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To solve your corrosion problem – You just have one choice

In 1987-88 Horizon Polymer commenced its manufacturing activities in Chhatral- Gujarat to process various grades of Fluoropolymer and produce lined piping systems based on technology and back-up support provided by M/s. BTR Silvertown Limited – UK.(Then the original Licensee of M/s. Resistoflex Corporation USA now known as Crane Resistoflex,)

- The association with M/s. BTR Silvertown made it possible for HORIZON to adopt the technology of M/s. Crane Resistoflex who were the pioneers and innovators of lined piping systems.

- Horizon thus acquired a proven and established technology to process Fluoropolymer by Extrusion and for lining valve bodies, components and fittings by the Injection Moulding technique.

- The products manufactured at HORIZON are not based on process parameters arrived or concluded by trial and error method which other processors are forced to do or adopt. Polymers or resins are determined by its grain size, specific gravity, and melt flow index. Considering these characteristics appropriate temperature conditions need to be applied to the resin/polymer, equipment and dies otherwise the entire batch of processed resin/polymer results in the extruded liners getting either over sintered or under sintered depending on the thickness. There could be cold spots, degradation of polymers and also cracks due to stress.

- In addition to acquiring process know-how the collaboration package also provided for: -

  - Design of all critical process and testing equipment – with full supervision during manufacture erection & commissioning
  - Design of patterns tooling and dies
  - Implementation of manufacturing standards and quality control procedures
  - Type testing of all products and carrying out factory audits at regular intervals.

- In-house extrusion and sintering process made available to us have some defined built in process parameters which produces a high quality liner having excellent mechanical and specific gravity properties which in turn enhances the life of the end product. Facilities for testing liners are available in –house and are carried out on *every* batch. In addition a “ROLL TEST” is carried out on each PTFE liner.

- Moulding technique adopted is unique unlike the transfer moulding technique adopted by competition. The built-in design features in our cast fittings, effective temp and hydraulic controls provided on our machines, tooling assembly and moulding technique adopted makes the product versatile which can withstand all critical/abusive service conditions.

- Horizon supplies a combination of lined piping system i.e. PP/PVDF/PTFE/PFA/FEP with valves to suit each service condition or application which eventually helps to make the piping costs economical and also bring down the overall project cost.
- Horizon has the best designed lined ball valve and ball check valves produced ion house with unique built-in features required by our overseas customers. Lined ball valves available or produced in the Indian market are split body designs (2 half bodies) which are lined on job work basis. HORIZON ensures that all valves are assembled and tested in a "Dust Free" room
- HORIZON valves can be directly fitted with Actuators if required on line, External jackets are possible to be provided for specific process conditions and for severe applications the PFA lined ball can be directly replaced with a Ceramic Ball.
- PFA Lined Ball valves produced at HORIZON were tested satisfactorily for Helium Leak Test as per ASME Sec V Article 10 which was carried out on entire valve body/Bonnet/Joints/Stuffing Box and in the presence of Third party Inspection Agency.
- HORIZON has acquired certifications for Quality Systems as per ISO 9001:2008 and also Certification as per EU – PED Directive 97/23/EC with approval to use the CE marking on our valves. In addition we are also approved by CHEMOURS TEFLON® LICENSING PROCESSOR for Lined pipe work and Valves.
- HORIZON is a professionally managed organization having its own sales force on all India basis who can personally interact and directly help to suggest an ideal solution to your corrosion problem with full back-up support and technical expertise.
- HORIZON strength is in adopting the proven technology for over 20 years which has helped solve very severe corrosion problems for many of our customers and today we have the confidence of over hundred customers even overseas who rely on our expertise.

HORIZON will have a solution to your corrosion problem

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NSIC-D&B-SMERA
Performance & Credit Rating

This is to certify that M / s

Horizon Polymer Engineering Private Limited

has been evaluated by SMERA RATINGS LIMITED

We hereby assign the subject a NSIC-D&B-SMERA Performance & Credit Rating of

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(Highest Performance Capability and High Financial Strength)

Executive Director

Mr. Gautam H. Sheth

Authorised Signatory

10th March, 2015
(Valid Till 09th March, 2016)

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BTR Silvertown Limited

Your ref	Our ref	Date
	TG/LR	12 April 1995

Certificate of Conformity

This is to certify that products manufactured at Horizon Polymer Engineering Limited, Chhatral are under sub-licensed specifications, methods and equipments provided by BTR Silvertown Ltd. This lined pipework has been tested to relevant ASTM specification and found to conform in all respects to the Performance requirements of the specification.

The original License is held by BTR Silvertown Limited from Resistoflex Corp. of Roseland, New Jersey and has been in place since 1958. This includes the patented Thermolok process for fixing liners in pipespools.

The methods of test, material of construction, physical dimensions and material physical properties conform to the requirements of the following specifications.

FMS 1	Product Specification
FMS 2	Testing of Lined Pipework
FMS 5	Fabrication of Spools for Lining
FMS 6	SG Iron Castings for Plastic Lining
FMS 7	Purchase of Controlled Diameter Steel Pipe for Plasting Lining
FMS 12	Approved Polymers
FMS 27	Qualification Test.

T. GORDON
Technical Service Manager
Chemical Plant Division

Designation: F1545 – 97 (Reapproved 2009)

An American National Standard

Standard Specification for Plastic-Lined Ferrous Metal Pipe, Fittings, and Flanges[1]

This standard is issued under the fixed designation F1545; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers factory-made plastic-lined ferrous metal pipe, fittings, and flanges intended primarily for conveying corrosive fluids. Requirements for materials, workmanship, dimensions, design, fabrication, working pressure and temperatures, test methods, qualification requirements, and markings are included.

1.1.1 This specification does not define the suitability of different liner materials to various chemical and operating environments. Refer to the manufacturer's chemical resistance data for suitability recommendations.

1.1.2 This specification does not include products coated with plastics.

1.2 This specification covers plastic-lined pipe, flanges, and fittings as listed in Table 1. Pressure limitations shall be in accordance with ANSI/ASME B16 Standards, except reduced pressure limitations may be established by the manufacturer, considering both pressure and temperature limitations of the ferrous metal housing and the sealing ability of the liner.

NOTE 1—In this specification, propylene plastics cover those materials defined as both polypropylene plastics and propylene plastics in Terminology F412. Both materials are identified as "PP" on the product. Note that this is at variance with Terminology D1600, where "PP" is the abbreviation for polypropylene.

1.3 The plastic-lined flanged pipe and fitting assemblies are limited to temperatures shown in Table 2. End users should consult with manufacturers as to the likely result of using a particular lined piping component at temperatures below the rated minimum.

NOTE 2—The temperature limitations are based on noncorrosive test conditions. Use in specific aggressive environments may alter temperature limitations. In such instances, specific temperature limits shall be established by mutual agreement between the purchaser and the manufacturer.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A48/A48M Specification for Gray Iron Castings

A53/A53M Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A105/A105M Specification for Carbon Steel Forgings for Piping Applications

A106/A106M Specification for Seamless Carbon Steel Pipe for High-Temperature Service

A126 Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

A135 Specification for Electric-Resistance-Welded Steel Pipe

A182/A182M Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service

A216/A216M Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service

A234/A234M Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

A278/A278M Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures Up to 650°F (350°C)

A312/A312M Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

A351/A351M Specification for Castings, Austenitic, for Pressure-Containing Parts

A395/A395M Specifi for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures

A403/A403M Specification for Wrought Austenitic Stainless Steel Piping Fittings

[1] This specification is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.11 on Composite.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

A513 Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
A536 Specification for Ductile Iron Castings
A587 Specification for Electric-Resistance-Welded Low-Carbon Steel Pipe for the Chemical Industry
D729 Specification for Vinylidene Chloride Molding Compounds[3]
D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
D1457 Specifi for Polytetrafl (PTFE) Molding and Extrusion Materials[3]
D1505 Test Method for Density of Plastics by the Density-Gradient Technique
D1600 Terminology for Abbreviated Terms Relating to Plastics
D2116 Specification for FEP-Fluorocarbon Molding and Extrusion Materials
D3159 Specification for Modified ETFE-Fluoropolymer Molding and Extrusion Materials
D3222 Specification for Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials
D3307 Specifi for Perfl (PFA)-Fluorocarbon Resin Molding and Extrusion Materials
D4101 Specification for Polypropylene Injection and Extrusion Materials
D4894 Specification for Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials
D4895 Specification for Polytetrafluoroethylene (PTFE) Resin Produced From Dispersion
D5575 Classification System for Copolymers of Vinylidene Fluoride (VDF) with Other Fluorinated Monomers
F412 Terminology Relating to Plastic Piping Systems

2.2 *ANSI/ASME Standards:*

B 16.1 Cast Iron Pipe Flanges Flanged Fittings[4]
B 16.5 Steel Pipe Flanges and Flanged Fittings[4]
B 16.9 Factory-Made Wrought Steel Butt Welding Fittings[4]
B 16.28 Wrought Steel Buttwelding Short Radius Elbows and Returns
B 16.42 Ductile Iron Pipe Flanges and Flanged Fittings—Section IX of the ASME Boiler and Pressure Vessel Code[4]

2.3 *Manufacturers Standardization Society (MSS) Standard:*

MSS SP-43 Wrought Stainless Steel Butt-Welding Fittings[5]

3. Terminology

3.1 *General*—The definitions used are in accordance with Terminologies F412 and D1600, unless otherwise indicated.

4. Materials

4.1 *Lining*:

4.1.1 *Material*—The lining shall be made from a resin conforming to one of the requirements in Table 3.

4.1.2 *Mechanical Properties*—The minimum tensile strength and minimum elongation at break when tested in accordance with the specifications outlined in 4.1.1 shall conform to Table 4, except the test specimens shall be obtained from extruded or molded liners. Sample orientation is not critical except for PTFE liners made using the paste extrusion process. For paste-extruded PTFE liners, test specimens with their major axis cut longitudinally shall meet the mechanical property criteria listed in Table 4, and specimens cut circumferentially shall have a minimum tensile strength at break of 2500 psi (17.3 MPa) and a minimum elongation of 200 %.

4.1.3 *Specific Gravity*—Specific gravity for polytetrafluoroethylene (PTFE) resins, when tested in accordance with Test Methods D792 or D1505, shall be as follows:

Lining Material, Resin Type	Specific Gravity
Polytetrafluoroethylene (PTFE) Types I and IV	2.14 to 2.19
Polytetrafluoroethylene (PTFE) Type III	2.13 to 2.21

4.2 *Ferrous Pipe and Fittings*:

4.2.1 *Mechanical Properties*—The mechanical properties of the pipes and fittings shall conform to the appropriate specifications listed in Table 5, except as they are influenced by accepted methods of processing in the industry (for example, Van Stone flaring, bending, swaging, welding, and threading). The carbon steel pipe and wrought fittings shall be welded or seamless steel, Schedule 40 or 80, except Schedule 30 pipe may be used in 8, 10, and 12-in. nominal size. Schedule 20 or standard wall may be used in nominal sizes 12 in. and larger.

4.2.2 *Finish*—The interior surfaces of all housings shall be clean and free of mold burrs, rust, scale, or other protrusions, which may adversely affect the integrity or performance of the lining.

4.2.3 *General*—All pipe and fitting end connections shall be manufactured to provide a minimum ⅛-in. radius or chamfer in the transition from pipe wall to flange or lap face. This radius or chamfer is required to reduce stress concentrations in the plastic liner as it is flared or molded over the flange face or stub end. For PTFE-lined pipe and fittings, a ⅛-in. minimum radius must be provided. A perforated metal collar which seats over the flange chamfer may be used to provide this required radius.

4.2.4 *Dimensional*—Flanges and fittings used for plastic-lined pipe shall conform dimensionally (Note 3) to the following industry ferrous flange and fitting dimensional standards:

Metallurgy	Specification
Steel	ANSI B 16.5
Ductile iron	ANSI B 16.42
Cast iron	ANSI B 16.1

NOTE 3—Center-to-face dimensions include the plastic lining.

