



**GGL TECHNICAL SPECIFICATIONS FOR CONTRACTOR  
PROCURED MATERIAL FOR  
(PE LAYING & DOMESTIC / COMMERCIAL/INDUSTRIAL PNG INSTALLATIONS)**

Sr.No	DESCRIPTION-Technical Specification	Document No.
1	PE – 100 Grade Pipes	GGL/TS/PE-PNG/SUPPLY/PE-100 PIPE/SPEC
2	Electrofusion Fittings	GGL/TS/EF FITTINGS/2015
3	Weld End Transition Fitting	GGL/TS/SPEC/WE-TF/2016
4	Brass Isolation Ball Valve	GGL/TS/PE-PNG/SUPPLY/ISOVLV/SPEC
5	Brass Appliance Valve	GGL/TS/PE-PNG/SUPPLY/APPVLV/SPEC
6	FRP sleeper with frame for PE Valve Chambers	GGL/TS/2022/JUL/17
7	Corrugated Flexible SS Metal hose Assembly-Anaconda	GGL/TS/ANACONDA/2018/001
8	Brass Blind Meter Adaptor & Brass Fittings With Head Chrome Plating	GGL/TS/METER ADAPTOR/2015
9	Powder Coated GI Pipes	GGL/TS/GI PIPE/2022/DEC/07
10	Powder Coating on GI fittings	GGL/TS/GI FITTINGS/2015
11	Powder Coating Of GI Pipes And Fittings	GGL/TS/POWDER COATING/2015
12	Powder Coated GI Nipple	GGL/TS/GI NIPPLE/2016
14	Warning Tapes / Mats	GGL/TS/WARNING TAPE-MAT/2018
15	PVC Sleeve For Wall Crossing	GGL/TS/SPEC/SLEEVE/001



# TECHNICAL SPECIFICATIONS FOR PE-100- PE PIPE

**Document No:** GGL/TS/PE-PNG/SUPPLY/PE-100 PIPE/SPEC

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## 1 GENERAL

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various Geographical Areas as per authorisation from PNGRB.

The intent of this specification is to establish minimum requirements to manufacture and supply of PE pipes for supplying natural gas.

The scope will include manufacture, supply, inspection, testing, marking, packaging, handling and despatch of PE pipes of ratings and grades as per IS: 14885: 2022 with latest amendments.

## 2 REFERENCE CODES AND STANDARDS:

### 2.1 Governing Standards

PNGRB T4S:	Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks.
ISO 4437:	Buried polyethylene (PE) pipes for the supply of gaseous fuels — Specifications
IS 14885:	Polyethylene pipes for the supply of Gaseous Fuels -- Specifications

### 2.2 Reference Standards

IS 7328:	High density polyethylene materials for moulding and extrusion — Specification
IS 2530:	Method of test for polyethylene moulding materials & polyethylene compound
EN 12099:	Plastic Piping Systems — Polyethylene piping materials and components — Determination of volatile content
ISO 18553:	Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds
ISO 8085-3:	Polyethylene fittings for use with polyethylene pipes for the supply of gaseous fuels — Specifications — Part 3: Electrofusion fittings
ISO 11413:	Plastic pipes and fittings — Preparation of test piece assembly between a polyethylene (PE) pipe and an electro fusion fitting
ISO 1133:	Plastics- Determination of melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics
ISO 1167-1:	Thermoplastic pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method
ISO 1167-2:	Thermoplastic pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 2: Preparation of pipe test pieces
ISO 1183:	Plastics — Methods for determining the density of non cellular plastics



ISO 2505:	Thermoplastic pipes — Longitudinal reversion — Test method and parameters
ISO 6259-1:	Thermoplastic pipes — Determination of Tensile properties — Part-1: General test method
ISO 6259-3:	Thermoplastic pipes — Determination of Tensile properties — Part-1: Polyolefin pipes
ISO 9080:	Plastics piping and ducting systems - Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation
ISO 11357-6:	Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal 01T) and oxidation induction temperature (dynamic 01T)
ISO 13477:	Thermoplastic pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Small scale steady-state test (S4 test)
ISO 13478:	Thermoplastic pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Full-scale test (FST)
ISO 13479:	Polyolefin pipes for the conveyance of fluids — Determination of resistance to crack propagation — Test method for slow crack growth on notched pipes (notch test)

In case of conflict between the requirements of this specification and the Reference Codes & Standards, the requirements of the specification, having stringent requirement, shall govern. Vendor shall obtain prior permission from GGL in such cases.

### 3 DEFINITIONS

For this specification the following definitions shall apply:

OWNER/ CLIENT:	Gujarat Gas Limited (GGL)
CONSULTANT :	Consultant engaged by GGL for evaluation of vendor
MANUFACTURER:	Means the Manufacturer of PE pipes.
VENDOR:	The person(s), firm, company, organization from whom Client / Contractor procures materials
TPIA:	Third Party Inspection Agency to be appointed by Vendor/ Contractor for inspection of brought out items
EIC:	Engineer – in – charge

#### 4 MATERIAL

The material grade of polyethylene PE Pipes shall be PE-100. Material shall conform to the requirement of Cl. No. 5 of IS 14885: 2022 with latest amendments. Raw material of PE pipe shall be virgin quality. Approved manufacturers for virgin raw material of PE -100 are as below:

S. No.	Manufacturer	Grade (PE-100)
1.	Borealis	Borsafe™ HE 3492-LS-H (orange)
2.	Borouge	Borsafe™ HE 3492-LS-H (orange)
3.	LyondellBasell	Hostalen CRP 100 orange
4.	INEOS O&P	ELTEX® TUB 125 N2025 (orange)
5.	Total Petrochemicals	Total HDPE XSC 50 (Orange)

- For 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.
- PE Compound Characteristics are as per the following:

Characteristics	Units	Requirement	Test Parameter	Test Method
<b>Tested as PE Compound</b>				
Conventional Density (of base polymer)	kg / m <sup>3</sup>	≥ 930 (Base Polymer )	23 °C	IS 7328
Melt Flow Rate	g / 10 min	0.20 ≤ MFR ≤ 1.40 The tested value of MFR shall be with in ± 20 percent of the nominated value declared by the compound manufacturer	190 °C / 5 kg	IS 2530
Volatile Content	mg / kg	≤ 350	Number of test pieces- 1	Annex C of IS 4984
Water Content	mg / kg	≤ 300 (equivalent to <0.03 percent by mass)	105± 2°C	Annex D of IS 4984
Thermal stability	min	≥ 20	200 °C	Annex B of IS 4984
Pigment Dispersion	Grade	≤ 3		ISO 18553/ IS 14885 (Annex A)



Tested in Pipe Form				
Resistance to gas constituents	Hour	$\geq 20$	80°C 2 MPa	IS 4984 (Annex E) / IS 14885 (Clause 5.5)
Resistance to rapid crack propagation (RCP)	Bar	$P_c \geq 1.5X \text{ MOP with}$ $P_c = 3.6 \times P_{cs} + 2.6 \text{ (in bar)}$	0 °C	ISO 13477
Resistance to slow crack growth	Hour	165, 500	80°C; 9.2 bar	ISO 13479, Annex J & E of IS 4984
Resistance To Weathering (Exposure to sunlight)				IS 14885 (Annex B & Cl 5.6)
Hydrostatic Strength	–	$\geq 1000 \text{ h}$	80°C; 5.0 MPa	Annex E of IS 4984
Elongation at Break of pipe	–	$\geq 350 \%$	23 °C	ISO 6259-1 & 3 / IS 14885 ( Cl 5.6)
De-cohesion of an Electrofusion joint — brittle failure	–	$\leq 33.3\%$	23 °C	ISO 13954/ISO 11413/ ISO-8085-3

## 5 PRESSURE RATING

The pressure rating of pipe shall be PE-100 shall be as per Table -7 of Clause 8.1 & 9.1 of IS: 14885: 2022 with latest amendments.

## 6 NOMINAL DIAMETER (DN)

The nominal diameter of pipes covered in this standard is DN 20, DN 32, DN 63, DN 90, DN 125 and DN 160.

## 7 DIMENSION, WALL THICKNESS, LENGTH OF PIPES

7.1 The Dimension of PE-100 shall be as per Table -4 of Clause 6.1 & 8.2.2 of IS: 14885 : 2022 with latest amendments

7.2 The wall thickness of PE-100 shall be as per Table -6 of Clause 6.2.1 of IS: 14885: 2022 with latest amendments

Nominal Diameter DN	SDR/thickness	Straight / Coil Length
20	9 (3mm Minimum)	Coil – 200 mtr.
32	11	Coil – 200 mtr.
63	11	Coil – 100 mtr.
90	17	Coil – 100 mtr.
125	17	Coil – 50 mtr.
160	17	Straight – 12 mtr.
125	11	Coil – 50 mtr.

7.3 Minimum inner diameter of coil shall be as per table 17 Annexure D of IS: 14885:2022 with latest amendments.

## 8 TOLERANCE

- Tolerances for Length of Pipes
- Tolerances for each rolled pipes : - 0 / +0.5m
- Tolerances for Outside diameter shall be as per Table 4 of IS: 14885: 2022 with latest amendments.
- Ovality of Pipes shall be as per Table 5 of IS: 14885: 2022 with latest amendments.

## 9 COLOUR

Colour of PE – 100 pipes shall be orange as per Clause 4.4 of IS: 14885: 2022 with latest amendments

## 10 APPEARANCE/ FINISH

When viewed without magnification, the internal and external surfaces of the pipes should be smooth, clean and free from grooving, rings and poke marks and other surface defects which may affect the pipe performance. The ends shall be cut cleanly and square to the axis of the pipe and within the tolerance as per IS 14885.

## 11 SAMPLING, FREQUENCY OF TEST

- Type tests as defined in clause 9.1 and in Table 11 of IS 14885:2022 shall be done at least once in two years on each pressure rating for each grade/class of material. However, hydrostatic pressure resistance test at 80° C for 1000 h shall be done at least once in 4 years and at 20° C for 100 h once in two years in accordance with IS 14885.
- Three samples of the same pressure class and same size should be selected at random for each type test and shall be tested for compliance with the requirements as indicated against each tests mentioned in IS 14885 QAP.
- Scale of sampling for visual and dimensional requirements shall be in accordance with IS 14885.
- Scale of sampling for tests for hydraulic characteristics (including Notched pipes), Reversion test, Density, MFR, Thermal stability (OIT), Pigment dispersion and Tensile test shall be in accordance with IS 14885.
- These pipes shall be selected at random from the lot and in order to ensure the randomness of selection, a random number tables given in IS 4905 may be referred.

## 12 MARKING

12.1 Owner name shall be marked on each pipe.

- All pipes shall be permanently and legibly marked along their length with a legend by inkjet marking or by embossing which shall be impressed to a depth of not more than 0.2 mm.
- Marking details shall be formed in such a way that marking does not initiate cracks or other type of failure and in such a way that with normal storage weathering and processing and permissible method of installation use legibility shall be maintained for the pipe.

**12.2** Legends shall be repeated at intervals of 1 m and shall consist of following information:

- a) Owner Trade mark / Name or Brand (i.e. GUJARAT GAS)
- b) Material and designation (i.e. D-32, SDR-11, PE-100)
- c) Manufacturer's identity name or trade name
- d) Code & Standard (i.e. IS – 14885:2022)
- e) Batch no. or lot no
- f) Length of Coil at every meter.
- g) Manufacturing Date
- h) Service (i.e. GAS)

### **13 INSPECTION/DOCUMENTATION**

- Inspection shall be carried out as per Owner Technical Specification.
- Owner Representative shall carry out stage wise inspection during manufacturing / final inspection.
- Manufacture /Vendor shall furnish all the material test certificates, proof of approval / licence from specified authority as per specified standard, if relevant, internal test / inspection reports as per Owner Tech. Spec. & specified code for 100% material, at the time of final inspection of each supply lot of material. All the codes / documents shall be made available for reference of TPIA at the time of inspection.  
For any control, test or examination required under the supervision of TPIA/Owner/Owner's representative, latter shall be informed in writing one (1) week in advance by vendor about inspection date and place along with production schedule. GGL will hire TPIA for production witnessing and testing as per approved QAP.
- Even after third party inspection, Owner reserves the right to select a sample of pipes randomly from each manufacturing batch & have these independently tested. Should the results of these tests fall outside the limits specified in Owner technical specification, then Owner reserves the right to reject all production supplied from the batch.
- Pipe shall be free from any sign of localized swelling, no leakage or bursting during hydro testing as well as delivery at site.
- Pipe shall be free from scoring, cavities and other surface defects and pipe end shall be cut cleanly and square to the axis.
- Pipe end shall cleanly cut, square with the axis of pipe and protected against shocks and ingress of foreign bodies by appropriate end caps.
- Pipe end shall cleanly cut, square with the axis of pipe and protected against shocks and ingress of foreign bodies by appropriate end caps.
- Manufacture /Vendor to submit QAP along based on indicative QAP enclosed in the tender. However, the same QAP shall be submitted for approval to the Owner / Owner's representative before manufacturing. Manufacturing shall start only after approval of QAP.
- The successful Manufacture /Vendor shall submit following for approval of Owner/Owner's Representative after placement of order:
  - The quality assurance plan
  - Material test report as per clause 5 of IS: 4984: 1995 with latest amendments.
  - Performance requirements as per clause 5, 8, & 9 of IS: 14885: 2022 with latest amendments.
  - Type test as per clause no. 9.1 of IS: 14885: 2022 with latest amendments.

- As per the requirement of Owner for meeting amendments if any, in IS 14885, QAP may be modified without any additional cost implication.

#### 14 PACKAGING

- Packing shall be done for Pipe end cleanly cut, square with the axis of pipe and protected against shocks and ingress of foreign bodies by appropriate end caps.
- Both PE Films & hessian cloth packing to be done only for coils and only hessian cloth packing shall be sufficient for Straight length PE pipes, to avoid direct sunlight and facilitate out door storage and the ends shall be protected by proper end caps to prevent from shocks and ingress of the foreign body.
- Packing size to be mentioned to ensure uniformity in delivery conditions of the pipe being procured. Manufacturer shall submit the packaging details and also complied with at the time of delivery.
- Contractor or Manufacturer shall make an arrangement for unloading of pipes at Owner's premises.

#### 15 ENCLOSURE:

- **ANNEXURE-1: QAP of PE 100 – Orange, Raw Material as per IS – 14885-2022**

### ANNEXURE-1

#### Raw Material (As per IS 14885:2022) Properties:

Sr. No.	Test Parameter	Specification / Tolerance	Unit	Instrument	Test Method	Sample size / Frequency for TPIA	Inspection by		Remarks
							Manufacturer	TPIA	
1	Conventional Density (Base Polymer)	$\geq 930$ at 23°C	Kg/m <sup>3</sup>	Electronic Weighing Balance	IS 7328:2020	One sample for each lot/ batch of raw material used	P	W	
2	Melt Flow Rate (MFR)	$\pm 20\%$ of values nominated by compound producer at 190 °C & 5 kg load	gm/10 min.	Melt flow tester	IS 2530:1963		P	W	
3	Thermal Stability (OIT)	$\geq 20$ minutes @ 200°C	Minutes	OIT Tester	Annex B of IS 4984:2016		P	W	
4	Volatile Matter Content	$\leq 350$	mg/kg	Electronic balance, Oven	Annex C of IS 4984:2016		P	W	
5	Water Content	$\leq 300$	mg/kg	Electronic balance, Oven	Annex D of IS 4984:2016 & Table 2 of IS 14885:2022		P	W	Applicable if volatile content is not in conformity
6	Pigment Dispersion	$\leq 3$ grade	-	Hot Plate, Microscope	Annex A of IS 14885:2022		P	W	
7	Resistance to gas constituents	> 20 hours at 80 °C at an induced stress 2 Mpa	-	-	Cl 5.5 & Table 3 of IS 14885:2022		R	R	
8	Colour	Orange	-	--	Cl 4.4 of IS 14885:2022		R	R	
9	Anti-Oxidant UV Stabilizer	The percentage of Antioxidant used shall not be more than 0.3 % by mass & the percentage of UV Stabilizer used shall not be more than 0.5% by mass of finished resin	%	--	Cl 5.3 & 5.4 of IS 14885:2022	--	R	R	





10	Material (PE Compound Quality Evaluation)	Minimum required strength of material shall be 10 Mpa at 20 °C and material designation PE 100, For 10000 hrs shall be carried out once	-	--	Cl. 4.2.1 & Table 1 of IS 14885:2022	--	R	R	Type Test certificate Review
11	Resistance to rapid crack propagation	Refer Note under Table 3	-	-	ISO 4437-1 : 2014		R	R	Raw material supplier TC review
12	Resistance to slow cracking (SCR)	As per ISO 13479, $\geq 500$ hrs at 80°C	-	--	As per ISO 13479	As per Table 11 of IS:14885 - 2022	R	R	Raw material supplier TC review
13	Resistance to Growth of Cleavage fracture (RCP)	As per ISO 13477, $\geq 1.5 \times \text{MOP}$ bar at 0°C	-	--	As per ISO 13477, Ann E of IS 4984:2016		R	R	Raw material supplier TC review
14	Resistance to Weathering		-	--	As per clause no. 5.6 & Annex B of IS:14885 - 2022		R	R	Raw material supplier TC review

### QAP of PE 100 – Orange, Finished Gas Pipes/Coils as per IS – 14885-2022

Sr. No.	Test Parameter	Specification / Tolerance	Unit	Instrument	Test Method	Sample size / Frequency for TPIA	Inspection by		Remarks
							Manufacturer	TPIA	
1	Dimensions	As per IS 14885:2022			As per IS:14885 -2022/ GGL Technical Specification	As per clause No. 9.2.3 Table 13 of IS 14885:2022, 100% on-line witness of all pipes by TPIA			
	a) Wall Thickness of pipe	As per Cl 6.2, Table 6&7 of IS 14885: 2022	mm	Ball ended micrometer			P	W	
	b) Outer Diameter	As per Cl 6.1, Table 4 of IS 14885:2022	mm	Vernier calliper/PI Tape			P	W	
	c) Ovality	As per Cl 6.1, Table 5 of IS 14885:2022	mm	Vernier calliper			P	W	



2	Visual Check	Internal surface of pipe shall be smooth, clean & free from grooving, rings & poke marks(As per clause No. 7 & Table 8 of Is 14885-2022)	----	---			P	W	
3	Length	20mm-200 Mtr. Length 32mm-200 Mtr. Length 63mm-100 Mtr. Length 90mm-100 Mtr. Length 125mm-50 Mtr. Length	Mtr.	Measuring Tape			P	W	Shorter length pipes shall not be accepted.
4	Marking	Printing shall be done by Inkjet printers in black Colour. Legends shall be repeated at intervals of 1 m and shall consist of following information: i) Owner Trade mark / Name or Brand (i.e. GUJARAT GAS) j) Material and designation (i.e. D-32, SDR-11, PE-100) k) Manufacturer's identity name or trade name l) Code & Standard (i.e. IS – 14885:2022) m) Batch no. or lot no n) Length of Coil at every meter. o) Manufacturing Date p) Service (i.e. GAS)		Visual		100%			
5	Density(Base Polymer)	$\geq 930$ at 23 °C	Kg/m <sup>3</sup>	Electronic Balance			P	W	
6	Melt Flow rate(MFR)	$\pm 20\%$ of values nominated by compound manufacturer at 190 °C with normal load of 5 kgf	g/10 min	Melt flow tester			P	W	
7	Thermal stability(OIT)	$\geq 20$ at 200° C	Minutes	Vendor to specify			P	W	
8	Longitudinal reversion Test	Shall not be greater than 3 percent	%	Oven, vernier calliper			P	W	
	Circumferential Reversion of Pipes with $d_n \geq 250$ mm	Shall not be greater than the range on mean outside diameter specified in Table 4	mm	Hot water bath, PI tape/Vernier Calliper		Cl 8.2.2 of IS 14885:2022	P	W	



GUJARAT GAS

9	Resistance to slow crack growth	$\geq 500$ hrs at induced stress of 4.6 Mpa	Hrs	80°C	ISO 13479	ISO 13479	P	R	To be carried out on manufactured pipe once for each type of raw material and each manufacturer (Type Test)
10	Resistance To Weathering (Exposure to sunlight)				IS 14885	Annex B	P	R	Review of Type test Certificates
<b>HYDRAULIC CHARACTERISTICS</b>									
11	Plain Pipes	165 Hrs. at 80° C & Induced stress 5.4 Mpa (No sign of localized swelling, leakage or weeping, and shall not burst during the prescribed test duration)	Hrs.	Hydraulic test machine with accessories	IS 14885-2022	All samples for hydro test will be taken from first batch Nos. of pipe, clause No. 8.1 Table 14, 9 of IS 14885-2022	P	W	
12	Notched Pipes	165 Hrs. at 80° C & Induced stress 4.6 Mpa (No sign of localized swelling, leakage or weeping, and shall not burst during the prescribed test duration)	Hrs.				P	W	Applicable to pipes of size 63mm and above
13	Plain pipes	Hydrostatic strength at 80° C for 1000 h. Induced stress 5 mpa	Hrs				P/R	R	Type test-Once in 4 years



14	Plain Pipes(Type Test)	100 Hrs. at 20° C & Induced stress 12.0 Mpa (No sign of localized swelling, leakage or weeping, and shall not burst during the prescribed test duration)	Hrs			One sample per lot testing as per Table 9,11 of IS 14885-2022	P	W	
15	Squeeze off Test(Type Test)	165 Hrs. at 80° C & Induced stress 5.4 Mpa (No sign of localized swelling, leakage or weeping, and shall not burst during the prescribed test duration)	Hrs				P	W	
16	Volatile content	≤350	mg/K g	Electronic balance & Hot air oven			P	W	
17	Tensile Test	Min 15	Mpa	Tensile tester		As per clause No. 9.2.4 Table 14 of IS: 14885-2022	P	W	
18	Elongation at break	Min 350	%	Tensile Tester			P	W	
19	Pigment Dispersion	≤3	Grade	Microscope			P	W	
20	Packing & transportation of coiled & plain pipes	Annex K of IS 14885-2022	---	Visual Check		Every coil or length of pipe extruded	P	W	PE film and hessain cloth wrapping shall be done after inspection

**Note:-**

- 1) TPIA-Third Party Inspection Agency, P-Perform, W-Witness, R-Review internal test record
- 2) On issuance of work order, vendor shall follow furnished QAP in GGL Tender. In case of any revision/amendment GGL shall furnish QAP in line with IS 14885: latest edition.
- 3) All external labs, if used for testing shall be NABL accredited.
- 4) All MDPE Gas pipes shall be manufactured, tested and designed as per IS 14885:2022 or latest

GUJARAT GAS

**TECHNICAL SPECIFICATION FOR PROCUREMENT OF  
ELECTROFUSION FITTINGS (PE-100)**

**Document No. : GGL/TS/EF FITTINGS/2015**

01	Pre-bid clarification and QAP included	06/06/2018
REV. NO	REVISION DESCRIPTION	DATE OF ISSUE

NAME OF COMPANY	GUJARAT GAS LTD.		
	NAME	DESIGNATION	SIGN & DATE
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## 1.0 INTRODUCTION AND SCOPE

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various Geographical Areas as per authorisation from PNGRB.

The intent of this specification is to establish minimum requirements to manufacture, testing and supply of Polyethylene (PE) Electrofusion Fittings for the supply of Natural gas.

The scope of the tender will include manufacture, supply, inspection, testing, marking, packaging, handling and despatch of Polyethylene (PE) Electrofusion Fittings as per EN 1555-3 : 2002 / ISO 8085-3 with latest amendments.

All codes and standards for manufacture, testing, inspection etc shall be of latest edition.

Owner reserves the right to delete or order additional quantities during execution of order, based on unit rates and other terms & conditions in the original order.

Following PE Electro-fusion fittings shall be supplied under this specifications.

- Electro-fusion Coupler/Elbow/Eq. Tee/End Cap/Reducer fitting
- Electro-fusion saddle / Tapping Tee fitting

## 2.0 REFERENCE CODES AND STANDARDS:

### 12.1 Governing Standards

PNGRB T4S	Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks.
EN 1555-3	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-3 Fittings

### 12.2 Reference Standards

IS 14885	Polyethylene pipes for the supply of Gaseous Fuels -- Specifications
EN 1555-1	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-1 : General
EN 1555-2	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-2 : Pipes
EN 1555-5	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-5 : Fitness for the purpose of the system
EN 1555-7	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-7 : Guidance for assessment of conformity
EN 682	Elastomeric seals – Material requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids
EN 728	Plastic piping and ducting systems – Polyolefin pipes and fittings – Determination of oxidation induction time.
EN 921	Plastic piping systems – Thermoplastic pipes – Determination of resistance to internal pressure at constant temperature.

EN 1716	Plastic piping systems – Polyethylene (PE) tapping tees – test method for impact resistance of an assembled tapping tee.
EN 12117	Plastic piping systems – Fittings, valves and ancillaries – determination of gaseous flow rate/pressure drop relationship
EN 12099	Plastic Piping Systems — Polyethylene piping materials and components — Determination of volatile content
EN ISO 1133	Plastics- Determination of melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics
ISO 1183	Plastics — Methods for determining the density of non cellular plastics
ISO 13954	Plastics pipes and fittings -- Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm
ISO 13955	Plastics pipes and fittings -- Crushing decohesion test for polyethylene (PE) electrofusion assemblies
ISO 13956	Plastics pipes and fittings -- Decohesion test of polyethylene (PE) saddle fusion joints -- Evaluation of ductility of fusion joint interface by tear test
ISO 13953	Polyethylene (PE) pipes and fittings -- Determination of the tensile strength and failure mode of test pieces from a butt-fused joint

### 3.0 DEFINITIONS

OWNER / CLIENT	Gujarat Gas Ltd., (GGL)
PNG	Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated / controlled, odorized & distributed through pipelines for various applications, i.e. for industrial, commercial and domestic.
Manufacturer	Manufacturer of PE Electro-fusion Fittings
Vendor	The person(s), firm, company, organization from whom Client/Contractor procures materials.
TPA	Third Party Inspection Agency
EIC	Engineer In Charge
PNGRB	Petroleum and Natural Gas Regulatory Board
T4S	Technical Standard and Specification including Safety Standards,

### 4.0 MATERIAL

#### Compound

The compound of PE 100 grade from which the fittings are made shall conform to EN 1555-1 (latest edition).



### **Material for non-polyethylene parts**

PE pipes conforming to EN 1555-2:2002 and the requirements for the level of material performance of non-polyethylene parts shall be at least as stringent as that of the compound for the piping system

### **Elastomers**

Elastomeric seals shall conform to EN 682 and other sealing materials are permitted if suitable for gas service.

### **Other Materials**

Greases or lubricants shall not enter into fusion areas, and shall not affect the long-term performance of fitting materials

Other materials may be used provided that it is proven that the fittings conform to this standard.

## **5.0 MECHANICAL PROPERTIES / TESTING**

- Fittings shall be tested using pipes, which conform to EN 1555-2.
- Jointed pipe and fitting test pieces shall be assembled in accordance with the technical instructions of the manufacturer and take into account the limit conditions of utilisation described in EN 1555-5.
- The sample test assemblies shall take account of manufacturing and assembly tolerances.
- In the event of modification of the jointing parameters, the manufacturer shall ensure that the joint conforms to the requirements given in clause 7.2 of as per EN 1555-3.
- Unless otherwise specified by the applicable test method, the test pieces shall be conditioned at  $(23 \pm 2)$  °C before testing in accordance with Table 4 of as per EN 1555-3.
- When tested in accordance with the test methods as specified in Table 4 of EN 1555-3 using the indicated parameters, the fittings shall have mechanical characteristics conforming to the requirements given in Table 4, as applicable to the following types of fitting :
  - Electro-fusion socket fitting;
  - Electro-fusion saddle/Tapping fitting;

## **6.0 PHYSICAL CHARACTERISTICS**

The physical characteristics of electro-fusion fittings shall conform to the requirements of Table 6 of clause 8.2 as per EN 1555-3.

## **7.0 PERFORMANCE REQUIREMENT**

When electro-fusion fittings conforming to this standard are assembled to each other or to components conforming to other parts of EN 1555, the joints shall conform to EN 1555-5.

## **8.0 HYDROSTATIC PRESSURE TEST**

Electro-fusion fittings shall confirm to the requirements of Table 4 of clause 7.2 as per EN 1555-3.

## **9.0 PNEUMATIC PRESSURE TEST**

Electro-fusion fittings shall be leak tightness tested and confirm to the requirements of Table 4 of clause 7.2 as per EN 1555-3.

## **10.0 DIMENSIONAL TOLERANCES**

Dimensions tolerances of various types of Electro-fusion fitting shall be as per EN 1555-3.

### **Measurement of dimensions**

Dimensions shall be measured at  $23 \pm 2$  °C, after being conditioned for at least 4 h. The measurement shall not be made less than 24 h after manufacture of fittings.

### **Diameters and lengths**

The electro-fusion socket diameter and lengths shall conform to Table 1 and clause 6.2 of as per EN 1555-3.

Outlets from tapping tees and branch saddles shall conform to clause of 6.4 of as per EN 1555-3.

The dimensions of spigot end fittings shall conform to Table 3 and clause of 6.4 of as per EN1555-3.

Mechanical fittings with polyethylene spigot ends (Polyethylene spigot ends) shall conform to 6.4.

Mechanical fittings with polyethylene electro-fusion sockets shall conform to 6.2.

### **Wall Thickness**

The minimum wall thickness of a fitting shall be SDR 11 in accordance as per Clause of 6.2.2 and Table 2 of as per EN 1555-3.

### **Wall thickness of the fusion end**

The wall thickness of the fusion end shall be at least equal to the minimum wall thickness of the pipe, except between the plane of the entrance face and a plane parallel to it, located at a distance not greater than  $(0.01 D_e + 1 \text{ mm})$ , where a thickness reduction for e.g. a chamfered edge is permissible.

### **Wall thickness of the fitting body**

The wall thickness of the fittings are as per SDR 11.

The permissible tolerance of the wall thickness at any point shall conform to those of the nominal wall thicknesses given in EN 1555-2.

Any changes in wall thickness of the fitting body shall be gradual in order to prevent stress concentrations.

### **Out-of-roundness of the bore of a fitting (at any point)**

When a fitting leaves the site of the manufacturer, the out-of-roundness of the bore of a fitting at any point shall not exceed 0,015dn.

## **11.0 COLOUR**

The colour of the PE parts of fittings shall be black.

