAME	**REMARKS**
M/s Sarin Industries Ltd.	
M/s Jupiter Metal Industries Ltd.	
M/s Jainsons Industries Ltd.	
M/s Jinan Meide	
M/s Green Malleable Pvt Ltd	
M/s Rajnesh Malleable Ltd., Delhi	
M/s Industrial Valves & Components, Delhi	
M/s Excel Metal & Engineering Industries, Mumbai	
M/s Modern Stores & Engineering Concern, Kolkata	
M/s Chokhawala Distributors (For Jinan Meide)	
ITEM CODE / DESCRIPTION	**Forged fittings**
VENDOR NAME	**REMARKS**
M/s Jainsons Industries Ltd Jalandhar	
M/s Modern Stores & Engineering Concern Kolkata	
M/s Bharat Forge & Press Industries Baroda	
M/s B M Meters Pvt Ltd, Jalandhar	
ITEM CODE / DESCRIPTION	**CS Pipe (ASTM A106 Gr B)**
Maharashtra Seamless Limited (MSL)	
Indian Seamless & Metal Tubes (ISMT)	

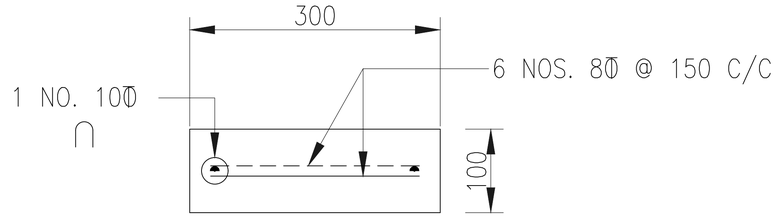
ITEM CODE / DESCRIPTION	**CS Fittings**
VENDOR NAME	**REMARKS**
M/s Commercial Supplying Agency, Mumbai	
M/s Dee Development Engineers Ltd	
M/s Eby Industries, Mumbai	
M/s Gujarat Infra Pipes Pvt Ltd, Vadodara	
M/s M S Fittings Mfg. Co. Pvt Ltd, Kolkata	
M/s Teekay Tubes Pvt. Ltd, Mumbai	
M/s Pipe Fit, Baroda	
M/s Sawan Engineers, Baroda	
M/s Sky Forge Pvt. Ltd., Palwal	
ITEM CODE / DESCRIPTION	**Isolation Ball Valve & Appliance Valve**
VENDOR NAME	**REMARKS**
M/s Enologas Bonomi S.P.A.	
M/s Ningbo Zhiqing Industrial Co. Limited	
M/s Zhejiang Valogin Technology Co. Ltd.	
M/s Umesh Enterprises	
M/s Parker Hannifin S.P.A.	
M/s Chandan Enterprises	
ITEM CODE/DESCRIPTION	**Warning Mat**
VENDOR NAME	**REMARKS**
M/s. Sparco Multi Plast	
M/s. Sri Vijay Wire & Cable	
M/s Singhal Industries, Ahmedabad	
M/s Raychem RPG Ltd.	
M/s BINA Enterprises	
ITEM CODE/DESCRIPTION	**HDPE Pipe**
VENDOR NAME	**REMARKS**
M/s. Duraline India	
M/s. Jain Irrigation Systems Limited	
M/s. Kriti Industries India Ltd.	
M/s. Oriplast Ltd.	
M/s Vee kay Plast	
M/s Vishakha Irrigation Pvt. Ltd.	
M/s Hari Plast	

M/s Climax Synthetics (P) Ltd., Vadodara	
M/s Sangir Plastics (P) Ltd., Mumbai	
M/s Himalyan pipe industries, Solan	
M/s Dutron Polymers Ltd.	
M/s Parixit Irrigation Limited	
M/s M/s Veekay Plast	
ITEM CODE/DESCRIPTION	**PE (Fitting/Valves/Transition Fittings)**
VENDOR NAME	**REMARKS**
M/s. Georg Fischer Piping System	
M/s. Kimplas piping Systems	
M/s Innogaz & M/s Frialen of M/s Aliaxis Utilities & Industry Pvt. Ltd. (formerly Glynwed pipe systems)	
M/s. RMG Autometers gas technologies	
M/s Friatech AG, Germany (represented by M/s Sherman Sales in India)	
M/s Al-Aziz Plastics Pvt. Ltd.	
M/s Sangir Plastics (P) Ltd., Mumbai	
ITEM CODE / DESCRIPTION	**Steel Reinforced Rubber Hose (Type-4)**
VENDOR NAME	**REMARKS**
M/s Super Seal Flexible Hose Ltd.	
M/s Suraksha Products Pvt. Ltd.	
M/s Vansh Industries	
M/s T & L Gases	
ITEM CODE / DESCRIPTION	**Corrugated Flexible Metal Hose (Anaconda)**
VENDOR NAME	**REMARKS**
M/s KPC Flex Tubes	
M/s Vestas Hose Division	
M/s Alpha Flexi Tubes	
M/s Chandan Enterprises	
M/s Vikram & co.	
ITEM CODE / DESCRIPTION	**MDPE Pipe**
VENDOR NAME	**REMARKS**
M/s Hari Udyog Pvt. Ltd	
M/s Jain Irrigation Systems Ltd.	
M/s Ori Plast Ltd.	

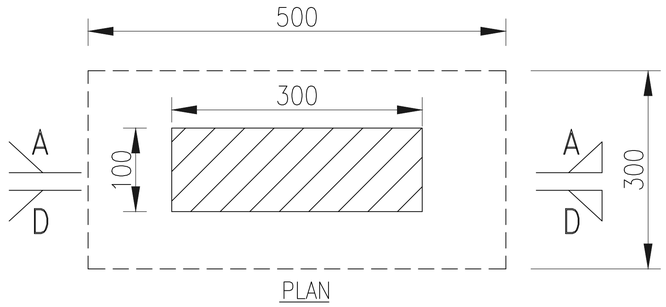
M/s. Vishakha Irrigation Pvt. Ltd.	
M/s Duraline Indian Pvt. Ltd.	
M/s Kriti Industries (I) Ltd., Indore	
M/s M/s Veekay Plast	
ITEM CODE / DESCRIPTION	**Copper Tubes & Fittings**
VENDOR NAME	**REMARKS**
M/s Rajco metal	
M/s Mehta tubes	
M/s Jay Banas Metals Pvt. Ltd	
M/s Paras Industries Ltd.	
M/s Chandan Enterprises	
M/s Paras Industries Ltd.	
ITEM CODE / DESCRIPTION	**Brass Fittings**
VENDOR NAME	**REMARKS**
M/s Chandan Enterprises	
M/s Paras Industries Ltd.	
M/s Om brass Enterprises	
M/s Chokhawala Distributors	
ITEM CODE / DESCRIPTION	**Third Party Inspection Agency**
VENDOR NAME	**REMARKS**
M/s American Bureau Services	
M/s Bureau Veritas	
M/s Certification Engineers International Limited (CEIL)	
M/s Lloyd Register of Industrial services	
M/s Meenaar Global Consultants LLP	
M/s SGS	
M/s TUV India Pvt. Ltd. (TUV - NORD)	
M/s TUV-SUD South Asia	

Notes:

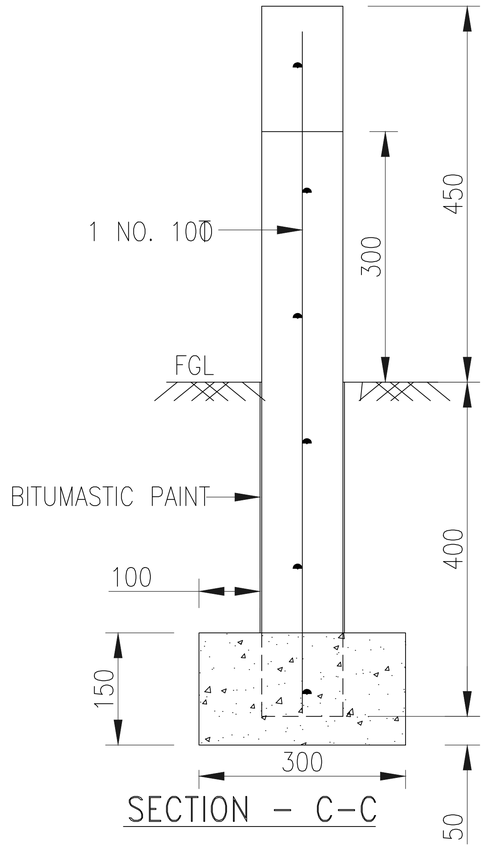
1. Above vendor list is indicative only and any other vendor(s) apart from as mentioned above may be accepted subject to approval by Owner/Owners representative based on past track record.
2. For the vendors of items not covered in above vendor list, but required for completion of project successfully, supplier shall take approval form Owner/Owners representative for the same during project execution. Bidder shall submit the required certifications, documents, PTR and Performance letters from clients for the same.



SECTION – B–B



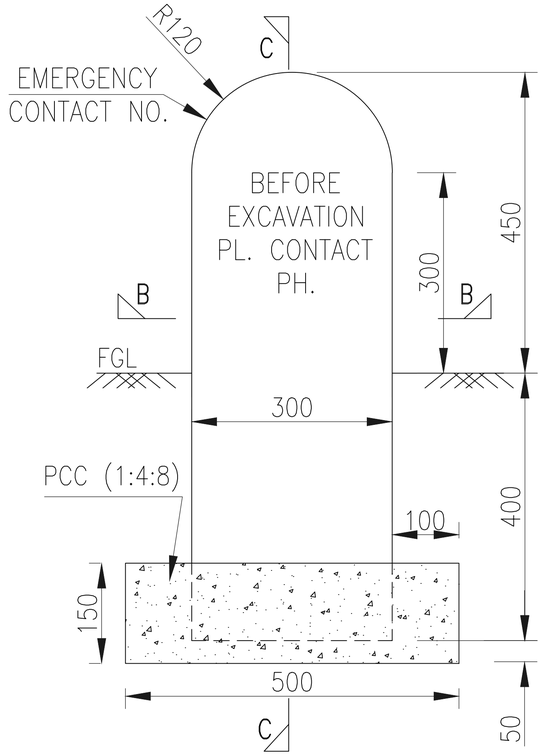
PLAN



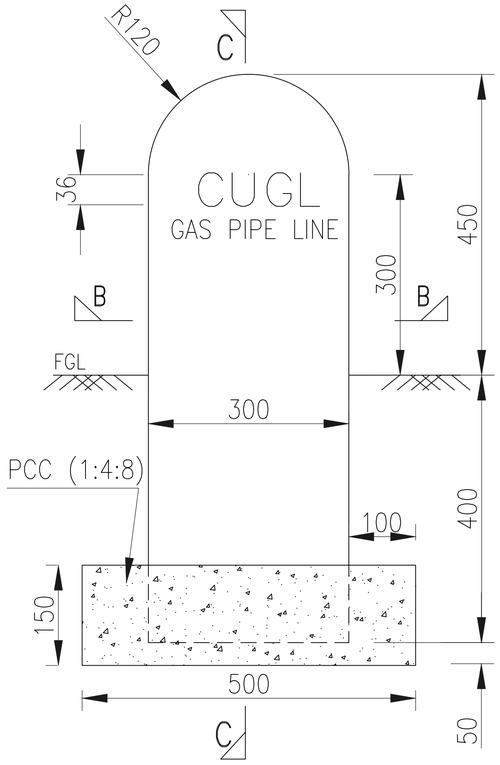
SECTION – C–C

NOTES

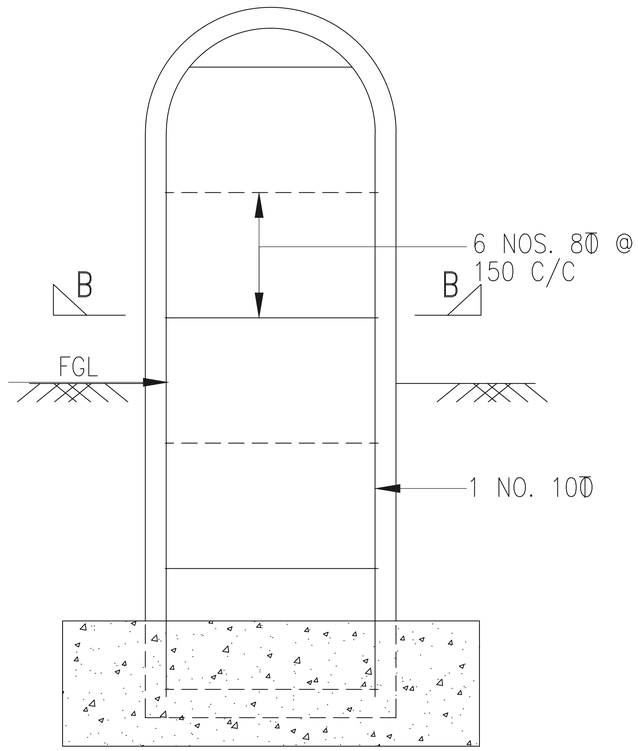
1. DRAWING IS NOT TO SCALE.
2. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
3. MARKERS SHALL BE INSTALLED IN EVERY 50 METER INTERVAL AS PER INSTRUCTIONS OF ENGINEER–IN–CHARGE.
4. ALL BOUNDARY MARKERS SHALL BE PRECAST & INSCRIPTIONS SHALL BE ENGRAVED 5mm DEEP IN THE MOULD ON BOTH FACE.
5. CONCRETE FOR BOUNDARY MARKER SHALL BE M – 20.



SECTION – D–D
(FOR DIMENSION)



SECTION – A–A
(FOR DIMENSION)



SECTION – A–A & D–D
(FOR REINFORCEMENT)

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: TYPICAL DETAIL OF CAUTION BOARD

TRACTEBEL ENGIE
TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	C	21028	007

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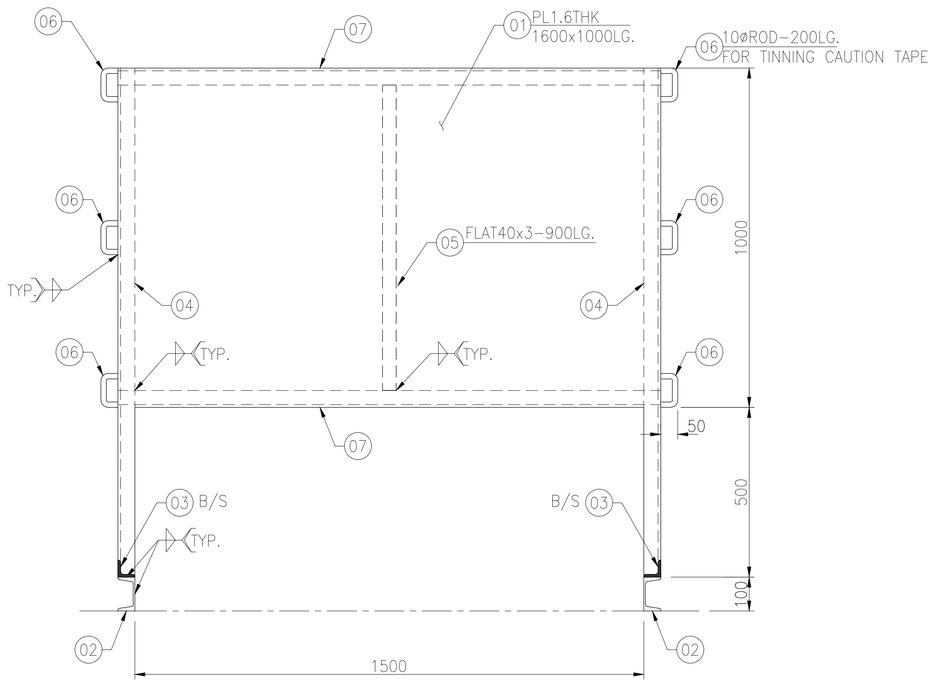
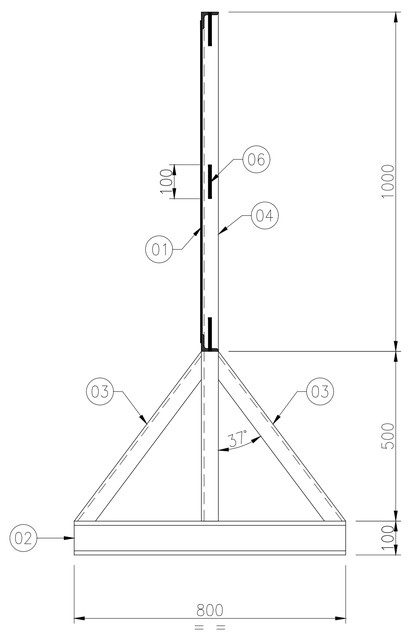