4.2.5 *Welding*—All metal welding shall be done by welders or welding operators using welding procedures qualified under the provisions of the ASME Boiler and Pressure Vessel Code (Section IX).

5. Requirements

5.1 *Dimensions*:

[3] Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.
[4] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.
[5] Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602, http://www.mss-hq.com.

5.1.1 *Housing*—Housing installation dimensions are as required in the applicable material specification in accordance with 4.2.4.

5.1.2 *Plastic Wall Thickness*—Pipe and fitting liners shall have a minimum wall thickness and face thickness in accordance with Table 6.

5.1.3 *Lining Flare Diameter*—The outside diameter of the flare covering the gasket portion of the flange or the full face of the lap-joint stub end shall not be less than the diameter specified in Table 7. The flared portion of the lining shall be concentric with the flared portion of the pipe within 1/16 in. (1.6 mm).

5.1.4 *Tolerances*—Tolerances for pipe, flanges, and fittings shall be in accordance with Table 8. Bolt holes in both flanges on a fixed flange spool shall straddle the same center line to facilitate alignment. Finished lined (plastic flare to plastic flare) fabricated fittings shall conform to the nominal center-to-face dimensions as specified in ANSI B 16.1, B 16.42, or B 16.5 with the applicable tolerances.

5.2 *Flange Construction*:

5.2.1 Threaded flanges shall be secured in position to prevent inadvertent turning of the flange.

5.2.2 Socket-type flanges, except threaded, shall be fully back-welded to the pipe housing and the inside surfaces of the socket flanges shall be ground smooth.

5.2.3 Slip-on flanges shall be fully back-welded.

NOTE 4—No welding shall be done on lined components in the field.

5.2.4 Modified slip-on flanges used as lap-joint flanges may be used with flared laps formed by flaring the pipe. The backing flange for the flared metallic lap shall have a 1/8-in. bevel or 1/8-in. corner radius at the bore to provide clearance for the fillet of the flared lap. The outside diameter of the flared lap shall be in accordance with the dimension of an ANSI B 16.9 lap-joint stub end.

5.2.5 Lap-joint (or Van Stone) flanged ends may be manufactured by standard forming techniques or by using fully welded Type A MSS SP-43 or ANSI B 16.9 lap-joint stub ends. Van Stone flares shall have a fillet radius compatible with the corner radius of the mating flange and shall not contain any cracks or buckles. Van Stone flares and stub ends shall have a radius to provide a smooth transition for the plastic flare. Only lap joint flanges in accordance with ANSI B 16.42 and B 16.5 shall be used.

5.3 *Venting*—Each pipe and fitting shall be provided with a venting system that will release any pressure between the liner and the housing.

NOTE 5—One or more holes in the housing, or a helical groove system inside the housing, that connects flange vents, has provided adequate venting.

NOTE 6—Venting is not required with PVDF, PP, ETFE, or PVDC liners.

5.4 *Workmanship*:

5.4.1 Pipe and fittings shall show no evidence of pinholes, porosity, or cracks when inspected in accordance with 5.5.2. The linings shall fit snugly inside the pipe and fitting housings. Any bulges or other obvious indications of poor contact with the housing shall be cause for rejection.

5.4.2 The gasket seating surface of the lining shall be free of surface defects that could impair sealing effectiveness. Scratches, dents, nicks, or tool marks on the seating surface shall not be deeper than 10 % of the face thickness.

5.5 *Performance*:

5.5.1 *Qualification*—Lined pipe and fittings must be capable of meeting the qualification requirements specified in Section 6.

5.5.2 *Inspection*—Each spool and fitting, prior to shipment, shall be hydrostatically or electrostatically tested in accordance with Section 7 and shall subsequently be inspected visually to verify conformance to the requirements of 5.4.

6. Test Methods

6.1 *High-Temperature Test*:

6.1.1 Cycle representative production samples of lined pipe and fittings in an oven from room temperature to the test temperature of the liner type (Table 9) to determine the ability of the lined components to withstand heat aging and temperature cycling. Test a minimum of two pipe spools, tees, and 90° elbows in each size.

6.1.2 *Procedure*—Install companion flanges at the manufacturer's recommended torque value, and affix a thermocouple in the ferrous housing to measure the temperature. Pipe spools shall be at least 3 ft (1 m) long. After 3 h in an oven at the test temperature (Table 9) as indicated by the thermocouple, air cool the lined components to 122°F (50°C) maximum. Repeat this test for a total of three cycles.

6.1.3 *Inspection*—Inspect lined pipe and fittings after each cycle for distortion or cracks in the lining. At the completion of the third cycle, subject tested specimens to the hydrostatic or electrostatic test described in Section 7.

6.2 *Low-Temperature Test*:

6.2.1 After the high-temperature test, subject the same parts used for 6.1 to a cold test at 0°F (−18°C) for a minimum of 48 h. New parts may also be used.

6.2.2 *Procedure*—Install companion flanges at the manufacturer's recommended torque value, and affix a thermocouple to the ferrous housing to measure the temperature. Pipe spools shall be at least 3 ft (1 m) long. After 48 h at or below 0°F (−18°C), as indicated by the thermocouple, allow the parts to warm to a minimum of 60°F (16°C).

6.2.3 *Inspection*—Inspect lined pipe and fittings for distortion or cracks in the lining. Subject tested specimens in the hydrostatic or electrostatic test described in Section 7.

6.3 *Steam-Cold Water Cycling Test*:

6.3.1 Subject representative production samples of lined pipe and fittings to steam-cold water cycling to determine the ability of the lined components to withstand rapid temperature changes. Test a minimum of two pipe spools, tees, and 90° elbows in each size.

6.3.2 *Procedure*—Assemble lined pipe and fittings with suitable flanges having provision for the introduction of steam air, cold water, and for drainage. Install the flange using the manufacturer's recommended torque value. Pipe spool length shall be 10 ft (3 m) minimum. Mount the sample in such a manner as to permit complete drainage and venting. Then subject the sample to 100 consecutive steam-cold-water cycles, each consisting of the following in the sequence given:

6.3.2.1 Circulate gage saturated steam at the pressure listed in Table 10 through the sample until the ferrous housing skin temperature adjacent to the flange at the outlet end of the sample has not changed more than 5°F (3°C) in 10 min.

6.3.2.2 Close off the steam.

6.3.2.3 Circulate water at a maximum temperature of 77°F (25°C). Circulate the cooling water until the ferrous housing skin temperature adjacent to the flange at the outlet end of the sample measures 122°F (50°C) or lower.

6.3.2.4 Vent and introduce air to purge the sample for a minimum of 1 min making certain that it is completely drained of water.

6.3.3 *Inspection*—There shall be no evidence of leakage from the venting system or from behind the plastic faces during the 100 cycles. At the completion of the test, the liner shall exhibit no buckling or cracking. On PFA, PTFE, and FEP, formation of water blisters shall not be cause for rejection.

NOTE 7—These surface blisters are formed due to absorption of the steam vapors by the liner and subsequent condensation in the liner. The blisters do not adversely affect liner performance.

6.3.4 Subject the lined pipes or fittings to either the hydrostatic test described in Section 7 or, after drying, to the electrostatic test described in Section 7.

6.4 *Vacuum Testing*:

6.4.1 Test representative samples of lined pipe and fittings to determine the vacuum ratings of the lined components. Test a minimum of two pipe spools, tees, and 90° elbows in each size. Conduct tests at room temperature, at the manufacturer's maximum recommended service temperature, and at one intermediate temperature level. Full vacuum is defined as 29.6 in. Hg corrected to sea level.

NOTE 8—Vacuum temperature ratings for pipe and fittings are published in the manufacturer's literature.

NOTE 9—The vacuum test is performed on pipe and fittings that have not been exposed to prior service. Use in specific environments may alter the vacuum-temperature ratings.

6.4.2 *Procedure*—For pipe spools, specimen lengths shall be at least 10 pipe diameters. Install a flange incorporating a sight glass at one end and a flange suitable for drawing a vacuum at the other end. Affix a thermocouple to the ferrous housing to measure the temperature. Heat the specimens uniformly externally with the sight glass end visible. Begin the test after the desired ferrous housing temperature has been reached. Hold a selected initial vacuum level for 8 h, and if no failure occurs, increase the vacuum by 5 in. Hg. Repeat this every 8 h until failure or full vacuum is reached. Failure is defined as any buckling or collapse of the liner. If failure occurs at the initial vacuum level selected, test a new test specimen at a lower vacuum level to determine the failure threshold. The vacuum failure threshold is defined as 1 in. Hg below that at which failure occurs.

NOTE 10—The external pressure method to simulate higher than full vacuum can be used to establish the failure threshold when full vacuum is achieved. With the use of pressure taps, a pressure is applied between the plastic liner outside diameter and the pipe inside diameter.

6.4.3 The vacuum rating shall be 80 % of the failure threshold value.

6.4.4 At the test completion and after establishing the vacuum rating, place a duplicate specimen in an oven at the test temperature. Apply the rated vacuum to the specimen after the desired skin temperature has been reached. Achieve the rated vacuum within 2 min and apply continuously for 48 h. If no liner buckling or collapse occurs, the rated vacuum shall be considered acceptable.

6.5 *Retest*—When a test specimen fails to meet the requirements of either 6.1.3, 6.2.3, 6.3.3, 6.3.4, 6.4.2, or 6.4.4, correct the cause of failure and repeat the specified test.

7. Inspection Tests

7.1 *Hydrostatic Pressure Test*—The internal test pressure shall be 250 psi (1.7 MPa) minimum for Class 125 (0.9-MPa) components and 425 psi (2.9 MPa) minimum for Class 150 (1.0-MPa) and Class 300 (2.1-MPa) components. Conduct the test at ambient temperature. Completely fill the pipe and fitting with clean water and bleed the system free of all air prior to the application of pressure. Reach full test pressure within 1 min and maintain for a further 3 min. Observe the pressure gage throughout the test for any evidence of leakage, which shall be cause for rejection.

7.2 *Electrostatic Test*—Conduct the test with a nondestructive high-voltage tester at an output voltage of 10 kV. A visible or audible spark, or both, that occurs at the probe when electrical contact is made with the housing because of a defect in the liner shall be cause for rejection.

8. Finish

8.1 The outside surface of all lined pipe and fittings, other than stainless steel, shall be coated with a corrosion-resistant primer over a properly prepared surface.

9. Quality Assurance

9.1 When the product is marked with this designation, F1545, the manufacturer affirms that the product was manufactured, inspected, sampled and tested in accordance with this specification and has been found to meet the requirements of this specification

10. Marking

10.1 *Quality Assurance*—When the product is marked with this ASTM designation, it affirms that the product was manufactured, inspected, sampled, and tested in accordance with this specification and has been found to meet its requirements

10.2 *Quality of Marking*—The markings shall be applied to the pipe in such a manner that it remains legible (easily read) after installation and inspection have been completed.

10.3 The pipe and fittings shall be marked with the following information:

10.3.1 Nominal pipe size,

10.3.2 Liner material identification,

10.3.3 Manufacturer's name (or trademark),

10.3.4 Length (on pipe only), and

10.3.5 ASTM designation.

10.4 Other information such as order numbers, part numbers, item numbers, and so forth shall be provided at the request of the purchaser.

10.5 Pipe liner identification shall be provided on a band utilizing raised letters. The band shall typically be located near the flange.

11. Packaging

11.1 The gasket face of each spool shall be protected by end plates or other suitable protective means.

11.2 Fittings shall have the same protective covers on the gasket faces unless protected by other means, such as individual boxing.