## 12.0 QUALITY ASSURANCE (QA)

The Contractor/Manufacturer /Vendor shall manufacture, supply, inspection, testing, marking, packaging, handling and dispatch of Polyethylene (PE) Electrofusion Fittings as per EN 1555-3: 2002 with latest amendments and GGL QAP.

### Quality Assurance of Company Procured Material

The Contractor/Manufacturer /Vendor shall submit QAP after getting firm order from Owner for their review and approval. Prior dispatching of materials, vendor shall offer material lot to TPA/Owner for inspection as per approved QAP at their premise following for review of TPA / EIC at the time of final inspection at vendor premise prior to dispatch of materials.

### Quality Assurance of Contractor Procured Material

The Contractor/Manufacturer /Vendor after getting firm order from Contractor shall manufacture, supply, inspection, testing, marking, packaging, handling and dispatch Polyethylene (PE) Electrofusion Fittings as per EN 1555-3: 2002 / ISO 8085-3 with latest amendments and GGL QAP.

## 13.0 INSPECTION / DOCUMENTS

Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and approved QAP.

### Inspection of Company Procured Material

- i. Inspection of Company Procured Material TPA /GGL Representative shall carry out final inspection at vendor premise prior to dispatching of materials.
- ii. TPA / GGL Representative shall carry out inspection during manufacturing/ final inspection as per approved QAP.
- iii. Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- iv. Even after third party inspection, OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- v. Deputation of TPA is in the scope of the Vendor.

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

### Inspection of Contractor Procured Material

- i. Vendor Representative shall carry out final inspection at his premise prior to dispatching of materials as per GGL QAP provided with the tender document.
- ii. For inspection at contractor premises by TPA/ GGL Representative, latter shall be informed in writing one (1) week in advance by contractor about inspection date & place along with inspection schedule.

- iii. Contractor shall furnish all the material test certificates, type test reports, internal test/ inspection reports as per OWNER Technical Specification and QAP, at the time of final inspection of each supply lot of material.
- iv. OWNER reserves the right to select a sample of items randomly from each batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- v. Inspection of the material shall be carried out as per GGL IMS procedure “ Quality Assurance for Contractor procured material”.

#### **14.0 MARKING**

Electro-fusion fittings marking shall confirm to the requirements of clause 10 as per EN 1555-3.

The minimum required marking shall conform to Table 7 of EN 1555-3.

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

- a) Number of the System Standard- EN 1555
- b) Manufacturer's name and/or trademark
- c) Bar code
- d) Nominal outside diameter(s) of pipe, dn (i.e. 20, 32, 63mm etc.)
- e) Material and designation (PE 100)
- f) Design application series
- g) SDR fusion range ( SDR 11)
- h) Manufacturer's information
- i) Internal fluid ( i.e. Gas)
- j) Month and year of manufacturing

#### **15.0 PACKAGING**

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Manufacturer / Supplier / Vendor shall submit the packaging details and also complied with at the time of delivery.

#### **16.0 DOCUMENTS OF PRECEDENCE**

In case of conflict between the requirements of this specification and the Reference Codes & Standards, the requirements of the specification, having stringent requirement, shall govern. Vendor shall obtain prior permission from GGL in such cases.

## 17.0 QUALITY ASSURANCE PLAN

S.No	Description	Quantum of check	Reference Document GGL Technical Specification	Acceptance Criteria	Inspection Methodology	Format of Record	INSPECTION		Remarks
							Manuf. / Supplier	TPA/ GGL	
1	Raw Material Inspection								
1.1	Density		As per EN 1555-Part 1 & EN ISO 1183	≥930 Kg / M <sup>3</sup> at 23°C			P	R	
1.2	Oxidation induction time (Thermal stability)		As per EN 1555-Part 1 & EN 728	>20 min at 200°C			P	R	
1.3	Melt mass flow rate (MFR)		As per EN 1555-Part 1 & EN ISO 1133	Min. 0.2 to 1.40 at 190°C & 5Kg. Load in gm/10 Min.			P	R	
1.4	Volatile Content		As per EN 1555-Part 1 & EN 12099	≤ 350 mg/kg			P	R	Not applicable if water content test reports are available.
1.5	Water Content (Moisture Content)		As per EN 1555-Part 1 & ISO 15512	< 300 mg/kg (Equivalent to < 0.03% by mass)			P	R	Only applicable, if the measured volatile content is not in conformity to its specified requirement. In case of dispute the requirement of water content shall be used. As an alternative method, ISO 760:1978 may apply
1.6	Carbon Black Content		As per EN 1555-Part 1 & ISO 6964	2 to 2.5% by mass			P	R	
1.7	Carbon Black Dispersion		As per EN 1555-Part 1 & ISO 18553	Grade ≤3			P	R	
1.8	Antioxidant and UV Stabilizer	-	PNGRB T4S- G.S.R. 612(E).	The Antioxidant used is not more than 0.3% and U V Stabilizer used are not more than 0.5% by mass of finished resin	Declaration from Raw Material Supplier and Fitting Manufacturer	Declaration from Raw Material Supplier and Fitting Manufacturer	P	R	
1.9	Cadmium Free Pigmented compound material			Material shall be cadmium free pigmented compound					
1.10	Polyethylene -Virgin Material			Polyethylene resin used for manufacture of thermoplastic fittings shall be virgin,					
2	Performance requirements								
2.1	Appearance	As per EN 1555-Part 7	Free from scoring, cavities and other surface defects and Cut cleanly and square to the axis. Smooth & clean Should be free grooves, scoring etc.	EN 1555-3/GGL Technical Spec.	Visual	Inspection Report	P	Rv	
2.2	Colour		GGL Technical Spec. / EN 1555-3	Black	Visual	Inspection Report	P	V	
2.3	Geometrical Characteristics		GGL Technical Spec. / EN 1555-3	EN 1555-3/GGL Technical Spec.	Vernier Calliper	Inspection Report	P	V	
2.4	Hydrostatic Strength (80° C, 165 h)	As per EN 1555-Part 7	EN 1555-Part 3 Clause No. 7.2 Table-4 & EN 921	EF fitting joint shall withstand the hydrostatic pressure throughout the test period. No leakages are allowed through fusion area.	Hydrostatic Pressure Test.	Inspection Report	P	R	
2.5	Oxidation induction time (Thermal stability)		EN 1555-Part 3 Clause No. 8.2, EN 12117 & EN 728	>20 min at 200°C		Inspection Report	P	R	
2.6	Melt mass-flow rate (MFR)		EN 1555-Part 3 Clause No. 8.2, EN 12117 & EN ISO 1133	After processing maximum deviation of ± 20 % of the value measured on the batch used to manufacture the fitting at 190°C & 5Kg. Load in gm/10 Min. Test Parameters as per Table 6 of EN 1555-3	Melt Flow Tester	Inspection Report	P	R	
2.7	Electric Resistance		EN 1555-Part 3 Clause No. 5.5	Resistance of the fitting at 23°C shall be as specified by the fitting manufacturer.	Resistance measurement		P	R	
2.8	Marking	As per EN 1555-Part 7	EN 1555-Part 3 Clause No. 10.2 & 10.3	a) Number of the System Standard- EN 1555 b) Manufacturer's name and/or trademark c) Barcode d) Nominal size of Fitting e) Material and designation f) Design application series ( i.e SDR - 11) g) Applicable SDR fusion range of pipe ( i.e SDR 11 to SDR 26 ) h) Manufacturer's information i) Internal Fluid ( i.e. Gas) j) Month and year of manufacturing.(A code may be provided e.g batch No -- 16/02)	Visual	Inspection Report	P	Rv	
2.9	Packing		EN 1555-Part 3	EN 1555-Part 3	Visual	Inspection Report	P	V	
2.10	Documentation		EN 1555-Part 3	As per the term & conditions of GGL Technical Specification	Visual	Compliance Certificate	P	R	
LEGENDS: Rv- Random Verification, V- Verification, W - Witness, R - Review of Documents / test certificates, H - Hold, P - Perform, TPA- Third Party Agency									
Notes: -									
1 In addition to above tests, Vendor shall submit Type Test report as per Table-4 of EN 1555-7									
2 The Above Testing and acceptance criteria are minimum requirements, however, Vendor shall ensure that the execution of works shall also comply to the additional requirements as per GGL Technical specifications(TS) & EN 1555-1, EN-1555-3 & EN 1555-7									

GUJARAT GAS

TECHNICAL SPECIFICATION – WELD END TRANSITION FITTINGS

Document No. : GGL/TS/WE-TF/2016 REV. 00

01	QAP included	06/06/2018
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NAME OF COMPANY	GUJARAT GAS LTD.		
	NAME	DESIGNATION	SIGN & DATE
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Approved by	Raghunath Kulai	Sr. Vice President (Technical Services)	<i>[Signature]</i>

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## 1.0 INTRODUCTION AND SCOPE

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various Geographical Areas as per authorisation from PNGRB.

The scope of the tender will include manufacture, supply, inspection, testing, marking, packaging, handling and despatch of Transition Fittings.

All codes and standards for manufacture, testing, inspection etc. shall be of latest edition.

Owner reserves the right to delete or order additional quantities during execution of order, based on unit rates and other terms & conditions in the original order.

## 2.0 REFERENCE CODES AND STANDARDS:

### Governing Standards

PNGRB T4S	Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks.
EN 1555-3	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-3 Fittings
IS 14885:	Polyethylene pipes for the supply of Gaseous Fuels – Specifications
API 5L	Specification for Line Pipe

### Reference Standards

EN 1555-1	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-1 : General
EN 1555-1	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-2 : Pipes
EN 1555-5	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-5 : Fitness for the purpose of the system
EN 1555-7	Plastic piping systems for the supply of gaseous fuels - Polyethylene (PE) Part-7 : Guidance for assessment of conformity
EN 682	Elastomeric seals – Material requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids
EN 728	Plastic piping and ducting systems – Polyolefin pipes and fittings – Determination of oxidation induction time.
EN 921	Plastic piping systems – Thermoplastic pipes – Determination of resistance to internal pressure at constant temperature.
EN 1716	Plastic piping systems – Polyethylene (PE) tapping tees – test method for impact resistance of an assembled tapping tee.
EN 12117	Plastic piping systems – Fittings, valves and ancillaries – determination of gaseous flow rate/pressure drop relationship



EN 12099:	Plastic Piping Systems — Polyethylene piping materials and components — Determination of volatile content
EN ISO 1133:	Plastics- Determination of melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics
ISO 1183:	Plastics — Methods for determining the density of non cellular plastics
ISO 13954	Plastics pipes and fittings -- Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm
ISO 13955	Plastics pipes and fittings -- Crushing decohesion test for polyethylene (PE) electrofusion assemblies
ISO 13956	Plastics pipes and fittings -- Decohesion test of polyethylene (PE) saddle fusion joints -- Evaluation of ductility of fusion joint interface by tear test
ISO 13953	Polyethylene (PE) pipes and fittings -- Determination of the tensile strength and failure mode of test pieces from a butt-fused joint

### 3.0 DEFINITIONS

OWNER / CLIENT	Gujarat Gas Ltd., (GGL)
Manufacturer	Manufacturer of Transition Fittings
Vendor	The person(s), firm, company, organization from whom Client/Contractor procures materials.
TPA	Third Party Inspection Agency
EIC	Engineer In Charge
PNGRB	Petroleum and Natural Gas Regulatory Board
T4S	Technical Standard and Specification including Safety Standards

### 4.0 MATERIAL

To make connection between steel pipe and PE 100 pipe specially fabricated transition fittings consisting of steel and PE 100 pipes should conform to the requirement described below.

#### PE 100 Pipe

The PE 100 pipe with one end plain should conform to the specification of SDR 11, black of IS: 14885 or ISO: 4437 of latest edition.

#### Steel Pipe

Black ERW steel pipe should conform to the specification as laid in API 5L / ASTM A 106 (latest edition).

Steel Pipe Nominal Bore	1" NB	2" NB	3" NB	4" NB
Steel Pipe Wall Thickness (mm)	4.0	4.5	4.8	5.4
Tolerance on Steel pipe Wall Thickness	-10% / + Not limited	-10% / + Not limited	-10% / + Not limited	-10% / + Not limited

End of the steel pipe should be bevelled for welding angle and bevel should be 30° +5°.

#### **Jointing between Steel and PE 100 Pipes**

Steel and PE 100 Pipes should be so jointed in the factory so as to have a monolithic joint which is leak free and should be mechanically as strong or stronger than the PE pipe.

### **5.0 MECHANICAL PROPERTIES / TESTING**

**Soundness Test** - No leakage from any part of the body and joint at 10 kg/cm<sup>2</sup> Pneumatic Pressure

**Test of Strength of Mechanical Crimping** – Min 250 kg/cm<sup>2</sup>

**Free from defects** - Free from crack, porosity, tear mark, blowholes, zinc lumpiness, deep gauges on PE pipes, crimping of sleeves and other defects

**Other Materials** - Greases or lubricants shall not enter into fusion areas, and shall not affect the long-term performance of fitting materials

**Test Certificate Requirement** – Yes

Other tests shall be carried as per the approved QAP

### **6.0 COLOUR**

The colour of the PE parts of Transition fittings shall be black.

### **7.0 QUALITY ASSURANCE (QA)**

The Contractor/Manufacturer /Vendor shall manufacture, supply, inspection, testing, marking, packaging, handling and dispatch of Polyethylene (PE) Electrofusion Fittings as per GGL technical specification and GGL QAP.

#### **Quality Assurance of Company Procured Material**

The Contractor/Manufacturer /Vendor shall submit QAP after getting firm order from Owner for their review and approval. Prior dispatching of materials, vendor shall offer material lot to TPA/Owner for inspection as per approved QAP at their premise following for

review of TPA / EIC at the time of final inspection at vendor premise prior to dispatch of materials.

### **Quality Assurance of Contractor Procured Material**

The Contractor/Manufacturer /Vendor after getting firm order from Contractor shall manufacture, supply, inspection, testing, marking, packaging, handling and dispatch Polyethylene (PE) Electrofusion Fittings as per EN 1555-3: 2002 / ISO 8085-3 with latest amendments and GGL QAP.

## **8.0 INSPECTION / DOCUMENTS**

Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and approved QAP.

### **Inspection of Company Procured Material**

- i. TPA /GGL Representative shall carry out final inspection at vendor premise prior to dispatching of materials.
- ii. TPA / GGL Representative shall carry out inspection during manufacturing/ final inspection as per approved QAP.
- iii. Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- iv. Even after third party inspection, OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- v. Deputation of TPA is in the scope of the Vendor.

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

### **Inspection of Contractor Procured Material**

- i. Vendor Representative shall carry out final inspection at his premise prior to dispatching of materials as per GGL QAP provided with the tender document.
- ii. For inspection at contractor premises by TPA/ GGL Representative, latter shall be informed in writing one (1) week in advance by contractor about inspection date & place along with inspection schedule.
- iii. Contractor shall furnish all the material test certificates, type test reports, internal test/ inspection reports as per OWNER Technical Specification and QAP, at the time of final inspection of each supply lot of material.

- iv. OWNER reserves the right to select a sample of items randomly from each batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- v. Inspection of the material shall be carried out as per GGL IMS procedure Quality Assurance for Contractor procured material”.

## **9.0 MARKING**

Marking must be permanently legible for the product life under standard stocking condition, exposure to external weather condition, installation and use.

At least the information given below shall be printed on each Transition Fitting.

- a) Number of the system standard-EN 1555/API 5L
- b) Manufacturer's name and/or trademark
- c) Barcode
- d) Nominal size of fitting
- e) Material and designation of steel and PE
- f) Design application series
- g) SDR fusion range ( SDR 11)
- h) Manufacturer's information
- i) Internal fluid ( i.e. Gas)
- j) Month and year of manufacturing

## **10.0 PACKAGING**

Transition Fitting shall be packaged individually in plastic bag in order to prevent deterioration. Both ends (Steel and PE) shall be protected with external temporary caps.

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

## **11.0 QUALITY ASSURANCE PLAN**

S.No	Description	Quantum of check	Reference Document GGL Technical Specification	Acceptance Criteria	Inspection Methodology	Format of Record	INSPECTION		Remarks
							Manuf. / Supplier	TPA/GGL	
<b>1</b>	<b>Raw Material Inspection</b>								
1.1	Steel Pipe	EN 1555-7	As per API 5L Gr. B / ASTM A 106 Gr B	Mechanical and Chemical properties as per API 5L Gr. B	MTC	MTC of supplier / manufacture	P	R	
1.2	Density		As per EN 1555-Part 1 & EN ISO 1183	≥930 Kg / M <sup>3</sup> at 23°C			P	R	
1.3	Oxidation induction time (Thermal stability)		As per EN 1555-Part 1 & EN 728	>20 min at 200°C			P	R	
1.4	Melt mass flow rate (MFR)		As per EN 1555-Part 1 & EN ISO 1133	Min. 0.2 to 1.40 at 190°C & 5Kg. Load in gm/10 Min.			P	R	
1.5	Volatile Content		As per EN 1555-Part 1 & EN 12099	≤ 350 mg/kg			P	R	Not applicable if water content test reports are available.
1.6	Water Content (Moisture Content)		As per EN 1555-Part 1 & ISO 15512	< 300 mg/kg (Equivalent to < 0.03% by mass)			P	R	Only applicable, if the measured volatile content is not in conformity to its specified requirement. In case of dispute the requirement of water content shall be used. As an alternative method, ISO 760:1978 may apply
1.7	Carbon Black Content		As per EN 1555-Part 1 & ISO 6964	2 to 2.5% by mass			P	R	
1.8	Carbon Black Dispersion		As per EN 1555-Part 1 & ISO 18553	Grade ≤3			P	R	
1.9	Antioxidant and UV Stabilizer	-	PNGRB T4S- G.S.R. 612(E).	The Antioxidant used is not more than 0.3% and U V Stabilizer used are not more than 0.5% by mass of finished resin	Declaration from Raw Material Supplier and Fitting Manufacturer	Declaration from Raw Material Supplier and Fitting Manufacturer	P	R	
1.10	Cadmium Free Pigmented compound material			Material shall be cadmium free pigmented compound					
1.11	Polyethylene -Virgin Material			Polyethylene resin used for manufacture of thermoplastic fittings shall be virgin,					
<b>2</b>	<b>Performance requirements</b>								
2.1	Soundness Test	Each Batch	GGL Technical Specification	No leakage from any part of the body and joint at 10 kg/cm <sup>2</sup>	Pneumatic test	Inspection Report	P	R	
2.2	Test of Strength of Mechanical Crimping	Each Batch	GGL Technical Specification	Min 250 kg/cm <sup>2</sup>	Mechanical Test.	Inspection Report	P	R	
2.3	Bevel End Angle		GGL Technical Spec	Bevel End Angle shall be 30 deg. + 5 deg.	Visual	Inspection Report	P	Rv	
2.4	Appearance	As per EN 1555-Part 7	Free from scoring, cavities and other surface defects and Cut cleanly and square to the axis. Smooth & clean Should be free grooves, scoring etc.	EN 1555-3/GGL Technical Spec.	Visual	Inspection Report	P	Rv	
2.5	Colour		GGL Technical Spec. / EN 1555-3	Black	Visual	Inspection Report	P	V	
2.6	Geometrical Characteris		GGL Technical Spec. / EN 1555-3	EN 1555-3/GGL Technical Spec.	Vernier Calliper	Inspection Report	P	V	
2.7	Hydrostatic Strength (80° C, 165 h)	As per EN 1555-Part 7	EN 1555-Part 3 Clause No. 7.2 Table-4 & EN 921	EF fitting joint shall withstand the hydrostatic pressure throughout the test period. No leakages are allowed through fusion area.	Hydrostatic Pressure Test.	Inspection Report	P	R	
2.8	Oxidation induction time (Thermal stability)		EN 1555-Part 3 Clause No. 8.2, EN 12117 & EN 728	>20 min at 200°C		Inspection Report	P	R	
2.9	Melt mass-flow rate (MFR)		EN 1555-Part 3 Clause No. 8.2, EN 12117 & EN ISO 1133	After processing maximum deviation of ± 20 % of the value measured on the batch used to manufacture the fitting at 190°C & 5Kg. Load in gm/10 Min. Test Parameters as per Table 6 of EN 1555-3	Melt Flow Tester	Inspection Report	P	R	
2.10	Electric Resistance		EN 1555-Part 3 Clause No. 5.5	Resistance of the fitting at 23°C shall be as specified by the fitting manufacturer.	Resistance measurement		P	R	
2.11	Marking	As per EN 1555-Part 7	EN 1555-Part 3 Clause No. 10.2 & 10.3	a) Number of the System Standard- EN 1555 b) Manufacturer's name and/or trademark c) Barcode d) Nominal size of Fitting e) Material and designation f) Design application series ( i.e SDR - 11) g) Applicable SDR fusion range of pipe ( i.e SDR 11 to SDR 26 ) h) Manufacturer's information i) Internal Fluid ( i.e. Gas) j) Month and year of manufacturing.(A code may be provided e.g batch No -- 16/02)	Visual	Inspection Report	P	Rv	
2.12	Packing		EN 1555-Part 3	EN 1555-Part 3	Visual	Inspection Report	P	V	
2.13	Documentation		EN 1555-Part 3	As per the term & conditions of GGL Technical Specification	Visual	Compliance Certificate	P	R	

**LEGENDS:** Rv- Random Verification, V- Verification, W - Witness, R - Review of Documents / test certificates, H - Hold, P - Perform, TPA- Third Party Agency

**Notes:-**

1 In additional to above tests, Vendor shall submit Type Test report as per Table -4 of EN 1555-7

2 The Above Testing and acceptance criteria are minimum requirements, however, Vendor shall ensure that the execution of works shall also comply to the additional requirements as per GGL Technical specifications(TS) & EN 1555-1, EN-1555-3 & EN 1555-7

# TECHNICAL SPECIFICATIONS

## FOR BRASS ISOLATION BALL VALVE

Document No: GGL/TS/PE-PNG/SUPPLY/ISOVLV/SPEC

01	Cl 1 and 17	Revision as per pre bid queries- Standards “with latest edition/ammendemt”, reference of GAD added	16.11.2023
00	-	Issued for Tendering	23.02.2023
REV. NO	CLAUSE NO.	REVISION DESCRIPTION	DATE OF ISSUE

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## **1. INTRODUCTION & SCOPE**

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various Geographical Areas as per authorization from PNGRB.

The intent of this specification is to establish minimum requirements to manufacture and supply of Manually Operated Isolation (Ball) Valves of sizes of ½" Dia., 1" Dia. & 1.5" Dia. made from Brass material for PNG Connection at Customers end.

The scope will include manufacture, supply, inspection, testing, marking, packaging, handling and dispatch of Manually Operated Isolation (Ball) Valves of ratings and grades as per EN 331 or latest edition/amendments.

## **2. REFERENCE CODES AND STANDARDS:**

### **2.1 GOVERNING STANDARDS**

PNGRB T4S: Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks.

EN 331 Manually operated ball valves and closed bottom taper plug valves for gas installations in buildings

### **2.2 REFERENCE STANDARDS**

IS 319 Free Cutting Brass Bars, Rods and Section

ASTM B 283 Standard Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)

EN 549 Specification for rubber materials for seals and diaphragms for gas appliances and gas equipment

EN 377 Lubricants for applications in appliances and associated controls using combustible gases except those designed for use in industrial processes

ISO 7 Pipe threads where pressure-tight joints are made on the threads

ISO 228 Pipe threads where pressure-tight joints are not made on the threads

ISO 261 ISO General purpose metric screw threads - General Plan

IS 554 Pipe threads where pressure-tight joints are made on the threads

In case of conflict between the requirements of this specification and the Reference Codes & Standards, the requirements of the specification, having stringent requirement, shall govern. Vendor shall obtain prior permission from GGL in such cases.



### 3. DEFINITION

For this specification the following definitions shall apply:

OWNER/ CLIENT	:	GUJARAT GAS LIMITED,
MANUFACTURER	:	Means the Manufacturer of Brass Isolation Valves.
VENDOR	:	The person(s), firm, company, organization from whom Client / Contractor procures materials
TPIA	:	Third Party Inspection Agency authorized by GUJARAT Gas for inspection of material

### 4. CLASSIFICATION OF VALVES

#### Pressure Class

Pressure Class is divided into three Classes, corresponding to maximum working pressure as follows:

Sr. No.	Class	Pressure Range
1	0.2 MOP	0 to $0.2 \times 10^5$ Pa
2	0.5 MOP	0 to $0.5 \times 10^5$ Pa
3	5.0 MOP	0 to $5 \times 10^5$ Pa

#### Temperature Classes

Temperature Class is divided into three Classes, corresponding to temperature as follows:

Sr. No.	Class	Temperature Range
1	- 5 °C	- 5 °C to 60 °C
2	- 20 °C	- 20 °C to 60 °C
3	- 40 °C	- 40 °C to 60 °C

### 5. MATERIAL

- The material of isolation valve (Ball, Stem, Bonnet & body) shall conform to ASTM B283/ Alloy UNS C37700 or IS 319
- The material of any part in contact with the gas to the surrounding atmosphere, shall be from the corrosion resistant material or shall be suitably protected and shall withstand the humidity test as per clause of 7.6.5 & 7.6.4 of EN 331 or Latest edition.
- Springs and other moving parts which shall be suitable protected against corrosion and shall retain their protective coating despite any movement resulting from the operation of the valve.
- All marking shall be durable and resistant to atmosphere conditions. Labels and their markings shall neither deteriorate nor lift nor become unreadable by humidity and temperature.
- Rubber materials shall confirm to EN 549 and Lubricants shall conform to EN 377.

## **6. CONSTRUCTION**

- a) Valves shall be designed in such a way that once installed, it is impossible to remove the closure member or a seal without damaging the valve or leaving clear signs of tempering on it.
- b) Valves designed to be maintained shall be such that it is difficult to remove parts serving to seal against gas without specialist knowledge and that any tampering is evident and incorrect reassembly is impossible.
- c) All valves components shall be free from burrs and clean (e.g free from swarf and core-sand) and shall be of sound manufacture. All valve components shall be free from sharp edges and corners which could be cause of damage, injury or incorrect operation, when viewed with the naked eye.
- d) Seals for moving parts which separate gas ways from the atmosphere, shall maintain their original leak-tightness without any manual adjustment.
- e) If a spring is used, the two end faces of the spring shall be parallel and perpendicular to the axis of the spring. The end coils of a spring shall not damage their mating faces.
- f) The wall thickness from any gas way to atmosphere to holes connected to the atmosphere shall not be less than 1 mm. Holes for screws, pins, etc which are used for the assembly of part and for mounting, shall not provide any leak path between gas ways and the atmosphere.
- g) Valve in the fully closed position, the angular distance between the gas port in the closure member and both the inlet port and outlet port in the valve body, shall be at least 8° with a measurement uncertainty of 1° when measured according to EN 331.

## **7. CONNECTION THREADS**

Threaded inlet and outlet connections for valves with pressure-tight joints made on the threads, shall conform to ISO 7.

Where threads for non pressure-tight joints are required, they shall conform to ISO 228 or ISO 261.

Valve with threaded connections shall have flats on the body which, when used for fitting shall accommodate commercially available tools.

### **SEALS**

Sealing on the closure member shall be constructed so that tightness is achieved by mechanical means. This excludes all sealing materials such as liquids, pastes, and tapes.

Sealing between split part bodies shall be constructed so that tightness is achieved by mechanical means. Sealant used for such connections shall withstand all torque and bending moment values.

For valves intended to be serviced, the tightness of the serviceable part shall be maintained after dismantling and reassembly.

### **OPERATION**

Valves shall be constructed so that they can be operated by means of a manual actuator such as a handle. Valves operated by turning shall close in a clockwise direction

The rotation from open to close shall be a quarter turn. If the manual actuator is detached then the end of the operating shaft shall be marked so that the open and closed positions are clearly indicated.

## STOPS

On valves the end positions “open” and “closed” shall be clearly identified and limited by fixed, non-adjustable stops.

The valve handle shall be designed so that it is:

- At right angles to the direction of the flow for the closed position:
- Parallel with the direction of the flow for the open position.

If the stop mechanism is part of the handle, the handle and the shaft shall be all of one piece: the fastening of the handle is sealed.

### 8. PERFORMANCE TEST INCLUDING LEAK TIGHTNESS TEST

Valves shall be confirming to the clause of 6 of EN 331: 1998 or Latest edition.

### 9. TEST METHODOLOGY OF PERFORMANCE TEST

Valves shall be confirming to the clause of 7 of EN 331: 1998 or Latest edition.

### 10. FREEDOM FROM DEFECT

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

### 11. IMMERSION TEST & PNEUMATIC PRESSURE TEST

All valves shall be confirming to the clause of 6 and 7 of EN 331: 1998 or Latest edition during testing and no leakage is permitted. This test shall be performed on each valve.

### 12. DIMENSIONS & DIMENSIONAL TOLERANCES

#### ISOLATION VALVES

Sr. No	Sizes	Total Length (mm)	End Connection
1	15 mm	56±1 mm	½” BSPT(F) as per IS 554 /ISO-7
2	25 mm	76±1 mm	1” BSPT (F) as per IS 554 /ISO-7
3	38 mm	96±1 mm	1.5” BSPT (F) as per IS 554 /ISO-7

### **13. QUALITY ASSURANCE (QA)**

The Contractor/Manufacture /Vendor shall submit following for review of TPIA / OWNER at the time of final inspection at contractor store before installation of materials.

- Material test certificates / reports
- Performance requirements and type test, if any.

### **14. INSPECTION / DOCUMENTS**

- a) Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / OWNER.
- b) TPIA /OWNER shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.
- c) TPIA / OWNER shall carry out random inspection during manufacturing/ final inspection.
- d) Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- e) Even after third party inspection, OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- f) For any control test or examination required under the supervision of TPIA/OWNER, latter shall be informed in writing one (1) week in advance by vender about inspection date & place along with production schedule.

### **15. MARKING**

Each valves at least shall be durably marked on the valve in a clearly visible position (No engraving allowed on threaded portion) with following things:-

1. Manufacturer's name or trade mark or identification mark
2. Nominal size DN:
3. Emboss- EN 331
4. Emboss- MOP in bar
5. On Valve's Lever- GGL Name & Logo, ON /OFF Indicator, Gas Flow direction

### **16. PACKAGING**

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / Vendor / Bidder shall submit the packaging details and also complied with at the time of delivery.

