GUJARAT GAS

TECHNICAL SPECIFICATION – WELD END TRANSITION FITTINGS

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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). Thickness of steel pipe of all size shall be as per Sch-40.

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/cm2 Pneumatic Pressure

Test of Strength of Mechanical Crimping – Min 250 kg/cm2

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/Manufacture /Vendor shall manufacture, supply, inspection, testing, marking, packaging, handling and dispatch of Polyethylene (PE) Electrofusion Fittings as per GGL technical specifcation 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	
1	**Raw Material Inspection**								
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^3 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 availbale.
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 Stabilzer	-	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 compund					
1.11	Polyethylene -Virgin Material			Polyethylene resin used for manufacture of thermoplastic fittings shall be virgin,					
2	**Performance requirements**								
2.1	Soundness Test	Each Batch	GGL Technical Specification	No leakage from any part of the body and joint at 10 kg/cm2	Penumatic test	Inspection Report	P	R	
2.2	Test of Strength of Mechanical Crimping	Each Batch	GGL Technical Specification	Min 250 kg/cm2	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 (80º 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) Intgernal 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