12. Keywords

12.1 plastic-lined ferrous metal fittings; plastic-lined ferrous metal flanges; plastic-lined ferrous metal pipe

TABLE 1 Specification Coverage

Material	ANSI Class	Nominal Pipe Size, in. (mm)
Ethylene Tetrafluoroethylene Copolymer (ETFE)	150/300	1 to 10 (25 to 254)
Perfluoro (Alkoxyalkane) Copolymer (PFA)	150/300	1/2 to 12 (13 to 305)
Perfluoro (Ethylene-Propylene) Copolymer (FEP)	150/300	1 to 12 (25 to 305)
Poly(Vinylidene Chloride) (PVDC)	125/150/300	1 to 8 (25 to 203)
Poly(Vinylidene Fluoride) (PVDF)	150/300	1 to 10 (25 to 254)
Poly(Vinylidene Fluoride) Copolymer (PVDF)	150/300	1 to 10 (25 to 254)
Polytetrafluoroethylene (PTFE)	150/300	1/2 to 24 (13 to 610)
Propylene and Polypropylene (PP)	125/150/300	1/2 to 16 (13 to 406)

TABLE 2 Temperature Specifications

Material	Temperature Range, °F (°C)
Ethylene Tetrafluoroethylene Copolymer (ETFE)	−20 to 300 (−29 to 149)
Perfluoro (Alkoxyalkane) Copolymer (PFA)	−20 to 500 (−29 to 260)
Perfluoro (Ethylene-Propylene) Copolymer (FEP)	−20 to 300 (−29 to 149)
Poly(Vinylidene Chloride) (PVDC)[A]	0 to 175 (−18 to 79)
Poly(Vinylidene Fluoride) (PVDF)	0 to 275 (−18 to 135)
Poly(Vinylidene Fluoride) Copolymer (PVDF)	−20 to 275 (−29 to 135)
Polytetrafluoroethylene (PTFE)	−20 to 500 (−29 to 260)
Propylene and Polypropylene (PP)	0 to 225 (−18 to 107)

[A] Storage or handling below 20°F (−7°C) of uninstalled 4, 6, and 8-in. components should be avoided.

TABLE 3 Polymer Standard Specifications[A]

Lining Material—Resin Type	Standard Resin Specification	Allowable Resin Classification	Standard Liner Color	Maximum Filler Material (by weight)
Polypropylene (PP)	ASTM D4101	Type I and II	orange	<30 % glass fiber
Poly(Vinylidene Chloride) (PVDC)	ASTM D729		gray	<20 % glass fiber
Poly(Vinylidene Fluoride) (PVDF)	ASTM D3222		black	
Poly(Vinylidene Fluoride) Copolymer (PVDF)	ASTM D5575		black	
Polytetrafluoroethylene (PTFE)	ASTM D1457		white	
	ASTM D4894			
	ASTM D4895			
Perfluoro (Ethylene-Propylene) Copolymer (FEP)	ASTM D2116	Type III	green	
Perfluoro (Alkoxyalkane) Copolymer (PFA)	ASTM D3307	Type II	natural	
Ethylene Tetrafluoroethylene Copolymer (ETFE)	ASTM D3159	Type I	natural	

[A] A maximum of 1 % by weight of additives or colorants, or both, is permissible. Colorants, if used, shall be identified in the manufacturer's specification. Clean, reworked resins may be used provided all mechanical property requirements are maintained. Only virgin PTFE resin may be used.

TABLE 4 Polymer Mechanical Properties

Lining Material—Resin Type	Minimum Tensile Strength at Break, psi (MPa)	Minimum Elongation at Break, %
Polypropylene (PP) Type I	4000 (27.6)[A]	10[A]
Polypropylene (PP) Type II	3000 (20.7)[A]	10[A]
Polypropylene (PP) 30 % Glass Filled	2500 (17.3)[A]	2[A]
Poly(Vinylidene Chloride) (PVDC)	1500 (10.3)[A]	2[A]
Poly(Vinylidene Fluoride) (PVDF)	4500 (31.0)	10
Poly(Vinylidene Fluoride) Copolymer (PVDF)	4000 (27.6)	300
Polytetrafluoroethylene (PTFE)	3000 (20.7)	250
Perfluoro (Ethylene-Propylene) Copolymer (FEP)	3000 (20.7)	250
Perfluoro (Alkoxyalkane) Copolymer (PFA)	3800 (26.2)	300
Ethylene Tetrafluoroethylene Copolymer (ETFE)	6500 (44.8)	275

[A] Minimum tensile strength and elongation at yield.

TABLE 5 Approved Ferrous Metal Flange and Fitting Material Standards (ASTM)

Lining Material	Pipe Specifications	Flange Specifications	Fitting Specifications
PVDF, PTFE, FEP, ETFE, and PFA	A53/A53M A106/A106M A135 A312/A312M A513 A587	A105/A105M A182/A182M A216/A216M A395/A395M A536 (60-40-18)	A105/A105M A182/A182M A216/A216M A234/A234M A351/A351M A395/A395M A403/A403M A536 (60-40-18)
PP and PVDC	A53/A53M A106/A106M A135 A312/A312M A513 A587	A105/A105M A182/A182M A216/A216M A395/A395M A536	A48/A48M A105/A105M A126 A182/A182M A216/A216M A234/A234M A278/A278M A351/A351M A395/A395M A403/A403M A536

TABLE 6 Minimum Liner Wall Thickness, in. (mm)[A]

Size, in.	Liner Material						
	PTFE	PVDF	PP	PFA	FEP	PVDC	ETFE
1	0.120 (3.05)	0.100 (2.54)	0.125 (3.18)	0.100 (2.54)	0.100 (2.54)	0.094 (2.39)	0.100 (2.54)
1 1/2	0.120 (3.05)	0.100 (2.54)	0.125 (3.18)	0.100 (2.54)	0.100 (2.54)	0.094 (2.39)	0.100 (2.54)
2	0.120 (3.05)	0.100 (2.54)	0.125 (3.18)	0.100 (2.54)	0.100 (2.54)	0.094 (2.39)	0.100 (2.54)
2 1/2	0.120 (3.05)	0.100 (2.54)	0.125 (3.18)	0.100 (2.54)	0.100 (2.54)	0.094 (2.39)	0.100 (2.54)
3	0.120 (3.05)	0.100 (2.54)	0.125 (3.18)	0.100 (2.54)	0.100 (2.54)	0.094 (2.39)	0.100 (2.54)
4	0.120 (3.05)	0.100 (2.54)	0.125 (3.18)	0.100 (2.54)	0.100 (2.54)	0.094 (2.39)	0.100 (2.54)
6	0.125 (3.18)	0.100 (2.54)	0.125 (3.18)	0.100 (2.54)	0.100 (2.54)	0.094 (2.39)	0.100 (2.54)
8	0.125 (3.18)	0.100 (2.54)	0.125 (3.18)	0.100 (2.54)	0.100 (2.54)	0.094 (2.39)	0.100 (2.54)
10	0.125 (3.18)	0.100 (2.54)	0.125 (3.18)	0.100 (2.54)	0.100 (2.54)	. . .	. . .
12	0.125 (3.18)	. . .	0.125 (3.18)	. . .	0.100 (2.54)	. . .	. . .
14	0.125 (3.18)	. . .	. . .	. . .	. . .	. . .	. . .
16	0.125 (3.18)	. . .	. . .	. . .	. . .	. . .	. . .
18	0.125 (3.18)	. . .	. . .	. . .	. . .	. . .	. . .
20	0.150 (3.81)	. . .	. . .	. . .	. . .	. . .	. . .
24	0.150 (3.81)	. . .	. . .	. . .	. . .	. . .	. . .

[A] Minimum liner face thickness shall be 80 % of minimum liner wall thickness.

TABLE 7 Lining Flare Diameter

Nominal Pipe Size, in.	Minimum Flare Diameter, in. (mm)
½	1¼ (31.8)
¾	1 9/16 (39.7)
1	1⅞ (47.6)
1½	2 11/16 (68.3)
2	3 7/16 (87.3)
3	4⅝ (117.5)
4	5 15/16 (150.8)
6	8 (203.2)
8	10 1/16 (255.6)
10	12¼ (311.2)
12	14⅜ (365.1)
14	15½ (393.7)
16	17¾ (450.9)
18	20¼ (514.4)
20	22¼ (565.2)
24	26¼ (666.8)

TABLE 8 Tolerances for Pipe, Flanges, and Fittings, in. (mm)

Pipe Length	6⅛ (63.2)
Fixed flange bolt hole alignment	6 1/16 (61.6)
Flange perpendicularity (with pipe centerline)	3/32 in./ft (7.8 mm/m) of diameter
Flanges:	
All dimensions	see ANSI B 16.42 or ANSI B 16.5
Fittings:	
All dimensions	see ANSI B 16.1, B 16.5 or B 16.42

TABLE 9 Test Temperatures, °F (°C)

PVDC	PP	PVDF	FEP	PTFE	PFA	ETFE
175 6 5 (79 6 3)	225 6 5 (107 6 3)	275 6 5 (135 6 3)	300 6 5 (149 6 3)	500 6 5 (260 6 3)	500 6 5 (260 6 3)	300 6 5 (149 6 3)

TABLE 10 Steam Test Pressures, psig (kPa)

PVDC	PP	PVDF	FEP	PTFE	PFA	ETFE
[A]	4 6 1 (28 6 7)	30 6 2 (207 6 15)	506 3 (300 6 20)	125 6 5 (862 6 35)	125 6 5 (862 6 35)	50 6 3 (300 6 20)

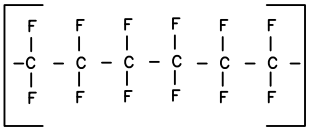
[A] The thermocycling test for PVDC lined pipe and fittings should be run using water at 175 6 5°F (79 6 3°C).

PLASTIC LINER SELECTION

POLYTETRAFLUOROETHYLENE [PTFE]

ALSO KNOWN AS TEFLON'

Colour - White

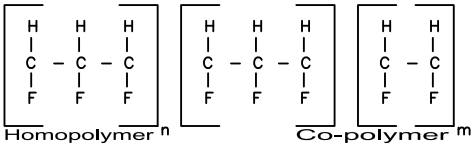


Virtually chemically inert to all known industrial chemicals and solvents, PTFE is recommended for continuous temperatures from −20°F (−29°C) to 450°F (232°C). It's superb non−stick properties, combined with its non−toxic and inert properties, make it an ideal choice for handling sticky resins and foodstuffs, eliminating the build up of any deposits on the pipe walls. It has superior properties such as low friction, non−flammable, insensitive to UV and non−aging weather resistance. Limitations for use are restricted to the molten alkali metals, (such as metallic sodium), fluorine and chlorine trifluoride at high temperatures and pressures

Chemplast extrusion technology ensures maximum mechanical properties and especially minimum permeability in pipe liners. PTFE does not have a liquid phase and therefore cannot be readily applied to lining of complex geometric, shapes.

POLYPROPYLENE CO-POLYMER [PP]

Colour - Orange



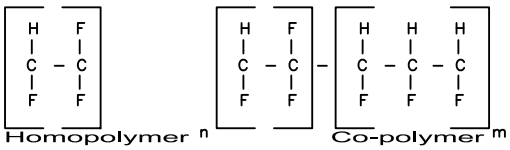
This hydro−carbon heat stabilized copolymer, provides an excellent combination of mechanical and chemical properties. This tough general purpose lining material is particularly suitable for water treatment, hot effluent, pickling or plating plants. Since polyproplene can be greatly affected by concentration and temperature of conveyed fluids, its application in pressure piping systems should generally not exceed 0°F (−18°C) TO 225°F (107°C), in continuous service. However polyproplene will withstand sterilization at 248°F (120°C) for short periods.

Careful consideration should be given to polyproplene applications, as it is generally not suitable for oxidizing acids, hot aromatic hydrocarbons, chlorinated hydrocarbons and benzene. Please consult our chemical resistance chart or refer to us for guidance.

