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TECHNICAL SPECIFICATION - GI FITTINGS

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1.0 SCOPE

The scope of this document is to provide technical specification for the procurement of GI fittings used in high pressure natural gas transportation and distribution systems. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which need to be fulfilled.

This specification covers the requirements for Malleable Cast Iron Fittings unless modified by this specification, requirements of IS 1879 – latest edition shall be valid.

2.0 GENERAL NOTES

- i. All fittings and their dimensions, tolerance, chemical composition, physical properties, heat treatment, hydro test and other testing and marking shall conform to the codes and standards.
- ii. Material test certificates (physical property chemical composition & heat treatment report) shall also be furnished for the fittings supplied.
- iii. All fittings shall be dry, clean and free from moisture, dirt and loose foreign materials of any kind.
- iv. All fittings shall be protected from rust, corrosion and mechanical damage during transportation, shipment and storage.

3.0 MATERIAL

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

4.0 DIMENSIONS & 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 S 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.

5.0 WEIGHT

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

6.0 THREADS

- i. Threads shall be NPT type and conforming to ASME B1.20.1.
- ii. Outlets of fittings shall be threaded to dimensions & the tolerances as specified in ASME B1.20.1.
- iii. All internal & external threads shall be tapered.
- iv. For checking conformity of threads gauging practice in accordance with ASME B1.20.1 shall be followed.

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- v. Chamfering: The outlet of fittings shall have chamfer.

7.0 FREE FROM DEFECTS

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

8.0 GALVANIZING

- 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/m².
- v. Freedom from defect: The zinc coating shall be uniform adhered, reasonably smooth & free from such imperfections as flux, ash bare patches, black spots, pimples, lumpiness runs, rust stains, bulky white deposits & blisters.
- vi. **Samplings**
 - a. All materials of the same type in coating bath having uniform coating characteristics shall be grouped together to continue a lot. Each lot shall be tested separately for the various requirements of the specification. The number of units to be selected from each lot for this purpose shall be given in Table 2 of IS 4759 – latest edition.
 - b. The sample selected according to Column 1 & 2 of Table 2, IS: 4759 – latest edition shall be tested for visual requirements as per Clause 6.2 of IS:4759 – latest edition
 - c. The sample found conforming to above requirements shall then be tested for mass of zinc coating in accordance with Clause 9.2 of IS: 4759 – latest edition.
 - 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.

9.0 PRESSURE TEST

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

10.0 COMPRESSION TEST

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

11.0 SAMPLING

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

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12.0 MARKING

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

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

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

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

13.0 PACKAGING AND DESPATCH

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

All fittings shall be dry, clean and free from moisture, dirt and loose foreign materials of any kind. All fittings shall be protected from rust, corrosion and mechanical damage during transportation, shipment and storage.

14.0 INSPECTION / DOCUMENTS

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

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15.0 SPECIFICATION FOR GI FITTINGS

Service	: Natural Gas
Working Pressure	: 4 bar (g)
Pressure Test	: As per Clause 11.1b of IS:1879-1987 with latest amendment on each and every fittings.
Working Temperature	: 0°C to 50°C
Material Description	: IS:14329-1995, latest amendments Grade BM 300
Tolerance	: As per IS 1879 -1987 with latest amendments
Protective Coating	: Fitting should be galvanized as per IS:4759 - 1996 with latest amendments.
Weight	: As per section 2-10 of IS:1879-1987 with latest amendments
Inspection	: 100% Pressure Testing shall be carried out at factory
Thread Type	: NPT type conforming to ASME B1.20.1 (External & internal threads shall be tapered. The outlet fittings shall be chamfered.)

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