### **17. ENCLOSURE:**

- Annexure-1: DATASHEET OF BRASS ISOLATION VALVE
- Annexure-2: QUALITY ASSURANCE PLAN
- Annexure-3: GAD

## 18. SPECIAL TERMS AND CONDITIONS

- All dimensions of the Isolation Valve are mentioned in GAD and no deviation is allowed in any part of the Isolation Valve. Any input in GAD are appreciated during tendering stage which in turn will be reviewed and way forward changes will be communicated timely prior to closer of the tendering process.
- No deviation / change request in GAD and Technical Specifications will be accepted after completion of the tendering process.
- Latest edition / all amendments are to be followed from date of implementation declared by the authority for all applicable standard mentioned in this document.

### ANNEXURE-1:

#### DATASHEET OF BRASS ISOLATION VALVE

Sr. No.	Description	Specification
1	Item	Brass Isolation Valve
2	Governing Standard	EN 331 - Latest Version
3	Valve Location and Function	Riser, Above Ground PNG and Commercial Connection for Gas Line Isolation
4	Service	Natural Gas
5	Maximum Operating Pressure	5 Barg
6	Flow Capacity (Max.)	1/2" - 5m3/hr 1" - 16m3/hr 1.5" - 40 m3/hr
7	Nominal Valve Size	15mm, 25mm, 38mm
8	Material	ASTM B 283 (Alloy UNS C37700) / IS 319
9	Surface Coating	Nickel/chromium Plated
10	Types of Valve Operation	Lever with PVC Coating
11	Ball Position Indicator	Open & Close Indicator
12	Length of the Valve & other Dimensions	Refer GAD
13	Valve Seat	PTFE / Soft Seated
14	End Connection	1/2" BSPT (F), 1" BSPT (F) & 1.5" BSPT (F) as per IS 554/ISO 7
15	Marking	1. Manufacturer's Name 2. Nominal Size DN 3. Emboss- EN 331 4. Emboss- MOP in bar 5. On Valve's Lever- GGL Name & Logo, ON /OFF Indicator, Gas Flow direction

## ANNEXURE-2:

### QUALITY ASSURANCE PLAN (QAP) FOR BRASS ISOLATION VALVE (*SPECIMEN COPY*)

SR. NO.	INSPECTION AND TESTING	QUANTUM OF CHECK	INSPECTION TYPE OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA AND CERTIFICATE	FORMAT OF RECORD	INSPECTION		
							MFG .	TPIA / CLIENT	REMARKS
1	Raw material Testing:								
1.1	Raw material Testing: (Chemical / Physical Requirement)	One in each heat	Document	Gujarat Gas Tech Specs	Gujarat Gas Tech Specs	MTC	P	R	
1.2	Springs, Seat, Stem, Seat, Seals and Lubricants	One in each heat	Document	As per EN 331 /EN 549 / EN 377 / PTFE / SOFT SEAT	As per EN 331 /EN 549 / EN 377 / PTFE / SOFT SEAT	MTC	P	R	
1.3	Handle Material	One in each Lot	Document	Steel as per IS2026 Gr.B for Isolation Valve handle/lever	IS 2062	MTC	P	R	
1.4	Nut Material	One in each Lot	Document	Nut material – Steel as per SS304	SS 304	MTC	P	R	
2	Performance test of Final product :								
2.1	- Gas Tightness Test	100%	Document	As per EN 331	Measured leakage rate should not exceed 20 cm³/hr as per clause 7.2 of EN331	MTC	P	Rw	Random Witness by TPI 10 piece in each lot
	- Twist (Torque) Test	1 piece in each lot	Document	As per EN 331	Operating torque should not exceed 7 Nm at ambient temperature as per table 4 of EN 331	MTC	P	W	
	- Bending Test - Turning Torque Test		Document		Should confirm to clause 6.5 of EN 331	MTC	P	W	
2.2	Flow Capacity test	1 piece in each lot	Document	As per EN 331	For ½" - 5 m³/hr. (max.) For 1" - 16 m³/hr. (max.) For 1.5" – 40 m³/hr (max)	MTC	P	R	
2.3	Immersion test	100%	Document	As per EN 331	5.0 Bar to 7.0 Bar	MTC	P	Rw	Random Witness by TPI 10 piece in each lot

3.0 FINAL INSPECTION									
3.1	Visual inspection ( Free from defects )	As per Table-I	Visual	As per EN 331	As per EN 331	MTC	P	Rw	
3.3	Sizes of Valves		Visual	As per EN 331	15mm, 25mm, 38mm	MTC	P	Rw	
3.4	Ball Position		Visual	As per EN 331	Open & Close Indicator	MTC	P	Rw	
3.5	Length of valve		Vernier Caliper	As per EN 331 / As per GAD Drawing	1/2"-56±1 mm 1"- 76±1 mm 1"- 96±1 mm	MTC	P	Rw	
3.6	Valve Seat		Document	As per EN 331 / As per Approved Drawing	As per EN 331 / EN 549 / EN 377 / PTFE / SOFT SEAT	MTC	P	Rw	
3.7	End Connection & Other Dimensions	As per Inspection plan at Table-I	"GO" - "NO GO" Gauge	As per EN 331 / IS 554 / ISO-7 / As per GAD Drawing	1/2" BSPT(F), 1"BSPT(F) & 1.5" BSPT(F) as per IS 554/ISO-7	MTC	P	Rw	
3.8	Type of handle		Visual	As per EN 331	For Brass Isolation valve- Lever with Yellow PVC coating	MTC	P	Rw	
3.9	Surface Coating by Nickel / chromium Plated		Visual	As per EN 331 / IS 4736	Gujarat Gas datasheet	MTC	P	R	
4	Marking incl. On / Off indication		Visual	As per EN 331	As per clause No. 9 of EN 331	MTC	P	Rw	
5	Final Documentation					COMPLIANCE CERTIFICATE	P	H	
<b>LEGENDS:</b> <ul style="list-style-type: none"> <li>Rw- Random Witness,</li> <li>W - Witness,</li> <li>R - Review of Documents / test certificates,</li> <li>H - Hold,</li> <li>P - Perform,</li> <li>TPIA - Third Party Inspection Agency appointed by Owner</li> </ul>									

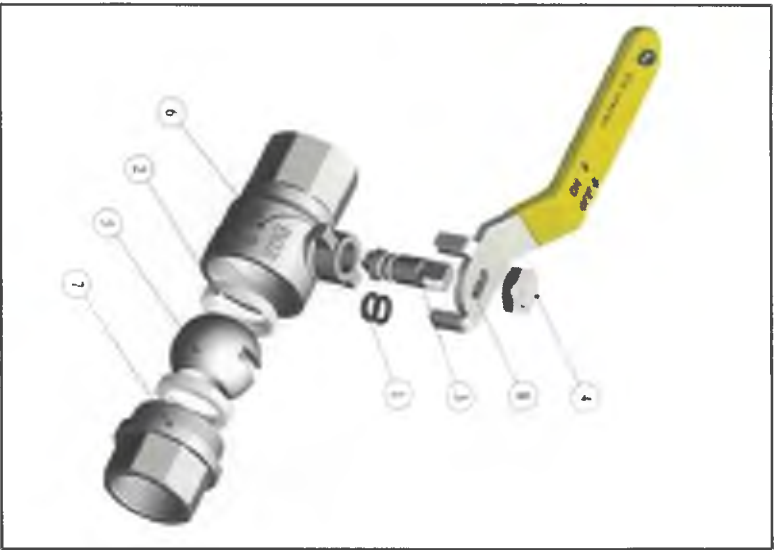
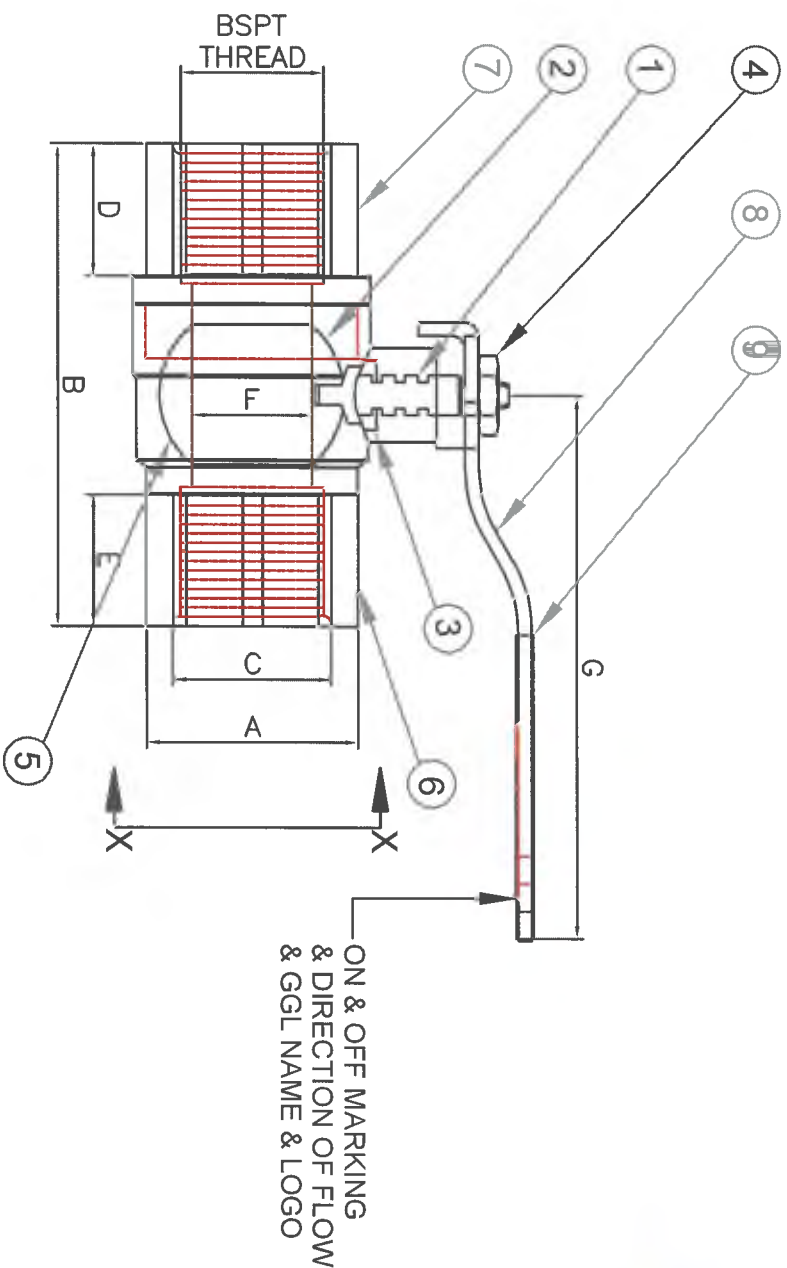
Notes: -	
1	The Above Testing and acceptance criteria are minimum requirements, however, vendor shall ensure that the execution of works shall also comply to the additional requirements as per Gujarat Gas Technical specifications.
2	If required, Owner/Owner representative shall review query and give inputs related to QAP / Quality manuals / Drawings etc. published in the tender documents
3	Vendor shall in coordination with detailed Plan and Inspection schedule indicating the dates and the locations to facilitate Owner/Owner's representative and TPIA to organize Inspection.
4	Critical or Special works procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specifications more stringent condition shall be applicable.

5	Owner / Owner's representative including TPIA will have the right to inspect any activity of execution of works at any time.
6	All reference Codes/ Standards, Documents shall be arranged by Vendor for reference of TPIA/ Owner at the time of Inspection
7	At the time of delivery from the manufacturer place and receipt of material in stores, Vendor will submit copy of all related document of inspection along with release note & MTC to TPIA / CA.
8	Contract / Manufacture / Vendor shall be sent minimum 3 sample for Chemical & Physical testing of materials at his cost in a year.
9	In QAP – all standards shall be taken with as per latest Version/Edition/Amendments.
10	Note: W-Witness of quantity shall as per inspection level 1 AQL 1 as per IS 2500(part 1):2000 **Sampling plan for TPI is 10% of offered quantity upto 100 valves
11	First lot of 100 nos of Isolation valves inspected through TPIA as per Technical specification / GAD / QAP shall be send to GGL QC department and further production shall be carried out only after go ahead from GGL

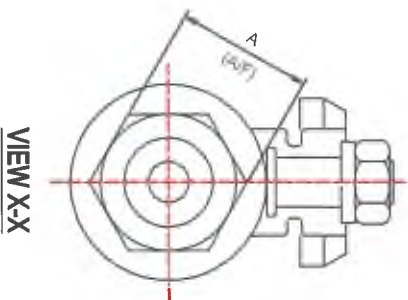
Table-I: Reference standard: IS 2500				
Sr. No.	Batch Size	Sample Size	Acceptance No.	Rejection No.
1	2 to 500	20	0	1
2	501 to 3200	50	1	2
3	3201 to 10000	80	2	3
4	10001 to 35000	125	3	4
5	35001 to 150000	200	5	6

Explanation:
<p>No. of samples inspected will be equal to the sample size given by the plan.</p> <p>If the no. of nonconforming product(s) is equal to or less than the acceptance no., the non-confirming product(s) will be removed from the lot and the remaining lot accepted.</p> <p>If the no. of non-confirming product(s) is equal to or greater than the rejection number, the whole lot will be retested for that particular parameter and rejected products, if any, will be replaced by fresh OK products.</p>





SR. NO.	SIZES	A	B	THREAD	D(Min.)	E(Min.)	F(Ø)	G(Min.)
1	1/2"	25±0.5	56±1	BSPT	15.5±0.5	15.5±0.5	14±1	90
2	1"	38±0.5	76±1	BSPT	18.5±0.5	18.5±0.5	24±1	101
3	1.5"	53±0.5	96±1	BSPT	21±0.5	21±0.5	40±1	137



ITEM NO.	PART NAME	MATERIAL OF CONSTRUCTION	FINISH
1	O-RING	NBR (EN 549)	-
2	BALL SEAT	PTFE (SOFT SEAT)	-
3	STEM	BRASS - IS:319 / ALLOY UNS C37700	-
4	STEM.NUT/SCREW/NUT	SS 304	NICKLE PLATED
5	BALL	FORGED BRASS - IS:319 / ALLOY UNS C37700	CHROME PLATED
6	BODY	FORGED BRASS - IS:319 / ALLOY UNS C37700	NICKEL PLATED
7	BONNET/NUT	FORGED BRASS - IS:319 / ALLOY UNS C37700	NICKEL PLATED
8	LEVER/HANDLE	STEEL IS:2062 Gr.B	NICKEL/CHROME PLATED
9	SLEEVE	PVC	YELLOW


NOTES :-

- ALL DIMENSIONS ARE IN MM.
- TPI- THREAD PER INCH.
- SAMPLES TO BE SENT AT LABORATORY ONCE IN YEAR FOR PHYSICAL AND CHEMICAL ANALYSIS.
- VALVE SHALL BE EMBOSD WITH MANUFACTURER'S NAME, SIZE, EN 331 & MAX. OPERATING PRESSURE.
- GA DRAWING AS SHOWN IS INDICATIVE ONLY. ACTUAL SHAPE SHALL BE AS PER VENDOR'S OWN GA DRAWING & SHALL BE WITHIN MENTIONED DIMENSIONS.

PROCESS PARAMETERS :-

- OPERATING PRESSURE - 5 BARG
- OPERATING TEMPERATURE - 0 TO 60 C

NO.	DATE	REVISION	REV.BY, SIGN.
SIGN:	PREPARED BY	CHECKED BY	APPROVED BY
NAME	DATE	DATE	DATE
FOR	GGL	GGL	GGL

**GUJARAT GAS LIMITED**  
TECHNICAL SERVICES

PROJECT NAME: ISOLATION VALVE

STATUS: ISSUED FOR INFORMATION CUM APPROVAL

TITLE: TYPICAL DRAWING FOR ISOLATION VALVE

SCALE SHEET

DRAWING NO.

REV.

NTS 1 OF 1

GGL-TS/PE-PNG/ISOVLV

00



## TECHNICAL SPECIFICATIONS FOR BRASS APPLIANCE VALVE (GAS TAP)

Document No: GGL/TS/PE-PNG/SUPPLY/APPVLV/SPEC

02	-	Revision in Data Sheet and QAP	04.10.2023
01	Cl.11 and QAP	Pre-bid queries incorporation	14.02.2023
00	-	Issued for Tendering	20.01.2023
REV. NO	CLAUSE NO.	REVISION DESCRIPTION	DATE OF ISSUE

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ANNEXURE-3: GAD	

## 1. INTRODUCTION & SCOPE

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various Geographical Areas as per authorization from PNGRB.

The intent of this specification is to establish minimum requirements to manufacture and supply of Manually Operated Appliance Valves (Gas Tap) of sizes of ½" Dia. made from BRASS material for PNG Connection at Customers end

The scope will include manufacture, supply, inspection, testing, marking, packaging, handling and dispatch of Manually Operated Appliance (Gas Tap) Valves of ratings and grades as per EN 331 with latest version/ amendments.

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ISO 261 ISO General purpose metric screw threads - General Plan

IS 554 Pipe threads where pressure-tight joints are made on the threads

In case of conflict between the requirements of this specification and the Reference Codes & Standards, the requirements of the specification, having stringent requirement, shall govern. Vendor shall obtain prior permission from GGL in such cases.

### 3. DEFINITION

For this specification, the following definitions shall apply:

OWNER/ CLIENT	:	GUJARAT GAS LIMITED,
MANUFACTURER	:	Means the Manufacturer of Brass Appliance Valve (Gas Tap.)
VENDOR	:	The person(s), firm, company, organization from whom Client / Contractor procures materials
TPIA	:	Third Party Inspection Agency authorized by GUJARAT Gas for inspection of material

### 4. CLASSIFICATION OF VALVES

#### A. Pressure Class

Pressure Class is divided into three Classes, corresponding to maximum working pressure as follows:

Sr. No.	Class	Pressure Range
1	0.2 MOP	0 to 0.2 X 10 <sup>5</sup> Pa
2	0.5 MOP	0 to 0.5 X 10 <sup>5</sup> Pa
3	5.0 MOP	0 to 5 X 10 <sup>5</sup> Pa

#### B. Temperature Classes

Temperature Class is divided into three Classes, corresponding to temperature as follows:

Sr. No.	Class	Temperature Range
1	- 5 °C	- 5 °C to 60 °C
2	- 20 °C	- 20 °C to 60 °C
3	- 40 °C	- 40 °C to 60 °C

### 5. MATERIAL

- The material of valve (Ball, Stem, Bonnet & body) shall conform to ASTM B283/ Alloy UNS C37700 or IS 319
- The material of any part in contact with the gas to the surrounding atmosphere, shall be from the corrosion resistant material or shall be suitably protected and shall withstand the humidity test as per clause of 7.6.5 & 7.6.4 (or applicable clause of revised edition) of EN 331 with Latest edition / amendments.
- Springs and other moving parts which shall be suitable protected against corrosion and shall retain their protective coating despite any movement resulting from the operation of the valve.
- All marking shall be durable and resistant to atmosphere conditions. Labels and their markings shall neither deteriorate nor lift nor become unreadable by humidity and temperature.

- v. Rubber materials shall confirm to EN 549 Latest edition / amendments and Lubricants shall conform to EN 377 Latest edition / amendments.

## 6. CONSTRUCTION

- i. Valves shall be designed in such a way that once installed, it is impossible to remove the closure member or a seal without damaging the valve or leaving clear signs of tempering on it.
- ii. Valves designed to be maintained shall be such that it is difficult to remove parts serving to seal against gas without specialist knowledge and that any tampering is evident and incorrect reassembly is impossible.
- iii. All valves components shall be free from burrs and clean (e.g free from swarf and core-sand) and shall be of sound manufacture. All valve components shall be free from sharp edges and corners which could be cause of damage, injury or incorrect operation, when viewed with the naked eye.
- iv. Seals for moving parts which separate gas ways from the atmosphere, shall maintain their original leak-tightness without any manual adjustment.
- v. If a spring is used, the two end faces of the spring shall be parallel and perpendicular to the axis of the spring. The end coils of a spring shall not damage their mating faces.
- vi. The wall thickness from any gas way to atmosphere to holes connected to the atmosphere shall not be less than 1 mm. Holes for screws, pins, etc which are used for the assembly of part and for mounting, shall not provide any leak path between gas ways and the atmosphere.
- vii. Valve in the fully closed position, the angular distance between the gas port in the closure member and both the inlet port and outlet port in the valve body, shall be at least 8° with a measurement uncertainty of 1° when measured according to EN 331 with latest version/amendments .

## 7. CONNECTION THREADS

Threaded inlet and outlet connections for valves with pressure-tight joints made on the threads, shall conform to ISO 7.

Where threads for non pressure-tight joints are required, they shall conform to ISO 228 or ISO 261.

Valve with threaded connections shall have flats on the body which, when used for fitting shall accommodate commercially available tools.

### SEALS

Sealing on the closure member shall be constructed so that tightness is achieved by mechanical means. This excludes all sealing materials such as liquids, pastes, and tapes.

Sealing between split part bodies shall be constructed so that tightness is achieved by mechanical means. Sealant used for such connections shall withstand all torque and bending moment values.

For valves intended to be serviced, the tightness of the serviceable part shall be maintained after dismantling and reassembly.

## OPERATION

Valves shall be constructed so that they can be operated by means of a manual actuator such as a handle. Valves operated by turning shall close in a clockwise direction

Aluminum Handle shall be design in such a way that tightening /wrenching shall be possible at threaded end of appliance valve.

The rotation from open to close shall be a quarter turn. If the manual actuator is detached then the end of the operating shaft shall be marked so that the open and closed positions are clearly indicated.

## STOPS

On valves the end positions “open” and “closed” shall be clearly identified and limited by fixed, non-adjustable stops.

The valve handle shall be designed so that it is:

- At right angles to the direction of the flow for the closed position:
- Parallel with the direction of the flow for the open position.

If the stop mechanism is part of the handle, the handle and the shaft shall be all of one piece: the fastening of the handle is sealed.

### 8. PERFORMANCE TEST INCLUDING LEAK TIGHTNESS TEST

Valves shall be confirming to the clause of 6 (or any other applicable clause of revised edition) of EN 331 with Latest edition/amendments.

### 9. TEST METHODOLOGY OF PERFORMANCE TEST

Valves shall be confirming to the clause of 7 (or applicable clause of revised edition) of EN 331 with Latest edition/amendments

### 10. FREEDOM FROM DEFECT

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

### 11. IMMERSION TESTING & PNEUMATIC PRESSURE TESTING

All valves shall be confirming to the clause of 6 and 7 (or applicable clause of revised edition) of EN 331 with Latest edition/amendments. during testing and no leakage is permitted. This test shall be performed on each valve.

### 12. DIMENSIONS & DIMENSIONAL TOLERANCES

## APPLIANCE VALVES

Sr. No	Sizes	End Connection
1	15 mm	½" BSPT(F) as per IS 554 /ISO-7/IS- 9573 Part 2

### 13. QUALITY ASSURANCE (QA)

The Contractor/Manufacture /Vendor shall submit following for review of TPIA / OWNER at the time of final inspection at contractor store before installation of materials.

- Material test certificates / reports
- Performance requirements and type test, if any.

### 14. INSPECTION / DOCUMENTS

- Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / OWNER.
- TPIA /OWNER shall carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.
- TPIA / OWNER shall carry out random inspection during manufacturing/ final inspection.
- Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- Even after third party inspection, OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- For any control test or examination required under the supervision of TPIA/OWNER, latter shall be informed in writing one (1) week in advance by vender about inspection date & place along with production schedule.

### 15. MARKING

Each valves at least shall be durably marked on the valve in a clearly visible position with OWNER' s logo, manufacturers name and trade mark and designation of valves. (No engraving allowed on threaded portion)

- Manufacturer's name or trade mark or identification mark
- Owner's name can be printed on durable sticker and pasted on Appliance Valve's handle/lever.
- Nominal size DN:
- Emboss- EN 331
- Emboss- MOP in bar

### 16. PACKAGING

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / Vendor / Bidder shall submit the packaging details and also complied with at the time of delivery.



**17. ENCLOSURE:**

- Annexure-1: DATASHEET OF APPLIANCE VALVE
- Annexure-2: QUALITY ASSURANCE PLAN
- Annexure-3: GAD

**18. SPECIAL TERMS AND CONDITIONS**

- All dimensions of the Appliance Valve are mentioned in GAD and no deviation is allowed in any part of the Appliance Valve. Any input in GAD are appreciated during tendering stage which in turn will be reviewed and way forward changes will be communicated to bidders timely by GGL prior to closer of the tendering process.
- No deviation / change request in GAD and Technical Specifications will be accepted after completion of the tendering process.
- For all applicable standard mentioned in this document, Latest edition / all applicable amendments are to be followed from date of implementation declared by the authority.

## ANNEXURE-1

### DATASHEET OF BRASS APPLIANCE VALVE (GAS TAP)

Sr. No.	Description	Specification
1	Item	Brass Appliance Valve (Gas Tap)
2	Governing Standard	EN 331 - Latest Version/Amendments.
3	Valve Location and Function	Above Ground near appliance for Gas supply isolation
4	Service	Natural Gas
5	Maximum Operating Pressure	5 Barg
6	Flow Capacity	5 m <sup>3</sup> /hr
7	Nominal Valve Size	15 mm (1/2")
8	Material	ASTM B 283 (Alloy UNS C37700) / IS 319
9	Surface Coating	Nickel / Chromium Plated
10	Types of Valve Operation	Knob type handle
11	Ball Position Indicator	Open & Close Indicator
13	Dimensions of various parts of the Appliance Valve	Refer GAD
14	Valve Seat	PTFE / Soft Seated
15	End Connection	Inlet 1/2" BSPT (F) and outlet Nozzle, suitable for Hose connection as per IS 554 / ISO-7/ IS-9573 Part 2
16	Marking	1. Manufacturer's Name 2. GGL Name and Logo 3. Nominal Size DN 4. Emboss- EN 331 5. Emboss- MOP in bar

## ANNEXURE-2

### QUALITY ASSURANCE PLAN (QAP) (SPECIMEN COPY) FOR BRASS APPLIANCE VALVE

SR. NO.	INSPECTION AND TESTING	QUANTUM OF CHECK	INSPECTION TYPE OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA AND CERTIFICATE	FORMAT OF RECORD	INSPECTION		
							MF G	TPIA/C LIENT	REMARK
1	Raw material Testing:								
1.1	Raw material Testing: (Chemical / Physical Requirement)	One in each heat	Document	Gujarat Gas Technical Specification	Gujarat Gas Tech Specs	MTC	P	R	
1.2	Springs, Seat, Stem, Seat, Seals and Lubricants	One in each heat	Document	As per EN-331 / EN 549 / EN 377 / PTFE / SOFT SEAT	As per EN 331 /EN 549 / EN 377 / PTFE / SOFT SEAT	MTC	P	R	
1.3	Handle Material	One in each Lot	Document	Aluminum	IS 2062	MTC	P	R	
1.4	Nut Material	One in each Lot	Document	Steel SS 304	SS 304	MTC	P	R	
2	Performance test of Final product :								
2.1	Gas Tightness Test	100%	Document	As per EN 331	Measured leakage rate should not exceed 20 cm³ / hr as per clause 7.2 of EN331	MTC	P	Rw	Random Witness by TPI 10 piece in each lot
	Twist (Torque) Test	1 piece in each lot	Document	As per EN 331	Operating torque should not exceed 7 Nm at ambient temperature as per table 4 of EN 331	MTC	P	W	
	Bending Test Turning Torque Test	1 piece in each lot	Document	As per EN 331	Should confirm to clause 6.5 of EN 331	MTC	P	W	
2.2	Flow Capacity test	1 piece in each lot	Document	As per EN 331	For ½” - 5 m³/hr. (max.)	MTC	P	R	
2.3	Immersion Testing	100%	Document	As per EN 331, Clause 6 and 7	5.0 Bar to 7.0 Bar	MTC	P	Rw	Random Witness by TPI 10 piece in each lot
3.0	FINAL INSPECTION								
3.1	Visual inspection (Free from defects)	As per Table-I	Visual	As per EN 331	As per EN 331	MTC	P	Rw	

3.3	Sizes of Valves		Visual	As per EN 331	15 mm (1/2")	MTC	P	Rw	
3.4	Ball Position		Visual	As per EN 331	Open & Close Indicator	MTC	P	Rw	
3.5	Valve Seat		Document	As per EN 331 / As per Approved Drawing	As per EN 331 / EN 549 / EN 377 / PTFE / SOFT SEAT	MTC	P	Rw	
3.6	End Connection	As per Inspection plan at Table-I	"GO" - " NO GO" Gauge	As per EN 331 / IS 554 /ISO-7/As per GAD Drawing	1/2" BSPT(F) as per IS 554 / ISO-7	MTC	P	Rw	
3.7	Type of handle		Visual	As per EN 331	Knob type	MTC	P	Rw	
3.8	All Dimensions of Appliance Valve		Vernier Caliper/ Visual	As per GAD Drawing	All Dimensions	MTC	P	Rw	
3.9	Surface Coating by Nickel / chromium Plated		Visual	As per EN 331 / IS 4736	Gujarat Gas Technical Specification	MTC	P	R	
4	Marking incl. On / Off indication		Visual	As per EN 331	As per clause No. 9 of EN 331	MTC	P	Rw	
5	Final Documentation					Compliance Certificate	P	H	

**LEGENDS: Rw- Random Witness, W - Witness, R - Review of Documents / test certificates, H - Hold, P - Perform, TPIA - Third Party Inspection Agency appointed by Owner**

#### IMPOFRTANT NOTES:

1	The Above Testing and acceptance criteria are minimum requirements; however, vendor shall ensure that the execution of works shall also comply to the additional requirements as per Gujarat Gas Technical specifications.
2	If required, Owner/Owner representative shall review query and give inputs related to QAP / Quality manuals / Drawings etc. published in the tender documents
3	Vendor shall in coordination with detailed Plan and Inspection schedule indicating the dates and the locations to facilitate Owner/Owner's representative and TPIA to organize Inspection.
4	Critical or Special works procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specifications more stringent condition shall be applicable.
5	Owner / Owner's representative including TPIA will have the right to inspect any activity of execution of works at any time.
6	All reference Codes/ Standards, Documents shall be arranged by Vendor for reference of TPIA/ Owner at the time of Inspection
7	At the time of delivery from the manufacturer place and receipt of material in stores, Vendor will submit copy of all related document of inspection along with release note & MTC to TPIA / CA.
8	Contract / Manufacture / Vendor shall be sent minimum 3 sample for Chemical & Physical testing of materials at his cost in a year.
9	In QAP - EN 331 shall be taken with as per latest Version/Edition/Amendments.
10	W-Witness of quantity shall as per inspection level 1 AQL 1 as per IS 2500(part 1):2000 **Sampling plan for TPI is 10% of offered quantity upto 100 valves