POLYVINYLIDENE FLUORIDE [PVDF]

ALSO KNOWN AS KYNAR®,

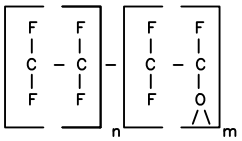
Colour - Black



PVDF is a true thermoplastic with a melt phase, permitting rotational transfer or injection molding of geometric complex shapes. This highly crystalline fluorinated polymer offers excellent chemical resistance to most inorganic acids, strong oxidants and halogens. It has particularly good resistance to aliphatic and aromatic fluorocarbons. PVDF exhibits excellent abrasion and permeation resistance and can handle temperatures from 0°F (−18°C) to 275°F (135°C). However because PVDF is only partially fluorinated, its chemical resistance is limited in temperature and chemical

PERFLUOROALKOXY [PFA]

Colour - Off White



PFA is a melt processible fluorinated polymer, with virtually identical chemical resistance to PTFE. PFA's melt processibility permits its use in molding geometric complex shapes. Its ultra pure inertness and superior creep resistance at high temperatures, excellent low temperature toughness and flame resistance makes PFA the obvious choice to use in conjunction with PTFE.

PFA is suitable in service from 0°F (−18°C) to 392°F (200°C)

CHEMICAL RESISTANCE CHART

CORROSIVE STREAM	PP °C	PVDF °C	PTFE / PFA °C
1,1,2-Trichioroethane	NR	65	230
1,2-Dibromo Propane	--	95	230
1,4 Dioxane	25	NR	230
1- Chloro-1-motropropane	--	--	230
2,3,4,6-Tetrachlorophenol	25	65	230
2,4,5-Trichlorophenol	25	65	230
2-Aminoisobutyric acid	50	--	230
2-Chloro-4-Phenylphenol	--	--	230
Acetaldehyde	25	NR	230
Acetamide	65	25	230
Acetic acid (10%)	95	110	230
Acetic acid (5%)	95	110	230
Acetic acid (50%)	95	95	230
Acetic acid (80%)	50	80	230
Acetic Acid (Glacial)	50	50	230
Acetic Anhydride	25	NR	230
Acetone (10%)	50	50	230
Acetone (100%)	50	NR	230
Acetonitrile	25	120	230
Acetophenone	25	120	230
Acetyl Chloride	NR	120	230
Acetylene	NR	25	230
Acetylene Tetra bromide	NR	65	230
Acetylene Tetra bromide	NR	135	230
Acrylonitrile	50	50	230
Adipic acid	65	80	230
Air	110	135	230
Allyl Alcohol	65	135	230
Allyl Chloride	25	95	230
Alum	110	80	230
Alum, Ammonium	110	135	230
Alum, Chrome	80	135	230
Alum, Potassium	110	95	230
Aluminum Chloride (aqueous)	110	135	230
Aluminum Fluoride	110	135	230
Aluminum Hyd roxide	95	135	230
Aluminum Nitrate	95	135	230
Aluminum Oxychloride	50	135	230
Aluminum Sulfate	110	135	230
Ammonia (Anhydrous gas)	65	NR	230
Ammonia (Anhydrous liquid)	110	NR	230
Ammonium Acetate (Saturated)	50	80	230
Ammonium Beryllium Fluoride	--	--	230
Ammonium Bifluoride	95	65	230
Ammonium Bromide (50%)	--	120	230
Ammonium Carbonate (Saturated)	110	135	230
Ammonium Chloride (Saturated)	110	135	230
Ammonium Dichromate	50	120	230
Ammonium Fluoride (10%)	95	135	230
Ammonium Fluoride (25%)	95	135	230
Ammonium Fluoride (saturated)	80	135	230
Ammonium Hydroxide (1 %)	110	110	230
Ammonium Hydroxide (1 0%)	110	110	230
Ammonium Hydroxide (conc.)	110	110	230
Ammonium Metaphosphate	65	110	230
Ammonium Nitrate (saturated)	65	135	230
Ammonium Persulfate	65	25	230
Ammonium Phosphate	110	135	230
Ammonium Sulfate (saturated)	110	135	230
Ammonium Sulfide	65	50	230
Ammonium Thiocyanate	65	135	230
Amyl Acetate	25	50	230
Amyl Alcohol	25	135	230
Amyl Chloride	NR	135	230
Aniline	50	50	230
Aniline Hydrochloride (10%)	NR	25	230
Antimony Trichloride	65	25	230
Aqua Regia	25	25	230
Ar-Tribromoethylbenzene	--	--	230
Arsenic Acid	95	135	230
Aryl Sulfonic Acids	65	--	230
Barium Carbonate	95	135	230
Barium Chloride	95	135	230
Barium Hydroxide	95	135	230
Barium Sulfate	95	135	230
Barium Sulfide	95	135	230
Beer	80	110	230

CORROSIVE STREAM	PP °C	PVDF °C	PTFE / PFA °C
Beet sugar liquors	65	110	230
Benzaldehyde	25	25	230
Benzalkonium Chloride	--	--	230
Benzene	NR	65	230
Benzenesulfonic acid	25	50	230
Benzoic acid	65	110	230
Benzoyl chloride	--	65	230
Benzyl alcohol	50	120	230
Benzyl amine	65	25	230
Benzyl chloride	25	135	230
Bis (2-Butoxyethyl) phthalate	--	--	230
Bismuth carbonate	110	135	230
Black liquor	--	80	230
Borax	80	135	230
Boric acid	110	135	230
Brine (acid)	95	135	230
Brine (basic)	80	135	230
Brine (chlorinated acid)	50	95	230
Bromine (dry gas)	NR	65	230
Bromine (liquid)	NR	65	230
Bromine (Water-3% saturated)	25	95	230
Bromine chloride (Dry gas)	NR	120	135
Bromine chloride (Liquid)	--	95	230
Bromine chloride water (8%)	25	95	230
Bromoform	NR	65	230
Butadiene	NR	120	230
Butane	NR	120	230
Butanediol	80	120	230
Butanol (Butyl alcohol)	95	120	230
Butyl acetate	NR	25	230
Butyl acrylate	NR	50	230
Butyl bromide	NR	135	230
Butyl chloride	NR	135	230
Butyl mercaptan	--	135	230
Butyl phenol	NR	110	230
Butyl phthalate	50	NR	230
Butylene (Butadiene)	--	120	230
Butyraldehyde	--	65	230
Butyric acid	80	110	230
Calcium Bisulfide	95	135	230
Calcium bisulfite	95	135	230
Calcium bisulfite bleach liquor(6% total SO2 5% free)	80	95	230
Calcium carbonate	110	135	230
Calcium chlorate	95	135	230
Calcium chloride (saturated)	110	135	230
Calcium chlorite	65	95	230
Calcium hydroxide (saturated)	110	135	230
Calcium hypochlorite	80	95	230
Calcium nitrate	95	135	230
Calcium oxide	110	120	230
Calcium oxide-sulfur	--	120	230
Calcium sulfate	110	135	230
Calcium sulfide	--	110	230
Cane sugar liquors	25	135	230
Caprylic acid	50	80	230
CARBITOL [2] ethylene glycol ethers	50	135	230
Carbolic acid (see Phenol)	--	--	230
Carbon bisulfide	NR	25	230
Carbon dioxide (gas)	110	135	230
Carbon disulfide (liquid)	NR	25	230
Carbon monoxide	110	135	230
Carbon tetrachloride	NR	135	230
Carbon Tetrachloride (wet gases)	NR	135	230
Carbonic Acid	110	135	230
Castor oil	50	80	230
Chloral (10%)	NR	50	230
Chloral hydrate	NR	25	230
Chlorinated phenol	--	65	230
Chlorine (5% in CCL 4)	NR	95	230
Chlorine dioxide	NR	65	230
Chlorine gas (dry)	NR	95	150
Chlorine gas (wet)	NR	95	150
Chlorine liquid (pressurized)	NR	95	150
Chlorine water (saturated)	65	110	230
Chloroacetic acid	50	NR	230
Chloroacetyl chloride	NR	50	230

CHEMICAL RESISTANCE CHART

CORROSIVE STREAM	PP °C	PVDF °C	PTFE / PFA °C
Chlorobenzene	NR	80	230
Chlorobenzyl chloride	NR	50	230
Chloroform	NR	50	230
Chlorohydrin (liquid)	NR	50	230
Chloropicrin	NR	65	230
Chlorosulfonic Acid (100%)	NR	NR	230
Chromic acid (50%)	50	50	230
Chromium plating solution	50	80	230
Chromium trioxide (30%)	50	80	230
Chromyl chloride	50	50	230
Citric acid	110	135	230
CLOROX 2 bleach solution (5.5% NaOCl)	65	135	230
Coal gas	65	110	230
Coconut oil	50	135	230
Copper carbonate, basic	95	135	230
Copper chloride (saturated)	95	135	230
Copper cyanide (10%)	95	135	230
Copper fluoride	95	135	230
Copper nitrate	95	135	230
Copper sulfate (saturated)	95	135	230
Corn oil	80	135	230
Cotton seed oil	65	135	230
Cresol	NR	65	230
Cresylic acid (50%)	NR	65	230
Croton aldehyde	NR	50	230
Crude oil	65	135	230
Cupric Chloride (saturated)	95	135	230
Cyanoacetic acid	--	--	230
Cyclohexane	NR	135	230
Cyclohexanol	25	65	230
Cyclohexanone	NR	25	230
Desoxyephedrine hydrochloride	--	--	230
Dextrose	110	135	230
Di-B (3,4-dihydroxyphenol aniline)	--	--	230
Di-isobutylene	50	135	230
Di-isobutylketone	25	50	230
Diacetone alcohol	50	25	230
Diazo salts	110	135	230
Dibutoxy ethyl phthalate	--	--	230
Dibutyl phthalate	50	NR	230
Dibutyl sebacate	--	NR	230
Dichloroacetic acid	50	50	230
Dichloroethane	25	80	230
Dichloroethylene	50	110	230
Dichloropropionic acid	--	50	230
Diesel fuels	25	135	230
Diethanol amine	65	NR	230
Diethyl amine (aqueous)	25	25	230
Diethyl ether	NR	50	230
Diethyl malonate	--	NR	230
Diethylene glycol ethers	65	95	230
Diethylene triamine	50	50	230
Diglycolic acid	25	25	230
Dimethanolamine	65	NR	230
Dimethyl acetamide	50	NR	230
Dimethyl amine (aqueous)	25	25	230
Dimethyl aniline	NR	25	230
Dimethyl formamide	50	NR	230
Dimethyl phthalate	25	25	230
Dimethyl sulfate	--	25	230
Dimethyl sulfoxide	--	NR	230
Dioctyl phthalate	NR	25	230
Diphenyl oxide	Ñ	50	230
Dipropylene glycol methyl ether	65	25	230
Disodium phospate	95	95	230
Distilled water	100	100	100
Divinyl benzene	--	50	230
DOWANOL 1 glycol ethers	65	95	230
Epichlorohydrin	50	NR	230
Ethyl acetate	50	NR	230
Ethyl acetoacetate	NR	25	230
Ethyl acrylate	25	25	230
Ethyl alcohol	80	135	230
Ethyl benzene (acidic)	NR	50	230
Ethyl chloride	NR	135	230
Ethyl chloroacetate	50	25	230