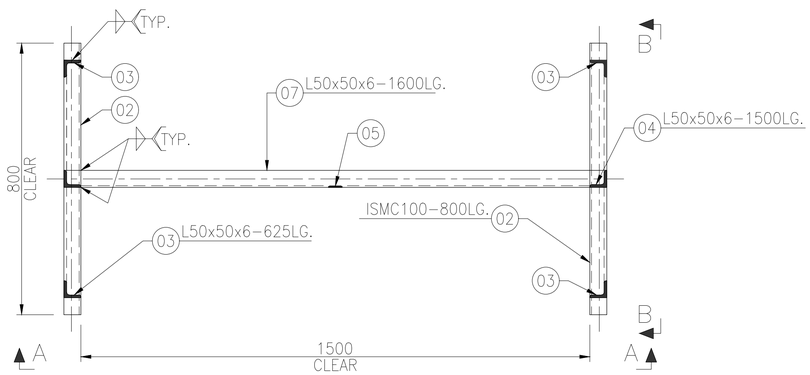
ELEVATION A-A

(SCALE 1:100)



ELEVATION B-B

(SCALE 1:100)



PLAN VIEW

(SCALE 1:100)

IN RED → CAUTION → CLIENT'S 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 BOTH SIDE OF ITEM NO. 01)

BILL OF MATERIAL

Item Mkd.	Section	Width	Length	item Qty.	Weight	In Kgs
				(All Marks)	Kgs./M, M2	Total Weight
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 3 Thk.	40	900	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**

NOTES

1. ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE SPECIFIED.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CUGL — CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: TYPICAL DETAIL OF CAUTION BOARD

TRACTEBEL ENGIE — TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet			Rev.
A1	NTS	01	of	01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	C	21028	008

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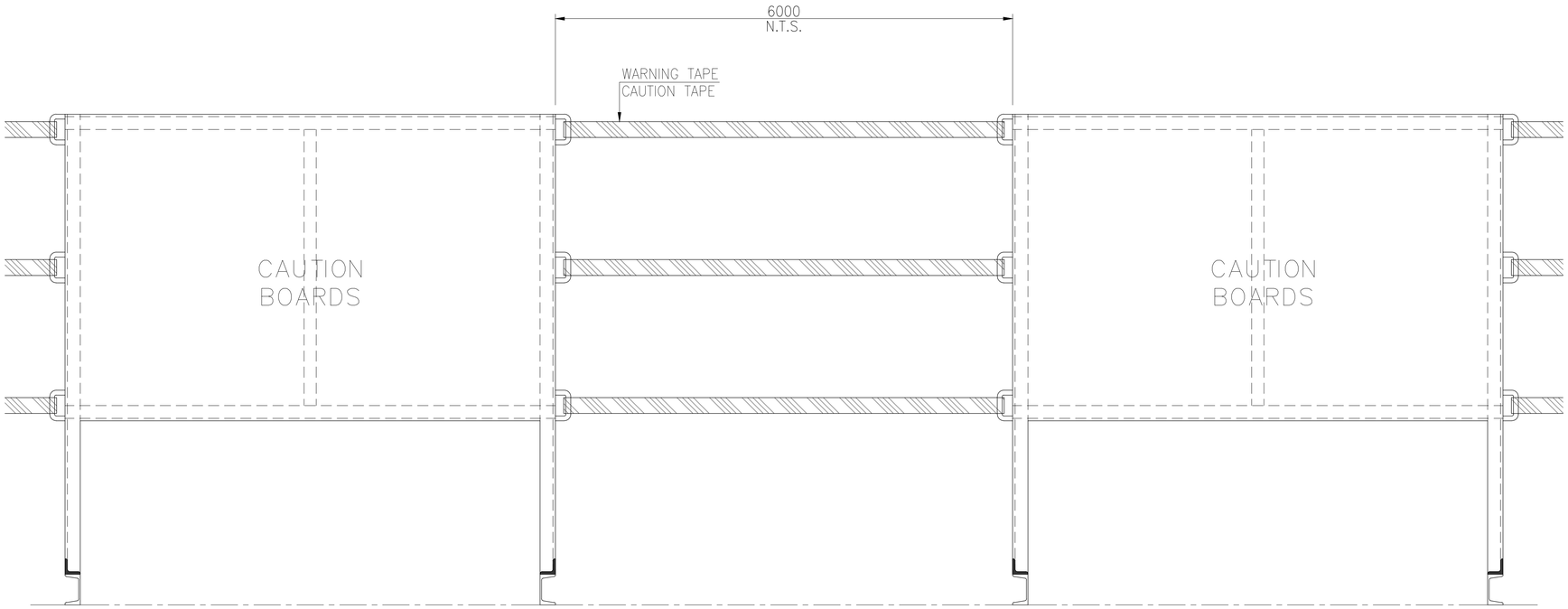

SCHEMATIC LAYOUT OF CAUTION BOARDS AND BARRICADDING

NOTES

1. ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE SPECIFIED.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER

CENTRAL UP GAS LIMITED

PROJECT

CITY GAS DISTRIBUTION PROJECT

SUBJECT

TYPICAL DETAIL OF BARRICADING

TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	C	21028	009

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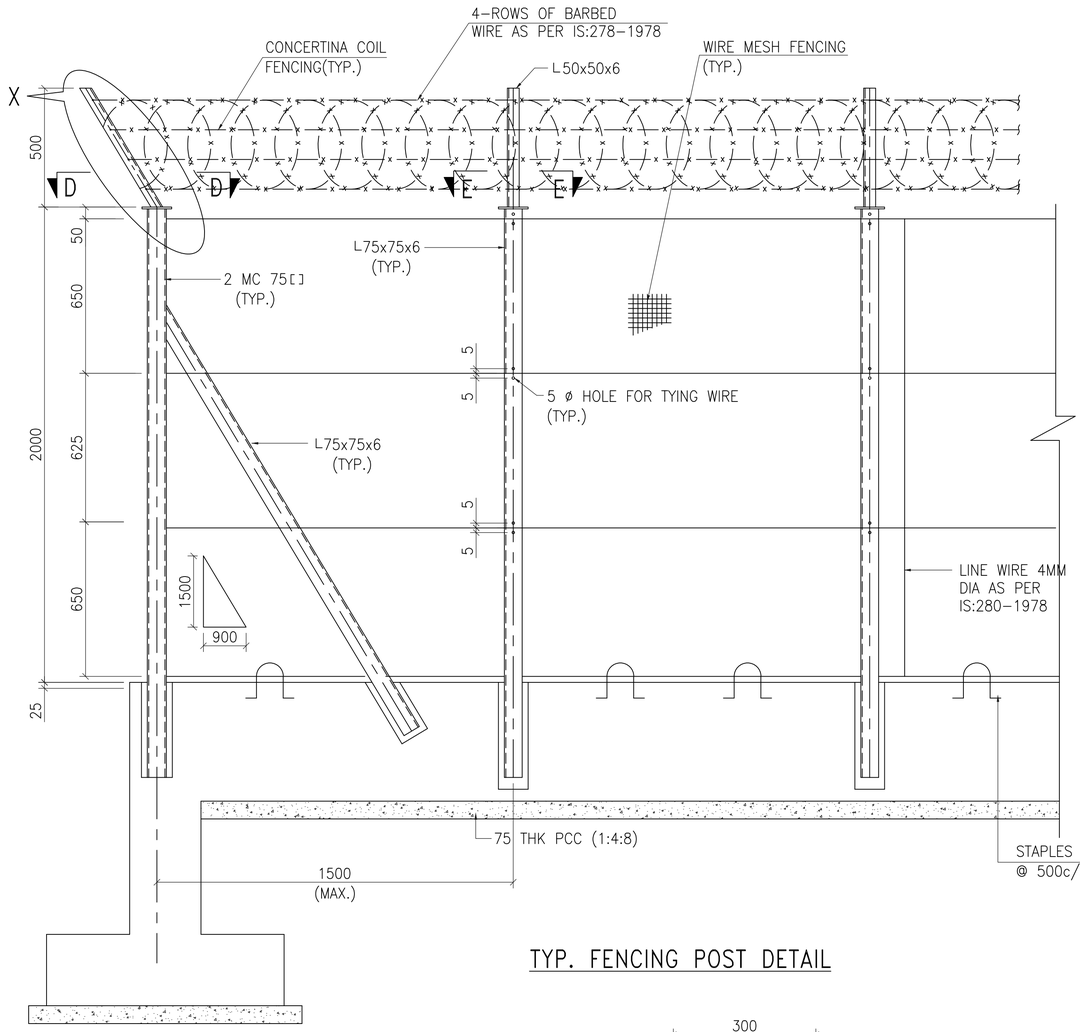
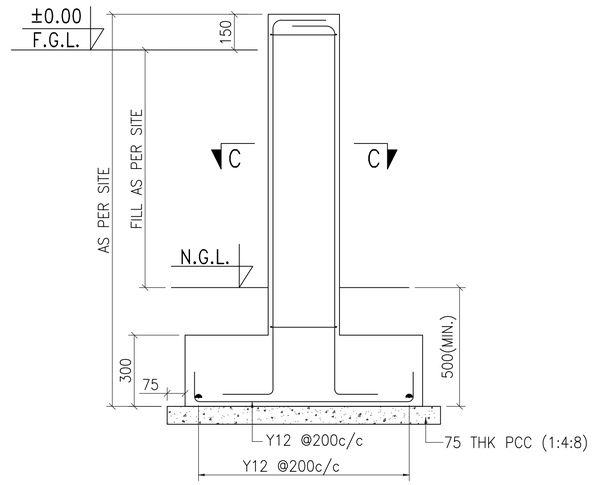
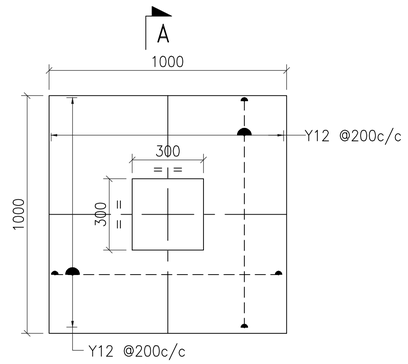


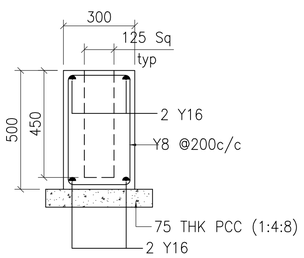
TYP. FENCING POST DETAIL



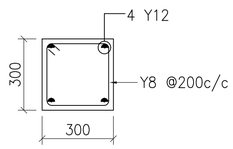
SECTION A–A



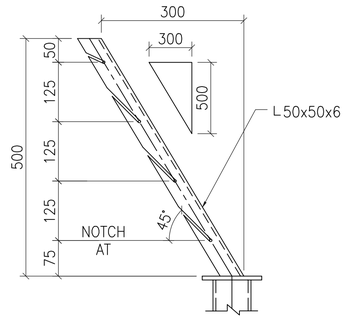
PLAN



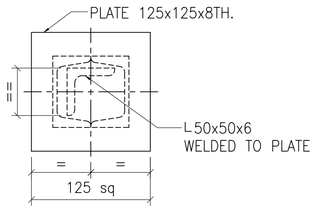
SECTION B–B



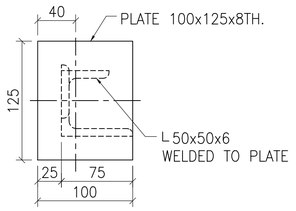
SECTION C–C



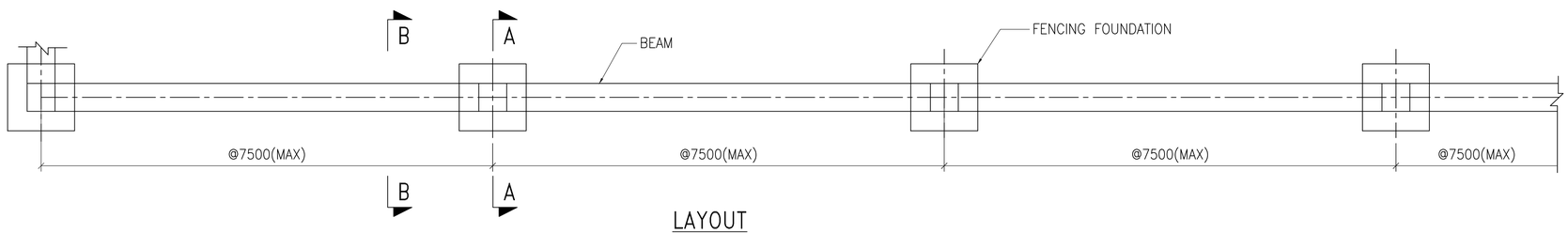
DETAIL X



SECTION D–D



SECTION E–E



LAYOUT

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DIMENSIONS.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: **TYPICAL DETAILS OF FENCING WITH WIRE MESH FENCING**

TRACTEBEL ENGIE — TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	C	21028	010

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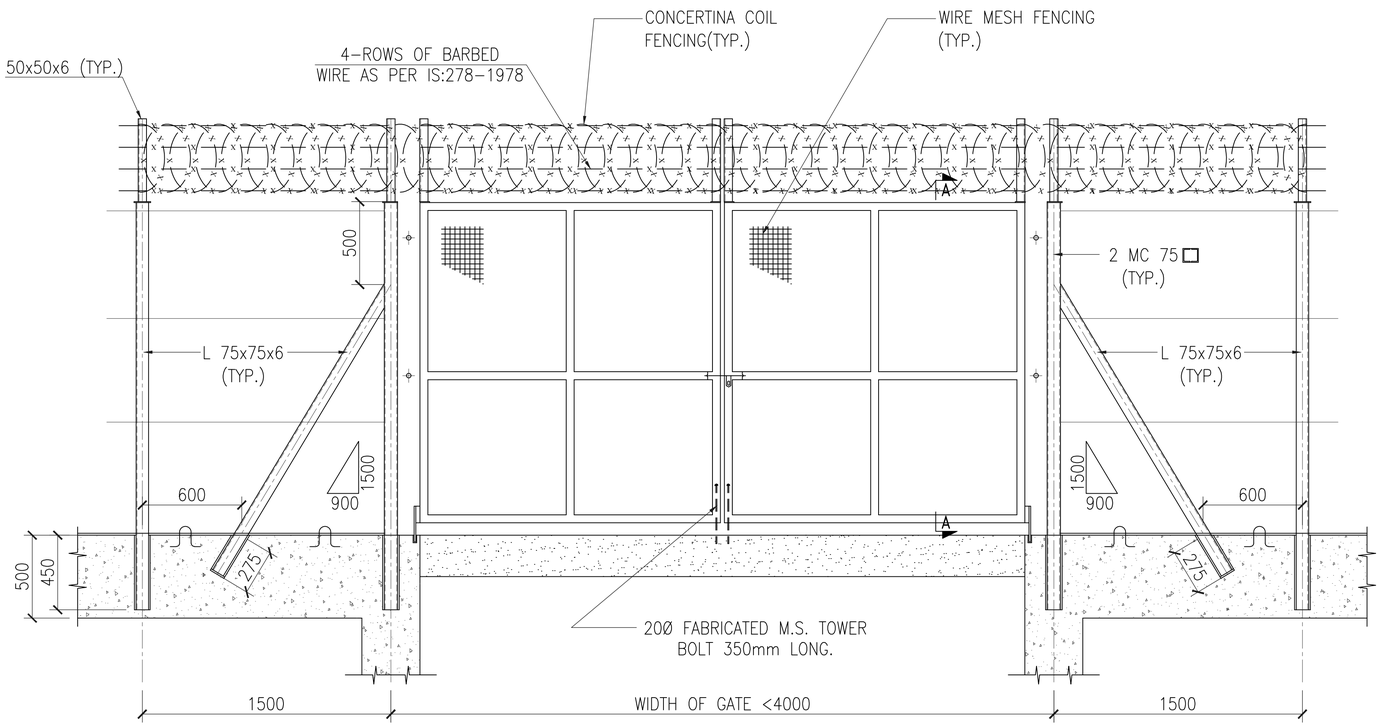
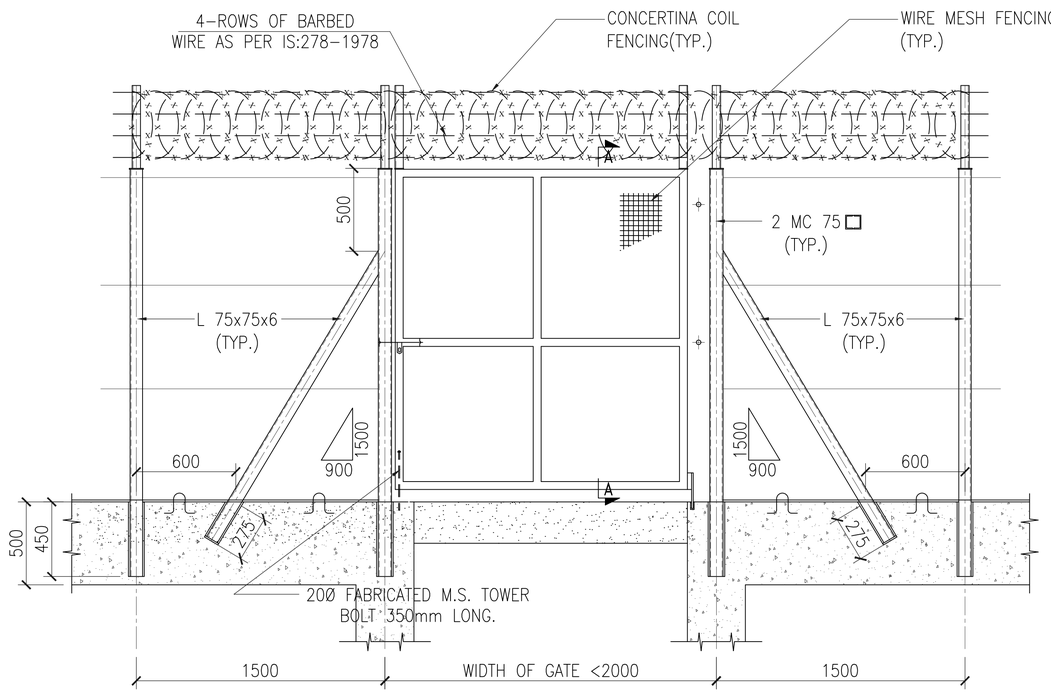
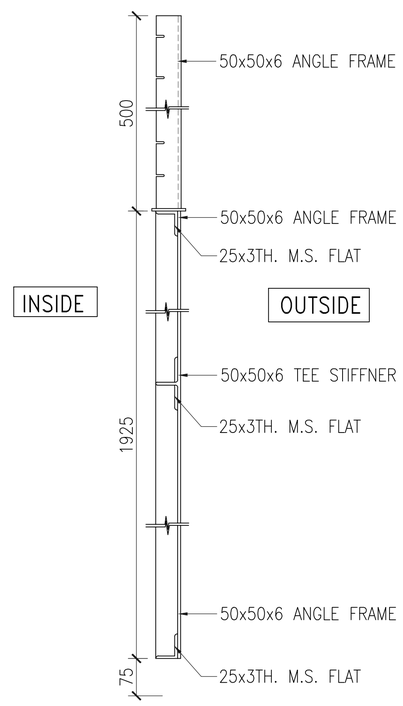