**Table-I:(Reference standard: IS 2500)**

Sr. No.	Batch Size	Sample Size	Acceptance No.	Rejection No.
1	2 to 500	20	0	1
2	501 to 3200	50	1	2
3	3201 to 10000	80	2	3
4	10001 to 35000	125	3	4
5	35001 to 150000	200	5	6

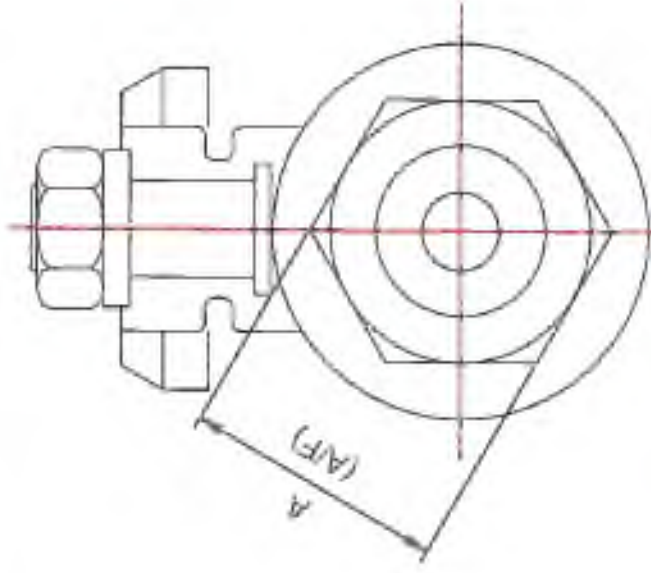
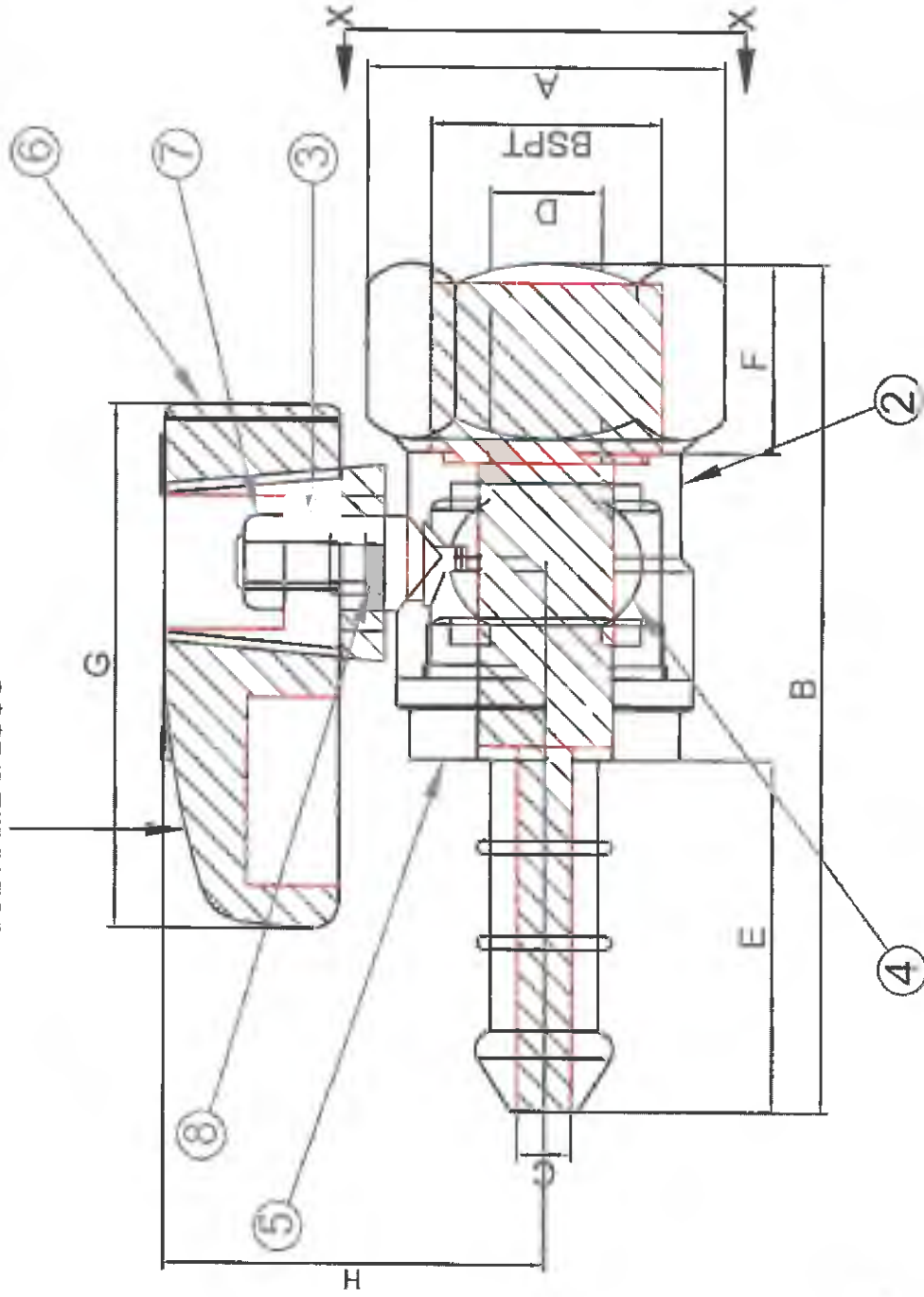
**Explanation:**

No. of samples inspected will be equal to the sample size given by the plan.

If the no. of nonconforming product(s) is equal to or less than the acceptance no., the non-confirming product(s) will be removed from the lot and the remaining lot accepted.

If the no. of non-confirming product(s) is equal to or greater than the rejection number, the whole lot will be retested for that particular parameter and rejected products, if any, will be replaced by fresh OK products.

**GGL NAME & LOGO**



**VIEW X-X**



SR. NO	SIZES	A	B	C( $\emptyset$ )	D( $\emptyset$ )	E	F	G
1	1/2"	25 $\pm$ 0.5	72 $\pm$ 1	5.5 $\pm$ 0.5	10	23 $\pm$ 1	15 $\pm$ 1	50 $\pm$ 1

ITEM NO.	PART NAME	MATERIAL OF CONSTRUCTION	FINISH
1	BODY	FORGED BRASS - IS:319 / ALLOY UNS C37700	NICKEL PLATED
2	SEAT/GASKET	PTFE (SOFT SEAT)	-
3	PIN	BRASS IS:319 / ALLOY UNS C37700	-
4	BALL	BRASS IS:319 / ALLOY UNS C37700	CHROME PLATED
5	NOZZLE	FORGED BRASS - IS:319 / ALLOY UNS C37700	NICKEL PLATED
6	HANDLE	ALUMINIUM	YELLOW POWDER COATED
7	SCREW NUT	SS 304	NICKEL PLATED
8	O-RING	NBR (EN549)	-

NOTES -

1. ALL DIMENSIONS ARE IN MM.
2. TPI— THREAD PER INCH.
3. 2-3 SAMPLES TO BE SENT AT LABORATORY ONCE IN YEAR FOR PHYSICAL AND CHEMICAL ANALYSIS.
4. FITTING SHALL BE EMBOSSED WITH MANUFACTURER'S NAME, SIZE, MAXIMUM OPERATING PRESSURE.

PROCESS PARAMETERS :-

1. OPERATING PRESSURE – 5 BARG
2. OPERATING TEMPERATURE – 0 TO 60 C

[illegible]

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**TECHNICAL SPECIFICATION  
FOR  
FRP CHAMBER COVERS USED FOR STEEL/PE BALL VALVE CHAMBERS**

**DOCUMENT NO : GGL/TS/2022/JUL/17**

1	<i>Addition of 2 different sizes of FRP Sleepers based on GA requirement</i>	30.09.2022
<b>REV. NO</b>	<b>REVISION DESCRIPTION</b>	<b>DATE OF ISSUE</b>

**TECHNICAL SPECIFICATION FOR FRP CHAMBER COVERS USED FOR STEEL/PE BALL VALVES**

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Approved



## 1.0 SCOPE

This specification covers general requirements of FRP Sleeper cover for Steel and PE Valve chambers, specifically used for Steel/PE Ball valves used in gas pipeline network.

## 2.0 APPLICABLE CODES AND SPECIFICATIONS

- 2.1 The following details, standards, and codes are part of this specification. All standards, specifications and codes of practice referred to herein shall be the latest edition including all applicable official amendments and revisions.
- 2.2 In case of discrepancy between this specification and those referred to herein, this specification shall govern.
- IS 1726:latest- Cast iron manhole covers and frames- specification.
  - EN 124:latest- Gully tops and manhole tops for vehicular and pedestrian areas- Design requirements, type testing, marking, quality control.
  - IS- 15658:latest- Abrasion resistant layer of decorative gray granite finish.

## 3.0 COMPOSITE RESIN CHAMBER/MANHOLE COVERS AND FRAMES

The composite resin covers and frame shall be manufactured from appropriate grade of glass fiber reinforced polyester (GFRP) modified for durability & abrasion resistance using special grade of resin.

### 3.1 Material:

- 3.1.1 The quartz, aggregate used as filler in polymer concrete shall meet the requirements of Resin additives, such as curing agents, pigments, dyes, fillers and thixotropic agents, used as required shall not be detrimental to the manholes.
- 3.1.2 The top surface layer of cover shall be UV resistant & shall have sufficient abrasion resistance to vehicular traffic movement.
- 3.1.3 The core inside the outer surface layer shall be complete solid & shall be made up of glass fiber & polymer concrete. No pours & hollow space shall be kept in the core layer.
- 3.1.4 The castings shall be sound, clean and free from porous space, air holes and other defects. They shall be well dressed, fettled and shall be straight, regular and true in every respect.
- 3.1.5 Covers shall have on its operative top a raised chequered design to provide an adequate no-slip grip as per EN-124.
- 3.1.6 Key holes, keys and lifting devices as per EN 124 shall be provided in the covers to facilitate their placement in the frames and their operative maintenance.

### 3.2 Color of Cover & frame

The covers & frames shall be of Yellow color with yellow frame top for better visibility to suit the site conditions as specified in Annexure 1.

### 3.3 Locking Devices

Suitable locking arrangements including that with SS chain/ Wire Rope or a lock, or both shall be provided for the manhole cover fixing with the frame. The cost of locking arrangements shall not be paid separately.

- 3.3.1 Isophthalic grade of polyester resin reinforcing with glass fibers of appropriate grade & make shall be used for manufacturing of composite resin covers and frame.
- 3.3.2 Types of glass fiber used shall be specified by manufacturer's specifications and shall have melting point more than 500-600-degree F.
- 3.3.3 Resin: The manufacturer shall use only Isophthalic grade of polyester resin of appropriate grade designed for use with gas valve chamber application. Isophthalic grade of polyester resin shall be used for top layer.

### 3.4 Size and shape

The size & shape of manhole covers shall be (without frame): -

- 600 mm X 600 mm
- 1000mm X 1000mm (cover shall be made with two nos. of sleeper wherein; each sleeper shall measure 1000mm X 500 mm.

Other different size of Steel Chambers requiring FRP Sleepers wherein, each sleeper shall measure 1200mm X 500 mm. The performance requirement of manhole covers and frames/ Gratings with frame shall conform to EN 124.

### 3.5 Frame seating area

The bearing area shall be designed in such a way that: a) the bearing pressure in relation to the test load shall not exceed 7.5 N/mm<sup>2</sup>; and it should provide an adequate contribution to stability under working conditions. Minimum 75mm frame seating is recommended.

### 3.6 Slot area as waterway in grating

The dimension of slots shall be selected considering hydraulic capacity and slots shall be evenly distributed throughout the clear size of grating. The total area of opening shall not be less than 30% of clear size of cover & the same shall be specified by manufacturers.

### 3.7 Marking

All chamber covers and frame shall have cast with the following information marked on them:

- a. GGL
- b. PE valve.
- c. Grade/ class designation
- d. Year of manufacture
- e. Name of Manufacturer
- f. Size of cover

The marking information should be as per figure:2 in attached Annexure – 1.

### 3.8 Installation of covers & Frame

Installation shall be carried out in accordance with the relevant Code of Practice. Until such Codes of Practice exist, the National Code of Practice or the manufacturer's guide should be used.

- 3.8.1 The cover with frame shall be fixed in M20 Grade of concrete for normal case however on the roads having heavy axle loads or heavy traffic, the cover with frame shall be fixed in M30 Grade of concrete.
- 3.8.2 The cover shall be air tight and water tight with SS nut-bolt / lever type locking arrangements.
- 3.8.3 The sizes of covers specified shall be taken as the clear internal dimensions of the frame.

Size of clear opening of chamber cover (mm)	Class / Grade
600 x 600	25 Ton for 30 seconds UDL (uniform Distributed Load)
1000 X 500 (2 nos.) for 1000 x 1000	
1200 X 500	

- 3.8.4 The weight of the various types of chamber covers and frames shall be Sufficient to sustain test load as per EN 124. These covers shall also be strong and light weight for ease of handling.
- 3.8.5 The cover shall be capable of easy opening and closing and it shall be fitted in the frame in good workmanship like manner.
- 3.8.6 The chamber covers with frame shall conform to EN124.
- 3.8.7 Inspection and Testing for Covers and frames Covers & frames shall be subjected to following tests for acceptance:
  - a. Visual & Dimensional check as per EN 124
  - b. Load test and Permanent Set test as per EN 124
  - c. Mechanical properties test as per EN 124.

### 3.9 Transporting & handling

- a. The Covers & frames should be preferably transported by road from the factory and stored as per the manufacturer specifications to protect damage.
- b. Contractor shall be responsible for the safety of covers & frames in transit, loading/unloading. Every care shall be exercised in handling covers & frames to avoid damage.
- c. The covers & frames shall be unloaded on timber skids with steadying ropes for by any other approved means.
- d. Suitable gaps in the covers & frames stacked shall be left at intervals to permit access from one side to the other.
- d. The covers & frames received on site shall be jointly checked for any visible damages shall be pointed out immediately to the Engineer at the site and recorded properly. Such defects shall be rectified or repaired to the satisfaction of the Engineer entirely at the Contractor's risk and cost. Any cover & frame which shows sufficient damage to preclude it from being used shall be discarded.

### 3.10 Destructive Testing

Successful vendor has to perform destructive test at MSME Lab / Approved Lab once for 1<sup>st</sup> supply for product approval.

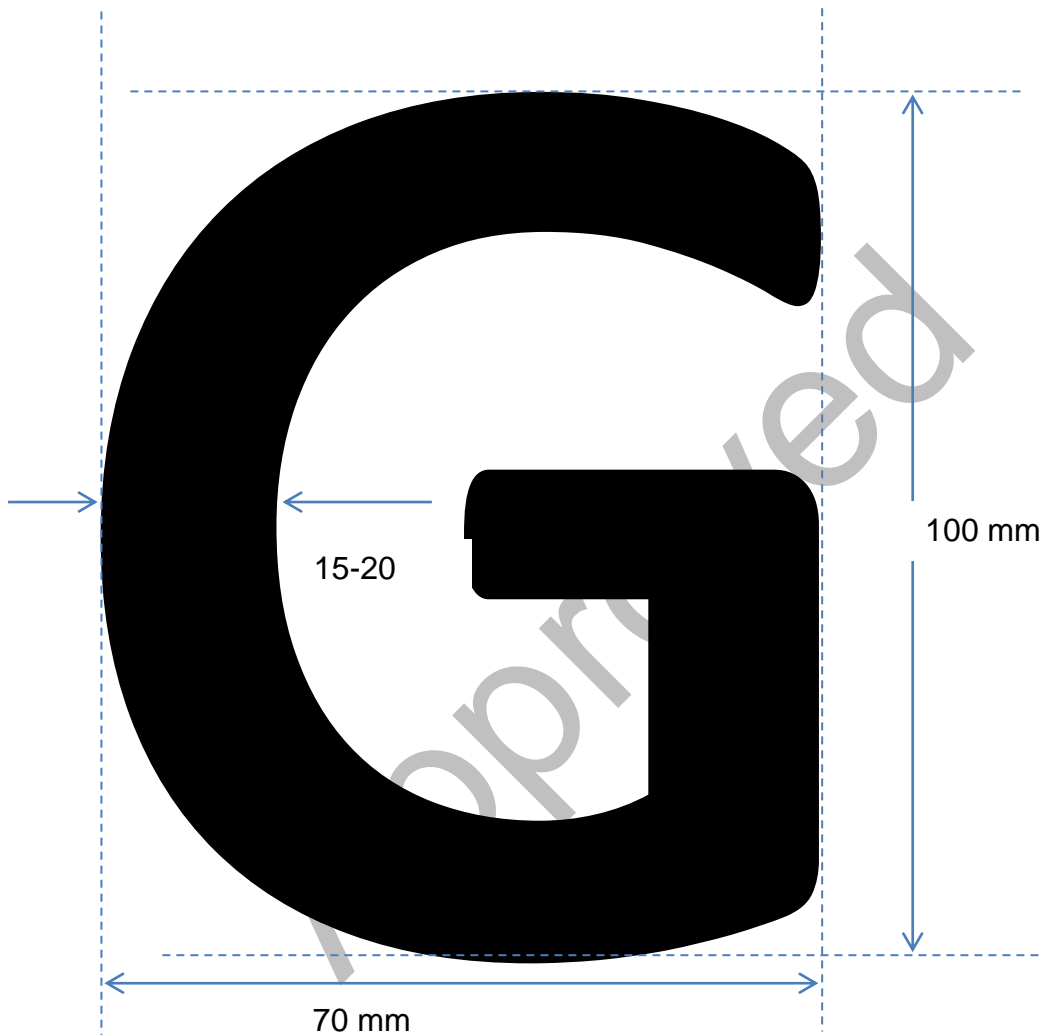
#### Annexure – 1



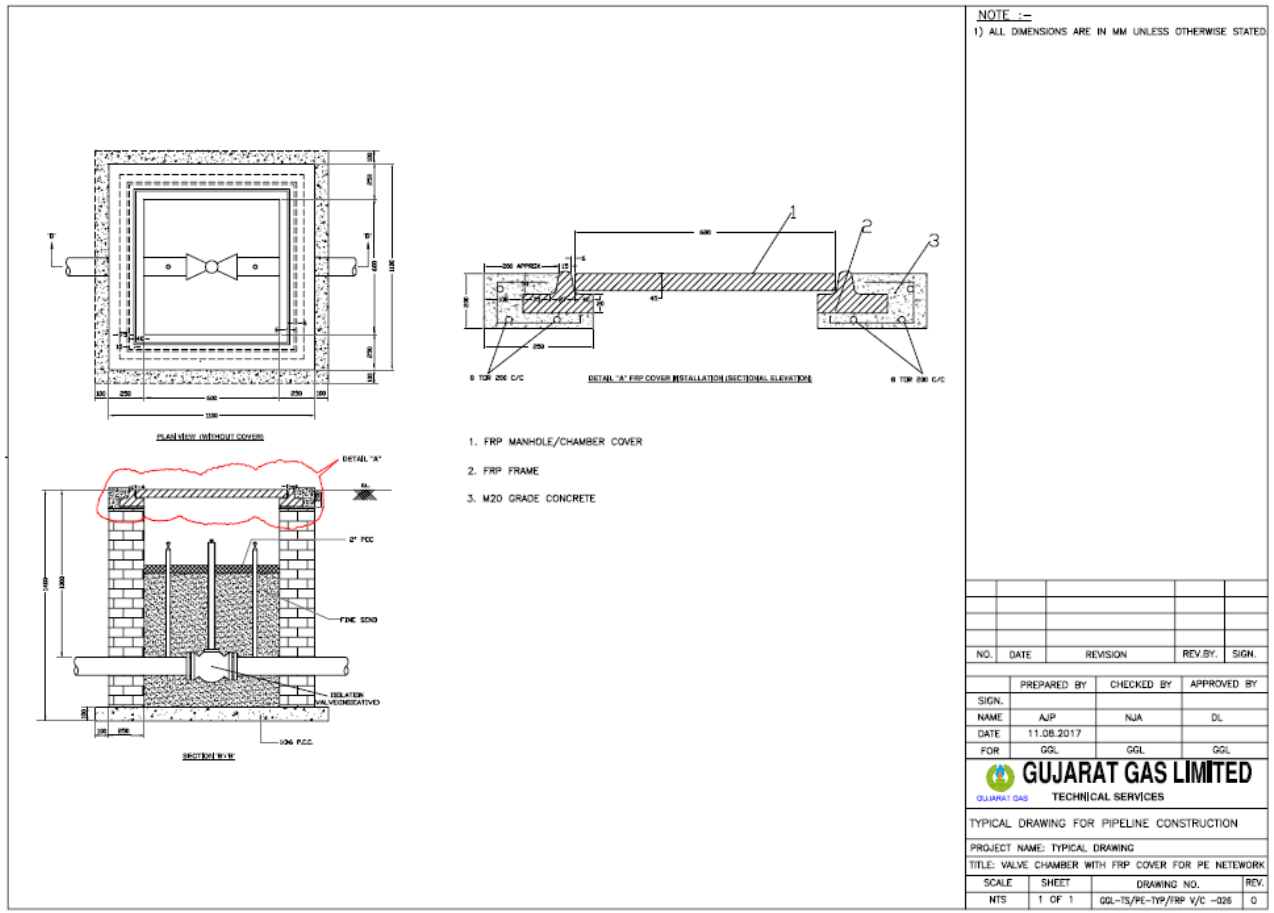
Figure: 1 - Sample FRP cover with frame



**Figure: 2 - Write-up/markings on cover**




**Font size for GAS marking**




### For Steel Valve Chamber



		<b>QUALITY ASSURANCE PLAN (SPECIMEN COPY)</b> <b>FRP MANHOLE COVERS</b>					QAP NO: PO NO.: REV.NO.: 00 DATE: PAGE:- 1 Of 1					
SR. No.	ACTIVITY AND OPERATION	CHARACTERISTICS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	Inspection Agency			REMARKS
1	2	3	4	5	6	7	8	9	10			11
1	Material								M	TPA	C	
1	Fire Retardent Resin	Review of manufacturing material TC, Viscosity, gel time, acid value, volatile content	Major	As per Raw material Manufacturers TC	100%	As per Raw material Manufacturers TC	As per Raw material Manufacturers TC	Raw material Manufacturers TC	P	R	R	
2	Fibreglass mat	Review of manufacturing material TC, Weight, Moisture content	Major	As per Raw material Manufacturers TC	100%	As per Raw material Manufacturers TC	As per Approved specification	Raw material Manufacturers TC	P	R	R	
3	FRP Test											
3.1	Dimension	Length, thickness, ID	Major	Measurement	100%	As per Approved drawing/specification	As per Approved drawing/specification +/- 5%	Internal Report	P	R	R	
3.2	Visual	Workmanship	Major	Visual	100%	As per Approved specification	As per Approved specification	Internal Report	P	R	R	
3.3	Marking	As required by Buyer	Major	Visual	100%	As per Approved specification/drawing	As per Approved specification/drawing	Internal Report	P	R	R	
3.4	Load Test	25 Tons	Major	Third Party testing	Once for 1st supply only	As per Approved specification/drawing	As per Approved specification/drawing	TPA Report	P	R	R	Test carried out at MSME Lab / Approved Lab
3.5	Destructive Test	continued until it breaks	Major	Third Party testing	Once for 1st supply only	As per Approved specification/drawing	As per Approved specification/drawing	TPA Report	P	R	R	Test carried out at MSME Lab / Approved Lab
<b>LEGEND:-</b> Use the following term as appropriate in columns 10. P: Perform, W: Witness, R: Review, V: verification, A: Approval.												



 <b>GUJARAT GAS</b>		<b>QUALITY ASSURANCE PLAN</b> <b>FRP SLEEPER</b>					QAP NO: GGL/TS/PE-PNG/SUPPLY/FRPSLEEPER/QAP DATE: PAGE:- 1 Of 1						
SR. No.	ACTIVITY AND OPERATION	CHARACTERISTICS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	Inspection Agency			REMARKS	
1	Material									M	TPA	C	
1	Fire Retardent Resin	Review of manufacturing material TC,Viscosity ,gel time,acid valve,volatile content	Major	As per Raw material Manufacturers TC	100%	As per Raw material Manufacturers TC	As per Raw material Manufacturers TC	Raw material Manufacturers TC	P	R	R		
2	Fibreglass mat	Review of manufacturing material TC,Weight ,Moisture content,	Major	As per Raw material Manufacturers TC	100%	As per Raw material Manufacturers TC	As per Approved specification	Raw material Manufacturers TC	P	R	R		
3	FRP Test												
3.1	Dimension	Length,thickness,ID	Major	Measurement	100%	As per Approved drawing/specification	As per Approved drawing/specification +/- 5%	Internal Report	P	P	R		
3.2	Visual	Workmanship	Major	Visual	100%	As per Approved specification	As per Approved specification	Internal Report	P	R	R		
3.3	Marking	As required by Buyer	Major	Visual	100%	As per Approved specification/drawing	As per Approved specification/drawing	Internal Report	P	R	R		
3.4	Load Test	25 Tons	Major	Third Party testing	Once for 1st supply only	As per Approved specification/drawing	As per Approved specification/drawing	TPA Report	P	R	R	Test carried out at MSME Lab / Approved Lab	
3.5	Destructive Test	continued until it breaks	Major	Third Party testing	Once for 1st supply only	As per Approved specification/drawing	As per Approved specification/drawing	TPA Report	P	R	R	Test carried out at MSME Lab / Approved Lab	
<b>LEGEND:-</b> Use the following term as appropriate in columns 10. P: Perform, W : Witness, R : Review, V: verification, A : Approval.													

Approval Note/Document : QAP & GAD FOR SUPPLY OF FRP SLEEPER

Approval Note/Document Ref. No. : GGL/TS/PE-PNG/SUPPLY/FRPSLEEPER/QAP

Proposed by : Shubhi Gupta

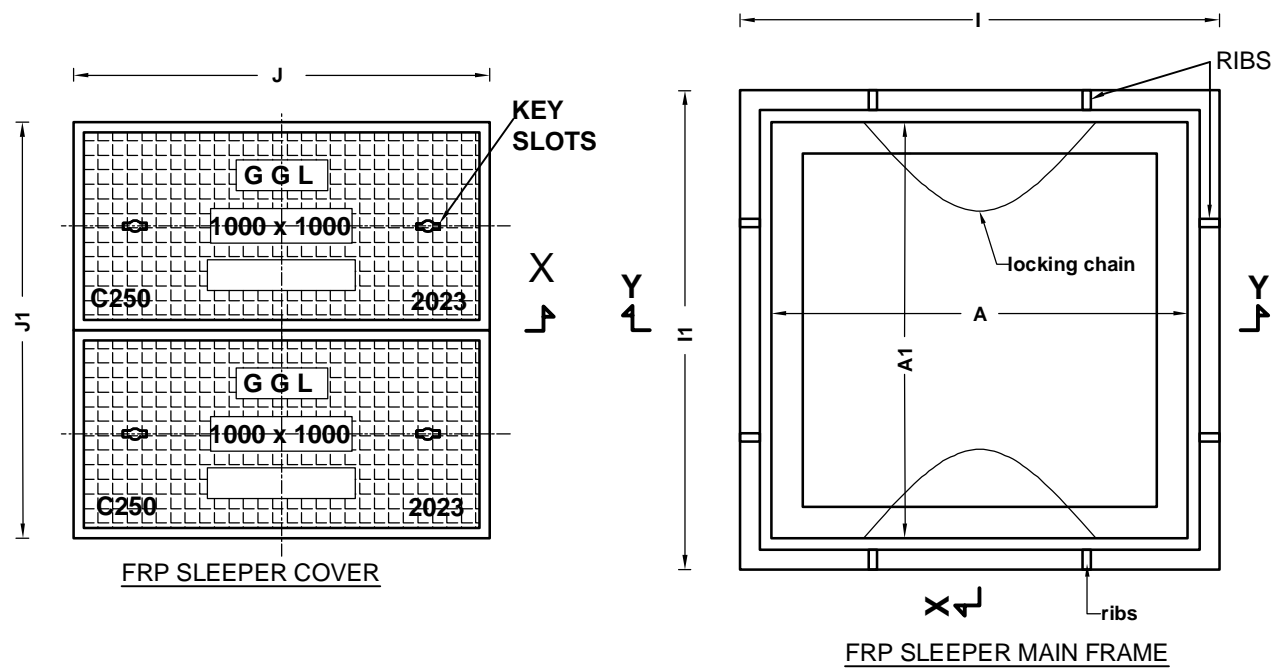
Proposed On: 31-Jan-2023

**Approval details:**

Action	Action By	Sign	Date	Remarks
Recommend	Mustak Patel		03/02/2023 4:06:43 PM	
Approve	Upendrakumar Sharma		03/02/2023 6:34:21 PM	

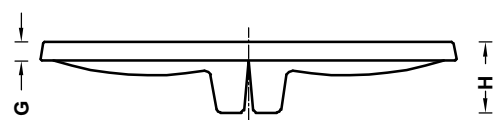
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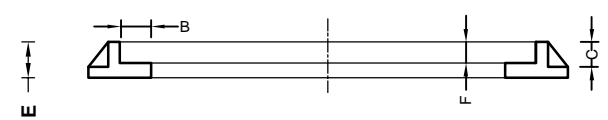


SIZE OF FRP	
SR. NO	1000X500
A	1000
A1	1000
B	MIN. 75
C	MIN. 85
D	MIN. 95
E	MIN. 25
F	MIN. 40
G	MIN. 45
H	MIN. 55
I	AS PER SUPPLIER DRAWING
I1	
J	
J1	

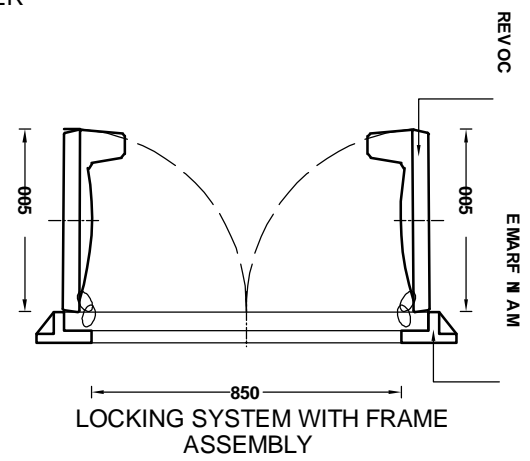
TOLERANCE FOR ALL DIM :±5MM



SECTION X'X' -COVER



SECTION Y'Y' - MAIN FRAME

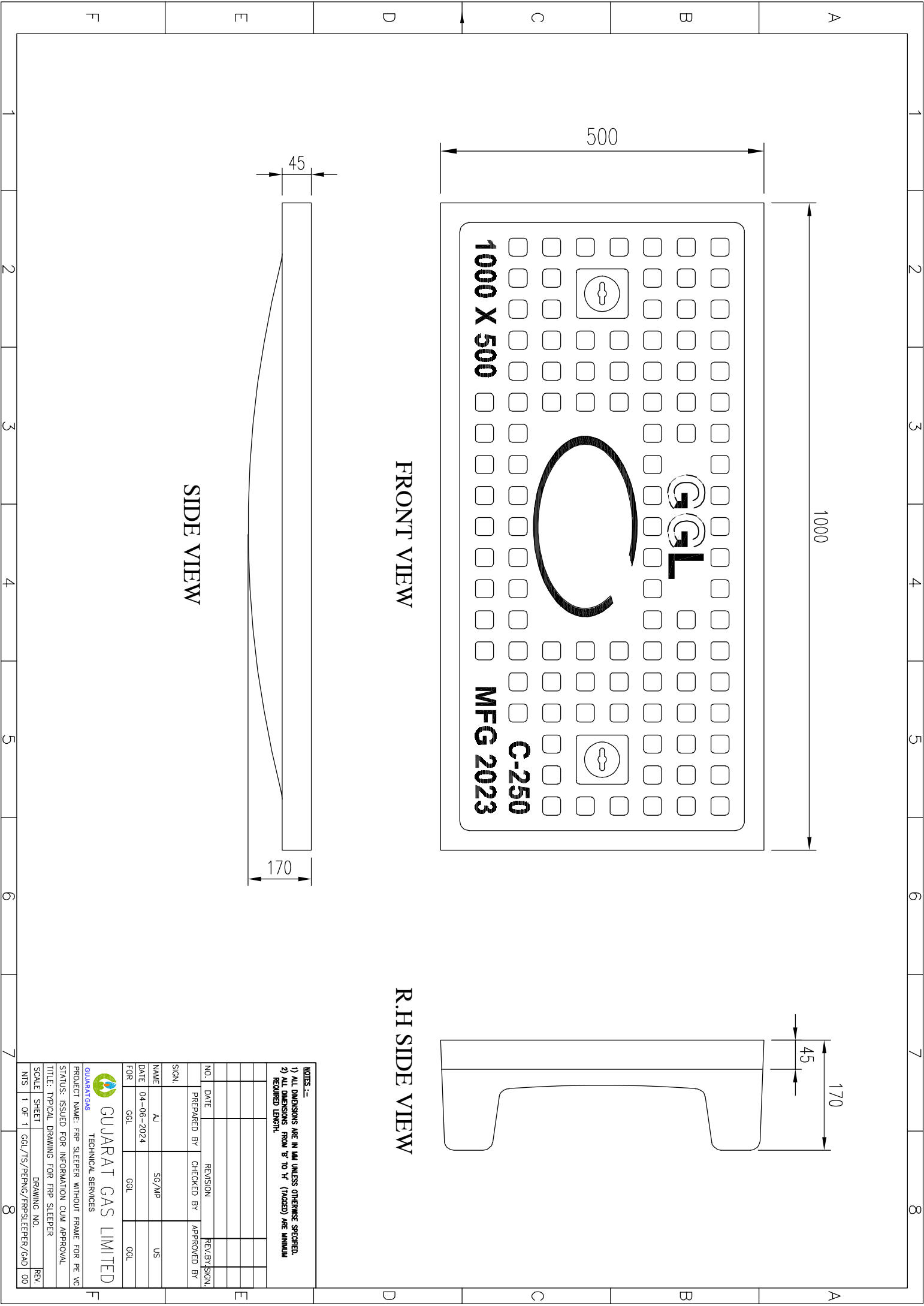


**NOTES :-**

- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
- ALL DIMENSIONS FROM 'B' TO 'H' (TAGGED) ARE MINIMUM REQUIRED LENGTH.