CORROSIVE STREAM	PP °C	PVDF °C	PTFE / PFA °C
Ethyl cyanoacetate	50	25	230
Ethyl ether	NR	50	230
Ethylene bromide	NR	135	230
Ethylene chloride	NR	135	230
Ethylene chlorohydrin	50	25	230
Ethylene diamine	65	25	230
Ethylene dibromide	25	110	230
Ethylene dichloride	25	135	230
Ethylene glycol	50	135	230
Ethylene oxide (5% aqueous)	NR	95	230
Ethylene trichloride	NR	135	230
Fatty acids	65	135	230
Ferric chloride	95	135	230
Ferric chloride + HCL	80	135	230
Ferric nitrate	95	135	230
Ferric sulfate	95	135	230
Ethyl benzene (acidic)	NR	50	230
Ethyl chloride	NR	135	230
Ethyl chloroacetate	50	25	230
Ethyl cyanoacetate	50	25	230
Ethyl ether	NR	50	230
Ethylene bromide	NR	135	230
Ethylene chloride	NR	135	230
Ethylene chlorohydrin	50	25	230
Ethylene diamine	65	25	230
Ethylene dibromide	25	110	230
Ethylene dichloride	25	135	230
Ethylene glycol	50	135	230
Ethylene oxide (5% aqueous)	NR	95	230
Ethylene trichloride	NR	135	230
Fatty acids	65	135	230
Ferric chloride	95	135	230
Ferric chloride + HCL	80	135	230
Ferric nitrate	95	135	230
Ferric sulfate	95	135	230
Ferrous chloride	95	135	230
Ferrous chloride + HCL	80	135	230
Ferrous nitrate	95	135	230
Ferrous sulfate	95	135	230
Fish solubles	25	65	230
Fluorine (gaseous)	NR	25	NR
Fluoroboric acid	65	135	230
Fluorosilicic acid	65	135	230
Formaldehyde (37%)	80	50	230
Formaldehyde (50%)	80	50	230
Formic acid	50	120	230
FREON 1 Fluorocarbons	NR	95	230
Fructose	110	135	230
Fruit juices, pulp	110	95	230
Fuel oil	25	135	230
Furfural	NR	25	230
Gallic acid	80	25	230
Gas (manufactured)	65	135	230
Gas (natural)	65	135	230
Gasoline (leaded)	25	135	230
Gasoline (unleaded)	25	135	230
Gelatin	80	120	230
Gin	95	95	230
Glucose	110	135	230
Glycerin	110	135	230
Glycerol triacetate	--	--	230
Glycine (saturated)	--	25	230
Glycolic acid	65	25	230
Heptane	NR	135	230
Hexane	25	135	230
Hydrazine dihydrochloride	--	25	230
Hydriodic acid	95	135	230
Hydrobromic acid (10%)	110	135	230
Hydrobromic acid (50%)	80	135	230
Hydrochloric acid (10%)	95	135	230
Hydrochloric acid (20%)	95	135	230
Hydrochloric acid (35%)	95	135	230
Hydrocyanic acid	65	135	230
Hydrofluoric acid (100%)	NR	95	230
Hydrofluoric acid (20%)	95	120	230
Hydrofluoric acid (30%)	95	120	230
Hydrofluoric acid (37%)	95	120	230

CHEMICAL RESISTANCE CHART

CORROSIVE STREAM	PP °C	PVDF °C	PTFE / PFA °C
Hydrofluoric acid (48%)	95	110	230
Hydrofluoric acid (60%)	95	95	230
Hydrofluorosilicic acid	65	135	230
Hydrogen	110	135	230
Hydrogen chloride (dry gas)	110	135	230
Hydrogen cyanide	NR	NR	230
Hydrogen fluoride gas	25	95	230
Hydrogen peroxide (3-8%) 1	NR	95	230
Hydrogen peroxide (30%) 1	NR	95	230
Hydrogen peroxide (90%) 1	NR	20	230
Hydrogen sulfide (dry)	80	135	230
Hydrogen sulfide (water sol.)	80	110	230
Hydrogen sulfide (wet)	80	110	230
Hydroquinone	65	120	230
Hypo (sodium thiosulfate)	65	135	230
Hypochlorous acid	65	25	230
Idoform	25	95	230
Iodine (1 0%)	25	65	230
Iodine (gas)	--	65	230
Isopropyl alcohol	95	65	230
Isopropyl ether	NR	50	230
Isopropylamine	65	50	230
Jet fuel (JP4, JP5)	25	95	230
Kerosene	25	135	230
Lactic acid (80%)	65	50	230
Lard oil	50	135	230
Lauric acid	80	110	230
Lauryl chloride	80	120	230
Lauryl sulfate (saturated)	80	120	230
Lead acetate	80	135	230
Lemon oil	25	120	230
Lime sulfur solution	65	95	230
Linoleic acid	50	120	230
Linseed oil	65	135	230
Lithium bromide (saturated)	--	110	230
Lubricating oil	50	135	230
m-Bromotoluene	NR	80	230
Magnesium carbonate	110	135	230
Magnesium chloride	110	135	230
Magnesium hydroxide	110	135	230
Magnesium nitrate	110	135	230
Magnesium sulfate (10%-saturated)	110	135	230
Maleic acid (1 0%)	65	120	230
Maleic anhydride	25	25	230
Malic acid	50	120	230
Manganese sulfate (10% to saturated)	25	120	230
Manganese sulfate (saturated)	25	--	230
Mercuric chloride	80	120	230
Mercuric cyanide	65	120	230
Mercuric nitrate	80	135	230
Mercury	65	135	230
Methacrylic acid	--	50	230
Methane	25	135	230
Methane sulfonic acid	50	95	230
Methoxy ethyl oleate	--	--	230
Methyl alcohol	95	135	230
Methyl bromide	NR	135	230
Methyl CELLOSOLVE 1 ethers	25	95	230
Methyl chloride	NR	135	230
Methyl chloroform	NR	50	230
Methyl chloromethyl ether	--	25	230
Methyl cyanoacetate	50	--	230
Methyl ethyl ketone	50	NR	230
Methyl isobutyl ketone	25	NR	230
Methyl methacrylate	110	50	230
Methyl salicylate	50	65	230
Methyl sulfuric acid	50	50	230
Methyl trichlorosilane	--	65	230
Methylene bromide	--	80	230
Methylene chloride	NR	50	230
Methylene iodide	--	95	230
Milk	110	120	230
Mineral oil	50	135	230
Molasses	110	65	230
mono-Bromobenzene	NR	65	230
Monoethanolamine	80	NR	230

CORROSIVE STREAM	PP °C	PVDF °C	PTFE / PFA °C
Morpholine	65	25	230
Naphtha	50	135	230
Naphthalene	110	95	230
Nickel chloride	95	135	230
Nickel nitrate	110	135	230
Nickel sulfate	95	135	230
Nicotinic acid	50	120	230
Nitric acid (30%) 2	65	50	230
Nitric acid (5-10%) 2	80	80	230
Nitric acid (50%) 2	25	50	230
Nitric acid (70%-fuming)	NR	NR	230
Nitrobenzene 2	50	25	230
Nitrogen	110	135	230
Nitrogen dioxide	--	80	230
Nitroglycerine	--	50	230
Nitromethane	50	50	230
Nitrous acid (1 0%)	NR	95	230
Nitrous oxide	25	NR	230
Nonyl isophenyl sulfide	--	--	230
o-Dichlorobenzene	NR	65	230
o-Phenylphenol	--	80	230
Octane	25	135	230
Oils and fats	80	120	230
Oleic acid	65	120	230
Oleum	NR	NR	230
Oxalic acid	50	50	230
Oxygen	50	135	230
Ozone	NR	110	230
Palmitic acid	80	120	230
Perchloric acid (1 0%)	65	95	230
Perchloric acid (70%)	25	50	230
Perchloroethylene	NR	135	230
Petrolatum	80	135	230
Petroleum ether	NR	65	230
Petroleum oils	50	120	230
Phenol (5%)	95	80	230
Phenol (90-100%)	65	50	230
Phenolsulfonic acid (65%)	--	50	230
Phenyl glycine potassium salt	--	--	230
Phenylhydrazine	NR	50	230
Phenylhydrazine hydrochloride	--	50	230
Phosgene (wet or dry)	NR	80	230
Phosphoric acid (10-50%)	110	135	230
Phosphoric acid (50-85%)	110	110	230
Phosphorus oxychloride	NR	NR	230
Phosphorus pentachloride	50	95	230
Phosphorus pentoxide	80	95	230
Phosphorus trichloride	NR	95	230
Phosphorus-red	25	25	230
Phosphorus-yellow	25	--	230
Photographic solutions	65	135	230
Phthalic acid	25	95	230
Picric acid	25	25	230
Plating solutions (Brass)	65	95	230
Plating solutions (Cadmium)	65	95	230
Plating solutions (Chrome)	50	95	230
Plating solutions (Copper)	65	95	230
Plating solutions (Gold)	65	95	230
Plating solutions (Iron)	65	95	230
Plating solutions (Lead)	65	95	230
Plating solutions (Nickel)	65	95	230
Plating solutions (Rhodium)	65	95	230
Plating solutions (Silver)	65	95	230
Plating solutions (Speculum)	65	95	230
Plating solutions (Tin)	65	95	230
Plating solutions (Zinc)	65	95	230
Polyglycol	80	95	230
Polyvinyl acetate	25	135	230
Polyvinyl alcohol	50	135	230
Potassium acetate	50	135	--
Potassium aluminum chloride	110	135	230
Potassium aluminum sulfate 50%	110	135	230
Potassium bicarbonate	110	95	230
Potassium borate	95	135	230
Potassium bromate	110	135	230
Potassium bromide	110	135	230
Potassium carbonate	110	135	230

CHEMICAL RESISTANCE CHART

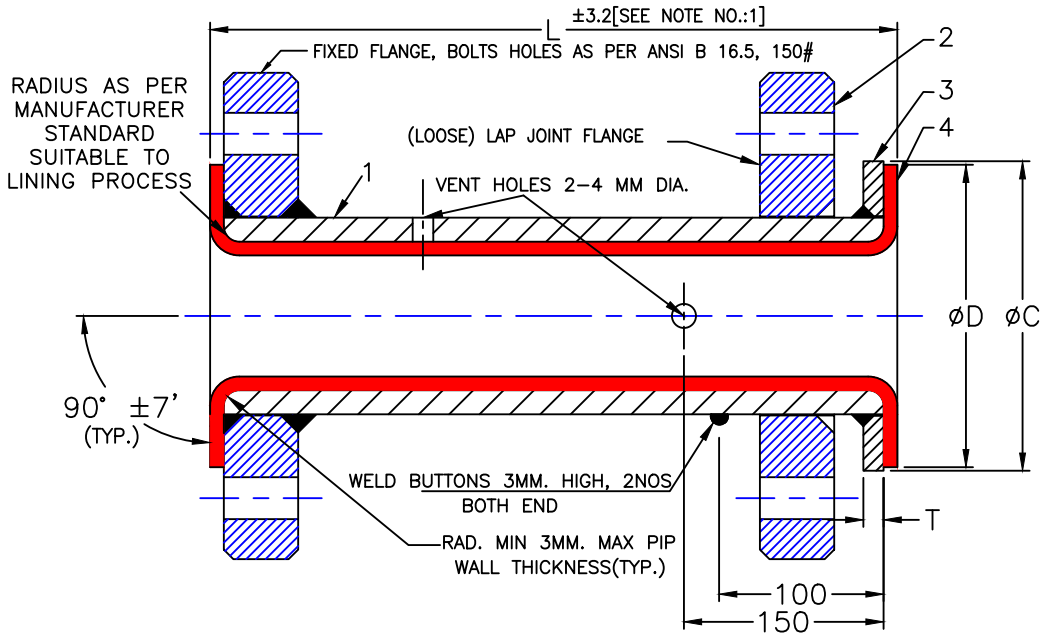
CORROSIVE STREAM	PP °C	PVDF °C	PTFE / PFA °C
Potassium chlorate (aqueous) [1]	110	95	230
Potassium chloride	95	135	230
Potassium chromate	110	135	230
Potassium cyanide	110	135	230
Potassium dichromate	110	135	230
Potassium ferricyanide (saturated)	110	135	230
Potassium ferrocyanide	110	135	230
Potassium fluoride	80	135	230
Potassium hydroxide (10%)	110	NR	230
Potassium hydroxide (50%)	80	NR	230
Potassium hydroxide (60-90%)	65	NR	230
Potassium hypochlorite 1	80	95	230
Potassium iodide	50	110	230
Potassium nitrate	80	135	230
Potassium perborate	110	135	230
Potassium perchlorate	65	95	230
Potassium permanganate (saturated)	65	120	230
Potassium persulfate	--	50	230
Potassium sulfate	110	135	230
Potassium sulfide	80	135	230
Propane	25	135	230
Propyl alcohol	80	65	230
Propylene chlorohydrin	80	NR	230
Propylene dibromide	25	95	230
Propylene dichloride	25	95	230
Propylene glycol	50	65	230
Propylene oxide	50	NR	230
Pyridene	65	NR	230
Salicyladehyde	25	50	230
Salicylic acid	50	95	230
Sea water	100	100	100
Selenic acid (aqueous)	25	65	230
Silicone oil	65	120	230
Silver cyanide	95	135	230
Silver nitrate	110	135	230
Soap solution (saturated)	80	50	230
Sodium acetate	95	135	230
Sodium benzoate	95	135	230
Sodium bicarbonate	110	135	230
Sodium bisulfate	110	135	230
Sodium bisulfite	110	135	230
Sodium borate (borax)	80	135	230
Sodium bromide	110	135	230
Sodium carbonate	110	135	230
Sodium chlorate	95	120	230
Sodium chloride	110	135	230
Sodium chlorite solutions	80	120	230
Sodium cyanide (saturated)	80	135	230
Sodium dichromate	110	95	230
Sodium dodecyl benzene (30%)	--	120	230
Sodium ferricyanide	65	135	230
Sodium ferrocyanide	65	135	230
Sodium fluoride (saturated)	80	135	230
Sodium hydroxide (<10%)1 & 2	95	40	230
Sodium hydroxide (>50%)	65	NR	230
Sodium hydroxide (1 0-50%)	95	NR	230
Sodium hydroxide (50%)	95	NR	230
Sodium hypochlorite (>1 5%) 3	50	50	230
Sodium hypochlorite (5%) 3	50	120	230
Sodium hypochlorite (5-15%)3	50	80	230
Sodium iodide	80	135	230
Sodium nitrate	80	135	230
Sodium nitrite	80	135	230
Sodium peroxide	50	95	230
Sodium phosphate	80	135	230
Sodium silicate	110	135	230
Sodium sulfate	110	135	230
Sodium sulfide	65	135	230
Sodium sulfite	65	135	230
Sodium thiosulfate (Hypo)	65	135	230
Sour crude oil	65	135	230
Stannic chloride	110	135	230
Stannous chloride (50%)	80	135	230
Steam	NR	135	230
Stearic acid	80	135	230
Stoddard solvent	50	120	230