GATE DETAIL



GATE DETAIL



SECTION A–A

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DIMENSIONS.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: TYPICAL DETAILS OF GATE

TRACTEBEL ENGIE — TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	C	21028	011

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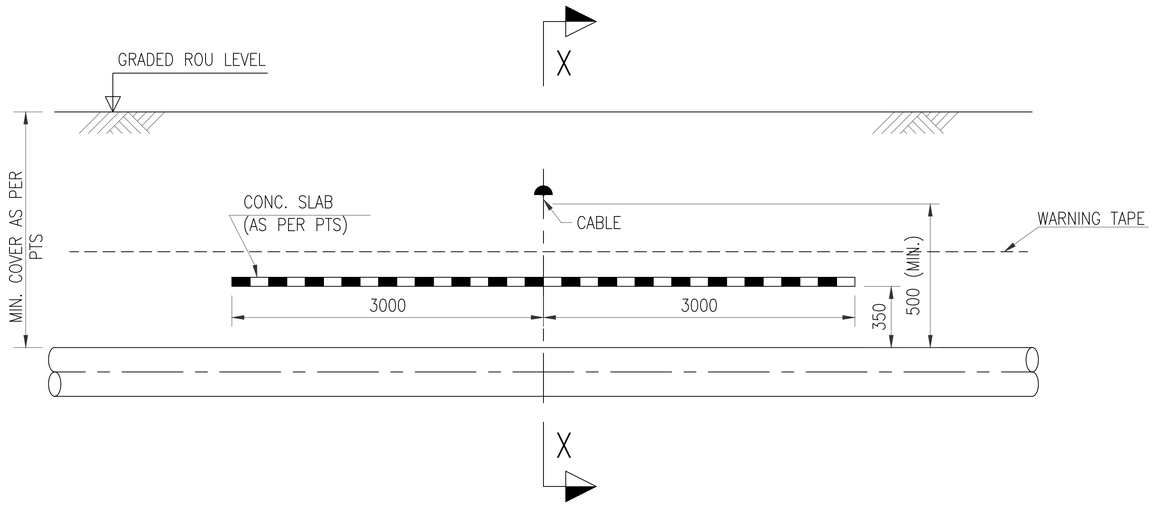

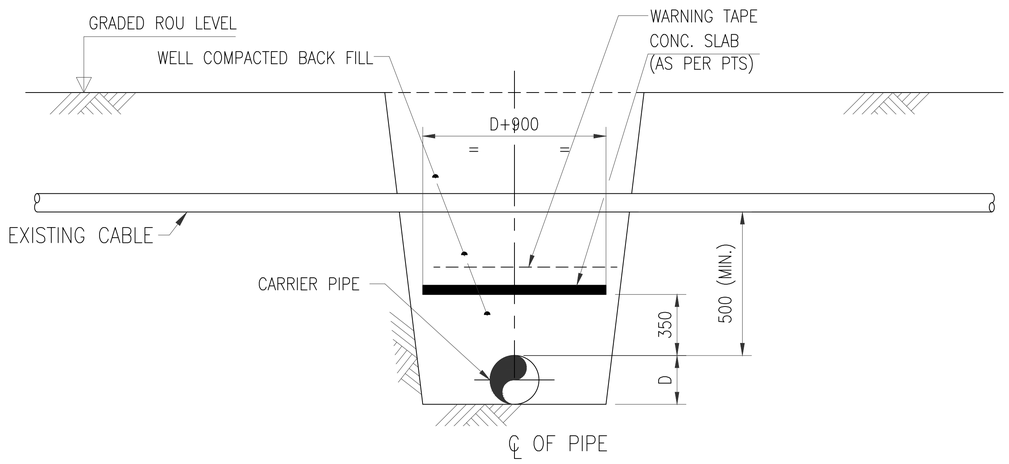

SECTION X–X

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. A MODIFIED PIPELINE WARNING SIGN SHALL BE INSTALLED CLOSE TO THE CROSSING.
3. APPROVAL OF THE CROSSING SHALL BE OBTAINED FROM CONCERNED AUTHORITIES.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER

CENTRAL UP GAS LIMITED

PROJECT

CITY GAS DISTRIBUTION PROJECT

SUBJECT

TYPICAL UNDERGROUND CABLE CROSSING DETAILS

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	D	20749	014

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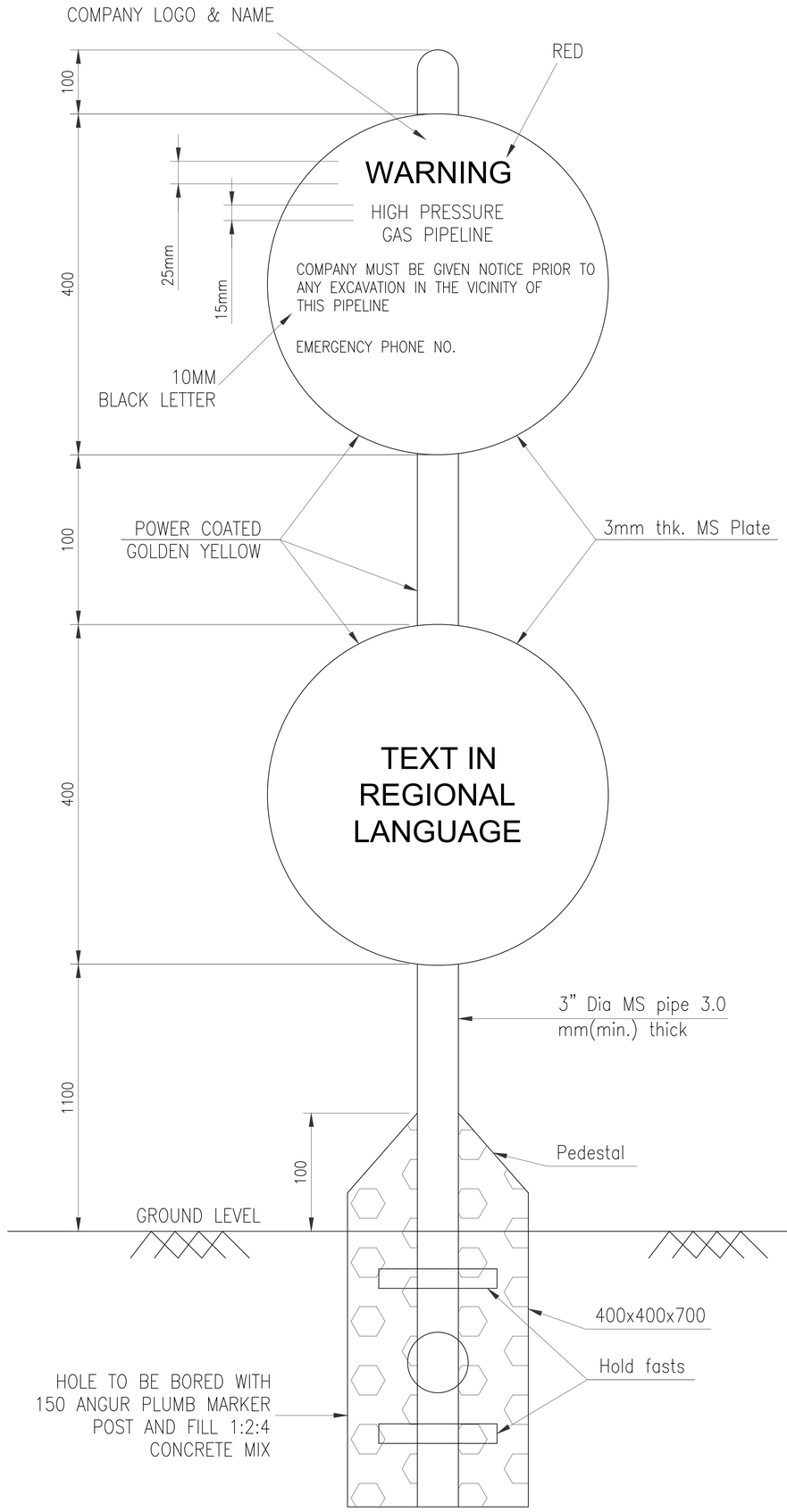
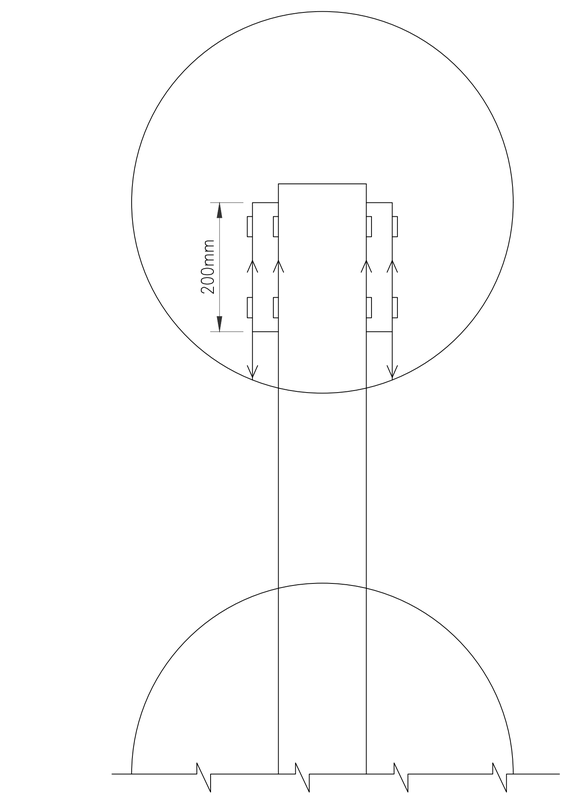
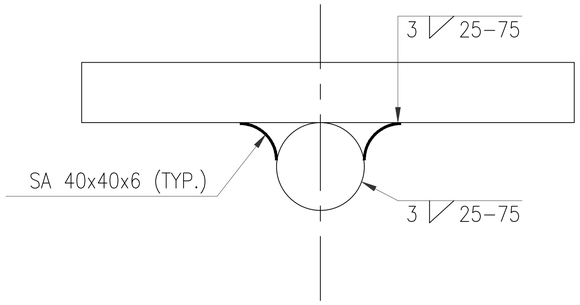


FIXING DETAILS





NOTES

1. THE FULL WORKING AND SIZES ARE ONLY INDICATIVE AND ARE SUBJECT TO THE APPROVAL BY OWNER/OWNER'S REPRESENTATIVE BEFORE FABRICATION.
2. SCHEME FOR POWDER COATING AND COLORING. ONE COAT OF PRIMER & TWO COATS OF SPECIFIED PAINTS. ALL LETTERS EXCEPT ''WARNING" TO BE PAINTED BLACK.
3. ALL DIMENSION ARE IN MM. UNLESS OTHERWISE SPECIFIED.
4. APPROVAL OF WARNING MARKER DESIGN SHALL BE OBTAINED BEFORE THE COMMENCEMENT OF WORK.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER

CENTRAL UP GAS LIMITED

PROJECT

CITY GAS DISTRIBUTION PROJECT

SUBJECT

POLE MARKER WITH
FOUNDATION DETAILS

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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A1	NTS	01	of	01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	D	20749	005

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NOTES

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2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE.

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0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: PLATE MARKER

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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Project No.	Discipline Code	System Code	Serial No.
P.014714	D	20749	006

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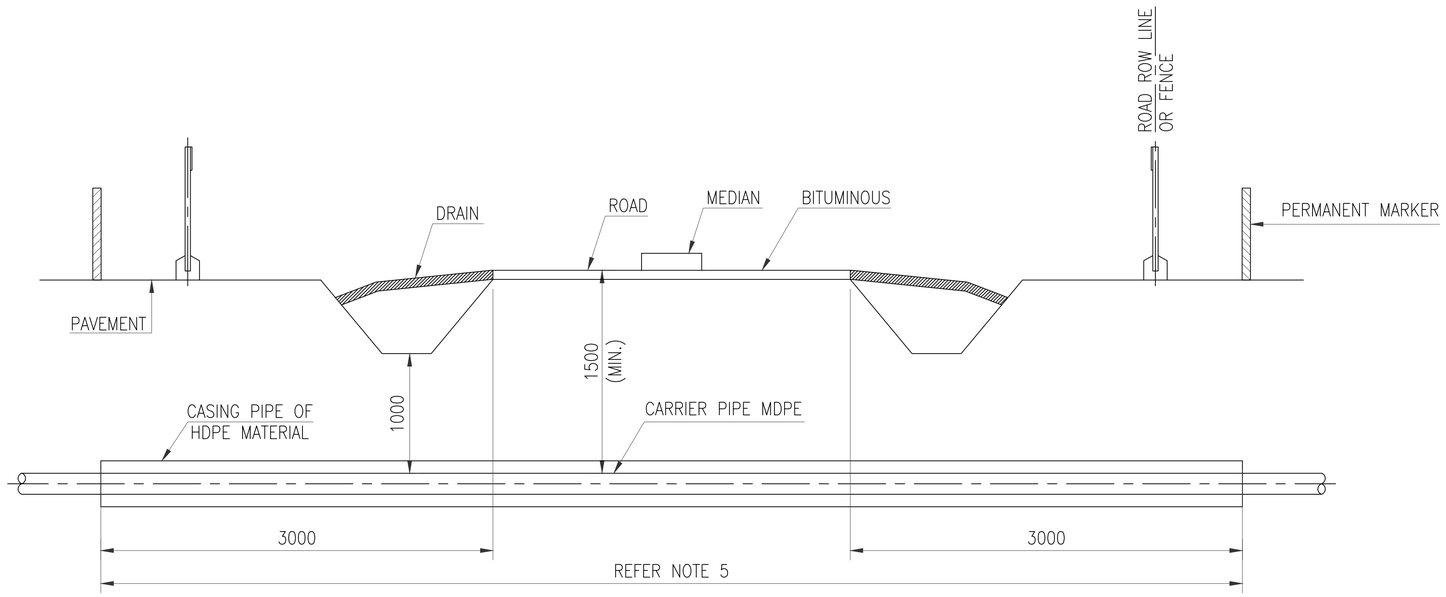

TYPICAL SECTION

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. ROAD HIGHWAY CROSSING SHALL BE RESTORED TO ORIGINAL CONDITION TO THE ENTIRE SATISFACTION OF OWNER AND CONCERNED AUTHORITIES HAVING JURISDICTION.
3. REFER API RP 1102 FOR OTHER DESIGN AND INSTALLATION REQUIREMENTS.
4. ANGLE OF INTERSECTION BETWEEN PIPELINE AND THE ROAD/HIGHWAY SHALL BE AS CLOSE TO 90° AS POSSIBLE BUT IN CASE LESS THAN 30°.
5. CONTRACTOR SHALL VERIFY THE ACTUAL DIMENSION WITH RESPECT TO SURVEY DETAIL FOR EACH ROAD/HIGHWAY CROSSING AND PREPARE DETAILED DRAWING FOR INDIVIDUAL CROSSING ENGINEER-IN CHARGE APPROVAL BEFORE COMMENCEMENT OF CONSTRUCTION.
6. THE CASING PIPE SHALL BE OF SIZES MENTIONED AT CLAUSE NO.19 OF TECHNICAL SPECIFICATION FOR PE LAYING.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER

CENTRAL UP GAS LIMITED

PROJECT

CITY GAS DISTRIBUTION PROJECT

SUBJECT

ROAD / HIGHWAY CASED CROSSING
FOR MDPE PIPE

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	D	20749	007

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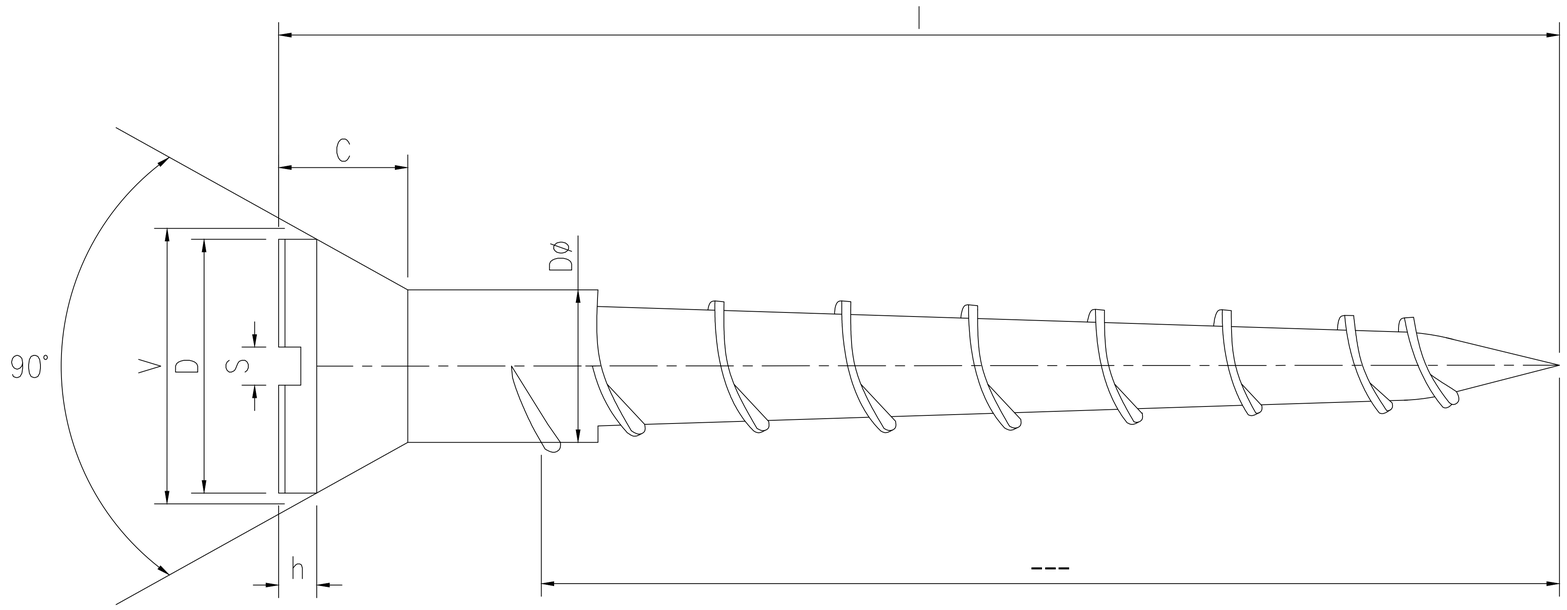

SCREW NO.	Dø			PITCH	V	D		c	s		h		l
	NOM.	MAX.	MIN.			MAX.	MIN	MAX.	MAX.	MIN	MAX.	MIN	
7	3.81	3.94	3.68	1.59	8.2	7.62	7.34	2.16	1.27	1.11	1.14	0.84	35

NOTES

1. THE DIMENSIONS FOR 'V' ARE THEORETICAL DIAMETER OF HEAD TO SHARP CORNERS & ARE GIVEN FOR DESIGN PURPOSE ONLY.
2. DIMENSIONS TOLERANCES WILL BE AS SPECIFIED IN IS : 6760–1972.
3. ALL DIMENSIONS ARE IN MILLIMETERS.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER

CENTRAL UP GAS LIMITED

PROJECT

CITY GAS DISTRIBUTION PROJECT

SUBJECT

SPECIFICATION FOR WOOD SCREWS

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	D	20749	008

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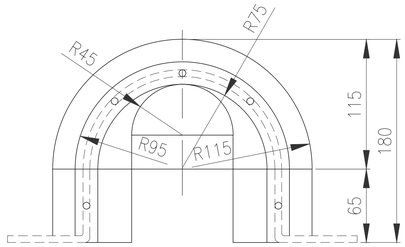
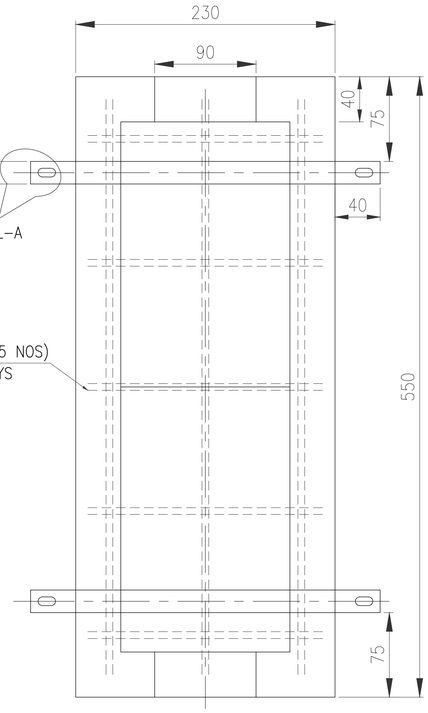
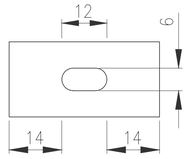
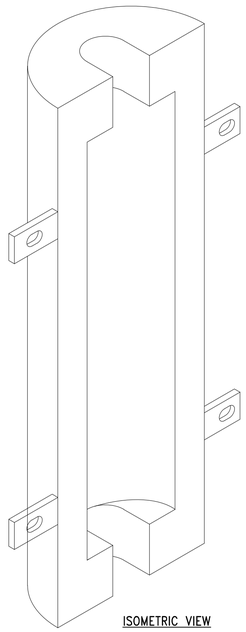




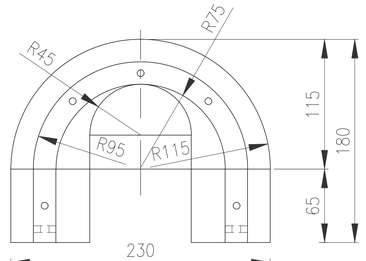


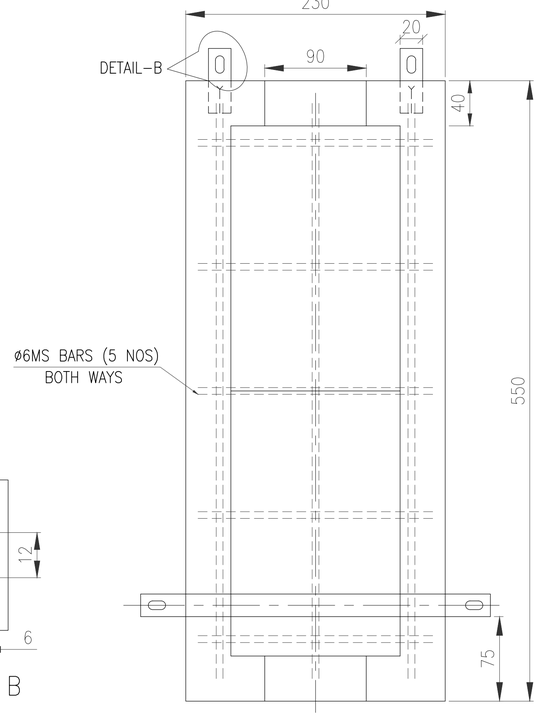
DETAIL A

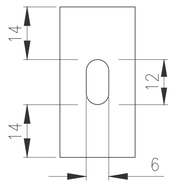


ISOMETRIC VIEW

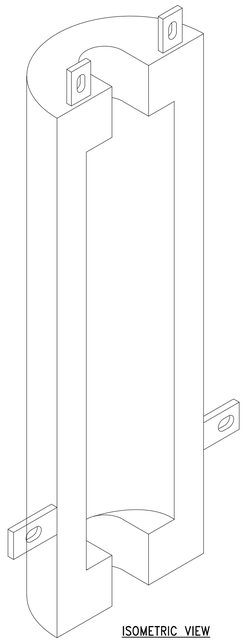
TYPE–1







DETAIL B



ISOMETRIC VIEW

TYPE–2

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. IT SHALL BE TAKEN APPROVAL FROM OWNER/OWNER'S REPRESENTATIVE BEFORE STARTING THE PROCUREMENT.
3. SIZES ARE SHOWN AS A TENTATIVE ONLY.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: HALF ROUND CONCRETE SLEEVE

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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P.014714	D	20749	009

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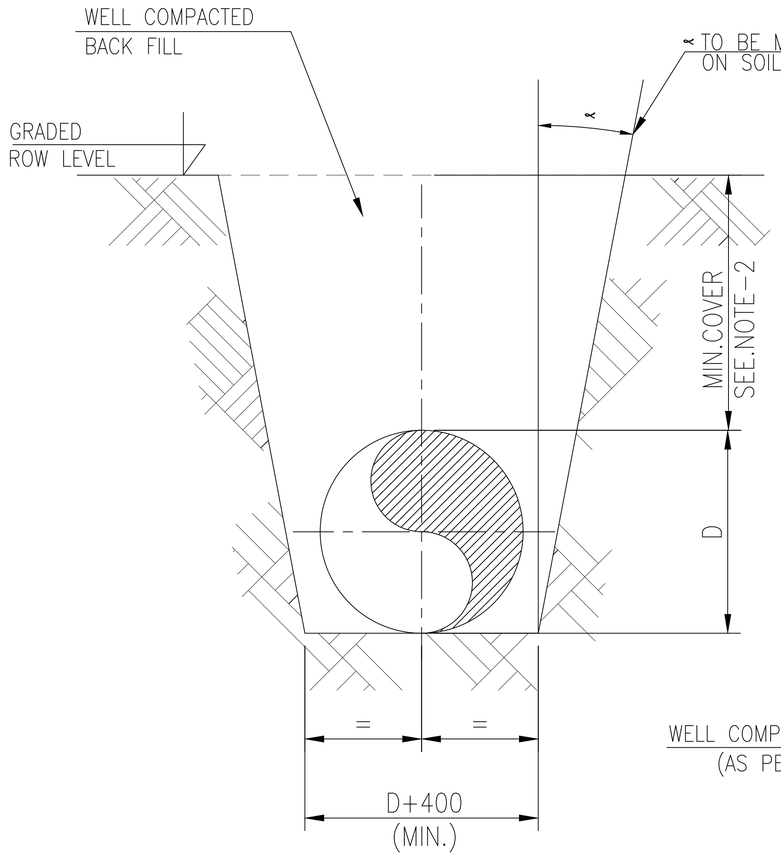
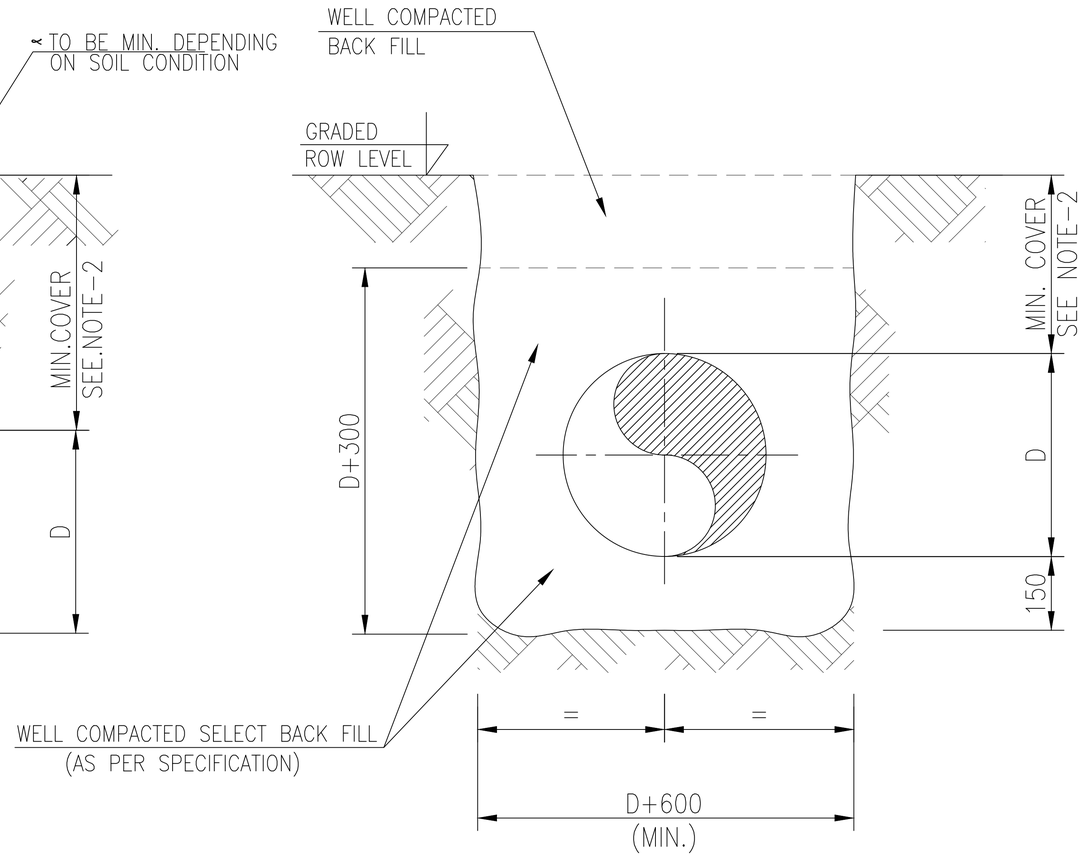


TRENCH IN NORMAL SOIL
TYPICAL SECTION



TRENCH IN CONSOLIDATED ROCK
TYPICAL SECTION

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. FOR ALL PIPELINE TO BE CONSTRUCTED IN THE LAND UNDER JURISDICTION OF GOVT. OF INDIA THE MIN. COVER TO BE ADOPTED SHALL BE 1000 MM IN ACCORDANCE WITH GOVT. OF INDIA PETROLEUM PIPELINE (ACQUISITION OF RIGHT OF USER IN LAND) ACT NO. 50, 1962 AND AMENDMENT ACT. NO.13 OF 1977. ANY EXTRA COVER REQUIREMENT SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.
3. MIN. COVER REQUIREMENT SHALL BE SUBJECT TO APPROVAL OF CONCERNED AUTHORITIES WHEREVER REQUIRED.
4. EXTRA COVER REQUIREMENT SHALL BE ESTABLISHED AT ALL OVER BENDS AND HORIZONTAL BENDS WHEREVER NECESSARY.
5. FOR MIN. COVER REQUIREMENT AT PIPELINE CROSSING ROADS, RAILWAY TRACKS, RIVERS MARSHY AREAS ETC REFER RELEVANT STANDARDS.

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0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER
CENTRAL UP GAS LIMITED

PROJECT
CITY GAS DISTRIBUTION PROJECT

SUBJECT
TYPICAL TRENCH DIMENSIONS
FOR PIPE LINE

TRACTEBEL Engineering pvt. ltd.