NO.	DATE	REVISION	REV.BY.SIGN.
SIGN.	PREPARED BY	CHECKED BY	APPROVED BY
NAME	HZ	SG/MP	US
DATE	04-06-2024		
FOR	GGL	GGL	GGL

**GUJARAT GAS LIMITED**  
 GUJARAT GAS TECHNICAL SERVICES  
 PROJECT NAME: FRP SLEEPER WITH FRAME  
 STATUS: ISSUED FOR INFORMATION CUM APPROVAL  
 TITLE: TYPICAL DRAWING FOR FRP SLEEPER  
 SCALE: SHEET 1 OF 1 DRAWING NO. GGL/TS/PEPNG/FRPSLEEPER/GAD REV. 00




FRONT VIEW

R.H SIDE VIEW

SIDE VIEW

NOTES:-  
1) ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.  
2) ALL DIMENSIONS FROM 'B' TO 'H' (TAGGED) ARE MINIMUM REQUIRED LENGTH.

NO.	DATE	REVISION	REV./BY	SIGN.	
	PREPARED BY	CHECKED BY	APPROVED BY		
NAME	AI	SG/MP	US		
DATE	04-06-2024				
FOR	GGL	GGL	GGL		

 **GUJARAT GAS LIMITED**  
TECHNICAL SERVICES

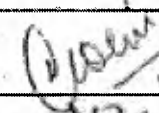

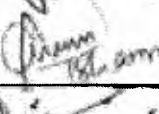

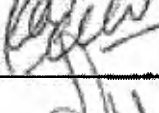


PROJECT NAME: FRP SLEEPER WITHOUT FRAME FOR PE VC  
STATUS: ISSUED FOR INFORMATION CUM APPROVAL  
TITLE: TYPICAL DRAWING FOR FRP SLEEPER  
SCALE: SHEET  
NTS 1 OF 1 GGL/TS/PE/NG/FRPSLEEPER/GAD 00



**TECHNICAL SPECIFICATION FOR  
CORRUGATED FLEXIBLE SS METAL HOSE ASSEMBLY  
(ANACONDA) FOR DOMESTIC CONNECTION**

Document No.: GGL/TS/ANACONDA/2018/001

		14/05/2018
REV. NO	REVISION DESCRIPTION	DATE OF ISSUE

NAME OF COMPANY	GUJARAT GAS LTD.		
	NAME	DESIGNATION	SIGN & DATE
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	Vasudev Gadhavi	Manager (Technical)	 10/05/18
	Dinesh Lad	Manager (Technical)	 10/05/18
Approved by	Raghunath Kulai	Sr. Vice President (Technical Services)	 14/5/18

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## 1. INTRODUCTION & SCOPE

Gujarat Gas Ltd, a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking), is in business of distributing Natural Gas to Industrial/Commercial/Non-commercial/Domestic Customers and CNG Stations in various Geographical areas as per Authorization from PNGRB.

This present document covers the technical specification for the procurement of flexible corrugated metallic hose assemblies (with protective heat shrink sleeve of polyolefin material on corrugated portion) for use with Natural Gas (and suitable manufactured gases) at pressures up to 100 mbar (g) used in distribution systems for domestic application. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which need to be fulfilled.

This specification covers the requirements for Flexible Hoses unless modified by this specification, requirements of ISO 10380 (latest edition) shall be valid.

## 2. DEFINITIONS

OWNER / CLIENT	Gujarat Gas Ltd., (GGL)
PNG	Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated / controlled, odorized & distributed through pipelines for various applications, i.e. for industrial, commercial and domestic.
Manufacturer	Manufacturer of flexible corrugated metallic hose assemblies
Vendor	The person(s), firm, company, organization from whom Client/Contractor procures materials.
PNGRB	Petroleum and Natural Gas Regulatory Board

## 3. REFERENCE

Unless modified by this specification, all the requirements of ISO 10380: 2012 and the latest editions of the standards mentioned therein, and in this specification, including all addenda and revisions, shall apply.

## 4. MATERIAL

Material of construction	: SS 316L (Stainless Steel) (As per the requirement of Table 2 of ISO 10380 (latest edition) or equivalent and % of Chromium & Molybdenum shall be maximum possible of the ranges 17.5 to 19% and 2.5 % $\pm$ 5% respectively).
Polyolefin sleeve	: A heat shrink tube of polyolefin material (yellow in color)
Rubber washer	: A rubber washer made of NBR (Nitrile butadiene rubber)



## **5. DESIGN AND METHOD OF ASSEMBLY**

The manufacturing of hose, joining and the method of assembly shall be done in accordance with Clause 4.1, 4.2, 4.3, 4.4, 4.5 and 4.15 of ISO 10380 respectively.

Transverse joining of strip or circumferential jointing of tube prior to corrugating shall not be permitted.

## **6. THREADS**

Unless specified, end fittings shall be supplied screwed with taper threads and shall be in accordance with IS 554.

For checking conformity of threads gauging practice in accordance with IS 8999: 2003 shall be employed.

## **7. PRODUCT QUALITY**

On visual examination the outside & inside surfaces of assemblies shall be smooth & free from defects. There shall be no thinning or thickening of the hose of a local nature. The corrugations shall be of regular form, continuous along the length of the hose, and shall be free from any defects such as scores, dents, cuts or weld variations that might cause premature failure. The welds shall be free from globular deposits, discontinuities, porosity and under cutting and shall have a regular surface.

A perfect shrinkage of the polyolefin tube on the corrugated portion of the flexible hose should be achieved. The flexibility of the hose should not be affected due to the polyolefin film.

## **8. TYPE TESTING, PRODUCTION TESTS AND TEST CERTIFICATES**

The type testing and production tests for the hose assemblies shall be carried out in accordance to Clause 5.4, 5.5, 5.6, 5.7.2, 5.7.2.1 of ISO 10380: 2012 respectively.

## **9. CLEANING AND PACKAGING**

Each hose assembly shall be cleaned internally and shall be maintained in a dry condition before dispatch.

In order to prevent the ingress of foreign matter each end of the assembly shall be fitted with plastic caps before the dispatch. Each hose assembly shall be packed in a transparent plastic cover of adequate thickness and the cover shall be appropriately closed / sealed. Each assembly shall be protected in order to avoid damage taking into account the method of transport.

## **10. MARKING**

Each hose assemblies shall be indelibly marked with the following information as stated below:

- The number of British standard i.e. ISO 10380: 2012
- The nominal size and nominal pressure
- The name of manufacturer or trademark
- The month and year of manufacture
- The hose assembly unique serial number
- Batch No./Lot No.

This marking may be stamped or engraved on the end fitting, or on a permanently affixed identification band.

## **11. PACKING**

- a. The FCHA (Flexible Corrugated Hose Assembly) shall be adequately packed for protection against damage and deterioration during all stages of processing, storage and delivery.
- b. FCHA shall be individually packed & sealed in clear uncolored polythene bags, the end fittings shall be protected with plastic end caps.
- c. Bags, containing FCHA, shall be packed in suitable boxes, providing protection against accidental damage. Each box shall be labeled with the following:
  - Total number of FCHA in the box
  - "GUJARAT GAS LTD."
  - Manufacturer's name or trade mark
  - Nominal bore & Thickness
  - Batch no. / Lot no.
  - Month and year of manufacturing (MM/YYYY)

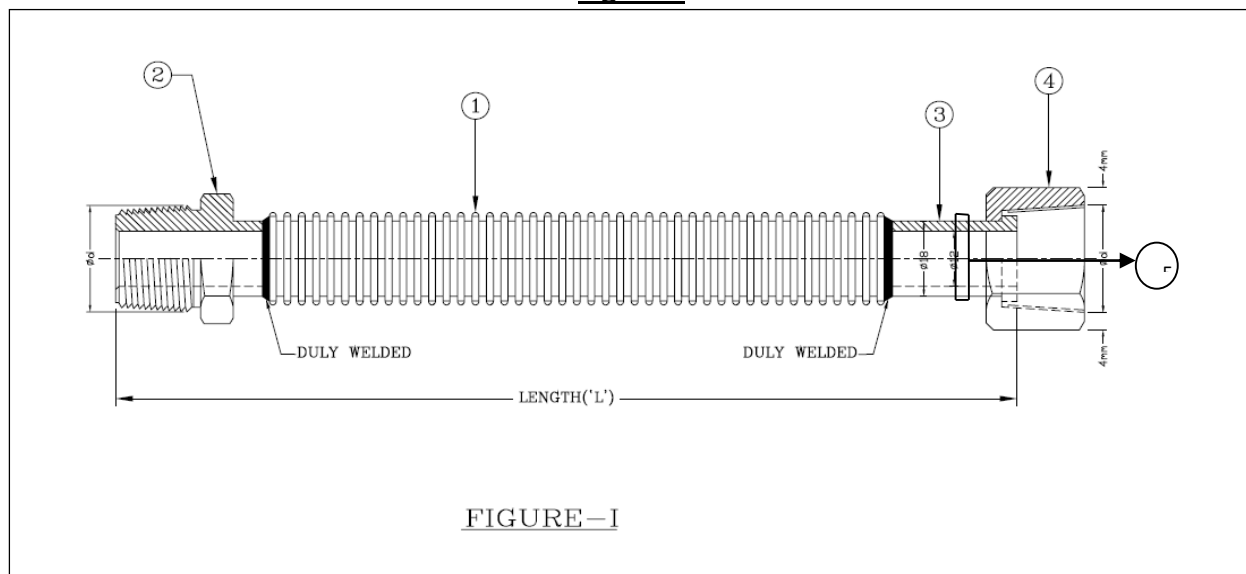
## **12. INSPECTION / DOCUMENTS.**

- a. Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / EIC.
- b. TPIA appointed by Vendor /EIC may carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.
- c. TPIA / EIC may carry out random inspection during manufacturing/ final inspection.
- d. Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- e. Even after inspection, OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- f. For any control, test or examination required under the supervision of TPIA/EIC against approved QAP, vendor shall intimate through letter/mail To TPIA/EIC one (1) week in advance about inspection date and place along with production schedule Marking.

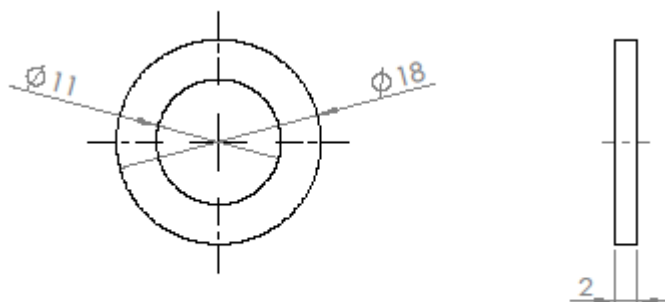
### 13. DATASHEET

Sr. No.	Technical Description	Specifications
1	Code / Std. applicable	ISO 10380
2	Medium of flow through hose	Natural Gas (Composition as per Annexure-1)
3	Nominal Size	½"
4	Dimensions of Hose Assembly end to end.	300 mm with +3 %, -1% tolerance
5	Thickness of flexible hose	0.15 to 0.18 mm (exact value shall be confirmed by GGL at the time of placement of order)
6	End Connection	Fixed Male Nut ½" BSPT (M) & Hex Swivel nut ½" BSPT (F) . End connection shall match to fit with the fittings of dimension as per IS 1879 (latest edition)
7	Flexible Type	Type 2
8	Design Pressure	4 bar (g)
9	Design Temperature	60 °C
10	Operating Pressure	100 mbar (g)
11	Operating Temperature	Ambient (10 – 60) °C
12	Material of construction	SS 316L (Stainless Steel) (As per the requirement of Table 2 of ISO 10380: 2012 or equivalent, with prior approval of GGL and % of Chromium & Molybdenum shall be maximum possible of the ranges 17.5 to 19% and 2.5 % ± 5% respectively).
13	Polyolefin sleeve	A heat shrink tube of polyolefin material (yellow in colour) has to be employed, wherein with the application of heat, the tube shrinks and takes the shape of the material (the corrugated portion of the flexible hose). The thickness of film before corrugation should be <b>0.2mm-0.25 mm</b> and after corrugation should be <b>0.4mm-0.45 mm</b>
14	Rubber washer	A rubber washer made of NBR (Nitrile butadiene rubber) shall be inserted inside the hexagonal swivel nut. The size of the rubber washer shall be appropriate to the swivel nut, such that the rubber washer does not come out easily. Refer Figure 2 for further details.
15	Test	As per ISO 10380 (Latest)
16	Type testing	As per ISO 10380 (Latest)
17	Cleaning and Packaging	As per ISO 10380 (Latest)
18	Test Certificate	As per ISO 10380 (Latest)
19	Marking on Hose	Each corrugated hose shall be marked with <ul style="list-style-type: none"> <li>• The number of British standard i.e. ISO 10380: 2012</li> <li>• The nominal size and nominal pressure</li> <li>• The name of manufacturer or trademark</li> <li>• The month and year of manufacture</li> <li>• The hose assembly unique serial number</li> <li>• Batch No./Lot No.</li> </ul>

**Figure 1**



**Figure 2 (Rubber Washer)**



Sr. No.	Item Description	Material of construction	Qty (Nos.)
1	SS corrugated Hose without braiding	SS 316 L (Stainless Steel) (As per the requirement of Table 2 ISO 10380: 2012) or equivalent, with prior approval of GGL. However, the % of Chromium & Molybdenum shall be maximum possible of the ranges 17.5 to 19% and 2.5 % $\pm$ 5% respectively.	1
2	Fixed Male Nut (M)		1
3	Flat seat nipple		1
4	Hex Swivel nut (F)		1
5	Rubber Washer	A rubber washer of material NBR (Nitrile butadiene Rubber)	1

**Note:**

- All dimensions are in mm
- Tolerance on the dimension is  $\pm 0.1$  mm.

## 14. QUALITY ASSURANCE PLAN (QAP)

Sr. No.	Description	Characteristics	Type of Check	Quantum of Check	Reference Document	Acceptance Norms	Format of Records	Scope		Remarks
<b>Raw Material</b>								<b>Vendor</b>	<b>TPIA</b>	
1	Flexible Corrugated Metallic Hose Assembly	Chemical Analysis of ◆ SS Hose Core ◆ Fixed male nut ◆ Hex. Swivel nut ◆ Flat seat nipple ◆ Rubber washer	Chemical Composition	One sample per lot	SS 316L	As per GGL Technical Specification	Material Test Certificate and vendor inspection report	P	R	TPIA has to select a sample for carrying out the chemical analysis at NABL approved lab and review report of the same.
<b>Final Inspection of Hose Assembly</b>										
2	Flexible Corrugated Metallic Hose Assembly	Dimensional Check	Length, Nominal bore Diameter, thickness of polyolefin film, dimensions of rubber washer. Threading	100%	As per GGL Technical Specification	As per GGL Technical Specification	Vendor Inspection report	P	W	100% Inspection by Vendor and 10% by TPIA
3	Flexible Corrugated Metallic Hose Assembly	Visual appearance	1. Surface finish of hose. 2. Perfect shrinkage of polyolefin film on the corrugated portion of the hose.	100%	As per GGL Technical Specification	As per GGL Technical Specification	Vendor Inspection report	P	W	100% Inspection by Vendor and 10% by TPIA
4	Flexible Corrugated Metallic Hose Assembly	Type Tests	Bend Test Fatigue test Burst test	One sample per PO	As per Clause No. 6 of ISO 10380	As per GGL Technical Specification	Vendor Inspection report	P	W	Witness test by TPIA
5	Flexible Corrugated Metallic Hose Assembly	Pressure Proof Test	Hydraulic / Pneumatic		As per Clause No. 8 of ISO 10380	As per GGL Technical Specification	Vendor Inspection report	P	W	100% Inspection by Vendor and 10% by Third Party Inspection Agency

Sr. No.	Description	Characteristics	Type of Check	Quantum of Check	Reference Document	Acceptance Norms	Format of Records	Scope		Remarks
6	Flexible Corrugated Metallic Hose Assembly	Cleaning and packaging	Visual		As per GGL Technical Specification	As per GGL Technical Specification	Vendor Inspection report	P	W	100% Inspection by Vendor and 10% by Third Party Inspection Agency
7	Flexible Corrugated Metallic Hose Assembly	Packing & Marking	Visual		As per GGL Technical Specification	As per GGL Technical Specification	Vendor Inspection report	P	W	100% Inspection by Vendor and 10% by Third Party Inspection Agency

**Remarks:**

1. All dimensions are in mm unless otherwise specified.
2. All the measuring instruments shall be duly calibrated at the time of inspection
3. Calibration certificates of all the measuring instruments shall be reviewed by TPI at the time of inspection, along with the Master calibration certificate of the measuring instruments from which the instruments is calibrated.
4. After satisfactory inspection, the TPI agency to apply their mark (stamp / sticker / embossing / etc.) on each on the assembly selected for testing. Also TPI has to apply their mark (stamp / sticker / embossing / etc.) on the outer packing of the assembly, after verifying the information mentioned in the GGL technical specification clause No.9.

### **ANNEXURE- I**

The hose assembly shall be suitable to carry natural gas having a typical composition as given below-

<b>Typical Gas Composition</b>	
Component	Mole % (v/v)
CH <sub>4</sub>	92.66%
Nitrogen	0.42%
C <sub>2</sub> H <sub>6</sub>	6.32%
C <sub>3</sub> H <sub>8</sub>	0.49%
i-C <sub>4</sub> H <sub>10</sub>	0.05%
n-C <sub>4</sub> H <sub>10</sub>	0.06%

GUJARAT GAS

**TECHNICAL SPECIFICATION – PROCUREMENT OF BRASS METER ADAPTOR**

**Document No. : GGL/TS/Meter Adaptor/2015**

00	QAP Included	06/06/2018
REV. NO	REVISION DESCRIPTION	DATE OF ISSUE

NAME OF COMPANY	GUJARAT GAS LTD.		
	NAME	DESIGNATION	SIGN & DATE
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Reviewed By- Technical Committee (PE-PNG Projects)	Jignesh Desai	Manager (Technical)	<i>[Signature]</i> 25/05/18
	Chirag Bhanvadia	Dy. Manager (Technical)	<i>[Signature]</i> 25/05/18
	Lalit Mistry	Dy. Manager (Technical)	<i>[Signature]</i> 25/05/18
	Vasudev Gadhavi	Manager (Technical Services)	<i>[Signature]</i> 25/05/18
	Dinesh Lad	Manager (Technical)	<i>[Signature]</i> 25/05/18
Approved by	Raghunath Kulai	Sr. Vice President (Technical Services)	<i>[Signature]</i>



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## 1.0 INTRODUCTION AND SCOPE

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various cities of Gujarat.

This specification covers the requirements for materials of Brass and it's fittings. Unless modified by this specification, requirement of IS 559 / IS 319: 2007/ BS 864 / EN 1254 Part 1 shall be valid. However, Latest Edition of IS/BS/EN shall be governing for Specification, if applicable.

## 2.0 DEFINITIONS

OWNER / CLIENT	Gujarat Gas Ltd., (GGL)
PNG	Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated / controlled, odorized & distributed through pipelines for various applications, i.e. for industrial, commercial and domestic.
Manufacturer	Manufacturer of the Brass Fittings with Head Chrome Plating
Vendor	The person(s), firm, company, organization from whom Client/Contractor procures materials.
TPA	Third Party Inspection Agency
EIC	Engineer In Charge
PNGRB	Petroleum and Natural Gas Regulatory Board
T4S	Technical Standard and Specification including Safety Standards

## 3.0 MATERIAL

- i. The material used for the manufacturer of Brass fittings shall conform to IS 319 :2007 ( Latest edition)
- ii. Material used for Brass Fitting shall be Clean, Smooth, and free from the surface defects like blisters, Silvers, Scales, Fins, Spills, Cracks etc. and Free From internal defects like Porosity, Piping etc.
- iii. Threading on the Brass fittings shall be done as per BS 21 / IS554.

## 4.0 CHEMICAL PROPERTIES

Chemical composition of free cutting brass rods of Brass and it's fittings shall be as mentioned in IS 319 : 2007 with Head Chrome Plating.

Copper (Cu)	:	56.0 % to 59.0 %
Lead (Pb)	:	2.0 % to 3.5 %
Iron (Fe)	:	0.35 % Max
Other Impurities (Excluding Iron)	:	0.70 % Max
Zinc (Zn)	:	Remaining

## **5.0 HYDROSTATIC / PNEUMATIC PRESSURE TEST**

All Brass fittings shall be sustaining the pressure of 3.5 bars for 30 minutes holding time during testing at site after installation and no leakage is permitted.

The test shall be performed on each size of the fittings at site after installation.

## **6.0 DIMENSIONAL TOLERANCES OF FREE CUTTING BRASS BARS, RODS AND SECTION**

### **Sizes**

The materials of Brass Fitting (Free Cutting Brass Rods) shall be supplied in sizes as specified in IS 319: 2007 or IS 2826 or as per Purchaser requirement.

### **Tolerances**

The tolerances on sizes of bars/rods shall be as specified in IS 2826.

## **7.0 DIMENSION, WALL THICKNESS & TOLERANCE OF BRASS FITTINGS**

Dimensions tolerances of various types of brass shall be as per drawing enclosed with tender.

The minimum wall thickness of a fitting shall be in accordance with Table 3 of EN 1254 Part 1

## **8.0 END CONNECTION**

End connection of the brass fitting must be capable of end feeding to the BSPT and as per drawing enclosed with tender

Internal solder ring type fitting is not acceptable.

## **9.0 FREEDOM FROM DEFECT**

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

## **10.0 QUALITY ASSURANCE (QA)**

The Contractor/Manufacturer /Vendor shall manufacture, supply, inspection, testing, marking, packaging, handling and dispatch of Fittings as per GGL Technical Specification and GGL QAP.

## **11.0 INSPECTION / DOCUMENTS**

Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and approved QAP.

- i. Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- ii. OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- iii. Vendor Representative shall carry out final inspection at his premise prior to dispatching of materials as per GGL QAP provided with the tender document.
- iv. For inspection at contractor premises by TPA/ GGL Representative, latter shall be informed in writing one (1) week in advance by contractor about inspection date & place along with inspection schedule.

Each fittings shall be embossed with manufacturers name / trade mark

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

- a) Manufacturer's name or trade mark.
- b) Designation of fittings.
- c) Month and year of manufacturing

## **12.0 PACKAGING**

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details and also complied with at the time of delivery.

## **13.0 DOCUMENTS OF PRECEDENCE**

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


#### 14.0 QUALITY ASSURANCE PLAN

Sr. No.	Characteristics	Referred Standard	Inspection Methodology	Inspection by TPA
1	Material (Chemical and Mechanical Properties)	IS 319 : 2007	Manufacturers test certificate of Raw material	R
2	Thread	IS 554	Test Certificate	R
3	Dimensions & Thread	Approved drawing of GUJARAT GAS	Dimension verification- ("GO" – "NO GO" Gauge)	Rv
4	Marking	Manufacturers name or trade mark	Visual	Rv

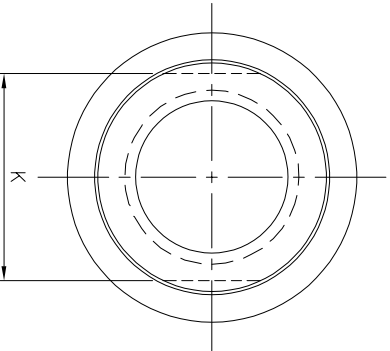
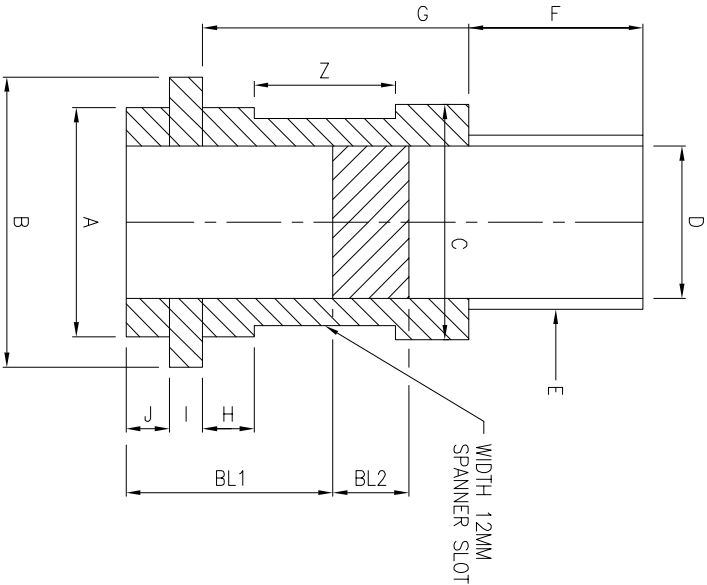
R- Review of Documents

Rv- Random Verification

---XXX---

 GUJARAT GAS		QUALITY ASSURANCE PLAN FOR ADAPTORS			QAP No.:		PROJECT: QAP/PEPNG/ADAPTORS/01				
					DATE:						
GUJARAT GAS LIMITED		P.O. NO. :			MANUFACTURE'S NAME & ADDRESS:						
SR No	Component & Stage	Characteristic	Type of Check	Quantam of Check	Reference Standard/ Documents	Acceptance Standard / Documents	Format of Records	Inspection By			Remarks
								M	TPA	CLIENT	
1	Raw Material										
1.1	Material (Chemical) & Mechanical Properties	Material Testing	Lab Testing/Mfg Test Reports	100%	IS 319:2007 or Mild Steel	As per drawing and Data sheet	MTC/Lab Test Certificate	P	R	R	
2	Final Dimension & Inspection										
21	Final Dimensional/ Visual Inspection	Thread	Visual Inspection & Test Certificate	100%	IS 554	Approved Drawings	Test Reports	P	W	V	--
2.2	Final Dimensional/ Visual Inspection	Dimensions	Dimension verification-GO - NO GO Guage		Approved drawing of GGL			P	W	V	
2.3	Marking		Visual		Manufacturer Name			P	W	V	
3	Final Documentation:										
3.1	Design Documents, Material compliance report, GAD & Dimension Report	History docket	Verification of records	100%	Approved specification	As per approved specification	Product File	P	R	R	
M : Manufacturer; P : Performer; W : Witness ; R : Review ; A: Approval; RW: Random Witness ; V : Verification											
Prepared By:			Reviewed By:				Approved By:				

COMPONENT PIN (BLIND)



- (i) MATERIAL CODE : 100002020 (OLD)
- (ii) MATERIAL CODE : 100012970 (NEW)

ADAPTOR FOR	A	B	C	D	E	F	G	H	I	J	K	Z	BL1	BL2
G1.6 MS BODY METER	17.0	24.0	21.35	14.0	1/2"BSPT	15.0	20.0	4.0	3.0	4.0	17A/F	12	19.0	7.0

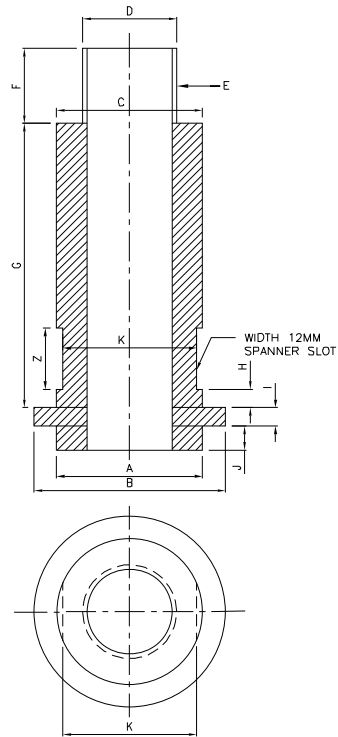
- NOTES
- ALL DIMENSIONS ARE IN mm.
  - TPI- THREAD PER INCH.
  - ALL TOLERANCES ARE +/- 0.1mm, UNLESS SPECIFIED EXPLICITLY.