CORROSIVE STREAM	PP °C	PVDF °C	PTFE / PFA °C
Styrene monomer	--	80	230
Succinic acid	65	65	230
Sugar syrup	95	135	230
Sulfamic acid	80	50	230
Sulfur	65	120	230
Sulfur chloride	25	25	230
Sulfur dichloride	25	25	230
Sulfur dioxide (dry or wet gas)	50	80	230
Sulfur dioxide (liquid)	--	80	230
Sulfur trioxide (liquid or gas)	NR	NR	230
Sulfuric acid (>98%-fuming)	NR	NR	230
Sulfuric acid (10%)	110	120	230
Sulfuric acid (16%)	95	120	230
Sulfuric acid (30%)	95	120	230
Sulfuric acid (60%)	95	120	230
Sulfuric acid (60%-sat. with CL 2)	25	95	230
Sulfuric acid (85%)	80	95	230
Sulfuric acid (93%)	NR	95	230
Sulfuric acid (96%)	NR	80	230
Sulfuric acid (98%)	NR	65	230
Sulfurous acid	80	95	230
Sulfuryl fluoride	NR	25	230
Tall oil	80	135	230
Tallow	65	135	230
Tannic acid	65	110	230
Tartaric acid	65	120	230
Tetraethyl lead	25	135	230
Tetrahydrofuran	NR	NR	230
Thionyl chloride	NR	NR	230
Thread cutting oils	50	95	230
Titanium tetrachloride	NR	65	230
Toluene	NR	80	230
Toluene (25%) + kerosene (75%)	NR	80	230
Tomato juice	110	95	230
Toxaphene (90%) + xylene (1 0%)	NR	--	230
Tributyl citrate	--	--	230
Tributyl phosphate	50	25	230
Trichloroacetic acid (10%)	65	95	230
Trichloroacetic acid (100%)	50	50	230
Trichloroethylene	NR	135	230
Trichloromenthane (chloroform)	NR	50	230
Tricresyl phosphate	50	NR	230
Triethanolamine	65	50	230
Triethylamine	25	50	230
Trimethyl propane	25	95	230
Trimethylamine	--	65	230
Tripropylene glycol methyl ether	65	--	230
Trisodium phosphate	80	135	230
Turpentine	NR	135	230
Urea	110	120	230
Urine	95	135	230
Vegetable oil	50	135	230
Vinegar	95	110	230
Vinyl acetate	25	120	230
Vinyl chloride monomer (liquid)	NR	95	230
Vinylidene chloride (monomer)	NR	95	230
Water-acid mine	100	100	100
Water-deionized	100	100	100
Water-demineralized	100	100	100
Water-distilled	100	100	100
Water-fresh	100	100	100
Water-salt	100	100	100
Water-sewage	100	100	100
Whiskey	110	110	230
Wine	95	110	230
Xylene	NR	95	230
Zinc chloride	80	135	230
Zinc hydrosulfite (10%)	--	95	230
Zinc nitrate	95	135	230
Zinc sulfate	95	135	230

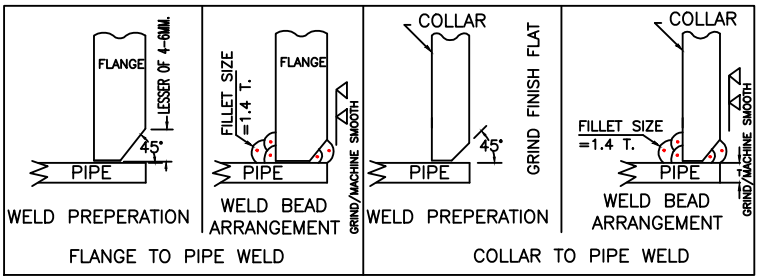
Product Drawings

Fluoro Polymer Lined Pipes and Fittings

TECHNICAL DATA SHEET - PTFE/PP/PVDF/HDPE LINED PIPE SPOOL



PTFE LINED PIPE SPOOL



DIMENSIONAL DATA

SIZE (NB)	PIPE SCH	øC	øD	T	AVG. I.D. mm	LINING THK.(−0,+0.25)				LENGTH		WIGHT (kg.)	
						PTFE.	P.P.	PVDF	HDPE	MIN.	MAX.	1m−kg	+1m−kg
20	40	43	40	11	17	2.5	–	–	–	90	3000	5.2	3.1
25	40	51	48	12	21	3.3	4.0	3.2	3.0	90	3000	5.2	3.1
40	40	73	69	12	35	3.4	4.5	3.2	3.0	95	3000	7.5	5.0
50	40	92	88	14	46	3.4	4.5	3.2	3.5	110	3000	10.8	6.6
80	40	127	117	16	72	3.5	5.3	3.5	5.0	120	3000	20.0	12.9
100	40	157	151	18	97	4.5	5.7	4.0	5.0	125	3000	29.8	18.6
150	40	216	203	18	145	5.5	7.0	4.5	5.0	140	3000	48.7	33.8
200	40	270	256	20	198	7.0	7.2	5.2	5.0	145	3000	75.5	52.0
250	40	324	311	22.5	249	7.0	7.2	5.2	5.0	150	3000	98.4	62.0
300	40/30	382	365	22.5	299	7.0	7.2	5.2	5.0	160	3000	120.1	82.0

NOTE: ALL DIMENSIONS IN MM

HORIZON POLYMER

HORIZON POLYMER ENGINEERING PVT. LTD.

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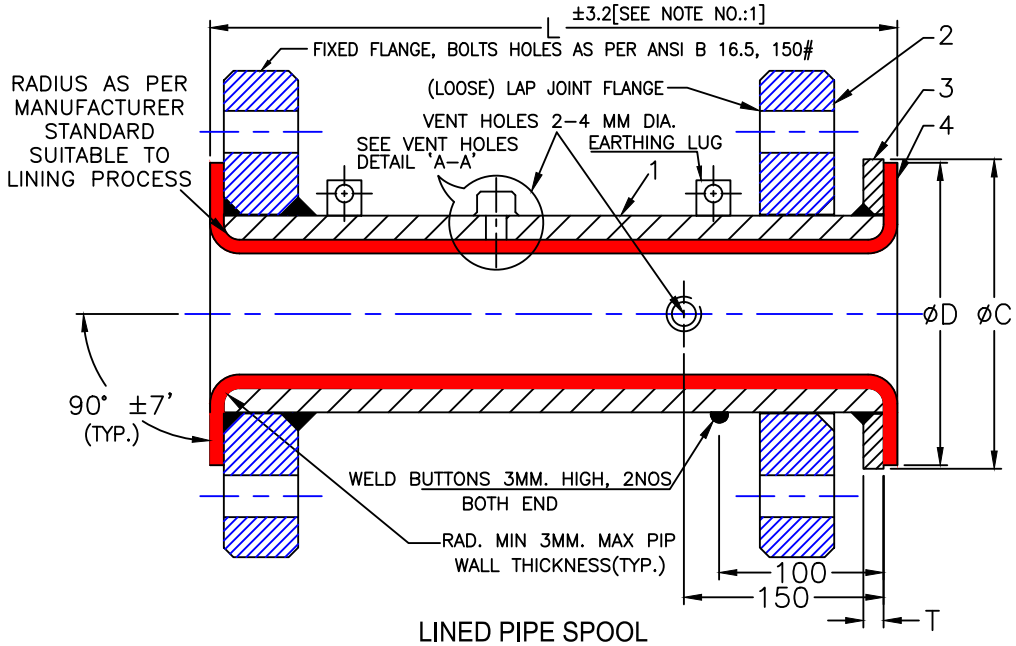
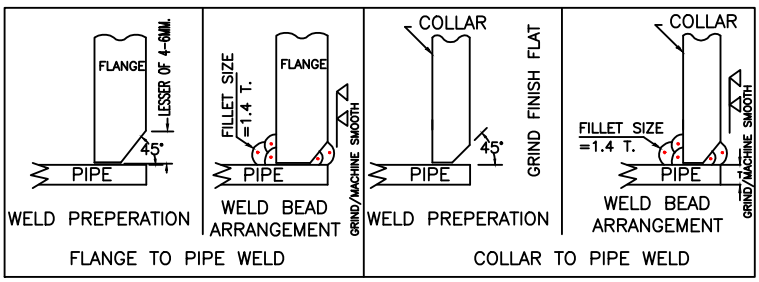
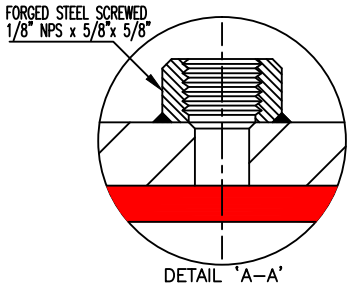
OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

TECHNICAL DATA SHEET - PTFE/PP/PVDF/HDPE LINED PIPE SPOOL



LINED PIPE SPOOL





DIMENSIONAL DATA

SIZE (NB)	PIPE SCH	øC	øD	T	AVG. I.D. mm	LINING THK.(−0,+0.25)				LENGTH		WIGHT (kg.)	
						PTFE.	P.P.	PVDF	HDPE	MIN.	MAX.	1m−kg	+1m−kg
20	40	43	40	11	17	2.5	–	–	–	90	3000	5.2	3.1
25	40	51	48	12	21	3.3	4.0	3.2	3.0	90	3000	5.2	3.1
40	40	73	69	12	35	3.4	4.5	3.2	3.0	95	3000	7.5	5.0
50	40	92	88	14	46	3.4	4.5	3.2	3.5	110	3000	10.8	6.6
80	40	127	117	16	72	3.5	5.3	3.5	5.0	120	3000	20.0	12.9
100	40	157	151	18	97	4.5	5.7	4.0	5.0	125	3000	29.8	18.6
150	40	216	203	18	145	5.5	7.0	4.5	5.0	140	3000	48.7	33.8
200	40	270	256	20	198	7.0	7.2	5.2	5.0	145	3000	75.5	52.0
250	40	324	311	22.5	249	7.0	7.2	5.2	5.0	150	3000	98.4	62.0
300	40/30	382	365	22.5	299	7.0	7.2	5.2	5.0	160	3000	120.1	82.0