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P.014714	D	20749	010

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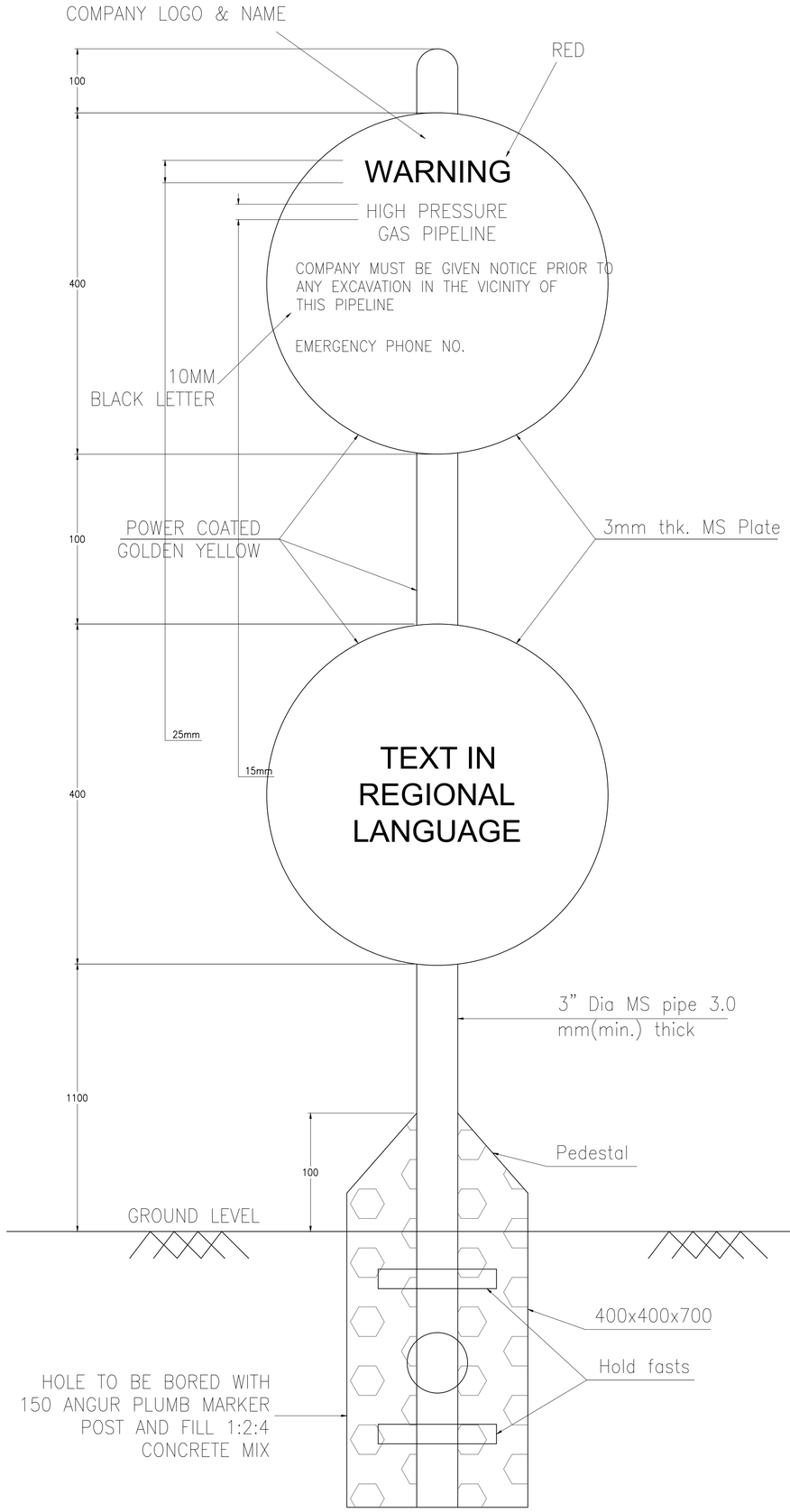
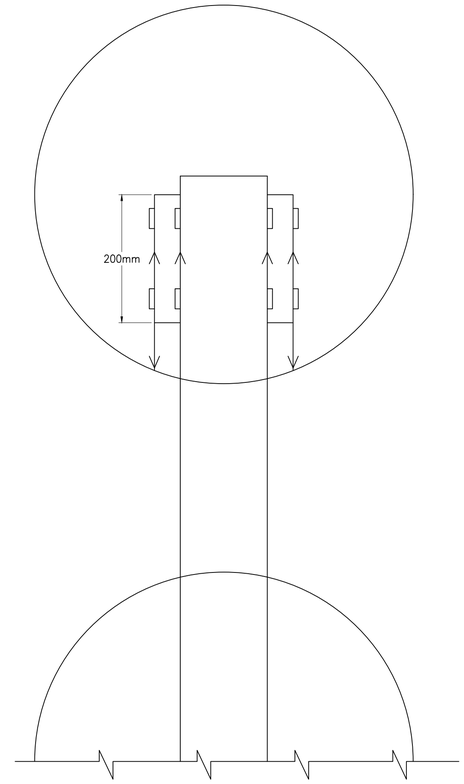
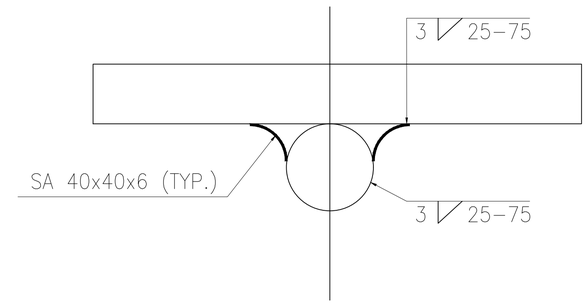


FIXING DETAILS





NOTES

1. THE FULL WORKING AND SIZES ARE ONLY INDICATIVE AND ARE SUBJECT TO THE APPROVAL BY OWNER/OWNER'S REPRESENTATIVE BEFORE FABRICATION.
2. SCHEME FOR POWDER COATING AND COLORING. ONE COAT OF PRIMER & TWO COATS OF SPECIFIED PAINTS. ALL LETTERS EXCEPT ''WARNING" TO BE PAINTED BLACK.
3. ALL DIMENSION ARE IN MM. UNLESS OTHERWISE SPECIFIED.
4. APPROVAL OF WARNING MARKER DESIGN SHALL BE OBTAINED BEFORE THE COMMENCEMENT OF WORK.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: POLE MARKER WITH FOUNDATION (INDIVIDUAL SOCIETIES & AREAS)

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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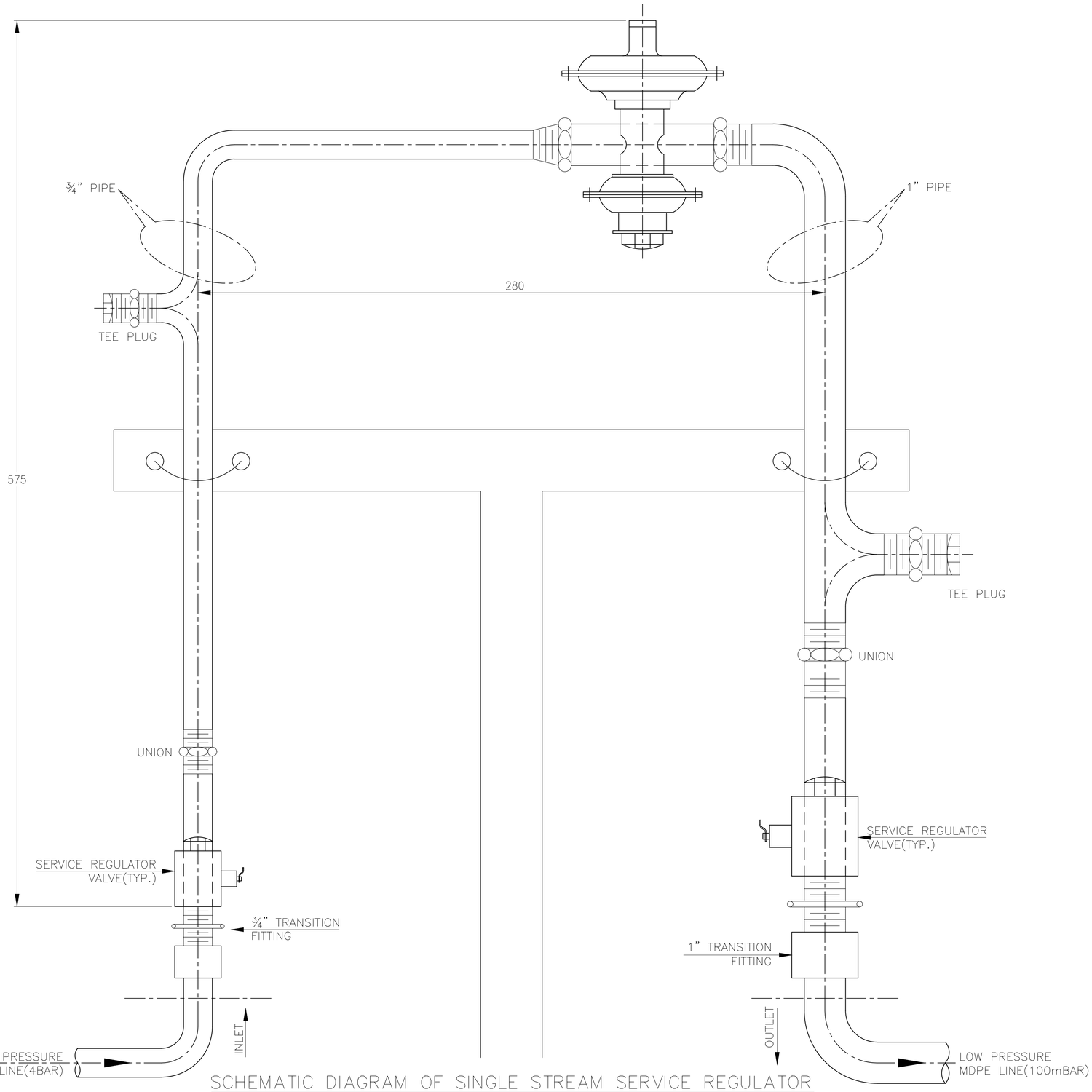

SCHEMATIC DIAGRAM OF SINGLE STREAM SERVICE REGULATOR

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSION ONLY, DO NOT SCALE.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: SCHEMATIC DIAGRAM OF SINGLE STREAM SERVICE REGULATOR

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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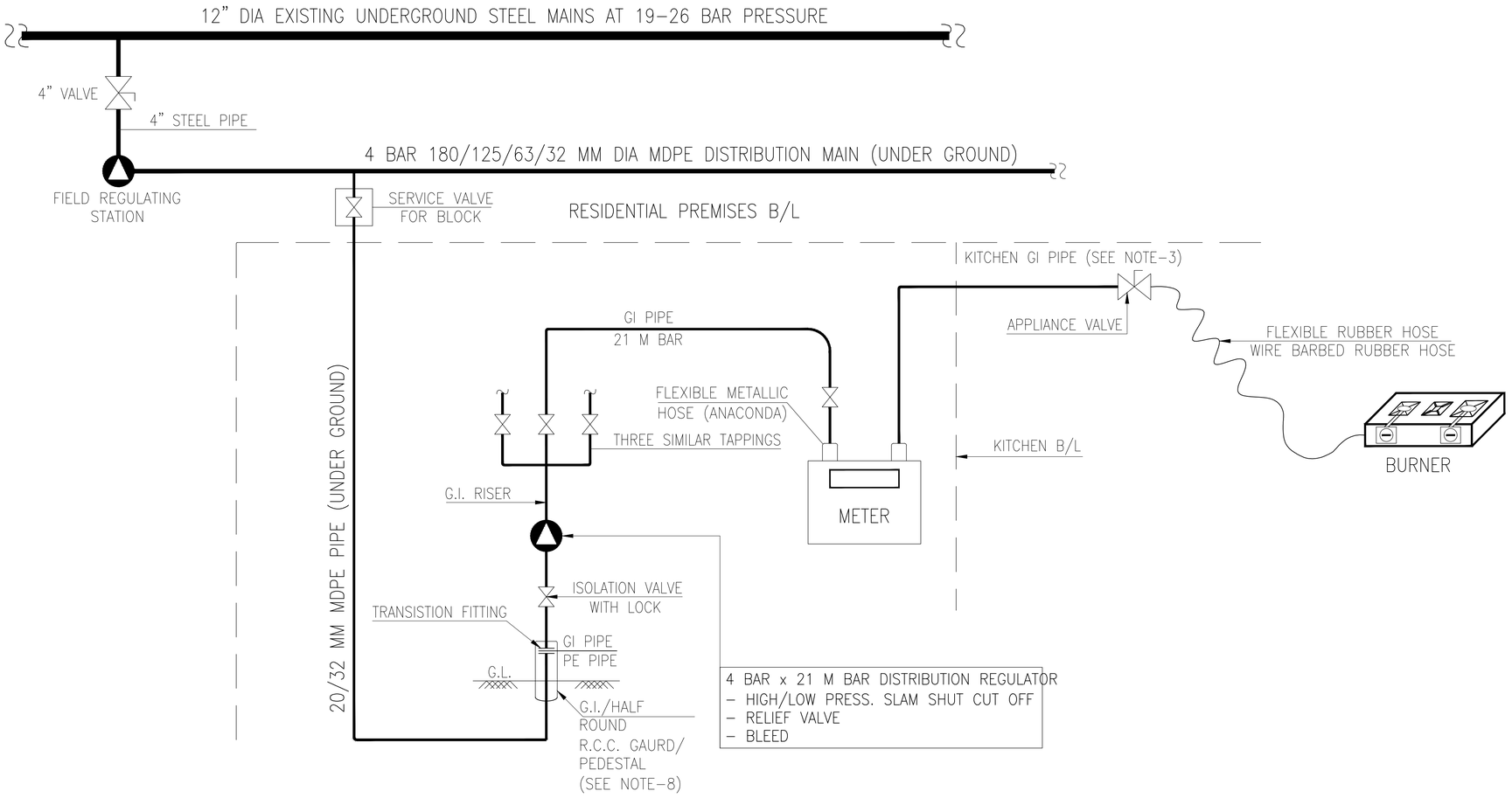
SCHEMATIC DRAWING FOR DOMESTIC CONNECTION



NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
2. THE SIZES SHOWN IN THE DRAWING ARE TENTATIVE.IT SHALL BE DECIDED DURING DETAIL ENGINEERING.
3. PIPING DOWN STREAM METER SHALL BE OF COPPER IN CASE METER IS INSTALLED WITHIN THE KITCHEN.
4. TENTATIVE RISER LENGTH (FROM OUTLET OF TRANSITION FITTINGS 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 GI PIPE GOES TO THE APPLIANCE VALVE THEN GI FITTING SHALL BE USED AT THE OUTLET THE METER.
7. MAXIMUM DISTANCE BETWEEN CLAMPS SHALL BE 1.5M WHEN PIPE GOES IN THE STRAIGHT LENGTH, IF ANY TEE OR ANY FITTING LIES IN BETWEEN THE PIPE THEN CLAMP SHALL BE PLACED 150MM FAR AWAY FROM CENTER LINE OF FITTINGS AT EVERY SIDE. HOW EVER, THE SAME MAY BE CHANGED AS PER SITE CONDITIONS/AS DIRECTED BY EIC.
8. G.I./HALF ROUND R.C.C. GUARD INSTALLATION SHALL BE DECIDED BY OWNER/OWNER'S REPRESENTATIVE AS PER SITE CONDITIONS.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: SCHEME FOR DOMESTIC CONSUMER CONNECTION

TRACTEBEL Engineering pvt. ltd.