MOC DETAILS			
Sr. No.	PART	MOC	OTHER REC'S
1.	COMPONENT PIN (BLIND)	MILD STEEL	HOT DIP GALVANIZED + RED POWDER COATING

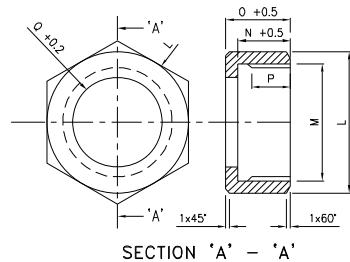
01.	07.07.23	FROM 3/4"NPT TO 1/2"BSPT	SB	
NO.	DATE	REVISION	REV. BY,	SIGN.
	PREPARED BY	CHECKED BY	APPROVED BY	
	NAME			
	DATE			
	FOR	GCL	GCL	GCL

PROJECT NAME: SCHEMATIC DRAWING FOR ADAPTOR			
STATUS: ISSUED FOR CONSTRUCTION			
TITLE: ADAPTOR FOR GAS METER (G1.6) NPT			
SCALE	SHEET	DRAWING NO.	REV.
NTS	1 OF 1	GCL/TS/NPT/ADP/001	01

**E-TENDER-567767**  
**METER ADAPTOR INLET**

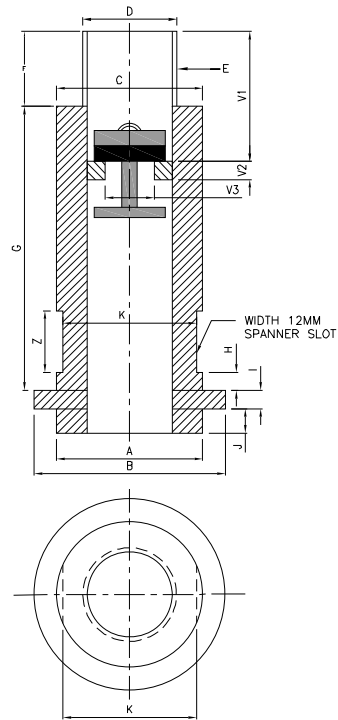


**NUT**



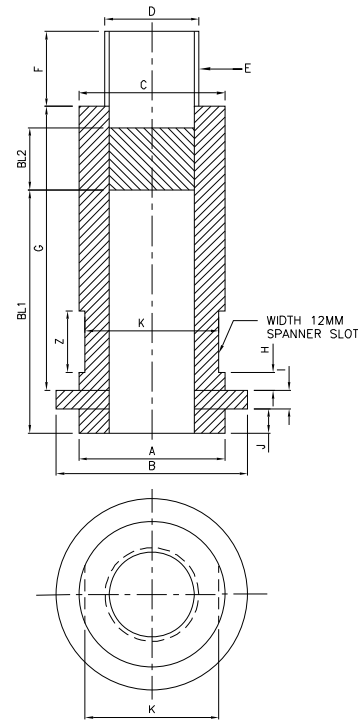
SECTION 'A' - 'A'

**METER ADAPTOR OUTLET WITH NRV**

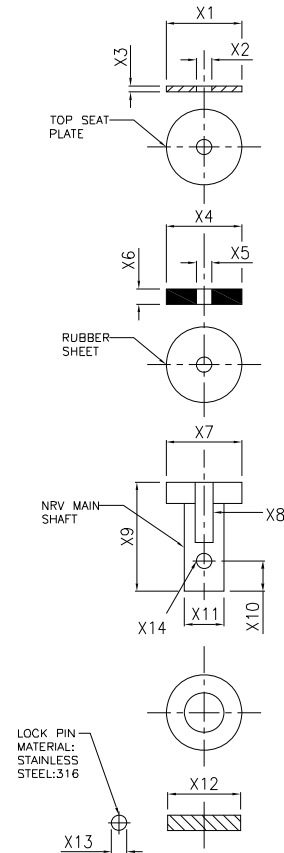


**BLIND-METER ADAPTOR**

Material code-100012971



**NRV ASSEMBLY**



**NOTES :-**

1. ALL DIMENSIONS ARE IN mm.
2. TPI- THREAD PER INCH.
3. ALL TOLERANCES ARE +/- 0.1mm, UNLESS SPECIFIED EXPLICITLY.
4. ALL FITTINGS ARE AS PER IS:319 WITH HARD CHROME PLATING.
5. 2-3 SAMPLES TO BE SENT AT LABORATORY ONCE IN YEAR FOR PHYSICAL AND CHEMICAL ANALYSIS.


**MOC DETAILS**

Sr. No.	PART	MOC	OTHER REC'S
1	ADAPTOR INLET	BRASS (IS319)	HARD CHROME PLATING
2	ADAPTOR OUTLET WITH NRV	BRASS (IS319)	HARD CHROME PLATING
3	NUT	BRASS (IS319)	HARD CHROME PLATING
4	BLIND	MILD STEEL	HOT DIP GALVANIZED + RED POWDER COATING
5	TOP SEAT PLATE	SS316	-
6	RUBBER SHEET	NITRILE	-
7	NRV MAIN SHAFT	ALUMINUM	-
8	LOCK PIN	SS316	-

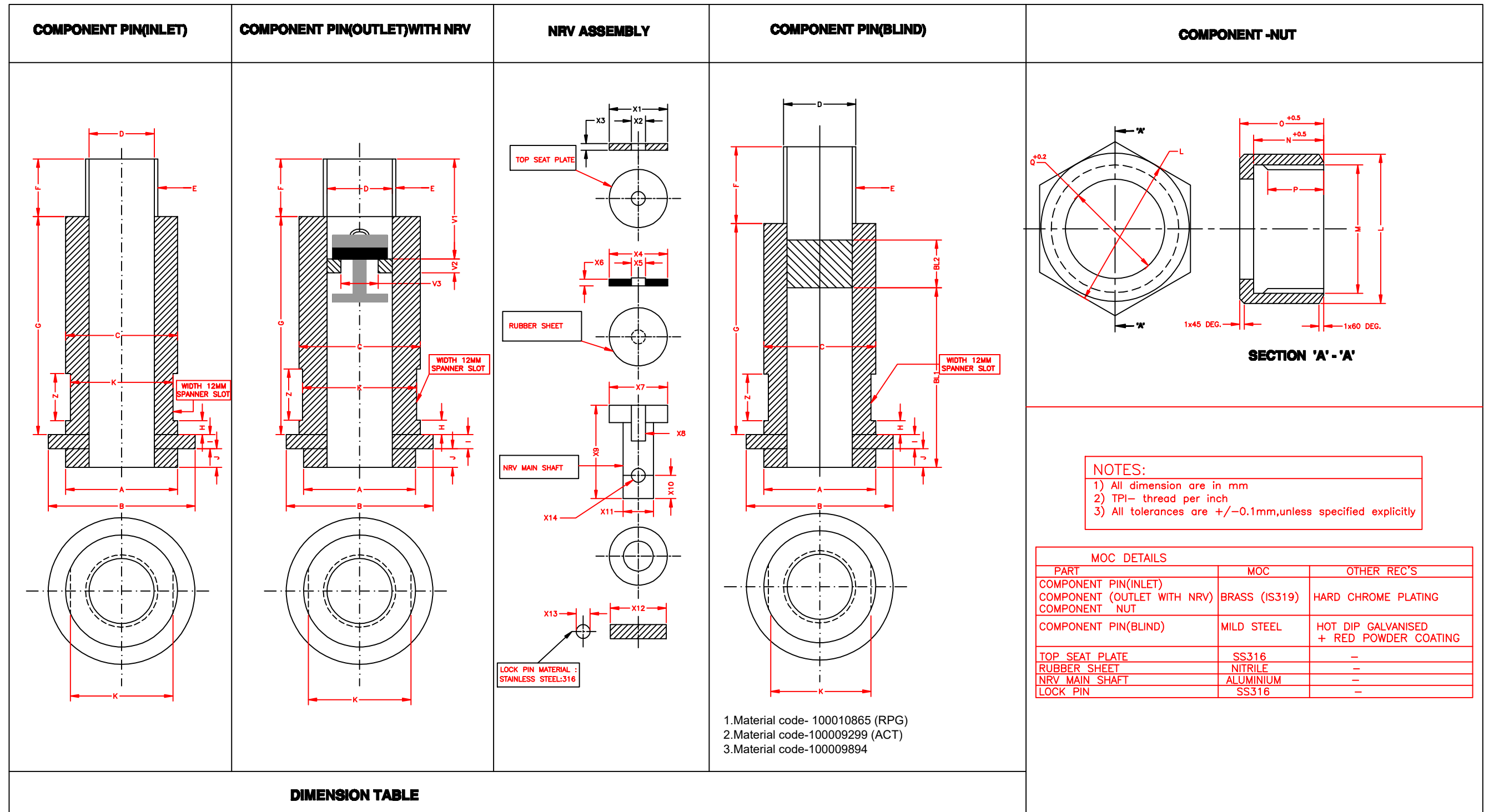
**DOMESTIC METER ADAPTOR - 3/4" BS-746**

**DIMENSION TABLE**


ADAPTOR FOR	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	Z	BL1	BL2	V1	V2	V3	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
G1.6 DOM. METER	21.0	26.6	21.60	14.0	1/2"BSPT	16.0	24.5	4.75	3.0	4.0	19A/F	35	3/4" BS746	13	16	10	22.2	15	19.0	7.0	19.0	4.0	10.0	12.5	2.5	1	12.5	2.5	1.0	12.5	M3x10	18.0	5.0	6.5	12.0	2.5	2.5

NO.	DATE	REVISION	REV.BY.	SIGN.
	PREPARED BY	CHECKED BY	APPROVED BY	
SIGN.				
NAME	AJP	NJA	DL	
DATE	11.08.2017			
FOR	GGL	GGL	GGL	
 <b>GUJARAT GAS LIMITED</b> <b>TECHNICAL SERVICES</b>				
TYPICAL DRAWING FOR PIPELINE CONSTRUCTION				
PROJECT NAME: DOMESTIC INTSALLATION				
TITLE: TYPICAL ARRANGEMENT OF INLET OUTLET DETAILS FOR GAS METER ADAPTOR (G1.6) - BS-746				
SCALE	SHEET	DRAWING NO.	REV.	
NTS	1 OF 1	GGL-TS/PE-TYP/ADAPTOR(G1.6)-015	0	


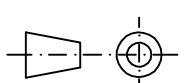




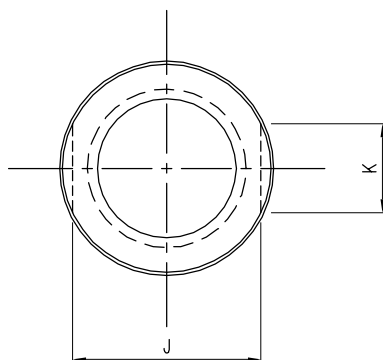
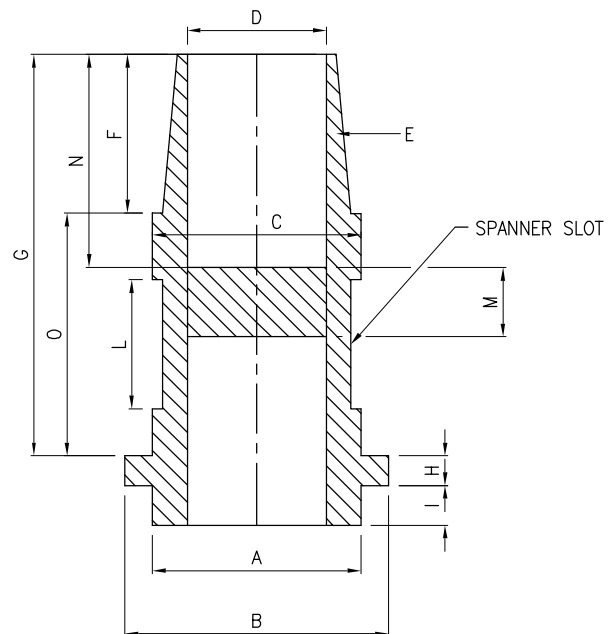
ADAPTOR FOR	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	Z	BL1	BL2	V1	V2	V3	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
G1.6 MS BODY METER(RPG)	21.0	26.6	21.6	14.0	1/2"BSPT	16.0	24.5	4.75	3.0	4.0	19A/F	35	3/8"BSP	13	16	10	22.2	15	19.0	7.0	19.0	4.0	10.0	12.5	2.5	1	12.5	2.5	1.0	12.5	M3X10	18.0	5.0	6.5	12.0	2.5	2.5
G1.6 MS BODY METER(ACT)	17.0	24.0	21.35	14.0	1/2"BSPT	15.0	20.0	4.0	3.0	4.0	17A/F	32	3/4"BSP	15	18	12	21.5	12	19.0	7.0	20.0	5.0	10.0	12.5	3.0	1	12.5	3.0	1.0	12.5	M3X10	20	5.0	6.5	12.0	3.0	3.0
G1.6 AL BODY METER	24.0	31.5	22.0	14.0	1/2"BSPT	16.5	23.5	3.0	3.0	4.0	18A/F	40	M34X1.5	15	18	12	22.5	14	20.0	7.0	19.0	4.0	10.0	12.0	2.5	1	12	2.5	1.0	12.0	M2X6	16.0	3.0	6.5	12.0	2.5	2.5

REVISION RECORD									 GUJARAT GAS			
						PREPARED	CHECKED	APPROVED	TITLE:- ADAPTOR FOR GAS METER(G1.6)			
					SIGN.							
					INITIALS				SCALE	SHEET	DRG. NO.:	REV.
NO.	DATE	REVISION	REV.BY.	SIGN.	DATE				NTS	1OF1	GG/QA/ADAP/902	2

MATERIAL : M.S BRIGHTBAR  
SURFACE TREATMENT :  
Zn PLATING WHITE PASSIVATION COATING THICK-8 MICROMIN

1		NUT – HEX BAR : A/F – 46 MM			1		BRASS				
SR. NO.		ITEM AND SIZE			QTY.		MATERIAL		REMARKS		
						<div></div> <div>GUJARAT GAS CO. LTD.</div> <div>SURAT</div>					
						DRN. BY :				TITLE :-  BLIND ADAPTER FOR N2 KIMMON GAS METER	
						DESG. BY :					
NO.	DATE	REVISION		REV.BY.	SIGN.	CHD. BY :					
						APPD. BY :					
		SCALE :				SHEET: 01 OF 01					
		NOT TO SCALE									
		SCALE		SHEET		DRG. NO.:		REV.			
		NTS		10F1		GGCL/SRT/QAD/AK2/0440		40			

# BLIND ADAPTOR FOR UGI GAS METER ADAPTOR




Material Code- 10009895

## NOTES

1. ALL DIMENSIONS ARE IN mm.
2. TPI- THREAD PER INCH.
3. ALL TOLERANCES ARE +/- 0.1mm, UNLESS SPECIFIED EXPLICITLY.
4. ALL FITTINGS ARE AS PER IS:319 WITH HARD CHROME PLATING.
5. 2-3 SAMPLES TO BE SENT AT LABORATORY ONCE IN YEAR FOR PHYSICAL AND CHEMICAL ANALYSIS.

MATERIAL : MS BRIGHT BAR  
SURFACE TREATMENT : HOT DIP GALVANISING WITH RED POWDER COATING

NO.	DATE	REVISION	REV.BY.	SIGN.
	PREPARED BY	CHECKED BY	APPROVED BY	
SIGN.				
NAME				
DATE	04.07.2019			
FOR	GGL	GGL	GGL	
 <b>GUJARAT GAS LIMITED</b> GUJARAT GAS TECHNICAL SERVICES				
PROJECT NAME: SCHEMATIC DRAWING FOR ADAPTOR				
STATUS: ISSUED FOR CONSTRUCTION				
TITLE: TYPICAL DRAWING FOR BLIND ADAPTOR FOR UGI GAS METER ADAPTOR				
SCALE	SHEET	DRAWING NO.	REV.	
NTS	1 OF 1	GGL-TS/BLIND ADAPTOR /TYP-922	00	

ADAPTOR FOR	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
UGI GAS METER	22.0	26.5	22.0	14.5	1 1/2"BSPT as IS-554	18.0	57.0	4.0	5.0	A/F-19	15.0	15.0	7.0	25.0	30.0



## TECHNICAL SPECIFICATION OF POWDER COATED GI PIPES

Document No.: GGL/TS/GI PIPE/2022/DEC/07

01	1. Inclusion of Dimension Tolerance for 1.5" and 2" GI Pipes 2. Inclusion of Powder Coating specification (provided separately in previous tender)	06.12.2022
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## 1.0 INTRODUCTION AND SCOPE

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various Geographical Areas as per authorisation from PNGRB.

This present document covers the technical specification for the procurement of GI Pipes used in natural gas distribution systems. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which needs to be fulfilled.

This specification covers the requirements for GI pipes of heavy (C- Class) steel tubes. Unless modified by this specification, requirements of IS 1239 (Part-I):(Latest edition) & IS 10748 (Latest edition) shall be valid.

## 2.0 DEFINITIONS

OWNER / CLIENT	Gujarat Gas Ltd., (GGL)
PNG	Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated / controlled, odorized & distributed through pipelines for various applications, i.e. for industrial, commercial and domestic.
Manufacturer	Manufacturer of the GI pipes
Vendor	The person(s), firm, company, organization from whom Client/Contractor procures materials.
TPIA	Third Party Inspection Agency
EIC	Engineer In Charge
PNGRB	Petroleum and Natural Gas Regulatory Board
T4S	Technical Standard and Specification including Safety Standards,

## 3.0 MATERIAL

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

## 4.0 PRESSURE TEST

Hydrostatic pressure test shall be carried out at a pressure of 5 Mpa for the duration of at least 3 second and shall not show any leakage in the pipe. Vendor to submit the internal

pressure test certificate for the same. Owner Representative or Third party Inspection Agency shall witness finish goods testing as per the sample procedure specified in IS: 1239 (Part-1) – latest edition.

## 5.0 DIMENSIONS, THICKNESS & DIMENSIONAL TOLERANCES

The dimensions & nominal mass of tubes shall be in accordance with Table 5 subject to the tolerances permitted in CL.8.1 & 9 of IS 1239 (Part-I) : ( Latest edition ). Length of each pipe shall be 3.0 mtr. with + 6, - 0 mm tolerance. However, pipe length shall be considered 3.0 mtr. only for measurement / payment purpose.

Nominal Diameter DN	15 mm (1/2")	25 mm (1")	40 mm (1.5")	50 mm (2")
Grade	Heavy (C-class)	Heavy (C-class)	Heavy (C-class)	Heavy (C-class)
Outer Dia. (Max. / Min.)	21.8 mm / 21.0 mm	34.2 mm / 33.3 mm	47.9 mm / 48.8 mm	59.7 mm / 60.8 mm
Thickness (mm)	3.2	4.0	4.0	4.5
Nominal weight (Kg / m)	1.44	2.93	4.37	6.19
Tolerance on Thickness	-10% / + Not limited	-10% / + Not limited	-10% / + Not limited	-10% / + Not limited

## 6.0 END CONNECTION OF PIPE

GI Pipes shall be supplied with plain end.

## 7.0 FREEDOM FROM DEFECTS

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

## 8.0 GALVANIZING

- Pipes shall be galvanized to meet the requirement of IS: 4736 – 1986 with latest amendment.
- Zinc conforming to any grade specified in IS: 13229- 1991 with latest amendment shall be used for the purpose of galvanizing.
- Galvanizing bath: The molten metal in the galvanizing bath shall contain not less than 98.5% by mass of zinc.
- Mass of zinc coating: Minimum mass of zinc coating determined as per IS: 6745 shall be 400 gms/m<sup>2</sup>.
- Uniformity of galvanized coating: The galvanized coating when determined on a 100 mm long test piece in accordance with IS 2633: 1986 with latest amendment shall withstand 5 one – minute dips.

f) Freedom from defect: The zinc coating on internal & external surfaces shall be uniform adhered, reasonably smooth & free from such imperfections as flux, ash & drop inclusions, bare patches, black spots, pimples, lumpiness runs, rust stains, bulky white deposits & blisters. Rejection & acceptance for these defects shall be as per Appendix - A of IS 2629: 1985 with latest amendments.

g) Samplings

All materials of the same type in coating bath having uniform coating characteristics shall be grouped together to continue a lot. Each lot shall be tested separately for the various requirements of the specification. The number of units to be selected from each lot for this purpose shall be IS: 4711 1995 with latest amendment.

The sample selected according to Clause 6.1 & 6.2 of IS: 4736 – latest edition.

The sample found conforming to above requirements shall then be tested for mass of zinc coating in accordance with Clause 5.1 of IS: 4736 – 1986 with latest amendment.

Criteria for conformity: As per IS: 4736 – 1986 with latest amendments.

## **9.0 POWDER COATING**

Specifications to be followed for powder coating on GI Pipes as per Annexure-3.

## **10.0 QUALITY ASSURANCE (QA)**

The Contractor/Manufacturer /Vendor shall manufacture, supply, inspection, testing, marking, packaging, handling and dispatch of GI Pipes as per GGL Technical Specification & GGL QAP.

### **Quality Assurance of Company Procured Material**

The Contractor / Manufacturer / Vendor shall submit QAP after getting firm order from Owner for their review and approval. Prior dispatching of materials, vendor shall offer material lot to TPA / Owner for inspection as per approved QAP at their premise following for review of TPA / EIC at the time of final inspection at vendor premise prior to dispatch of materials.

### **Quality Assurance of Contractor Procured Material**

The Contractor/Manufacturer /Vendor after getting firm order from Contractor shall manufacture, supply, inspection, testing, marking, packaging, handling and dispatch GI pipes as per GGL technical specification and GGL QAP.

## **11.0 INSPECTION / DOCUMENTS**

Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and approved QAP. The manufacturer shall have a valid licence to use ISI monogram for manufacturing of pipe in accordance with the requirement of IS:1239.



### **Inspection of Company Procured Material**

- a. TPA /GGL Representative shall carry out final inspection at vendor premise prior to dispatching of materials.
- b. TPA / GGL Representative shall carry out inspection during manufacturing/ final inspection as per approved QAP.
- c. Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- d. Even after third party inspection, OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- e. Deputation of TPA is in the scope of the Vendor.

For any control test or examination required under the supervision of TPA/ GGL Representative, Mail communication / latter shall be submitted in writing one (1) week in advance by vender about inspection date & place along with production schedule.

### **Inspection of Contractor Procured Material**

- a) Vendor Representative shall carry out final inspection at his premise prior to dispatching of materials as per GGL QAP provided with the tender document.
- b) For inspection at contractor premises by TPA/ GGL Representative, Mail communication latter shall be informed in writing one (1) week in advance by contractor about inspection date & place along with inspection schedule.
- c) Contractor shall furnish all the material test certificates, type test reports, internal test/ inspection reports as per OWNER Technical Specification and QAP, at the time of final inspection of each supply lot of material.
- d) OWNER reserves the right to select a sample of items randomly from each batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- e) Inspection of the material shall be carried out as per GGL IMS procedure "Quality Assurance for Contractor procured material".

Inspection shall be carried out as per Owner Technical Specification / approved QAP.

## **12.0 MARKING**

Each pipe shall be embossed with manufacturer's / Owner's logo, manufacturer's name or trademark, size designation, class of pipe at the interval of not more than 1 meters.

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

- a) Manufacturers name or trademark.
- b) Class of pipe – Heavy(C-class)

c) Indian standard mark (ISI)

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

### **13.0 PACKAGING**

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / Vendor / Bidder shall submit the packaging details and also complied with at the time of delivery.

### **14.0 DOCUMENTS OF PRECEDENCE**

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

### **15.0 QUALITY ASSURANCE PLAN**

ANNEXURE-1 Specifications for Powder coating on GI pipes

ANNEXURE-2 Quality Assurance Plan for Company Procured Material

ANNEXURE-3 Quality Assurance Plan for Contractor Procured Material

## **ANNEXURE-1-SPECIFICATIONS FOR POWDER COATING ON GI PIPES**

### **1.0 MATERIAL**

The material used for the powder coating confirming to pure polyester.

Following information shall be made available by the coating powder supplier for each lot-

- a) Manufacturer
- b) Trade Name
- c) Colour
- d) Gloss level
- e) Type of resin
- f) Batch number
- g) Box number
- h) Product reference code
- i) Date of manufacture
- j) Date of dispatch

Storage of coating powder shall be carried out as per clause no. 5.2 of EN 13438

### **1. REQUIREMENTS FOR THE FABRICATED ELEMENTS**

The section shall be suitable for powder coating, defects in construction which lead to corrosion, e.g. inappropriate combinations of materials, spaces which cannot be ventilated, cracks and components which are not suitable for powder coating, should be avoided.

The quality of the powder coating on galvanized Pipes & Fittings shall be primarily determined by the quality of the galvanization. The hot galvanization guidelines in IS apply only when the hot galvanized pipes & Fittings shall not be coated afterward.

### **2. PREPARATION & PRE-TREATMENT**

To obtain a suitable powder coated surface, grinding down of the uneven areas on the galvanized surface may be required. Brushing or the use of abrasive paper, grain size 60, is recommended before initial preparation or pre-treatment.

Galvanized surfaces shall be powder coated immediately after preparation or pre- treatment and before the products of zinc corrosion, or white rust, can develop.

#### **PREPARATION**

Sweep blasting shall be used to prepare a clean and even surface on the zinc / galvanize coating which is ideal for adhesion of the powder coating.

The hot galvanized parts shall have a Rz mean surface roughness according to DIN 4768 of between 15 and 30 µm and a high degree of coverage.

After the sweeping process is completed, any dust must be removed thoroughly from the entire surface, which should have a uniform matte gray appearance.

#### **PRE-TREATMENT**

Yellow chromating has become the most common wet-chemical process. This method uses either immersion or spraying techniques; zinc-phosphating shall be also used.

This shall rinse the conversion layer thoroughly with de-ionized water. The conversion layers must be sufficiently clean and dry before powder coating to ensure that surface irregularities do not form when the powder coating shall be cured.

### **3. COATING SYSTEM**

Due to the excellent corrosion resistance of zinc coatings, powder coatings are usually applied to galvanized pipes and Fittings in a single coat.

The minimum thickness of powder coatings is 60 µm.

All coat thicknesses shall be measured according to ISO 2360.

#### **REQUIREMENTS FOR THE COATING & COATING MATERIAL**

The powder coating shall satisfy the requirements of the voluntary quality guidelines of aluminium substrates and in addition qualify for the use on galvanized pipes & Fittings.

The powder coating shall meet the requirements of BS EN 13438 & EN 12206-1.

The quality of other materials must be equivalent, especially with regard to the following points:

- Color and effect
- Gloss and surface characteristics such as flow properties and texture
- Resistance to weathering and anti-corrosion protection
- Mechanical properties
- Glossy at 60°C, with a gloss level of 85–95 %
- Smooth Flow Surface

### **4. TESTING**

Coating powder shall conform to following test requirements and shall be carried out as per EN 13438 latest standard.

Test	Clause as per standard EN 13438	Test method / standard	Requirements
Surface appearance	General	EN ISO 3668	No scratches through to substrate. No blisters, craters, pinholes or scratches first visible from < 1 m
Colour	5.3.2 / A.4.2	EN ISO 3668 / EN ISO 11664-4	Within tolerances
Gloss	5.3.3 / A.4.3	EN ISO 2813	Within tolerances
Adhesion	5.3.4 / A.4.4	EN ISO 2409	Classification 0
Scratch resistance	5.3.5 / A.4.5	EN ISO 1518-1	No penetration through to substrate
Deformation resistance	5.3.6 / A.4.6	EN ISO 1519	No cracking or delamination
Mortar resistance	5.3.7 / A.4.7	Procedure described	Mortar dislodged easily. No detachment of coating or change in appearance.
Weathering (artificial)	5.3.8.a / A.4.8.2	EN ISO 11341	No cracking or blistering. Residual gloss level > 40% of original. Colour changes within tolerances
Weathering (natural)	5.3.8.b / A.4.8.2	EN ISO 2810	No cracking or blistering. No unacceptable colour change
Humidity	5.3.9 / A.4.9	EN ISO 6270-1 / EN ISO 2409	No blistering, softening or detachment of the coating. No corrosion classification 0
Sulfur dioxide	5.3.10 / A.4.10	EN ISO 3231	No blistering of the coating or corrosion of the substrate. No colour change
Permeability	5.3.11 / A.4.11	Procedure described	No blistering or detachment of the coating
Natural Salt spray	5.3.12.3 / A.4.12.1	EN ISO 9227	No under-film corrosion or loss of adhesion beyond 5 mm from scribe lines. No blistering or cracking on rest of panel
Acetic acid salt spray	5.3.12.3 / A.4.12.2	EN ISO 9227	No under-film corrosion or loss of adhesion beyond 5 mm from scribe lines. No blistering or cracking on rest of panel

The powder coating shall be confirmed to the following test results and quality characteristics with regard to weathering, corrosion protection and mechanical properties

Owner Representative or Third-party Inspection Agency appointed by Owner shall witness finish goods testing as per the sample procedure specified in relevant ISO /IS latest edition.