NOTE: ALL DIMENSIONS IN MM

HORIZON POLYMER

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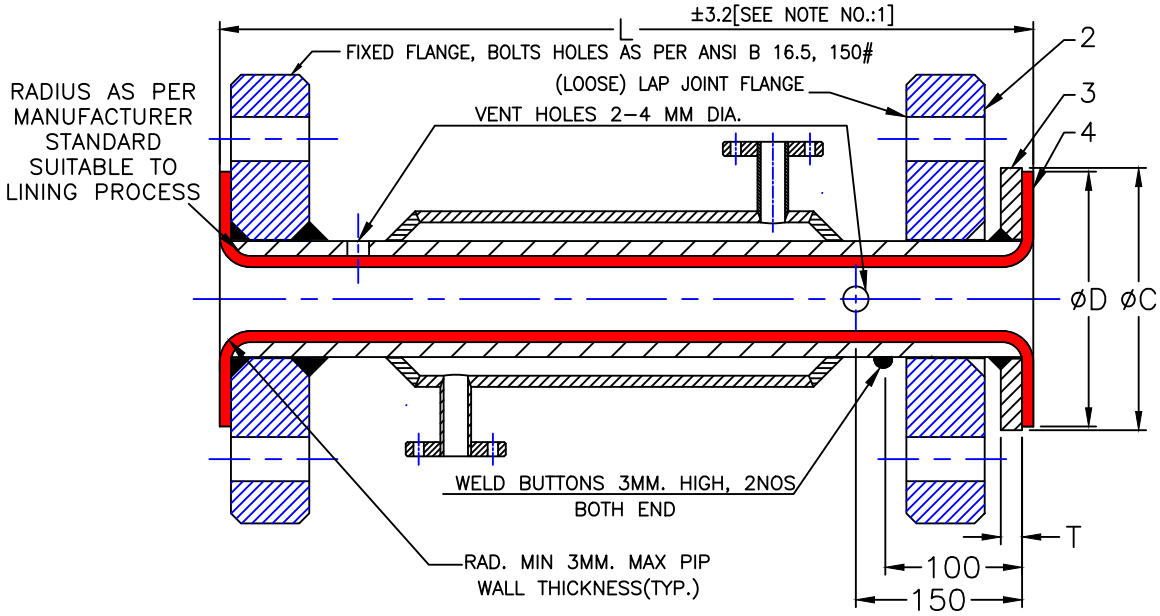
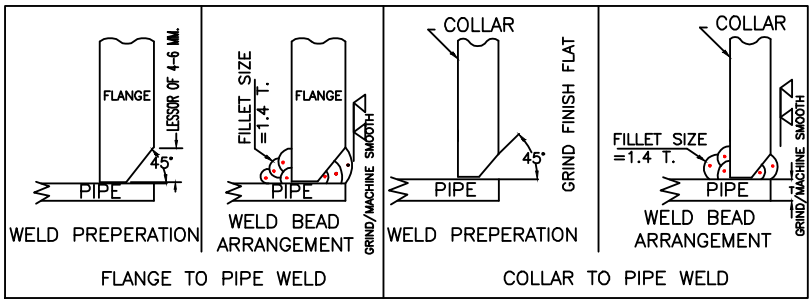
TECHNICAL DATA SHEET - PTFE/PP/PVDF/HDPE LINED PIPE SPOOL



PP LINED PIPE SPOOL



DIMENSIONAL DATA

SIZE (NB)	PIPE SCH	øC	øD	T	AVG. I.D. mm	LINING THK.(−0,+0.25)				LENGTH		JACKET PIPE		WIGHT (kg.)	
						PTFE.	P.P.	PVDF	HDPE	MIN.	MAX.	SIZE	SCH	1m−kg	+1m−kg
25	40	51	48	12	21	3.3	4.0	3.2	3.0	200	3000	50	40	10.2	7.1
40	40	73	69	12	35	3.4	4.5	3.2	3.0	200	3000	50	40	14.0	10.4
50	40	92	88	14	46	3.4	4.5	3.2	3.5	200	3000	80	40	23.0	18.0
80	40	127	117	16	72	3.5	5.3	3.5	5.0	250	3000	100	10	37.0	29.0
100	40	157	151	18	97	4.5	5.7	4.0	5.0	250	3000	150	40	59.0	47.0
150	40	216	203	18	145	5.5	7.0	4.5	5.0	300	3000	200	40	87.0	71.0
200	40	270	256	20	198	7.0	7.2	5.2	5.0	300	3000	250	30	127.0	103.0
250	40	324	311	22.5	249	7.0	7.2	5.2	5.0	350	3000	300	30	166.0	128.0
300	40/30	382	365	22.5	299	7.0	7.2	5.2	5.0	350	3000	350	30	203.0	164.0

NOTE: ALL DIMENSIONS IN MM

HORIZON POLYMER

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TECHNICAL DATA SHEET - PTFE/PP/PVDF/HDPE LINED PIPE SPOOL

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	SEAMLESS PIPE	CARBON STEEL	ASTM A-106 GR B SCH 40/30	ANSI B 36.10
2	FLANGE (SLIP-ON)	CARBON STEEL	ASTM A-105 / IS 2062 GR.A	ANSI B 16.5 150 CLASS
3	LAP COLLAR	CARBON STEEL	ASTM A-105 / IS 2062 GR.A	ASTM F1545-2003
4	RESIN	PTFE	ASTM D 4895	ASTM F1545-2003
		P.P.	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH PIPE SPOOL PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.0, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545-2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545-2003).

NOTES:-

1. FIXED SLIP ON FLANGE & LAPCOLLAR TO BE FULLY WELDED ON BACK AND FACE.
2. MIN. 1/8" RADIUS IN THE TRANSITION FROM PIPE WALL TO FLANGE OR LAP COLLAR FACE SHOULD BE PROVIDED.
3. FLANGE AND COLLAR FACES TO EXIBIT NO CONCAVITY, SHOULD BE FLAT AND SQUARE TO AXIS. FLARE PORTION OF LINING SHALL BE CONCENTRIC WITH PIPE BORE WITH ± 1.6 MM.
4. TOLERANCE ON SPOOL (AS FABRICATED) = ± 3.2MM.
5. VENT HOLES:- 2 PAIR OF HOLES 2 TO 4MM DIA 180' APART, LOCATED 150 MM FROM EACH FLANGE FACE. EACH PAIR OF HOLES TO BE ROTATED 90' TO THE OTHER.
6. SPOOLS LESS THAN 450 MM LONG TO HAVE ONE PAIR OF HOLES LOCATED CENTRALLY BETWEEN THE FLANGE ENDS.
7. WELD BUTTON WILL NOT BE PROVIDED FOR PIPE LENGTH LESS THAN 300 MM.
8. THE INTERIOR SURFACE OF ALL PIPES SHALL BE CLAEN&FREE OF MOLD BURRS,RUST,SCALE OR OTHER PROTRUSIONS.
9. LINER THIKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545-2003.
10. MINIMUM LINER THICKNESS AT FLARE SHALL BE 80% OF MIN.LINER WALL THICKNESS.
11. THE PLASTIC LINER FLARE WILL REPLACE THE RAISED FACE PORTION OF THE FLANGE.
12. LINING MUST BE PROTECTED WITH WOODEN COVERS.
13. PIPE SPOOL LESS THAN 100 MM WILL BE SUPPLIED WITH FIXED FLANGES ON BOTH ENDS OR LINED SPACER OR DISTANCE PIECE OR SOLID SPACER.

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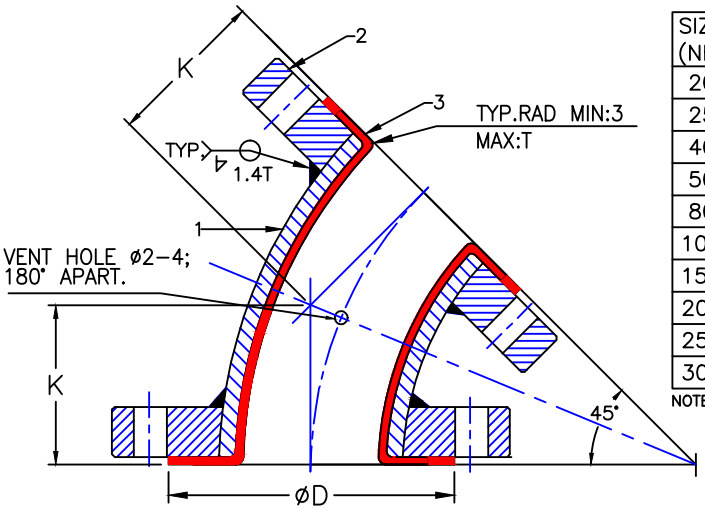
TECHNICAL DATA SHEET - ELBOW 45°

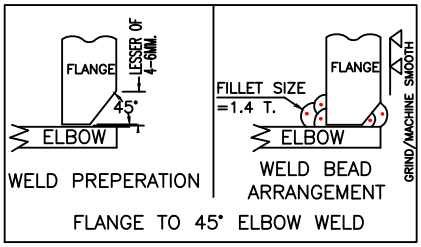


PTFE LINED 45° ELBOW

DIMENSIONAL DATAS

SIZE (NB)	PIPE SCH	K	øD	LINING THK. (–0,+0.25)	WIGHT (kg.)
20	40	45	40	2.8	1.5
25	40	45	48	3.3	2.0
40	40	57	69	3.4	3.2
50	40	64	88	3.4	4.8
80	40	76	117	3.5	9.8
100	40	102	151	4.5	17.0
150	40	127	203	5.5	29.0
200	40	140	256	7.0	50.0
250	40/30	165	311	7.0	73.0
300	40/30	190	365	7.0	87.0

NOTE: ALL DIMENSIONS IN MM.



BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	ELBOW 45° HOUSING	ASTM A–234 GR. WPB	ASTM A–234 GR.WPB SCH–40	AS PER MANUFACTURER STD.
2	FLANGE (SLIP–ON)	CARBON STEEL	ASTM A 105 / IS 2062 GR. A	ANSI B 16.5 150 CLASS
3	POLYMER	PTFE	ASTM D 4895	ASTM F1545–2003

INSPECTION TESTS:-

1. EACH ELBOW PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545–2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545–2003)

NOTES:-

1. FLANGE TO BE FULLY WELDED ON BACK AND FACE.
2. PROVIDE TAPER BORE TO SUIT ELBOW RADIUS.
3. FLANGE FACES TO EXIBIT NO CONCAVITY, SHOULD BE FLAT AND SQUARE TO AXIS. FLARING PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ± 1.6 MM.
4. TOLERANCE ON ELBOW (AS FABRICATED) = ± 1.6 MM.
5. VENT HOLES:– 2 PAIR OF HOLES 2 TO 4 MM DIA 180' APART CENTRALLY LOCATED.
6. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545–2003.
7. MINIMUM LINER THICKNESS AT FLARE SHELL BE 80% OF MINIMUM LINER WALL THICKNESS.
8. THE PLASTIC LINER FLARE WILL REPLACE THE RAISED FACE PORTION OF THE FLANGE.
9. LINING MUST BE PROTECTED WITH WOODEN COVERS.
10. MIN. 1/8" RADIUS IN THE TRANSITION FROM ELBOW WALL TO FLANGE FACE SHOULD BE PROVIDED.