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P.014714	D	20749	013

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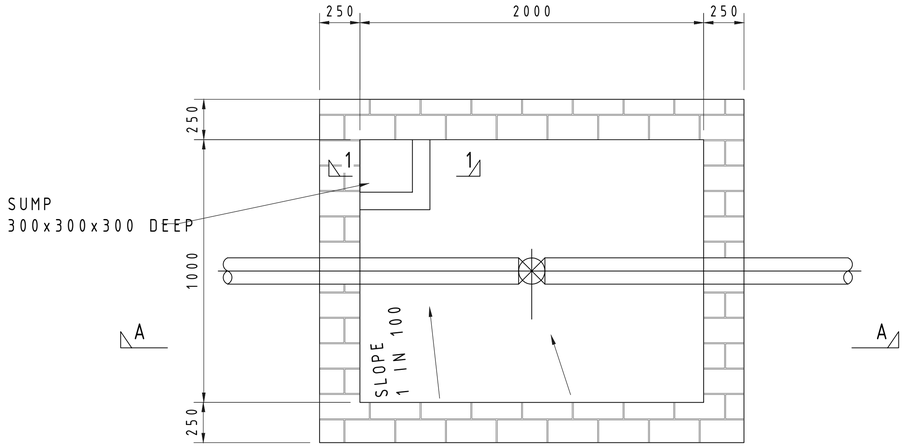
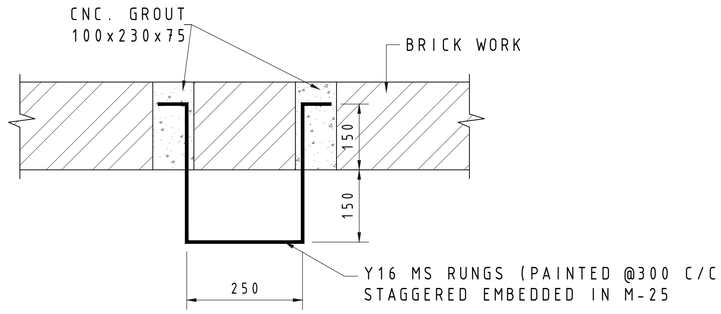
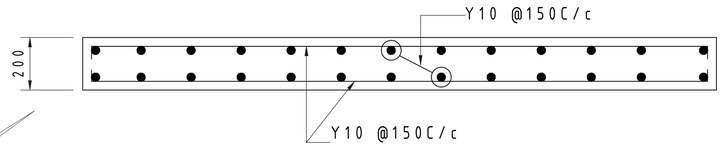


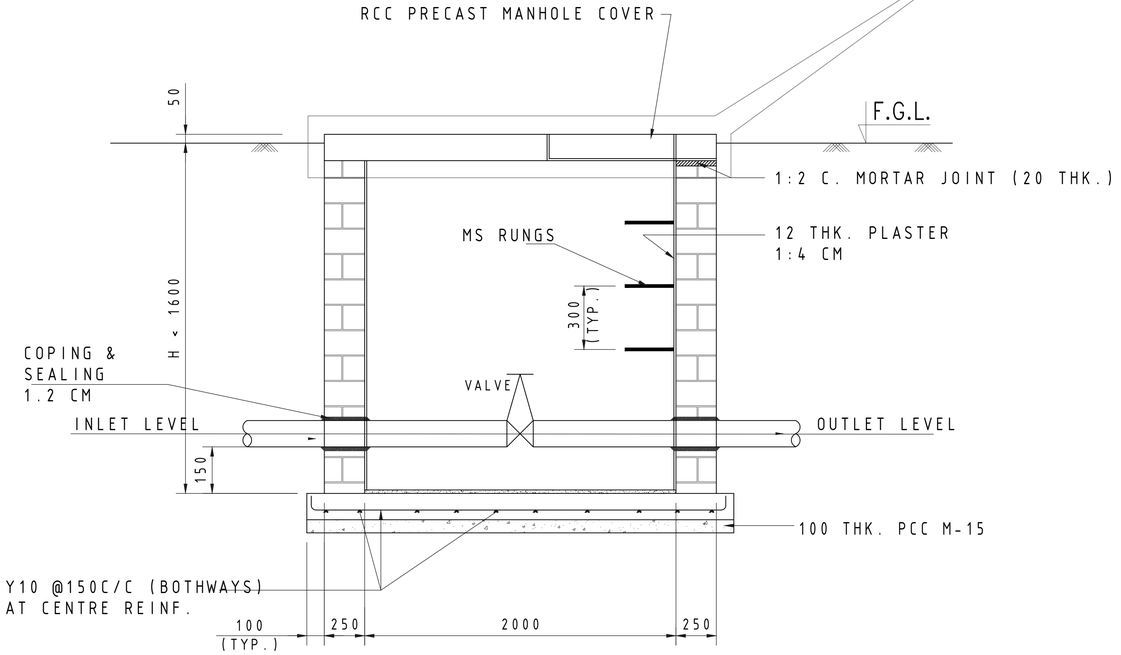
VALVE PIT PLAN



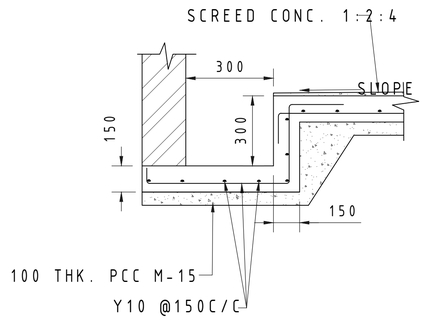
TYP. DET.OF MS RUNGS



TYPICAL SLAB R/F DETAIL



SECTION A-A



SECTION 1-1

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DIMENSIONS.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE: (a) SLAB = 20mm
4. BRICK SHALL BE OF 75 CLASS, RCC OF M-25 & PCC OF M-15.
5. REINFORCEMENT SHALL BE OF HYSD (GRADE Fe 415) CONFORMING TO IS:1786.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: **BRICK VALVE CHAMBER TYPE-1 (2.0M X 1.0M)**

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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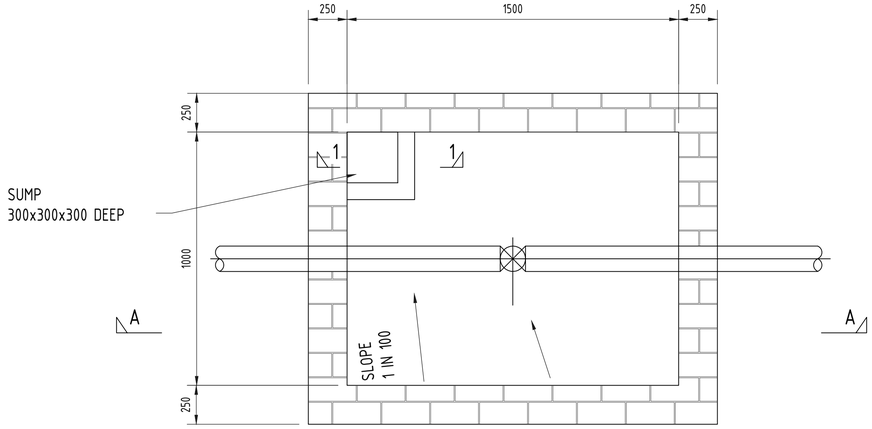
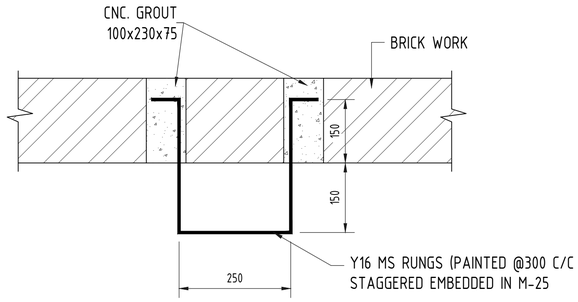
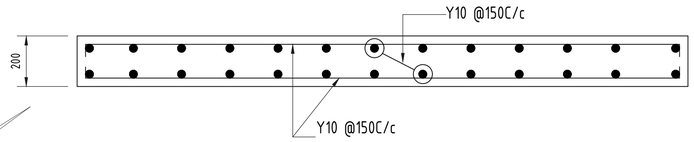


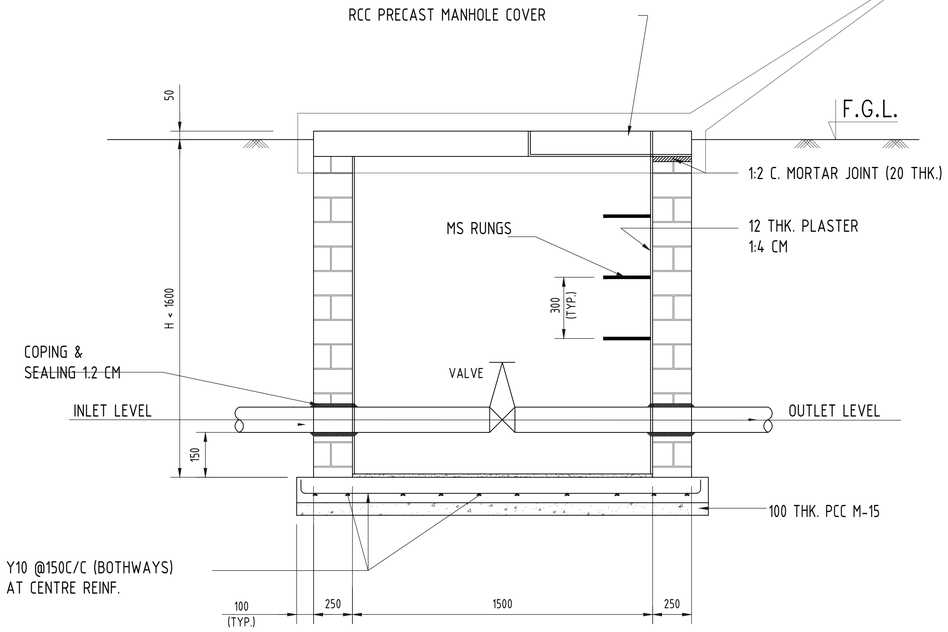
VALVE PIT PLAN



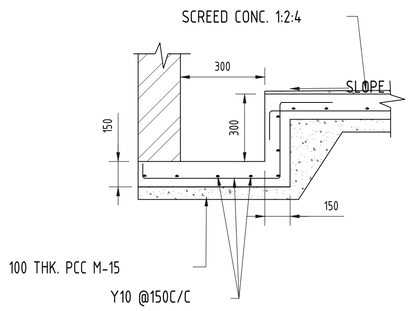
TYP. DET.OF MS RUNGS



TYPICAL SLAB R/F DETAIL



SECTION A-A



SECTION 1-1

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DIMENSIONS.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE: (a) SLAB = 20mm
4. BRICK SHALL BE OF 75 CLASS, RCC OF M-25 & PCC OF M-15.
5. REINFORCEMENT SHALL BE OF HYSD (GRADE Fe 415) CONFORMING TO IS:1786.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: BRICK VALVE CHAMBER TYPE-2 (1.5M X 1.0M)

TRACTEBEL ENGIE

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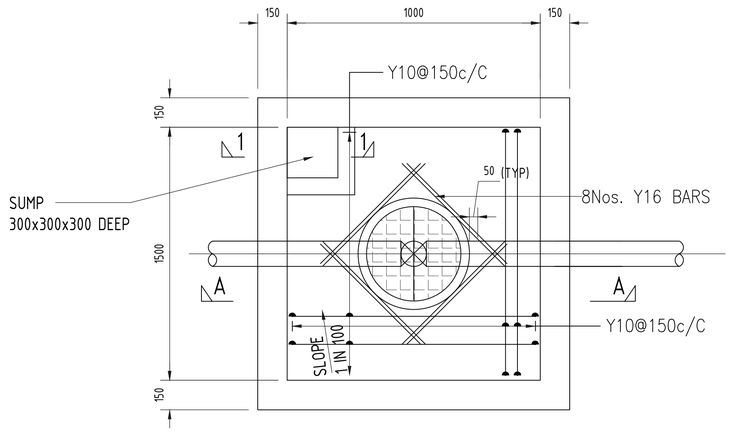
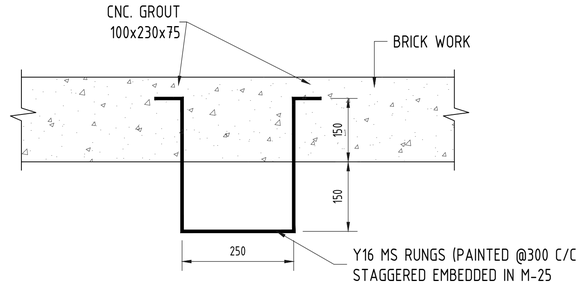
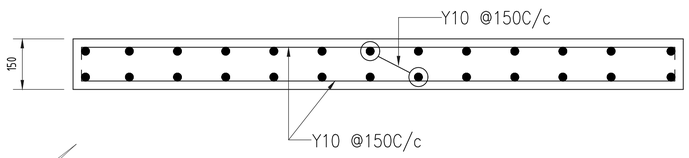


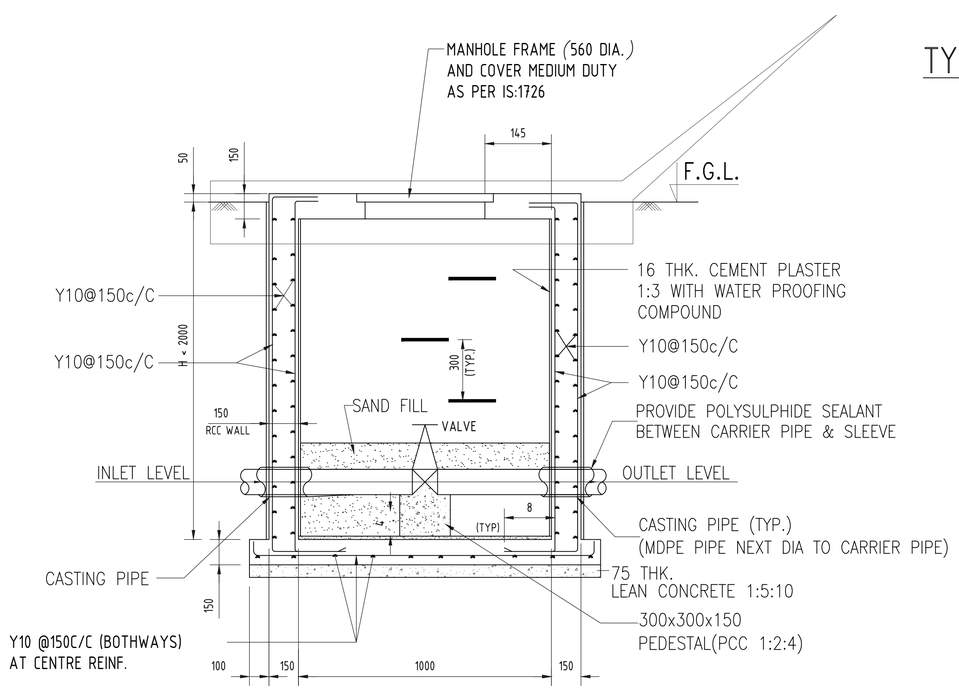
VALVE PIT PLAN



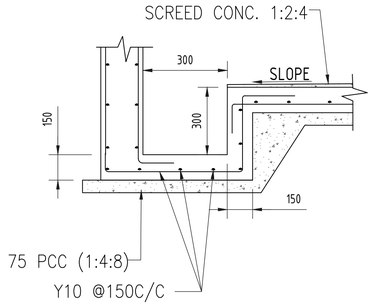
TYPICAL DETAILS OF MS RUNGS



TYPICAL SLAB R/F DETAIL



SECTION A-A



SECTION 1-1

NOTES

1. ~~ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.~~
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DIMENSIONS.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE: (a) SLAB = 20mm GRADE OF CONCRETE SHALL BE M-25.
4. REINFORCEMENT SHALL BE OF HYSD (GRADE Fe 415) CONFORMING TO IS:1786.

Rev.	Date	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS
Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By

CUSTOMER

CENTRAL UP GAS LIMITED

PROJECT

CITY GAS DISTRIBUTION PROJECT

SUBJECT

RCC VALVE CHAMBER
(1.5M X 1.0M)

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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NOTES

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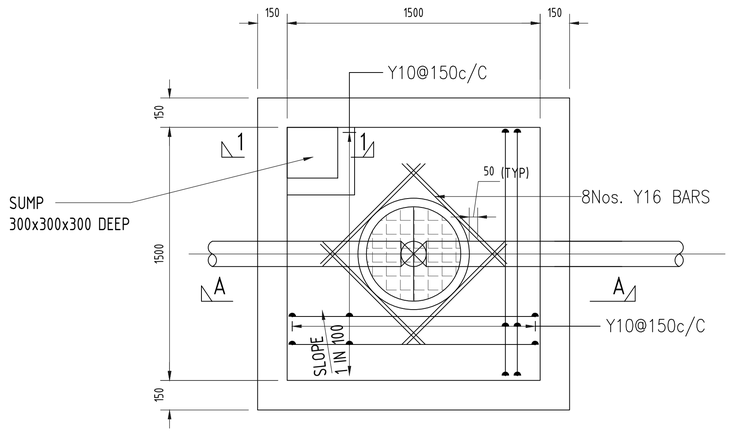
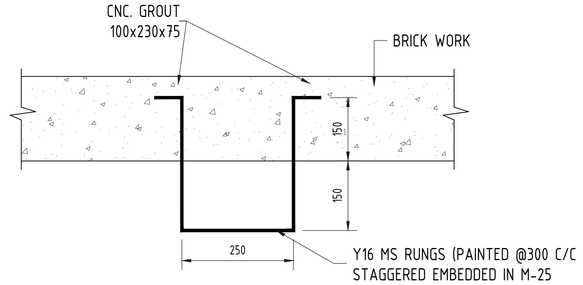
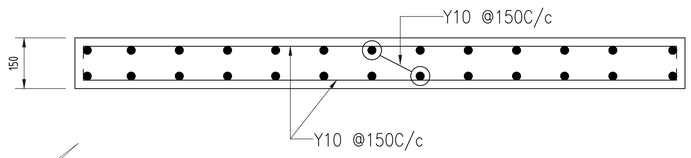
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DIMENSIONS.
3. CLEAR COVER TO MAIN REINFORCEMENT SHALL BE: (a) SLAB = 20mm GRADE OF CONCRETE SHALL BE M-25.
4. REINFORCEMENT SHALL BE OF HYSD (GRADE Fe 415) CONFORMING TO IS:1786.