Test	Norm	Results
Weathering	conforms to EN 12206-1	As Per EN 12206-1
Resistance to Humidity	ISO 6270 [hrs]	720
Enrichson Cupping	Min. 8mm	Depth of cupping 10.38mm
Impact Resistance	Direct – 150kg. Min. In Direct – 150kg. Min. ASTM D-2794	No removal of coating observed
Salt Spray Resistance	1000 Hrs. ASTM-B 117	No rusting observed upto 1000 Hrs.
Coating Thickness	ISO 2360 [µm]	60 µm Min.
Porosity	DIN 55 670	non-porous
Film Type	Glossy	Satisfactory
Gloss at 60° C	86-95 %	Satisfactory
Cross hatch Adhesion (ASTM D-5870)	GT = 0/100	Satisfactory
Pencil Hardness. (min.)	2 H	Satisfactory
Scratch Resistance (Kg. Min.)	3	Satisfactory

## 5. QUALITY ASSURANCE (QA)

The Contractor/Manufacture /Vendor shall carry out internal inspection as per testing requirements mentioned in this specification

## 6. INSPECTION / DOCUMENTS

- Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender.
- Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.

## **7. MARKING**

Each packing containing materials / items shall carry the following stamped or written in indelible ink.

- a) Powder coating firm or trade mark.
- b) Month and year of Powder coating

## **8. PROTECTION DURING TRANSPORT AND PACKAGING**

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details during QAP and also complied with at the time of delivery.

Suitable packaging materials shall be used to protect coated components against mechanical and chemical agents such as those in mortar, plaster, cement and concrete and during storage, transport and assembly.

The supplier / Contractor / Vendor make sure that packaging materials and all other materials shall be used as intended and shall be removed without difficulty. To avoid damage to the coated surface check adhesive tapes, etc. for their suitability.

It shall be ensured that incorrect storage shall not lead to milky white spots on the surface, e.g. under packing materials, caused by a combination of moisture and warmth.

Sealing compounds and other materials such as glazing aids, drilling, cutting and other kinds of lubricants which shall come into contact with coated surfaces shall be pH neutral and free of any substances which shall damage the coating.

## **9. DOCUMENTS OF PRECEDENCE**

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

## 10. QUALITY ASURANCE PLAN

Sr. No.	Name of test/Features	Requirement	Inspection Methodology	Inspection By TPA/GGL
1	Powder Material	Pure Polyester	Material Test Certificate	Rw
1.1	Application	Electrostatic Spraying (40-90 KV Manual / Automatic)		
1.2	Backing Schedule	180°C to 200°C for 10mm (Metal Temperature)		
1.3	Coating Thickness	60 Microns Min.		
1.4	Colour	Golden Yellow		
2	Testing		Material Test Certificate	Rw
2.1	Film Type	Glossy		
2.2	Gloss 60 deg	86 – 95 %		
2.3	Cross hatch Adhesion (ASTM- D -5870)	GT = 0/100		
2.4	Cylindrical bending Test (ASTM D-522) 5mm Rod dia.	Passes		
2.5	Enrichsen cupping (min.)	8 Passes (Min. 8 mm), Depth of cupping 10.38 mm		
2.6	Pencil Hardness. (min.)	2 H		
2.7	Scratch Resistance (Kg. Min.)	3		
2.8	Impact Resistance (Kg. Min.) ASTM D-2794)	Direct:150 kg. min Indirect : 150 kg. Min. No removal of coating observed		
2.9	Resistance to humidity	720		
2.10	Salt Spray Resistance	No rusting observed up to 1000 Hrs		
2.11	Porosity	Non-Porous as per DIN 55670		

Rw - Review of Documents



### ANNEXURE-2 QAP FOR COMPANY PROCURED MATERIAL

Sr. No.	DESCRIPTION	TYPE OF CHECK		QUANTUM CHECK	REFERENCE DOC.	ACCEPTANCE CRITERIA	FORMATE OF RECORD	SCOPE OF INSPECTION	
								VENDOR	GGL/TPIA
1	PRE PRODUCTION CHECKS.	A	QUALITY ASSURANCE PLAN	100%	NA	ADHERANCE TO APPROVED QAP	GGL APPROVED QAP	R	R
		B	PERFORMANCE OF MEASURING INSTRUMENT & EQUIPMENT	INSTRUMENT	NA	CALIBRATED INSTRUMENT & EQUIPMENT CONDITION	CALIBRATION HISTORY REPORT & CERTIFICATE		
2	RAW MATERIAL HR COIL STEEL CONFIRMING TO IS:10748-2004	A	CHEMICAL ANALYSIS	ONE SAMPLE PER HEAT	IS:10748-2004 CL No.-6.2 & TABLE No.1/AND RELEVANT PARTS OF IS:228 & IS:513	IS:1239:2004 TABLE NO.-02	MTC & TEST REPORT	P	R
		B	TENSILE TEST		IS:10748-2004 TABLE No.-03 AND IS:1239:2004 CL. No.14.1 & IS:1608:1995	IS:1239:2004 TABLE NO.-14.1			
3	INPROCESS INSPECTION	A	OUTSIDE DIMENSIONS	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. 01 & 2	IS:1239:2004 CL. No.8.1 & TABLE No.3/4/5	IS:1239:2004 TABLE NO.-4 & GGL SPECIFICATION	TUBE MILL INSPECTION REPORT / FINAL INSPECTION REPORT	P	R
		B	THICKNESS		IS:1239:2004 CL. No.9.1(a)	15mm dia - 3.2mm – ½ Inch 25mm dia - 4.0mm – 1 Inch 40mm dia- 4.0 mm – 1½ Inch 50mm dia- 4.5 mm – 2 Inch + NOT LIMIT/-10%			
		C	LENGTH		P.O. Requirement	3 MetersA PER P.O. TOLERANCE :+6%/-0%			
		D	STRAIGHTNESS		IS:1239:2004 CL. No.15	THE FINISH TUBES SHALL BE REASONABLY STRAIGHT			
		E	INTERNAL WELD FIN HEIGHT		IS:1239:2004 CL. No.6.5	THE HEIGHT OF THE INTERNAL WELD FIN SHALL NOT BE > 60% OF THE SPECIFIED WALL THICK.			
		F	WORKMANSHIP, FINISH & APPEARANCE		IS:1239:2004 CL. No.15	TUBES SHALL BE CLEANLY FINISHED AND REASONABLY FREE FROM INJURIOUS AND SHALL BE CLEANLY CUT AND REASONABLY SQUARE WITH THE AXIS OF THE TUBE.		P	R
		g	TENSILE TEST % EL		IS:1239:2004 CL. No.14.1 & 14.1.1/IS: 1608-1995	TENSILE STRENGTH MIN. -320 Mpa ELONG. MIN. 12%		P	R

Technical Specification of GI Pipes

		h	BEND TEST		IS:1239:2004 CL. No.14.2 & IS:1239:2004 CL. No.14.3 & IS:2328	THE BEND TEST WITHOUT SHOWING ANY SIGN OF FRACTURE			
		i	NOMINAL WEIGHT OF PIPE		IS:1239:2004 CL. No.9.1(b)	15mm dia - 1.44 Kg/m (+/-10%) 25mm dia - 2.93 Kg/m (+/-10%) 40mm dia-4.37 Kg/m (+/-10%) 50mm dia-6.19 Kg/m (+/-10%)		P	R
		j	CHEMICAL COMPOSITION		IS:1239:2004 CL. No.7.1.1 table 1 & 2		Product Analysis	R	R
		k	TUBE ENDS	100%	IS:1239:2004 CL. No.3.3 & 10.2	SQUARE CUT TO AXIS		P	R
		l	LEAK PROOF TEST	EACH TUBE	IS:1239:2004 CL. No.13	5MPA AND MAINTAINED FOR 3 secs Minimum NO LEAKAGE IN PIPE	HYDRO TEST REPORT	P 100%	R
		m	GALVANISING MASS OF ZINC COATING	ONE SAMPLE AT EVERY FOUR HOURS & AS PER IS:4736	IS: 1239: 2004 CL. NO. 12.1 TO 12.1.1 IS:4736 CL.5.1, 5.2, & 5.5 IS:2629, IS:2633	400 Gm /M2(MIN.)	GALVANISING REPORT	P	R
		n	UNIFORMITY OF ZINC COATING			NO RED SPOT, FREE FROM LUMPS, EXCESS ZINC, FREE FROM WHITE RUST			
		o	FREE BORE TEST			FREE PASSING OF MANDAREL/ROD THROUGH GALVANISING TUBE. 11MM ROD FOR 15MM & 21MM ROD FOR 25MM, ROD LENGTH 230MM MIN.			
4	FINAL INSPECTION	a	OUTSIDE DIMENSIONS	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. 01	IS:1239:2004 CL. No.8.1 & TABLE No.3/4/5	IS:1239:2004 TABLE NO.-4 + GGL SPECIFICATION	TUBE MILL INSPECTION REPORT/FINAL INSPECTION REPORT	P	W / H AS PER IS 4711:2008
		b	THICKNESS		IS:1239:2004 CL. No.9.1(a)	15mm dia - 3.2mm 25mm dia - 4.0mm 40mm dia- 4.0 mm 50mm dia- 4.5 mm + NOT LIMIT/-10%			
		c	LENGTH		P.O. Requirement	3 Meters AS PER P.O. TOLERANCE :+6%/-0%			
		d	STRAIGHTNESS	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. 01	IS:1239:2004 CL. No.15	THE FINISH TUBES SHALL BE REASONABLY STRAIGHT	TUBE MILL INSPECTION REPORT/FINAL INSPECTION REPORT	P	W / H AS PER IS 4711:2008
		e	INTERNAL WELD FIN HEIGHT		IS:1239:2004 CL. No.6.5	THE HEIGHT OF THE INTERNAL WELD FIN SHALL NOT BE > 60% OF THE SPECIFIED WALL THICK.			
		f	WORKMANSHIP, FINISH & APPEARANCE		IS:1239:2004 CL. No.15	TUBES SHALL BE CLEANLY FINISHED AND REASONABLY FREE FROM INJURIOUS AND SHALL BE CLEANLY CUT AND REASONABLY SQUARE WITH THE AXIS OF THE TUBE.		P 100%	W/H 40%

		g	NOMINAL WEIGHT G.I. PIPE		IS:1239:2004 CL. No.9.1(b)	15mm dia - 1.44 Kg/m (+/-10%) 25mm dia - 2.93 Kg/m (+/-10%) 40mm dia-4.37 Kg/m (+/-10%) 50mm dia-6.19 Kg/m (+/-10%)		P	W/H
		h	TUBE ENDS PLAIN ENDS	100%	IS:1239:2004 CL. No.3.3 & 10.2	Square Cut to Axis		P	W / H AS PER IS 4711:2008
		i	SAMPLING TUBES	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. & 2	IS:1239:2004 CL. No.16.2/ IS:4711:2008 TABLE No.2	IS:4711: 2008 TABLE NO. 02	MECHANICAL TEST REPOPT	P	(W) AS PER IS 4711: 2008 TABLE NO.2
		j	TENSILE TEST % EL		IS:1239:2004 CL. No.14.1 & 14.1.1/IS: 1608-1995	TENSILE STRENGTH MIN. -320 Mpa ELONG. MIN. 12%			
		k	BEND TEST	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. 2	IS:1239:2004 CL. No.14.2 & IS:1239:2004 CL. No.14.3 & IS:2328	THE BEND TEST WITHOUT SHOWING ANY SIGN OF FRACTURE		P	(W) AS PER IS 4711: 2008 TABLE NO.2
		l	GALVANISING MASS OF ZINC COATING	ONE SAMPLE AT EVERY FOUR HOURS & AS PER IS:4736	IS: 1239: 2004 CL. NO. 12.1 TO 12.1.1 IS:4736 CL.5.1, 5.2, & 5.5 IS:2629, IS:2633	400 Gm/M2(MIN.)	GALVANISING REPORT	P	W / H AS PER IS 4711:2008
		m	UNIFORMITY OF ZINC COATING			NO RED SPOT, FREE FROM LUMPS, EXCESS ZINC, FREE FROM WHITE RUST			
		n	FREE BORE TEST			FREE PASSING OF MANDREL/ROD THROUGH GALVANISING TUBE. 11MM ROD FOR 15MM & 21MM ROD FOR 25MM, ROD LENGTH 230MM MIN.			
		O	LEAK PROOF TEST	EACH TUBE	IS:1239:2004 CL. No.13	5MPA AND MAINTAINED FOR 3 secs Minimum NO LEAKAGE IN PIPE IS:1239:2004 CL. No.13	HYDRO TEST REPORT	----	H/W 10%
5	PRODUCT MARKING	a	VISUAL VERIFICATION OF MARKING	EACH TUBE	IS:1239:2004 CL. No.17 & P.O. REQUIREMENT	IS:1239:2004 CL. No.17 & P.O. REQUIREMENT MARKING SHALL BE AT THE INTERVAL OF NOT MORE THAN 1 METERS. EACH PIPE SHALL BE EMBOSSED WITH - (1) MANUFACTURER'S NAME/TRADEMARK (2) INDIAN STANDARD MARK (ISI) (3) CLASS OF PIPE (4) LOT NO./BATCH NO. OF PRODUCTION	-----	P 100%	W 25%
6	BUNDLING & PACKING	a	P.O./SPECIFICATION REQUIREMENT	EACH REQUIREMENT	P.O. Requirement	MARKING DONE ON METAL TAG AND AFFIXED WITH EACH BUNDLE: (1) MANUFACTURER'S NAME/TRADEMARK (2) OWNER'S NAME- GUARAT GAS LIMITED	TEST CERTIFICATE	R	R



GUJARAT GAS

						(3) CLASS OF PIPE- HEAVY( <b>C-class</b> ) (4) LOT NUMBER/BATCH NUMBER OF PROD. (5) SIZE DESIGNATION			
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R = REVIEW OF RECORDS    W = WITNESS BY BUYER/ TPI AGENCY    H = HOLD POINT    P = PERFORM ( BY VENDOR)

### ANNEXURE-3 QAP FOR CONTRACTOR PROCURED MATERIAL

S. NO.	DESCRIPTION		TYPE OF CHECK	QUANTUM CHECK	REFERENCE DOC.	ACCEPTANCE CRITERIA	FORMATE OF RECORD	SCOPE OF INSPECTION	
								VENDOR	GGL/TPIA
1	Calibration	b	PERFORMANCE OF MEASURING INSTRUMENT & EQUIPMENT	INSTRUMENT	-----	CALIBRATED INSTRUMENT & EQUIPMENT CONDITION	CALIBRATION HISTORY REPORT & CERTIFICATE	R	R
2	RAW MATERIAL HR COIL STEEL CONFIRMING TO IS:10748-2004	a	CHEMICAL ANALYSIS	ONE SAMPLE PER HEAT	IS:10748-2004 CL No.-6.2 & TABLE No.1/AND RELEVANT PARTS OF IS:228 & IS:513	IS:1239:2004 TABLE NO.-02	MTC & TEST REPORT	P	R
		b	TENSILE TEST		IS:10748-2004 TABLE No.-03 AND IS:1239:2004 CL. No.14.1 & IS:1608:1995	IS:1239:2004 TABLE NO.-14.1			
3	FINAL INSPECTION	a	OUTSIDE DIMENSIONS	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. 01	IS:1239:2004 CL. No.8.1 & TABLE No.3/4/5	IS:1239:2004 TABLE NO.-4 + GGL SPECIFICATION	TUBE MILL INSPECTION REPORT/FINAL INSPECTION REPORT	P	Rv
		b	THICKNESS		IS:1239:2004 CL. No.9.1(a)	15mm dia - 3.2mm 25mm dia - 4.0mm 40mm dia- 4.0 mm 50mm dia- 4.5 mm + NOT LIMIT/-10%			
		c	LENGTH		P.O. Requirement	3 Mtrs/ 6 Mtrs AS PER P.O. TOLERANCE :+6%/-0%			
		d	STARIGHTNESS	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. 01	IS:1239:2004 CL. No.15	THE FINISH TUBES SHALL BE REASONABLY STRAIGHT	TUBE MILL INSPECTION REPORT/FINAL INSPECTION REPORT	P	Rv
		e	INTERNAL WELD FIN HEIGHT		IS:1239:2004 CL. No.6.5	THE HEIGHT OF THE INTERNAL WELD FIN SHALL NOT BE > 60% OF THE SPECIFIED WALL THICK.			
		f	WORKMANSHIP, FINISH & APPEARANCE		IS:1239:2004 CL. No.15	TUBES SHALL BE CLEANLY FINISHED AND REASONABLY FREE FROM INJURIOUS AND SHALL BE CLEANLY CUT AND REASONABLY SQUARE WITH THE AXIS OF THE TUBE.		P	Rv
		g	WEIGHT G.I. PIPE		IS:1239:2004 CL. No.9.1(b)	15mm dia - 1.44 Kg/m (+/-10%) 25mm dia - 2.93 Kg/m (+/-10%) 40mm dia-4.37 Kg/m (+/-10%)		P	Rv

Technical Specification of GI Pipes

					50mm dia-6.19 Kg/m (+/-10%)			
		h	TUBE ENDS PLAIN ENDS	100%	IS:1239:2004 CL. No.3.3 & 10.2	Square Cut to Axis		P Rv
		i	SAMPLING TUBES	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. & 2	IS:1239:2004 CL. No.16.2/ IS:4711:2008 TABLE No.2	IS:4711: 2008 TABLE NO. 02	MECHANICAL TEST REPOPRT	P R
		j	TENSILE TEST % EL	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. & 2	IS:1239:2004 CL. No.14.1 & 14.1.1/IS: 1608-1995	TENSILE STRENGTH MIN. - 320 Mpa ELONG. MIN. 12%		
		k	BEND TEST	SCALE OF SAMPLING FOR TESTING AS PER IS 4711:2008 TABLE NO. 2	IS:1239:2004 CL. No.14.2 & IS:1239:2004 CL. No.14.3 & IS:2328	THE BEND TEST WITHOUT SHOWING ANY SIGN OF FRACTURE		P R
		l	GALVANISING MASS OF ZINC COATING	ONE SAMPLE AT EVERY FOUR HOURS & AS PER IS:4736	IS: 1239: 2004 CL. NO. 12.1 TO 12.1.1 IS:4736 CL.5.1, 5.2, & 5.5 IS:2629, IS:2633	400 Gm/M2(MIN.)	GALVANISING REPORT	P R
		m	UNIFORMITY OF ZINC COATING			NO RED SPOT, FREE FROM LUMPS, EXCESS ZINC, FREE FROM WHITE RUST		
		n	FREE BORE TEST			FREE PASSING OF MANDAREL/ROD THROUGH GALVANISING TUBE. 11MM ROD FOR 15MM & 21MM ROD FOR 25MM, ROD LENGTH 230MM MIN.		
		O	LEAK PROOF TEST	EACH TUBE	IS:1239:2004 CL. No.13	5MPA AND MAINTAINED FOR 3 secs Minimum NO LEAKAGE IN PIPE	HYDRO TEST REPORT	---- R
5	PRODUCT MARKING	a	VISUAL VERIFICATION OF MARKING	EACH TUBE	IS:1239:2004 CL. No.17 & P.O. REQUIREMENT	IS: 1239:2004 CL. No.17 & P.O. REQUIREMENT MARKING SHALL BE AT THE INTERVAL OF NOT MORE THAN 1 METERS. EACH PIPE SHALL BE EMBOSSSED WITH - (1) MANUFACTURER'S NAME/TRADEMARK (2) INDIAN STANDARD MARK (ISI) (3) CLASS OF PIPE (4) LOT NUMBER/BATCH NUMBER OF PRODUCTION	-----	P Rv
6	BUNDLING & PACKING	a	P.O./SPECIFICATION REQUIREMENT	EACH REQUIREMENT	P.O. Requirement	MARKING DONE ON METAL TAG AND AFFIXED WITH EACH BUNDLE: (1) MANUFACTURER'S NAME/TRADEMARK (2) OWNER'S NAME- GUARAT GAS	TEST CERTIFICATE	R R



GUJARAT GAS

						LIMITED (3) CLASS OF PIPE- HEAVY( <b>C-class</b> ) (4) LOT NUMBER/BATCH NUMBER OF PRODUCTION (5) SIZE DESIGNATION			
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R = REVIEW OF RECORDS    Rv =RANDOM VERIFY    P = PERFORM ( BY VENDOR)

GUJARAT GAS

TECHNICAL SPECIFICATION FOR PROCUREMENT OF POWDER  
COATED GI FITTINGS

Document No. : GGL/TS/GI Fittings/2015

00	QAP Included	06/06/2018
REV. NO	REVISION DESCRIPTION	DATE OF ISSUE

NAME OF COMPANY	GUJARAT GAS LTD.		
	NAME	DESIGNATION	SIGN & DATE
Prepared By	Nikhil Agarwal	Dy. Manager (Technical Services)	<i>[Signature]</i> 25/05/2018
Reviewed By- Technical Committee (PE-PNG Projects)	Jignesh Desai	Manager (Technical)	<i>[Signature]</i> 11/6/18
	Chirag Bhanvadia	Dy. Manager (Technical)	<i>[Signature]</i> 25/5/18
	Lalit Mistry	Dy. Manager (Technical)	<i>[Signature]</i> 25/5/18
	Vasudev Gadhavi	Manager (Technical Services)	<i>[Signature]</i> 25/5/18
	Dinesh Lad	Manager (Technical)	<i>[Signature]</i> 25/5/18
Approved by	Raghunath Kulai	Sr. Vice President (Technical Services)	<i>[Signature]</i>



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## 1.0 INTRODUCTION AND SCOPE

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various cities of Gujarat.

This present document covers the technical specification for the procurement of GI fittings used in natural gas distribution systems. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which need to be fulfilled.

This specification covers the requirements for Malleable Cast Iron Fittings unless modified by this specification, requirements of IS 1239 (Part-I), latest edition and IS 1879 – latest edition shall be valid.

## 2.0 DEFINITIONS

OWNER / CLIENT	Gujarat Gas Ltd., (GGL)
PNG	Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated / controlled, odorized & distributed through pipelines for various applications, i.e. for industrial, commercial and domestic.
Manufacturer	Manufacturer of the GI Fittings
Vendor	The person(s), firm, company, organization from whom Client/Contractor procures materials.
TPA	Third Party Inspection Agency
EIC	Engineer In Charge
PNGRB	Petroleum and Natural Gas Regulatory Board
T4S	Technical Standard and Specification including Safety Standards

## 3.0 MATERIAL

The material used for the manufacturing of GI fittings shall conform to IS 1239 (Part-I): 2004 (Latest edition) or IS 14329 – 1995 with latest amendments Grade BM 300.

## 4.0 PRESSURE TEST

Vendor shall carry out pneumatic pressure test as per Clause 11.1b of IS 1879 – 1987 with latest amendments on each & every fittings. Vendor to submit the Internal Quality control certificate for the same. Owner shall witness pneumatic testing as per the sampling procedure specified in IS 1879 – 1987 with latest amendments.

## 5.0 COMPRESSION TEST

This test shall be conducted to judge the malleability of the pipe fittings & shall be carried out as per Clause 12 of IS 1879 – 1987 with latest amendments.

## 6.0 SAMPLING

Owner Representative or Third Party Inspection Agency shall witness the tests as per clause 14 of IS 1879 – 1987 with latest amendments/ as per approved QAP. However, vendor to perform 100% inspection of visual, dimensional & pressure test. Vendor shall furnish Internal test certificates at the time of final inspection to the Owner.

## 7.0 DIMENSIONS & DIMENSIONAL TOLERANCES

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

## 8.0 WEIGHT & WALL THICKNESS

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

Nominal Diameter DN	15 mm (1/2")	25 mm (1")
Grade	Heavy	Heavy
Outer Dia. (Max. / Min.)	21.8 mm / 21.0 mm	34.2 mm / 33.3 mm
Thickness ( mm )	2.5	3.0
Tolerance on Thickness	-0.5 mm/ + Not limited	-0.7 / + Not limited

## 9.0 THREADS

Threads shall be BSPT, Female type.

## 10.0 FREEDOM FROM DEFECTS

On visual examination, the outside & inside surfaces of fittings shall be smooth & free from any defects such as cracks, injurious flaws, fine sand depth etc.

**11.0 GALVANIZING**

- i. Fittings shall be galvanized to meet the requirement of IS: 4759 – 1996 with latest amendments.
- ii. Zinc conforming to any grade specified in IS: 13229-1991 with latest amendments shall be used for the purpose of galvanizing.
- iii. Galvanizing bath: The molten metal in the galvanizing bath shall contain not less than 98.5% by mass of zinc.
- iv. Coating requirements: Mass of coating shall be 610 - 700 gms/m<sup>2</sup>.
- v. Freedom from defect: The zinc coating shall be uniform adhered, reasonably smooth & free from such imperfections as flux, ash bare patches, black spots, pimples, lumpiness runs, rust stains, bulky white deposits & blisters.
- vi. Samplings
  - a) All materials of the same type in coating bath having uniform coating characteristics shall be grouped together to continue a lot. Each lot shall be tested separately for the various requirements of the specification. The number of units to be selected from each lot for this purpose shall be given in Table 2 of IS 4759 – latest edition.
  - b) The sample selected according to Column 1 & 2 of Table 2, IS: 4759 – latest edition shall be tested for visual requirements as per Clause 6.2 of IS:4759 – latest edition
  - c) The sample found conforming to above requirements shall then be tested for mass of zinc coating in accordance with Clause 9.2 of IS: 4759 – latest edition.
  - d) Criteria for conformity: As per Clause 8.3 of IS: 4759-latest edition.
  - e) Test procedure shall be as per Clause 9 of IS: 4759-latest edition.

**12.0 QUALITY ASSURANCE (QA)**

The Contractor/Manufacture /Vendor shall manufacture, supply, inspection, testing, marking, packaging, handling and dispatch of Fittings as per GGL Technical Specification and GGL QAP.

**13.0 INSPECTION / DOCUMENTS**

- i. Inspection shall be carried out as per Owner Technical Specification/approved QAP.
- ii. GGL Representative shall ensure the manufacturer / vendor monogram on accepted GI fittings during inspection of materials.
- iii. Contractor / Manufacture /Vendor shall furnish all the material test certificates, proof of approval / licence from specified authority as per specified standard, if relevant, internal test / inspection reports as per Owner Tech. Spec. & specified code for 100% material, at the time of final inspection of each supply lot of material.
- iv. For any control, test or examination required under the supervision of TPA/EIC, latter shall be informed in writing one (1) week in advance by vendor about inspection date and place along with production schedule.
- v. Owner reserves the right to select a sample of items / materials randomly from each manufacturing batch / lot & have these independently tested. Should the results of these

tests fall outside the limits specified in Owner technical specification, then Owner reserves the right to reject all production supplied from the batch.

#### **14.0 MARKING**

Each fitting shall be embossed with manufacturer's name or trademark or monogram and the size designation.

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

Manufacturer's name or trade mark or monogram

- a. Designation of fittings.
- b. Lot number.

#### **15.0 PACKAGING**

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / Vendor / Bidder shall submit the packaging details and also complied with at the time of delivery.

#### **16.0 DOCUMENTS OF PRECEDENCE**

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

#### **17.0 QUALITY ASSURANCE PLAN**

Sr. No.	Name of test/Features	Referred Standard	Inspection Methodology	Inspection by TPA
1	Chemical Properties	IS 1239 (Part-I): 2004 (Latest edition) or IS 14329 – 1995 with latest amendments Grade BM 300	Manufacturers test certificate of Raw material	R
2	Mechanical Properties	IS 14329 – 1995 with latest amendments Grade BM 300	Manufacturers test certificate	R
3	Physical Verification			
3.1	Dimensions	IS :1879, as per table shown below.	Vernier Calliper	Rv
3.2	Wall Thickness			
3.3	Thread	IS :554,	Test Certificate	Rv
4	Powder Coating	Coating thickness – Min.60 Micron	Test Certificate	R

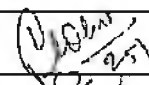

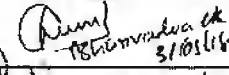
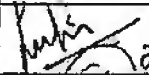
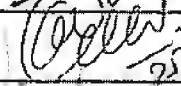
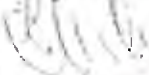

R- Review of Documents      Rv- Random Verification

GUJARAT GAS

**TECHNICAL SPECIFICATION – POWDER COATING ON GI PIPES & FITTINGS**

**Document No. : GGL/TS/Powder Coating/2015**

01	QAP included	06/06/2018
REV. NO	REVISION DESCRIPTION	DATE OF ISSUE

NAME OF COMPANY	GUJARAT GAS LTD.		
	NAME	DESIGNATION	SIGN & DATE
Prepared By	Nikhil Agarwal	Dy. Manager (Technical Services)	 25/05/2018
Reviewed By- Technical Committee (PE-PNG Projects)	Jignesh Desai	Manager (Technical)	 16/11/18
	Chirag Bhanvadia	Dy. Manager (Technical)	 3/10/18
	Lalit Mistry	Dy. Manager (Technical)	 25-5-18
	Vasudev Gadhavi	Manager (Technical Services)	 22/5/18
	Dinesh Lad	Manager (Technical)	 31/5/18
Approved by	Raghunath Kulai	Sr. Vice President (Technical Services)	

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## 1.0 INTRODUCTION AND SCOPE

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various cities of Gujarat.

This present document covers the minimum technical specification for the powder coating on GI Steel Pipes & Fittings used in high pressure natural gas transportation and distribution systems. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which need to be fulfilled.

This specification covers the requirements for powder coating on GI Steel Pipes & Fittings. Unless modified by this specification, requirements of IS/ISO /EN with Latest edition shall be valid.

## 2.0 DEFINITIONS

OWNER / CLIENT	Gujarat Gas Ltd., (GGL)
PNG	Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated / controlled, odorized & distributed through pipelines for various applications, i.e. for industrial, commercial and domestic.
Manufacturer	Manufacturer of PE Electro-fusion Fittings
Vendor	The person(s), firm, company, organization from whom Client/Contractor procures materials.
TPA	Third Party Inspection Agency
EIC	Engineer In Charge
PNGRB	Petroleum and Natural Gas Regulatory Board
T4S	Technical Standard and Specification including Safety Standards,

## 3.0 MATERIAL

The material used for the powder coating confirming to pure polyester.

## 4.0 REQUIREMENTS FOR THE FABRICATED ELEMENTS

The section shall be suitable for powder coating, defects in construction which lead to corrosion, e.g. inappropriate combinations of materials, spaces which cannot be ventilated, cracks and components which are not suitable for powder coating, should be avoided.





The quality of the powder coating on galvanized Pipes & Fittings shall be primarily determined by the quality of the galvanization. The hot galvanization guidelines in IS apply only when the hot galvanized pipes & Fittings shall not be coated afterward.

## **5.0 PREPARATION & PRE-TREATMENT**

To obtain a suitable powder coated surface, grinding down of the uneven areas on the galvanized surface may be required. Brushing or the use of abrasive paper, grain size 60, is recommended before initial preparation or pre-treatment.

Galvanized surfaces shall be powder coated immediately after preparation or pre-treatment and before the products of zinc corrosion, or white rust, can develop.

### **PREPARATION**

Sweep blasting shall be used to prepare a clean and even surface on the zinc / galvanize coating which is ideal for adhesion of the powder coating.

The hot galvanized parts shall have a Rz mean surface roughness according to DIN 4768 of between 15 and 30  $\mu\text{m}$  and a high degree of coverage.

After the sweeping process is completed, any dust must be removed thoroughly from the entire surface, which should have a uniform matte gray appearance.

### **PRE-TREATMENT**

Yellow chromating has become the most common wet-chemical process. This method uses either immersion or spraying techniques; zinc-phosphating shall be also used.

This shall rinse the conversion layer thoroughly with de-ionized water. The conversion layers must be sufficiently clean and dry before powder coating to ensure that surface irregularities do not form when the powder coating shall be cured.

## **6.0 COATING SYSTEM**

Due to the excellent corrosion resistance of zinc coatings, powder coatings are usually applied to galvanized pipes and Fittings in a single coat.

The minimum thickness of powder coatings is 60  $\mu\text{m}$ .

All coat thicknesses shall be measured according to ISO 2360.

### **REQUIREMENTS FOR THE COATING & COATING MATERIAL**

The powder coating shall satisfy the requirements of the voluntary quality guidelines of aluminum substrates and in addition qualify for the use on galvanized pipes & Fittings.

The powder coating shall meet the requirements of BS 6497 & EN 12206-1.

The quality of other materials must be equivalent, especially with regard to the following points:

- Color and effect
- Gloss and surface characteristics such as flow properties and texture
- Resistance to weathering and anti-corrosion protection
- Mechanical properties
- Glossy at 60° C, with a gloss level of 85–95 %
- Smooth Flow Surface

## 7.0 TESTING

The powder coating shall be confirmed to the following test results and quality characteristics with regard to weathering, corrosion protection and mechanical properties

Owner Representative or Third party Inspection Agency appointed by Owner shall witness finish goods testing as per the sample procedure specified in relevant ISO /IS latest edition.

Test	Norm	Results
Weathering	conforms to EN 12206-1	As Per EN 12206-1
Resistance to Humidity	ISO 6270 [hrs]	720
Enrichson Cupping	Min. 8mm	Depth of cupping 10.38mm
Impact Resistance	Direct – 150kg. Min. In Direct – 150kg. Min. ASTM D-2794	No removal of coating observed
Salt Spray Resistance	1000 Hrs. ASTM-B 117	No rusting observed upto 1000 Hrs.
Coating Thickness	ISO 2360 [μm]	60 μm Min.
Porosity	DIN 55 670	non-porous
Film Type	Glossy	Satisfactory
Gloss at 60° C	86-95 %	Satisfactory
Cross hatch Adhesion (ASTM D-5870)	GT = 0/100	Satisfactory
Pencil Hardness. (min.)	2 H	Satisfactory
Scratch Resistance (Kg. Min.)	3	Satisfactory

## **8.0 QUALITY ASSURANCE (QA)**

The Contractor/Manufacturer /Vendor shall carry out internal inspection as per testing requirements mentioned in this specification

## **9.0 INSPECTION / DOCUMENTS**

- i. Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender.
- ii. Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- iii. OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.

## **10.0 MARKING**

Each packing containing materials / items shall carry the following stamped or written in indelible ink.

- a) Powder coating firm or trade mark.
- b) Month and year of Powder coating

## **11.0 PROTECTION DURING TRANSPORT AND PACKAGING**

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details during QAP and also comply with at the time of delivery.

Suitable packaging materials shall be used to protect coated components against mechanical and chemical agents such as those in mortar, plaster, cement and concrete and during storage, transport and assembly.

The supplier /Contractor / Vendor make sure that packaging materials and all other materials shall be used as intended and shall be removed without difficulty. To avoid damage to the coated surface check adhesive tapes, etc. for their suitability.

It shall be ensured that incorrect storage shall not lead to milky white spots on the surface, e.g. under packing materials, caused by a combination of moisture and warmth.

Sealing compounds and other materials such as glazing aids, drilling, cutting and other kinds of lubricants which shall come into contact with coated surfaces shall be pH neutral and free of any substances which shall damage the coating.

## 12.0 DOCUMENTS OF PRECEDENCE

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

## 13.0 QUALITY ASURANCE PLAN

Sr. No.	Name of test/Features	Requirement	Inspection Methodology	Inspection By TPA/GGL
1	Powder Material	Pure Polyester	Material Test Certificate	Rw
1.1	Application	Electrostatic Spraying (40-90 KV Manual / Automatic)		
1.2	Backing Schedule	180°C to 200°C for 10mm (Metal Temperature)		
1.3	Coating Thickness	60 Microns Min.		
1.4	Colour	Golden Yellow		
2	Testing		Material Test Certificate	Rw
2.1	Film Type	Glossy		
2.2	Gloss 60 deg	86 – 95 %		
2.3	Cross hatch Adhesion (ASTM-D -5870)	GT = 0/100		
2.4	Cylindrical bending Test (ASTM D-522) 5mm Rod dia.	Passes		
2.5	Enrichsen cupping (min.)	8 Passes (Min. 8 mm), Depth of cupping 10.38 mm		
2.6	Pencil Hardness. (min.)	2 H		
2.7	Scratch Resistance (Kg. Min.)	3		
2.8	Impact Resistance (Kg. Min.) ASTM D-2794)	Direct:150 kg. min Indirect : 150 kg. Min No removal of coating observed		
2.9	Resistance to humidity	720		
2.10	Salt Spray Resistance	No rusting observed up to 1000 Hrs		
2.11	Porosity	Non-Porous as per DIN 55670		

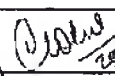

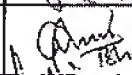

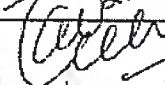
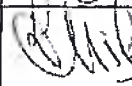

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GUJARAT GAS

TECHNICAL SPECIFICATION FOR POWDER COATED GI NIPPLE

Document No. : GGL/IS/GI NIPPLE/2016

01	QAP Included	06/06/2018
REV. NO	REVISION DESCRIPTION	DATE OF ISSUE

NAME OF COMPANY	GUJARAT GAS LTD.		
	NAME	DESIGNATION	SIGN & DATE
Prepared By	Nikhil Agarwal	Dy. Manager (Technical Services)	 25/05/2018
Reviewed By- Technical Committee (PE-PNG Projects)	Jignesh Desai	Manager (Technical)	 16/11/18
	Chirag Bhanvadia	Dy. Manager (Technical)	 25/05/18
	Lalit Mistry	Dy. Manager (Technical)	 25-5-18
	Vasudev Gadhavi	Manager (Technical Services)	 25/5/18
	Dinesh Lad	Manager (Technical)	 31/05/18
Approved by	Raghunath Kulai	Sr. Vice President (Technical Services)	

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## 1.0 INTRODUCTION AND SCOPE

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various cities of Gujarat.

This present document covers the technical specification for the procurement of Powder Coated GI Nipple used in natural gas distribution systems. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which needs to be fulfilled.

This specification covers the requirements for Powder Coated GI Nipples of heavy steel tube. Unless modified by this specification, requirements of IS 1239 (Part-I): 2004 (Latest edition) & IS 10748 (Latest edition) shall be valid for pipes used in preparing the GI Nipples.

## 2.0 DEFINITIONS

OWNER / CLIENT	Gujarat Gas Ltd., (GGL)
PNG	Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated / controlled, odorized & distributed through pipelines for various applications, i.e. for industrial, commercial and domestic.
Manufacturer	Manufacturer of the GI Nipple
Vendor	The person(s), firm, company, organization from whom Client/Contractor procures materials.
PNGRB	Petroleum and Natural Gas Regulatory Board
T4S	Technical Standard and Specification including Safety Standards,

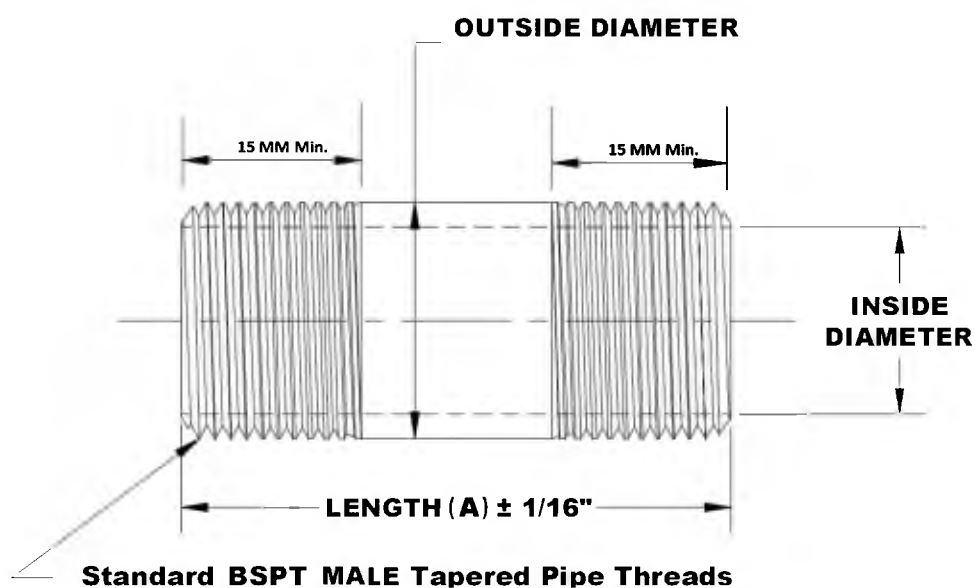
## 3.0 MATERIAL

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

#### 4.0 DIMENSIONS, THICKNESS & DIMENSIONAL TOLERANCES

The dimensions & nominal mass of GI Nipples shall be in accordance with table given below

Nominal Diameter DN	15 mm (1/2")	25 mm (1")
Grade	Heavy	Heavy
Outer Dia. (Max. / Min.)	21.8 mm / 21.0 mm	34.2 mm / 33.3 mm
Thickness ( mm )	3.2	4.0
Nominal weight (Kg / m) inclusive Galvanized coating without powder coating	1.44	2.93
Tolerance on Thickness	-10% / + Not limited	-10% / + Not limited



Nominal Diameter DN	Length (A)			
15 mm (1/2")	2"	3"	4"	6"
25 mm (1")	2"	3"	4"	6"

#### 5.0 END CONNECTION OF GI NIPPLE

GI NIPPLE shall be supplied with BSPT Male thread.

#### 6.0 FREEDOM FROM DEFECTS

On visual examination the outside & inside surfaces of GI Nipples shall be smooth & free from defects such a cracks etc.





## 7.0 GALVANIZING

- i. GI Nipples shall be galvanized to meet the requirement of IS: 4736 – 1986 with latest amendment.
- ii. Zinc conforming to any grade specified in IS: 13229- 1991 with latest amendment shall be used for the purpose of galvanizing.
- iii. Galvanizing bath: The molten metal in the galvanizing bath shall contain not less than 98.5% by mass of zinc.
- iv. Mass of zinc coating: Minimum mass of zinc coating determined as per IS: 6745 shall be 400 gms/m<sup>2</sup>.
- v. Uniformity of galvanized coating: The galvanized coating when determined on a 100 mm long test piece in accordance with IS 2633: 1986 with latest amendment shall withstand 5 one – minute dips.
- vi. Freedom from defect: The zinc coating on internal & external surfaces shall be uniform adhered, reasonably smooth & free from such imperfections as flux, ash & drop inclusions, bare patches, black spots, pimples, lumpiness runs, rust stains, bulky white deposits & blisters. Rejection & acceptance for these defects shall be as per Appendix - A of IS 2629: 1985 with latest amendments.
- vii. Samplings
  - a) All materials of the same type in coating bath having uniform coating characteristics shall be grouped together to continue a lot. Each lot shall be tested separately for the various requirements of the specification. The number of units to be selected from each lot for this purpose shall be IS: 4711 1995 with latest amendment.
  - b) The sample selected according to Clause 6.1 & 6.2 of IS: 4736 – latest edition.
  - c) The sample found conforming to above requirements shall then be tested for mass of zinc coating in accordance with Clause 5.1 of IS: 4736 – 1986 with latest amendment.
  - d) Criteria for conformity: As per IS: 4736 – 1986 with latest amendments.

## 8.0 POWDER COATING

Powder coating shall be carried out as per the ***GGL Technical specification for Powder Coating***. Powder coating shall be done on threaded pipe nipple.

## 9.0 QUALITY ASSURANCE (QA)

The Contractor/Manufacture /Vendor shall carry out internal inspection and prepare internal reports as per GGL Technical specification requirement at their premise and submit the report to GGL for dispatch clearance from GGL prior to dispatch of materials.

## 10.0 DOCUMENTS OF PRECEDENCE

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

## 11.0 QUALITY ASSURANCE PLAN

Sr. No.	Name of test/Features	Referred Standard	Inspection Methodology	Inspection by Manufacturer /Vendor	Inspection by GGL/TPA
1	Chemical and Mechanical Properties	As per IS 1239 (latest Standard)	Material TC	P	R
2	Physical Verification				
2.1	Dimensions	IS : 1239 part I	Vernier Caliper	P	Rv
2.2	Wall Thickness				
2.3	Thread				
2.4	Powder Coating	Coating thickness – Min.60 Micron	Test Certificate	P	Rw

**Note:** In case Nipple is prepared by Contractor at site. Only Dimensions, Wall Thickness and Thread verification is applicable. However, it is to be ensured that Nipple is manufactured from GI pipe which are already approved by GGL/TPA as per the QAP of GI pipes.

R- Review of Documents


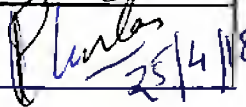
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GUJARAT GAS

TECHNICAL SPECIFICATION FOR WARNING MAT/ TAPE

Document No. : GGL/TS/Warning Tape-Mat/2018

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REV. NO	REVISION DESCRIPTION	DATE OF ISSUE

NAME OF COMPANY	GUJARAT GAS LTD.		
	NAME	DESIGNATION	SIGN & DATE
Prepared By	Nikhil Agarwal	Dy. Manager (Technical Services)	
Reviewed By- Technical Committee (PE-PNG Projects)	Jignesh Desai	Manager (Technical)	 23/4/18
	Chirag Bhanvadia	Dy. Manager (Technical)	 20/04/18
	Lalit Mistry	Dy. Manager (Technical)	
	Vasudev Gadhavi	Manager (Technical)	 23/4/18
	Dinesh Lad	Manager (Technical)	
Approved by	Raghunath Kulai	Sr. Vice President (Technical Services)	 25/4/18

Technical Specification for Warning Mat / Tape

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## 1.0 INTRODUCTION AND SCOPE

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various cities of Gujarat.

The present document covers the technical specifications for the procurement of Warning Mat / Tape. Warning mats/tape shall be laid in the ground above the gas main line.

## 2.0 DEFINITIONS

OWNER / CLIENT	Gujarat Gas Ltd., (GGL)
PNG	Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated / controlled, odorized & distributed through pipelines for various applications, i.e. for industrial, commercial and domestic.
Manufacturer	Manufacturer of the Warning Mat/tape
Vendor	The person(s), firm, company, organization from whom Client/Contractor procures materials.
TPIA	Third Party Inspection Agency
EIC	Engineer In Charge
PNGRB	Petroleum and Natural Gas Regulatory Board
T4S	Technical Standard and Specification including Safety Standards
LDPE	Low density Polyethylene
HDPE	High Density Polyethylene

## 3.0 REFERENCE CODE

IS 2508	Specification for Low Density Polyethylene Films
ASTM D-638	Standard test method for Tensile Properties of plastics.
ASTM D-882	Standard test method for Tensile Properties of thin plastic sheeting
ASTM D-792	Standard test method for Density and Specific gravity of plastics by Displacement
IS 10889	High density Polyethylene films

## 4.0 MATERIAL

The material grade of Warning Mat shall be Virgin Low density polyethylene (PE) material with warning sticker / stamp. The LDPE material shall be having the density as per IS 2508 and HDPE as per IS 10889.



The tape shall be uniform in colour, texture and finish and shall be free from holes and foreign Materials.

The material and colour, if used, for printing shall have no detrimental effects on the environment.

a) Mechanical properties

Description	Properties of Warning Mat/tape (Thickness- 300 micron)	Properties of Warning Mat/tape (Thickness- 1000 micron)
Minimum Tensile strength at break (Machine direction)	120 Kgf / cm <sup>2</sup>	185 Kgf/cm <sup>2</sup>
<b>Minimum Elongation at break</b>		
Length wise direction	200 %	200%
Crosswise	400 %	

## 5.0 RECOMMENDED MANUFACTURER FOR RAW MATERIAL

1. SOLVAY
2. BOREALIS
3. FINA
4. DOW
5. ELENAC
6. RELIANCE
7. GAIL
8. HALDIA
9. IOCL
10. OPAL

However any other reputed national or international Manufacturer may also be consider for supply of Raw material with approval of Owner / Owner's representative.

## 6.0 DIMENSION AND WALL THICKNESS

Warning Mat/Tape shall have following dimensions:

Description	For PE-PNG	For steel Laying
Width	200 mm ± 5 mm	300 mm ± 5 mm
Thickness (Minimum)	300Micron	1000 Micron
Length of Roll	250 mtrs.	100 mtrs.

Negative tolerance on thickness is not allowed.



## 7.0 TESTING

Testing of warning mat /tape shall be performed as below.

### a) Colour - Fast test

Test specimen 100 mm to 150 mm wide shall be immersed in a 20% solution of ammonium sulphide at 15 to 20 °C temperature for 15 days. The colour fastness shall be evaluated by comparing the test specimen with a sample specimen. The comparison shall be made by placing the two specimens on a white back ground in day light, but without exposing them directly to sun light. Test shall be accepted satisfactory, if the colour of the strip remains intact.

### b) Other tests shall be carried out as per relevant national / international standard enclosed in QAP.

## 8.0 COLOUR

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

## 9.0 WARNING MAT/TAPE VIRGINITY TEST

Differential Scanning Calorimeter (DSC) Scan test along with the temperature of melting ( $T_m$ ) shall be performed for the Warning Mat/ Tape and its raw polymer i.e. virgin low density polyethylene (LDPE) or High Density Polyethylene (HDPE).

The Differential Scanning Calorimeter (DSC) Scan curve of the Warning Mat / tape obtained from its DSC Scan test along with its Temperature of Melting ( $T_m$ ) shall then be compared with the DSC

Scan curve and the Temperature of Melting ( $T_m$ ) of its raw polymer (i.e. virgin LDPE). To ensure the virginity of the Warning mat / tape , the DSC Scan curve and  $T_m$  of the Warning Mat / tape (finished product manufactured from the raw polymer) shall match on overlapping with its corresponding raw polymer's DSC Scan curve and  $T_m$ .

## 10.0 QUALITY ASSURANCE (QA)

The Contractor/Manufacture /Vendor shall submit QAP after getting firm order from Owner for their review and approval. Prior dispatching of materials, vendor shall offer material lot to TPIA/Owner for final acceptance test as per approved QAP at their premise following for review of TPIA / EIC at the time of final inspection at vendor premise prior to dispatch of materials.

## 11.0 INSPECTION / DOCUMENTS

- i. Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and QAP enclosed in this tender by TPIA / EIC.
- ii. TPIA /EIC may carry out final inspection at contractor store at the time of material acceptance / clearance before installation / work execution at site.
- iii. TPIA / EIC may carry out random inspection during manufacturing/ final inspection.



- iv. Contractor / manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard, if relevant, internal test/ inspection reports as per OWNER Technical Specification, at the time of final inspection of each supply lot of material.
- v. Even after inspection, OWNER reserves the right to select a sample of items randomly from each manufacturing batch/ lot and have these independently tested. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject all production supplied from the batch.
- vi. For any control, test or examination required under the supervision of TPIA/EIC against approved QAP, vendor shall intimate through letter/mail To TPIA/EIC one (1) week in advance about inspection date and place along with production schedule Marking

Marking on the Mat/Tape shall be approved by owner. The warning mat must be engraved with "Caution: High pressure gas pipeline below" in both English and Hindi or local language along with Owner's Logo at a frequency of every meter.

Contractor / manufacturer shall submit proposed Artwork to be marked on the Mat for the approval from Owner / Owner's representative.

## **12.0 PACKING**

The warning mat shall be delivered in rolls as mentioned in clause no. 6.0 .

Packing size to be mentioned to ensure uniformity in delivery conditions of the materials being procured

Packing size to be mentioned to ensure uniformity in delivery conditions of the material being procured.

Contractor / manufacturer / Supplier / Vendor shall submit the packaging details and also complied with at the time of delivery.

## **13.0 DOCUMENTS OF PRECEDENCE**

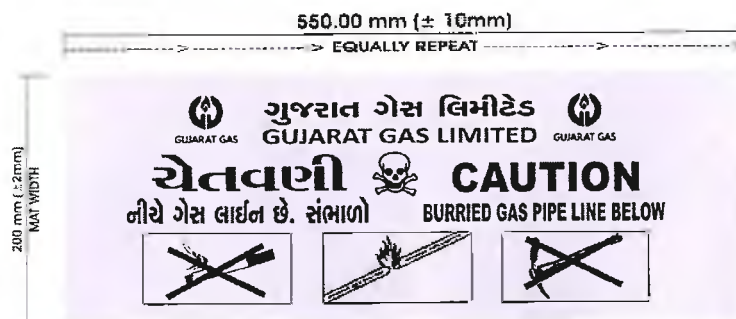
Where any portion of the GTS is repugnant or variance with any provisions of the GGL Technical Specification, unless a different intention appears, the provision(s) of GGL Technical Specification shall be deemed to govern the provision(s) of GTS of contract. If there is no variance or repugnance between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

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

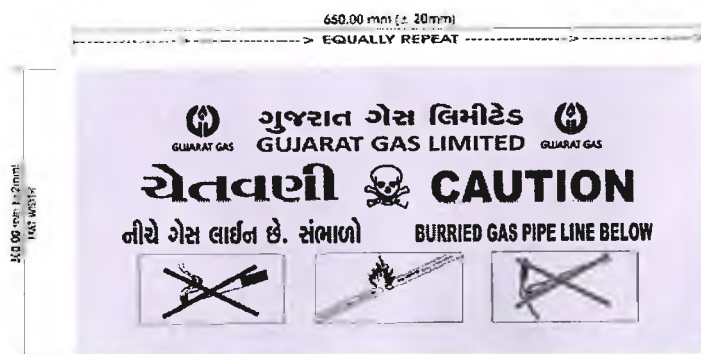
## **14.0 DRAWING:**

**Warning Tape for PE-PNG:**





Warning Tape for Steel Laying:



#### 15.0 QAP:

Sr. No.	Name of test/Features	Unit	Requirement	Inspection Methodology	Inspection by TPA
1	Material	-	LDPE as per IS 2508 / HDPE as per 10889	Material Test Certificate	Rw
2	Tensile strength at break	kgf/cm <sup>2</sup>	For LDPE - 120 (min) FOR HDPE – 185 (Min)	Material Test Certificate	Rw
3	Elongation	%	For LDPE – Length wise direction - 200 Crosswise - 400 FOR HDPE – 200	Material Test Certificate	Rw
4	Virginity Test		GGL Tech. Spec. Clause no. 9.0	Test Certificate	Rw
5	Impact Strength Test		LDPE as per IS 2508 / HDPE as per 10889	Test Certificate	Rw
6	Colour	-	Bright Golden Yellow	Visual	Rw
7	Dimensions				
7.1	Width	mm	200 ± 5mm / 300 ± 5 mm	Scale	Rv
7.2	Thickness	micron	LDPE - 300 micron (Min) HDPE – 1000 micron (Min)	Vernier/Micro Meter	Rv
6	Marking	*	*As shown in the drawing	Visual	Rv
7	Colour- Fast test (Type Test)		Temp. 15 to 20°C & Duration 15 days	Material Test Certificate	Rw

Rw- Review of document

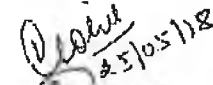
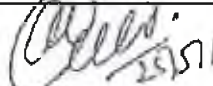
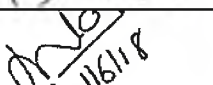

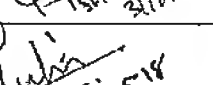
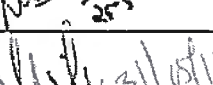

V- Verify

Rv – Random Verification

**TECHNICAL SPECIFICATION  
FOR  
PVC SLEEVE FOR WALL CROSSING OF PNG CONNECTION**

Document No.: GGL/TS/SPEC/SLEEVE/001,REV-02

02	Pre-hid clarification incorporated	06/06/2018
REV NO	REVISION DESCRIPTION	DATE OF ISSUE

NAME OF COMPANY	GUJARAT GAS LTD.		
	NAME	DESIGNATION	SIGN & DATE
Prepared By	Nikhil Agarwal	Dy. Manager (Technical Services)	 25/05/18
Reviewed & Checked By	Vasudev Gadhavi	Manager (Technical)	 25/5/18
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	Lalit Mistry	Dy. Manager (Technical)	 25/5/18
	Dinesh Lad	Manager (Technical Services)	 31/05/18
Approved by	Raghunath Kulai	Sr. Vice President (Technical Services)	



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## 1 GENERAL

Gujarat Gas Ltd., is a Group Company of Gujarat State Petroleum Corporation Ltd., (State Government undertaking) is supplying natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various Geographical Areas as per authorisation from PNGRB.

The intent of this specification is to establish minimum requirements to manufacture and supply of PVC Sleeve for wall crossing of PNG connection.

The scope will include manufacture, supply, inspection, testing, marking, packaging, handling and despatch of PVC Sleeve of ratings and grades as per IS: 4985 with latest amendments.

## 2 REFERENCE CODES AND STANDARDS:

PNGRB T4S: Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks.

IS 4985: Unplasticized PVC pipes for potable water supplies - Specifications

In case of conflict between the requirements of this specification and the Reference Codes & Standards, the requirements of the specification, having stringent requirement, shall govern. Vendor shall obtain prior permission from GGL in such cases.

## 3 DEFINITIONS

For this specification the following definitions shall apply:

OWNER/ CLIENT: Gujarat Gas Limited (GGL)

CONSULTANT : Consultant engaged by GGL for evaluation of vendor

MANUFACTURER: Means the Manufacturer of PE pipes.

VENDOR: The person(s), firm, company, organization from whom Client / Contractor procures materials

## 4 MATERIAL

Material shall conform to the requirement of Cl. No. 6 of IS 4985: 2000 with latest amendments.



## 5 SPECIFICATION

Parameter Description	Specification
Material	PVC (Composition shall be as per the requirement of IS 4985 (latest edition))
Reference Standard	IS 4985
Pipe Dia	For 1/2" GI Pipe - Sleeve Size - 32mm For 1" GI Pipe - Sleeve Size - 40mm
Thickness	Dia 32mm - 1.5 to 1.9 mm (Class 4) Dia 40mm – 1.4 to 1.8 mm (Class 3)
Length	3 meter
End Type	Plain end
Pressure Rating	Class 4 - 8.0 kg/cm <sup>2</sup> Class 3 – 6.0 kg/cm <sup>2</sup>
Colour	Grey
Maximum Operating Temperature (Working Pressure)	27° C
Combustion Participation	No
Marking	As per IS 4985 (latest edition)
Inspection & Testing	As per IS 4985 (latest edition)

## 6 QUALITY ASSURANCE (QA)

The manufacturer is entirely responsible for the quality of the material.

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

To ensure that all PVC Sleeve 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.

## 7 INSPECTION

Inspection shall be carried out as per design codes/standards, OWNER Technical Specification and standard.

Manufacturer / Supplier / Vendor shall furnish all the material test certificates, proof of approval/ license from specified authority as per specified standard.

OWNER reserves the right to independently test the PVC Pipes. If the results of these tests fall outside the limits specified in OWNER Technical specification, then OWNER reserves the rights to reject the material.

## 8 MARKING, PACKAGING AND SHIPMENT

Marking must be permanently legible for the product life under standard stocking condition, exposure to external weather condition, installation and use.



All the items shall be suitably wrapped and packaged to withstand rough handling during inland journey.

Each item shall be properly tagged and packaged separately to facilitate easy identification.

Packaging note shall carry easily identifiable name or code of the physical item.

## 9 QUALITY ASSURANCE PLAN

Sr. No.	Characteristics	Acceptance criteria and certificate	Inspection Methodology	Inspection by Manufac./ Supplier	Inspection by TPA/GGL
1.	Grade of pipe	Dia 32 mm – Class 4 Dia 40 mm – Class 3	Material TC	P	R
2.	Mean Outside diameter	32mm = 32.00 – 32.30 mm 40mm = 40.00 – 40.30 mm	Vernier Caliper	P	Rv
3.	Wall Thickness	Dia. 32mm = 1.50 – 1.90 mm Dia. 40mm = 1.4 to 1.8 mm			
4.	Effective Length of Pipe	3 Mtr.	Measuring Tape	P	Rv
5.	Pipe End	Clean cut and square to axis	Visual	P	Rv
6.	Colour	Light Grey	Visual		
7.	Surface (Internal & External)	Smooth	Visual		
8.	Opacity	Max. 0.2 %	Material TC/ test Reports	P	R
9.	Reversion	Max. 5 %			
10.	Vicat softening temp.	Min. 80 °C			
11.	Density at 27 °C	1.40 – 1.46 gm/cm <sup>3</sup>			
12.	Sulphated Ash Content test	Max. 11%			
13.	Internal hydrostatic acceptance pressure at 27 °C for 1 Hour	No. burst , leakage , swelling			
14.	Resistance to external blows at 0 °C	TIR value Max.10 %			
15.	Pressure Rating	Class 4 – 8.0 kg/cm <sup>2</sup> Class 3 – 6.0 kg/cm <sup>2</sup>			

Rv – Random Verification

R- Review of Test Reports / Test Certificates