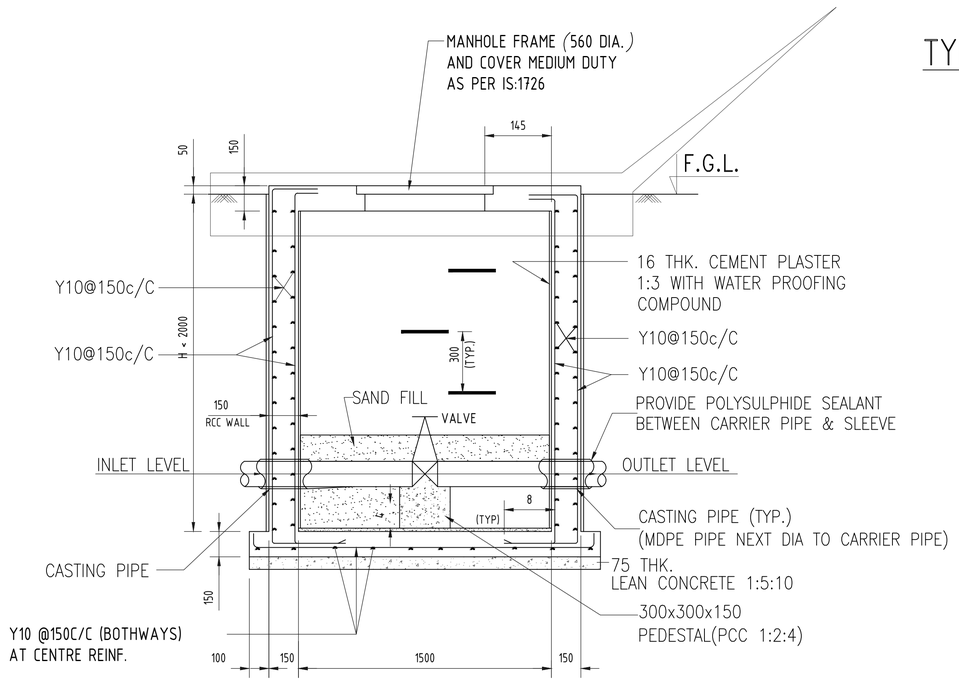
VALVE PIT PLAN



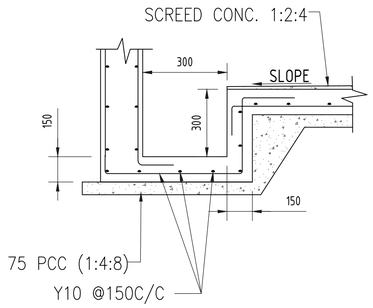
TYPICAL DETAILS OF MS RUNGS



TYPICAL SLAB R/F DETAIL



SECTION A-A



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0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: **RCC VALVE CHAMBER (1.5M X 1.5M)**

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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Project No.	Discipline Code	System Code	Serial No.
P.014714	D	20749	017

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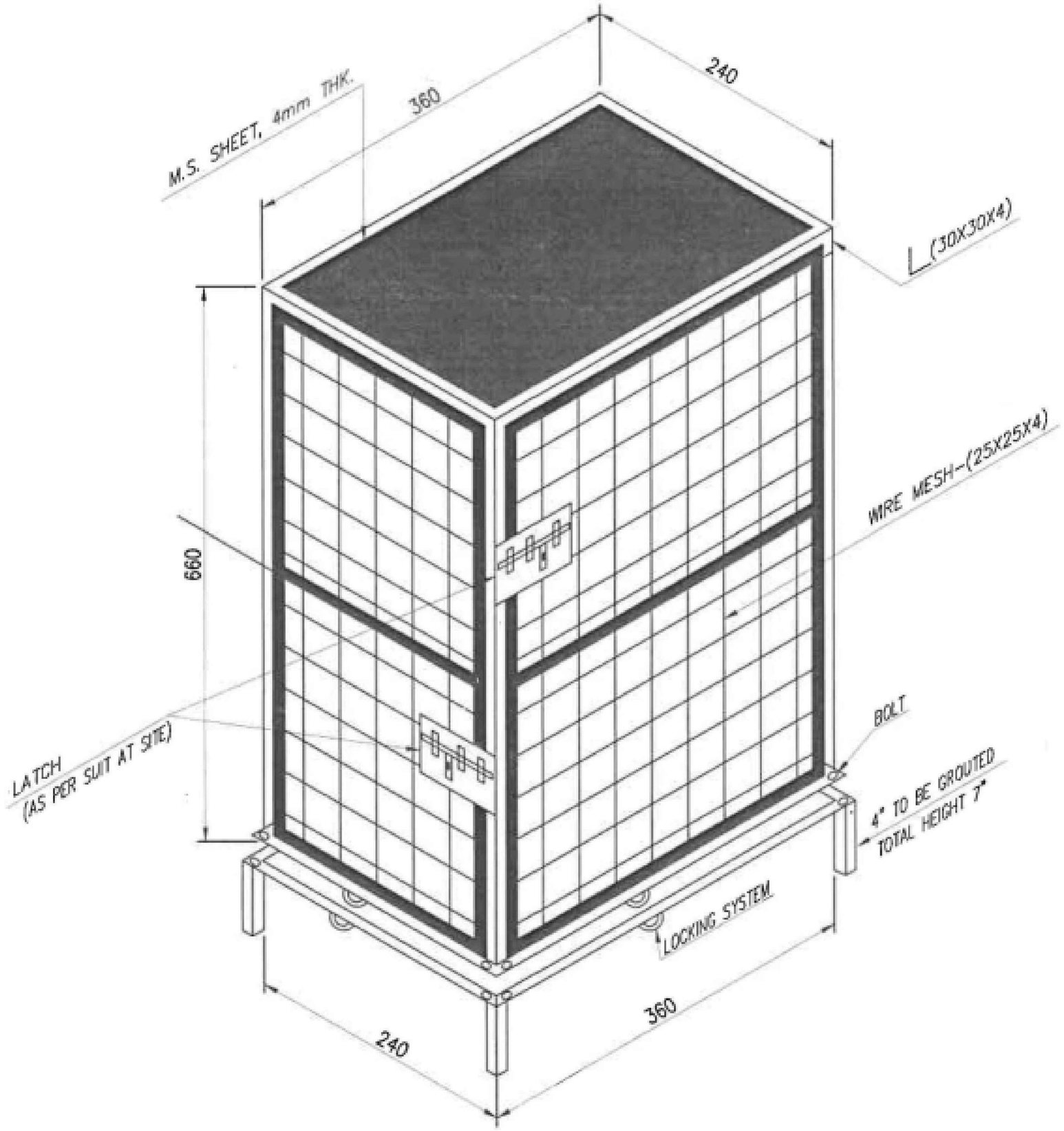

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. 40MM GROUTING WITH NON-SHRINKAGE COMPOUND SHALL BE PROVIDED AT BOTTOM OF SERVICE REGULATOR.
3. WIRE MESH AND MS ANGLE/PLATES SHOULD BE PAINTED WITH PRIMER & GOLDEN YELLOW PAINT OF REPUTATED MAKE.

Rev.	D M Y	Modifications	Drawn By	Checked By	Approved By
0	22.10.20	ISSUED FOR TENDER	MHL	AMK	KNS

CUSTOMER: CENTRAL UP GAS LIMITED

PROJECT: CITY GAS DISTRIBUTION PROJECT

SUBJECT: **SCHEMATIC DIAGRAM OF HOUSING FOR SINGLE SERVICE REGULATOR**

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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Project No.	Discipline Code	System Code	Serial No.
P.014714	D	20749	018

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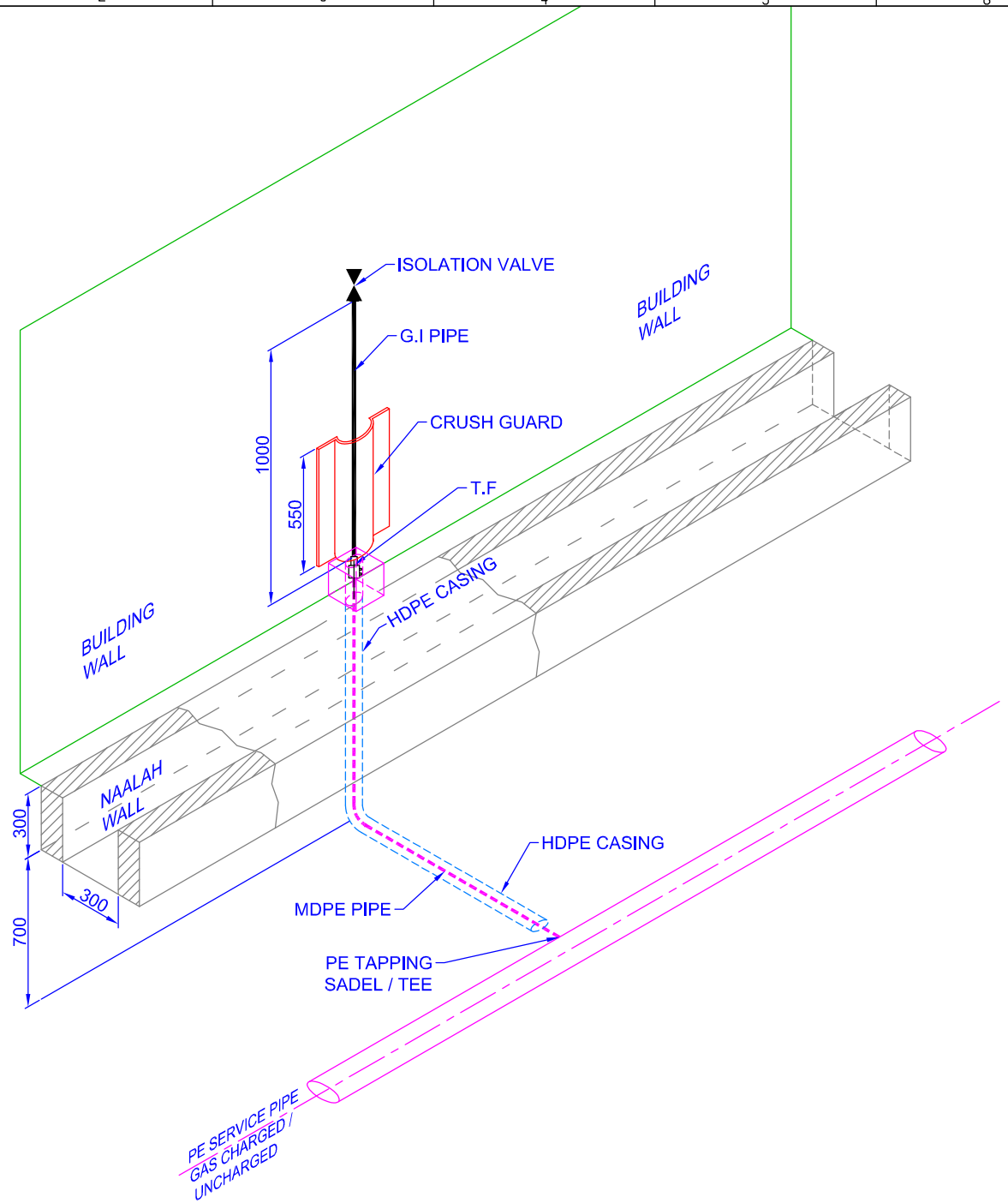


NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.

CENTRAL UP GAS LIMITED

TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

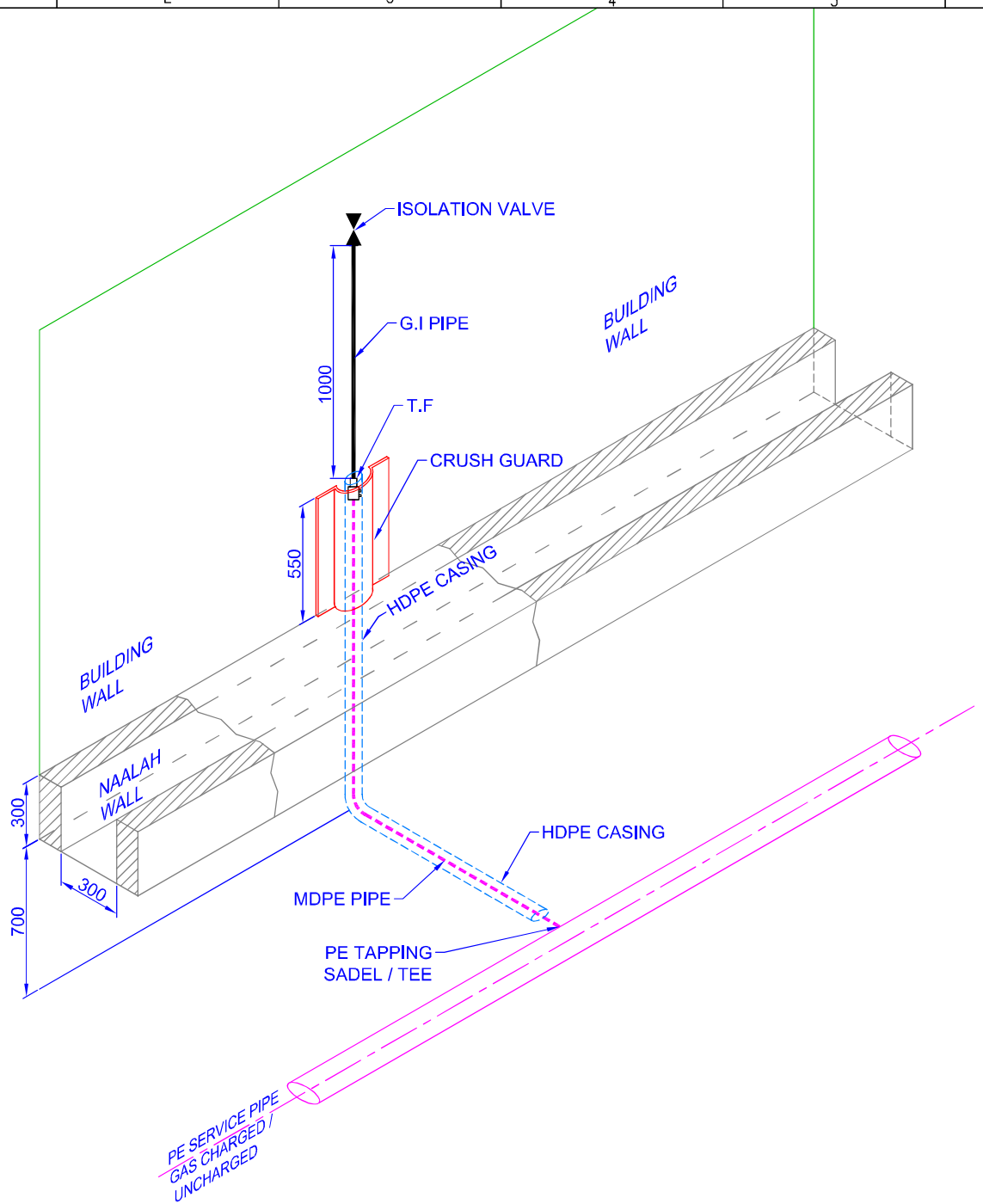
Project No.	Discipline Code	System Code	Serial No
P.014714	D	20749	017

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. 15792 -10-03-44 REV-0



NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.

CENTRAL UP GAS LIMITED

TRACTEBEL Engineering pvt. ltd.

Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

Project No.	Discipline Code	System Code	Serial No
P.014714	D	20749	017

PROJECT: CITY GAS DISTRIBUTION PROJECT

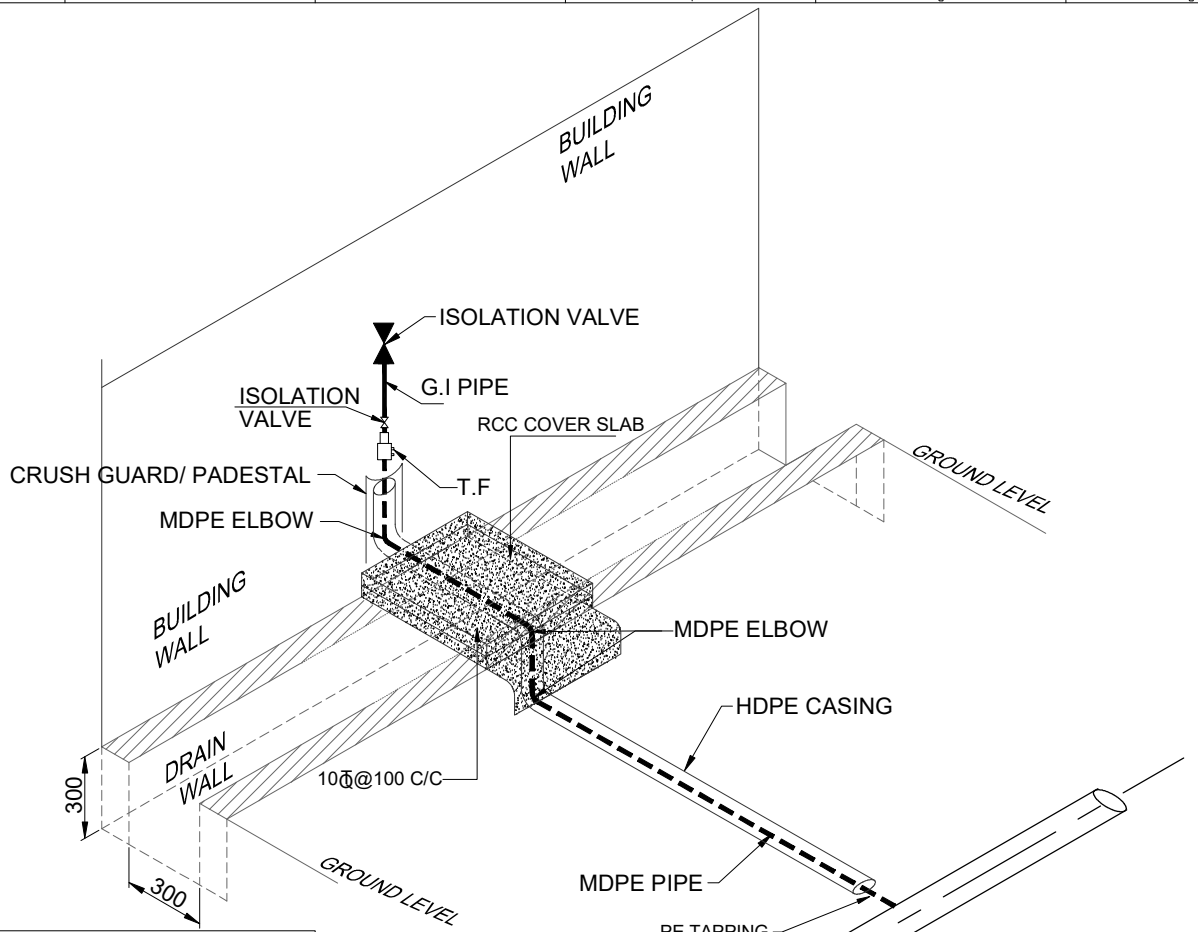
TITLE: DRAIN CROSSING FOR LAYING OF SERVICE LINES WHERE PEDESTAL NOT POSSIBLE

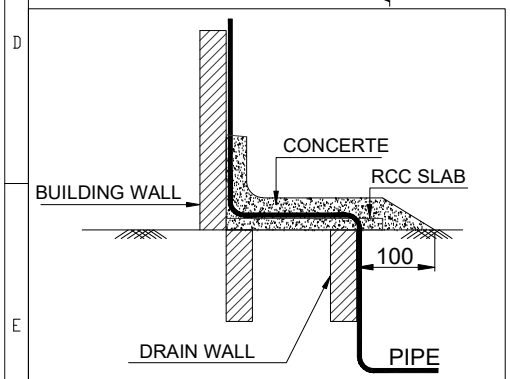
SCALE	DATE	CAD FILE: DATE	CAD	A3
N.T.S.				

DRG. NO. 15792 -10-03-45 REV-0

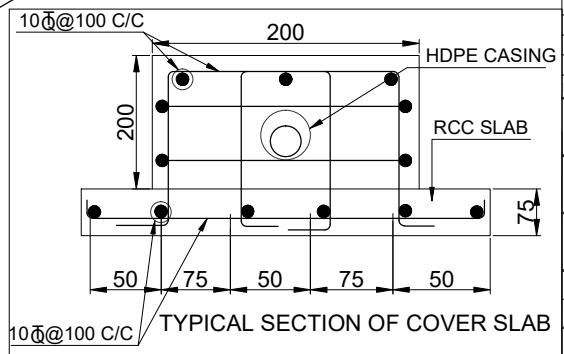
NOTES:-

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.





SIDE VIEW SCHEME



TYPICAL SECTION OF COVER SLAB

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

CENTRAL UP GAS LIMITED

TRACTEBEL Engineering pvt. ltd.

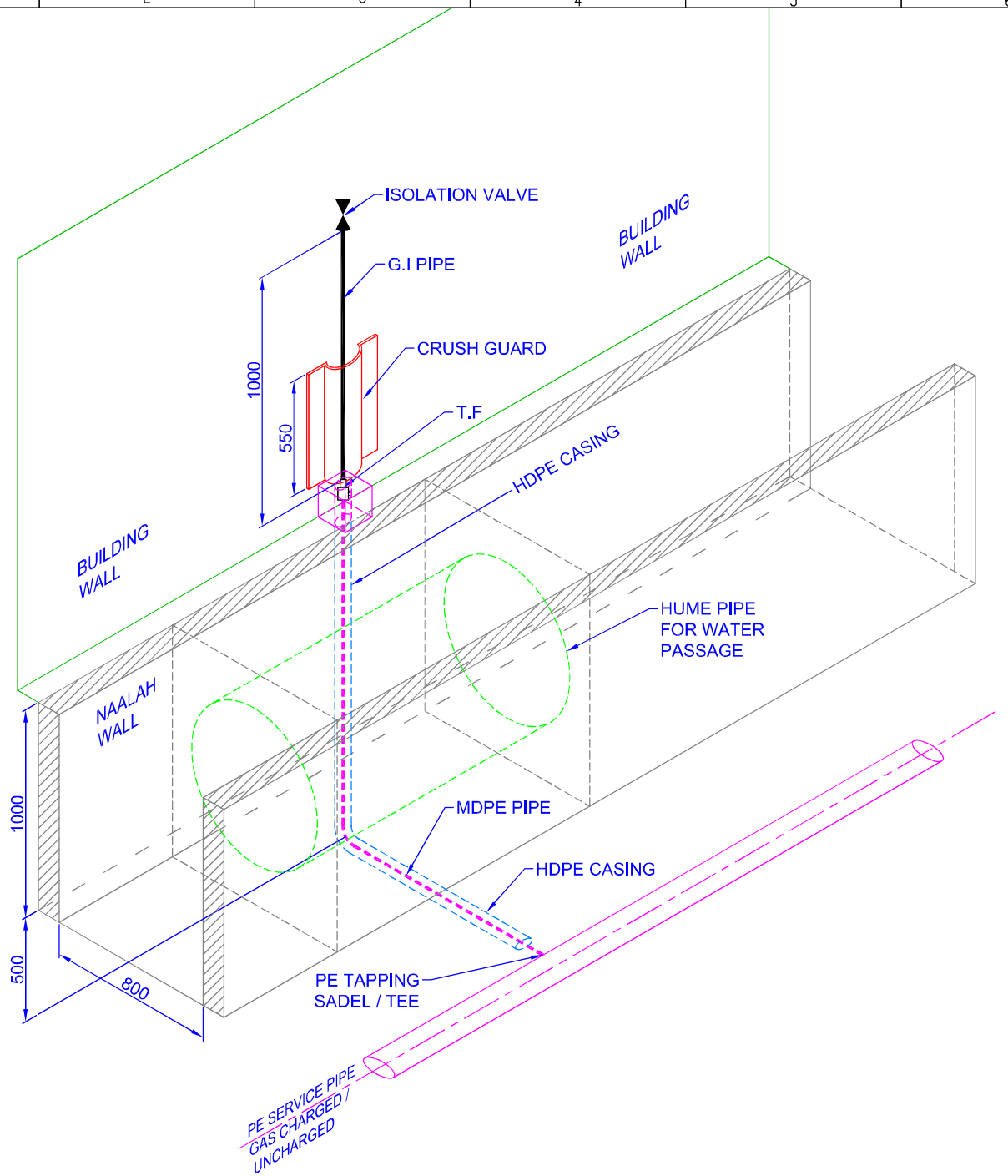
Size	Scale	Sheet	Rev.
A1	NTS	01 of 01	0

Project No.	Discipline Code	System Code	Serial No.
P.014714	D	20749	017

PROJECT: CITY GAS DISTRIBUTION PROJECT

SCALE	TITLE
NTS	DRAIN CROSSING FOR LAYING OF SERVICE LINES

SIZE	CLIENT JOB NO.	DRAWING NUMBER	SHEET	REV.
A3	15792	15792 -10-03-46A	1 OF 1	1



NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.

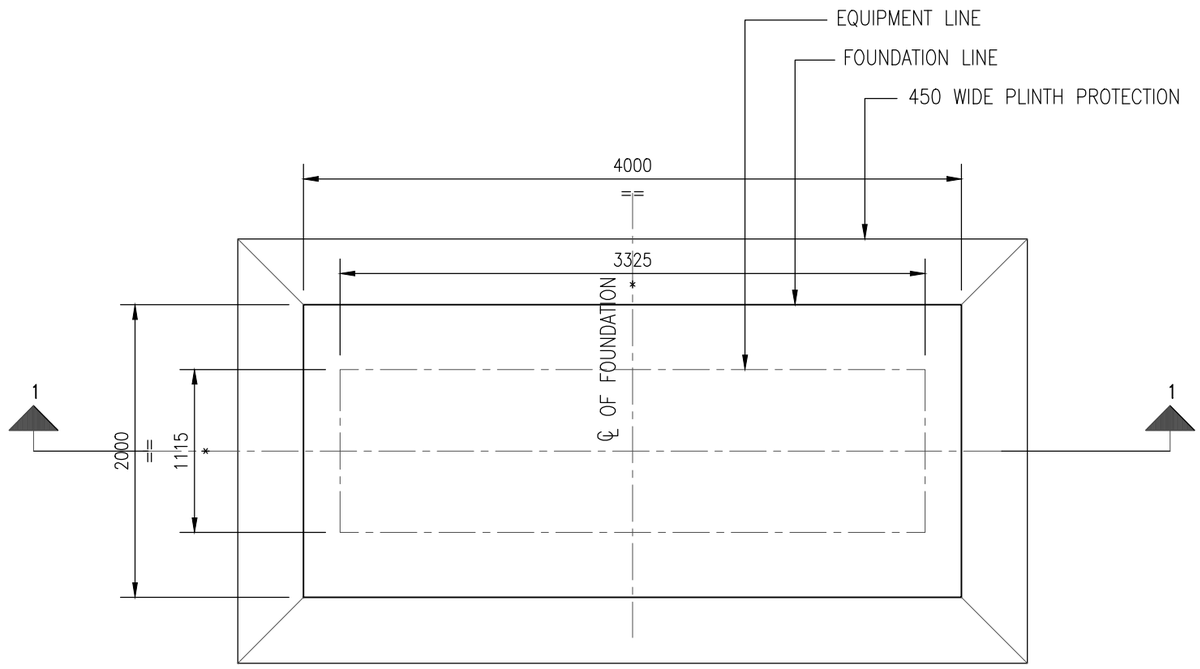
CENTRAL UP GAS LIMITED

CITY GAS DISTRIBUTION PROJECT

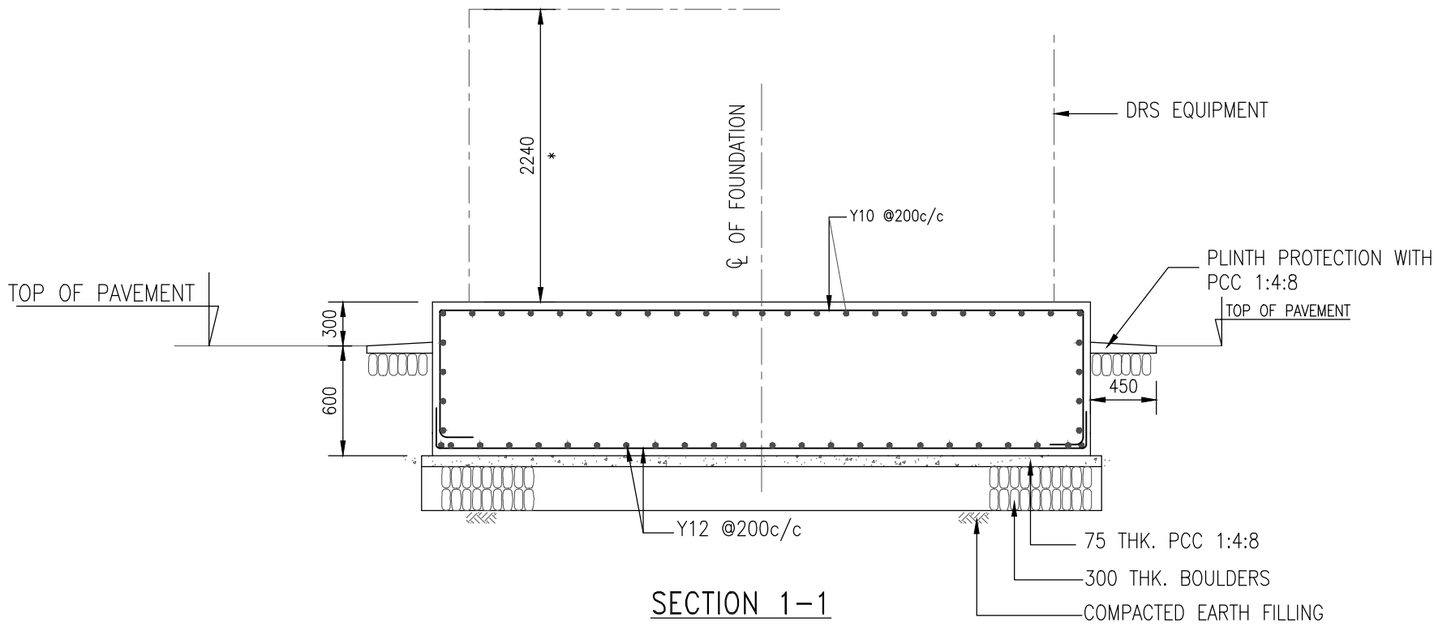
TITLE: NALLAH CROSSING FOR LAYING OF SERVICE LINES

TRACTEBEL Engineering pvt. ltd.

A1	NTS	01 of 01	0
P.014714	D	20749	017



FOUNDATION PLAN FOR DRS FOUNDATION (FOR 5000 SCMH)



SECTION 1-1

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS, LEVELS ARE IN METERS.
2. FOLLOW WRITTEN DIMENSIONS ONLY. DO NOT SCALE THE DRAWING.
3. PROPOSED FINISHED GROUND LEVEL (F.G.L.) EL.(±)0.00 SHALL MATCH WITH EXISTING FINISHED GROUND LEVEL.
4. IN ANY LOOSE SOIL ENCOUNTERED AT THE FOUNDATION LEVEL IT SHALL BE EXCAVATED OUT AND BACKFILLED WITH PCC (1:5:10).
5. 5.0T/SQM.(SBC) AT THE DEPTH OF 1.0M FROM EXISTING FGL HAS BEEN CONSIDERED FOR FOUNDATION DESIGN. CONTRACTOR TO ENSURE THAT THE SAME SBC SHOULD BE ACHIEVED, BEFORE STARTING CONSTRUCTION WORK.
6. CONCRETE MIX M25 SHALL BE USED IN ALL RCC WORK UNLESS NOTED OTHERWISE.
7. ALL P.C.C. SHALL BE 1:4:8 UNLESS NOTED OTHERWISE.
8. HIGH STRENGTH DEFORMED BARS OF YIELD STRENGTH 415N/SQMM SHALL BE USED AS PER IS:1786 IN ALL RCC WORK.
9. CORROSION RESISTANT STEEL BARS OF YIELD STRENGTH 415N/Sqmm SHALL BE USED BELOW GROUND LEVEL AS PER IS:1786.
10. LAP LENGTH(LD) SHALL BE 50D FOR ALL BARS.
11. CLEAR COVER TO REINFORCEMENT SHALL BE AS FOLLOWS:
    (a) FOUNDATION = 50mm
12. SOIL SHALL BE COMPACTED BELOW FOUNDATION UPTO 95% OF M.D.D. AS PER IS:2720.
13. LOCATION OF DRS FOUNDATION TO BE CONFIRMED WITH APPROVED PLOT PLAN.
14. (*) CONTRACTOR SHALL CONFIRM THE LOCATION & ORIENTATION OF COMPRESSOR BEFORE CASTING OF FOUNDATION.
15. (*) SIZE OF FOUNDATION & LOCATION OF POCKETS SHALL BE FINALIZED AFTER THE RECEIPT OF DATA FROM VENDOR.

Rev.	D M Y	Modifications	Drawn	Checked	Approved	Validated
0	06.01.2020	ISSUED FOR APPROVAL	TBS	KD	GSJ	AR

CUSTOMER

CENTRAL U.P.GAS LIMITED

DRS FOUNDATION (5000 SCMH) DETAILS

TRACTEBEL ENGIE

TRACTEBEL Engineering pvt. ltd.

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Project No.	Discipline Code	System Code	Serial No.
P.009718	D	20930	001

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At the helm of the Energy Transition, Tractebel provides a full range of engineering and advisory services throughout the life cycle of its clients' projects, including design and project management. As one of the world's leading engineering and advisory companies and with more than 150 years of experience, it's our mission to actively shape the world of tomorrow. With about 5,000 experts and presence in more than 70 countries, we are able to offer our customers multidisciplinary solutions in energy, water and urban.

TRACTEBEL ENGINEERING PVT. LTD.

GURGAON OFFICE
Intec House, 37
Institutional Area, Sector 44
122002 - Gurgaon - INDIA
tractebel-engie.com

NITISH NANDI
tel. +91 124 469 8500
fax +91 124 469 8586
nitish.nandi@tractebel.engie.com