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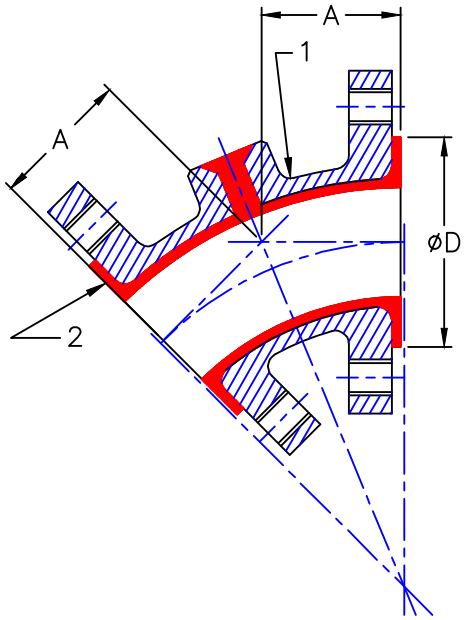
TECHNICAL DATA SHEET - ELBOW 45°



DIMENSIONAL DATAS

SIZE (NB)	A	ØD	LINING THK. (−0,+0.25)	WIGHT (kg.)
25	45	48	3.5	2.0
40	57	69	4.0	3.2
50	64	88	4.0	4.8
80	76	117	4.0	9.8
100	102	151	5.0	17.0
150	127	203	5.5	29.0
200	140	256	6.5	50.0
250	165	311	6.5	73.0
300	190	365	6.5	87.0

NOTE: ALL DIMENSIONS IN MM.

PFA/PP/PVDF/HDPE LINED 45° ELBOW

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	ELBOW 45° CAST HOUSING	ASTM A−234 GR. WPB	ASTM A−395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545−2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH ELBOW PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545−2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545−2003)

NOTES:-

1. CAST ON FLANGED ENDS, AND FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. CAST FITTINGS ARE VENTED AT THE INJECTION BOSS.
3. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
4. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545−2003.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.
7. MIN. 1/8" RADIUS IN THE TRANSITION FROM ELBOW WALL TO FLANGE FACE.

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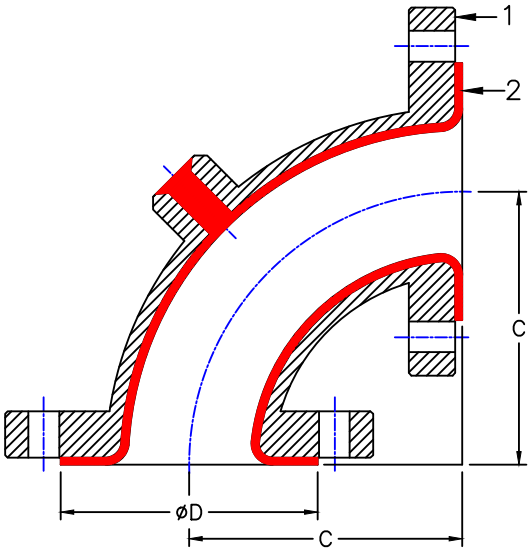
TECHNICAL DATA SHEET - ELBOW 90°



DIMENSIONAL DATAS

SIZE (NB)	C	øD	LINING THK. (−0,+0.25)	WIGHT (kg.)
20	75	40	2.8	1.9
25	89	48	3.3	2.4
40	102	69	3.4	3.9
50	114	88	3.4	6.4
80	140	117	3.5	12.0
100	165	151	4.5	19.0
150	203	203	5.5	34.0
200	229	256	7.0	57.0
250	279	311	7.0	91.0
300	305	365	7.0	110.0

NOTE: ALL DIMENSIONS IN MM.

PFA/PP/PVDF/HDPE LINED 90° ELBOW

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	ELBOW 90° CAST HOUSING	DUCTILE IRON	ASTM A−395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545−2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH ELBOW PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545−2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545−2003)

NOTES:-

1. CAST ON FLANGED ENDS, AND FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. CAST FITTINGS ARE VENTED AT THE INJECTION BOSS.
3. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
4. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545−2003.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.
7. MIN. 1/8" RADIUS IN THE TRANSITION FROM ELBOW WALL TO FLANGE FACE.

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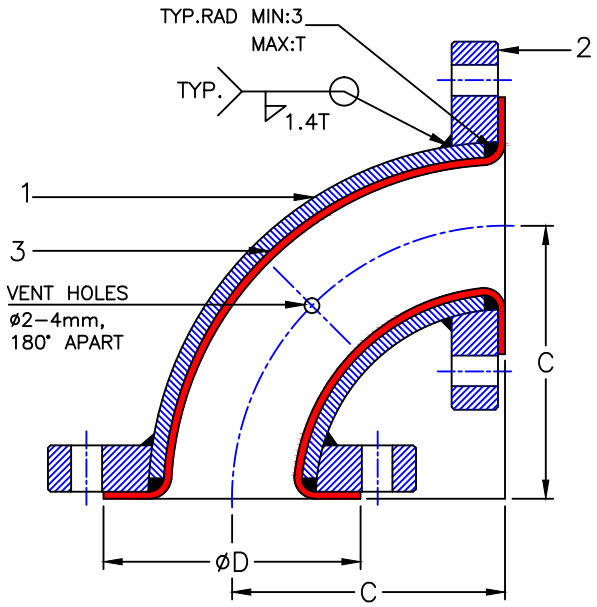
TECHNICAL DATA SHEET - ELBOW 90°

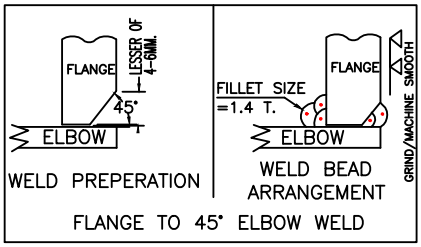


PTFE LINED 90° ELBOW

DIMENSIONAL DATAS

SIZE (NB)	PIPE SCH	C	øD	LINING THK. (–0,+0.25)	WIGHT (kg.)
20	40	75	40	2.8	1.9
25	40	89	48	3.3	2.4
40	40	102	69	3.4	3.9
50	40	114	88	3.4	6.4
80	40	140	117	3.5	12.0
100	40	165	151	4.5	19.0
150	40	203	203	5.5	34.0
200	40	229	256	7.0	57.0
250	40/30	279	311	7.0	91.0
300	40/30	305	365	7.0	110.0

NOTE: ALL DIMENSIONS IN MM.



BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	ELBOW 90° HOUSING	ASTM A–234 GR. WPB	ASTM A–234 GR.WPB SCH–40	AS PER MANUFACTURER STD.
2	FLANGE (SLIP–ON)	CARBON STEEL	ASTM A 105 / IS 2062 GR. A	ANSI B 16.5 150 CLASS
3	POLYMER	PTFE	ASTM D 4895	ASTM F1545–2003

1. EACH ELBOW PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545–2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545–2003)

NOTES:-

1. FLANGE TO BE FULLY WELDED ON BACK AND FACE.
2. PROVIDE TAPER BORE TO SUIT ELBOW RADIUS.
3. FLANGE FACES TO EXIBIT NO CONCAVITY, SHOULD BE FLAT AND SQUARE TO AXIS. FLARING PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ± 1.6 MM.
4. TOLERANCE ON ELBOW (AS FABRICATED) = ± 1.6 MM.
5. VENT HOLES:– 2 PAIR OF HOLES 2 TO 4 MM DIA 180’ APART CENTRALLY LOCATED.
6. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545–2003.
7. MINIMUM LINER THICKNESS AT FLARE SHELL BE 80% OF MINIMUM LINER WALL THICKNESS.
8. THE PLASTIC LINER FLARE WILL REPLACE THE RAISED FACE PORTION OF THE FLANGE.
9. LINING MUST BE PROTECTED WITH WOODEN COVERS.
10. MIN. 1/8” RADIUS IN THE TRANSITION FROM ELBOW WALL TO FLANGE FACE SHOULD BE PROVIDED.

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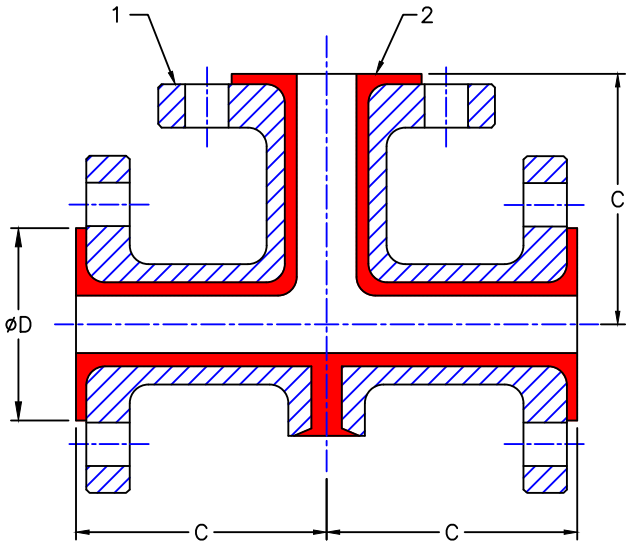
TECHNICAL DATA SHEET - EQUAL TEE



PFA/PP/PVDF LINED EQUAL TEE

DIMENSIONAL DATAS

SIZE	B	øD	LINING THK. (−0,+0.25)	WIGHT (kg.)
20	75	40	3.5	4.0
25	89	48	4.0	4.5
40	102	69	4.0	6.4
50	114	88	4.0	8.9
80	140	117	4.0	18.2
100	165	151	5.0	30.0
150	203	203	5.5	55.0
200	229	256	6.5	82.0
250	279	311	6.5	132.0
300	305	365	7.5	181.0

NOTE: ALL DIMENSIONS IN MM.

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	EQUAL TEE CAST HOUSING	DUCTILE IRON	ASTM A−395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545−2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

1. EACH EQUAL TEE PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545−2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545−2003)

NOTES:-

1. CAST ON FLANGED ENDS, AND FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. CAST FITTINGS ARE VENTED AT THE INJECTION BOSS.
3. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
4. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545−2003.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.
7. MIN. 1/8" RADIUS IN THE TRANSITION FROM EQUAL TEE WALL TO FLANGE FACE.

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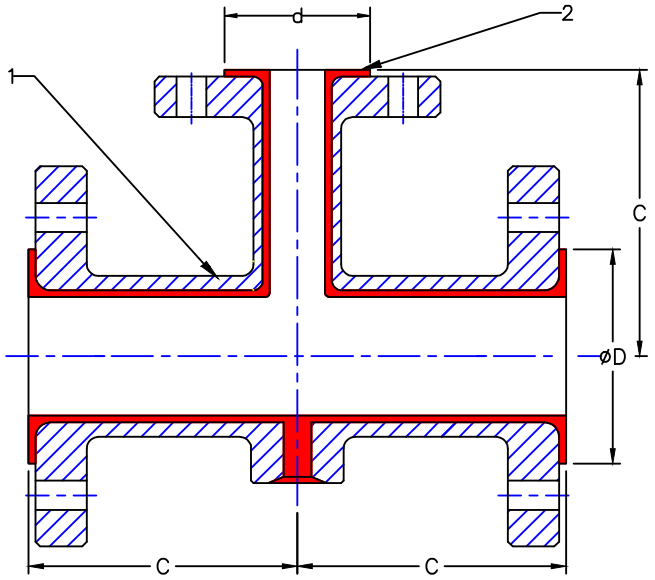
TECHNICAL DATA SHEET - UN-EQUAL TEE



PFA/PP/PVDF LINED UN-EQUAL TEE

DIMENSIONAL DATAS

SIZE (NB)	C	øD	d	LINING THK. (−0,+0.25)	WIGHT (kg.)
40 X 20	102	68	40	3.5	6.5
40 X 25	102	68	48	3.5	6.5
50 X 20	114	88	40	4.0	7
50 X 25	114	88	48	4.0	8
50 X 40	114	88	68	4.0	9
80 X 25	140	117	48	4.0	14.0
80 X 40	140	117	68	4.0	15.0
80 X 50	140	117	88	4.0	16.0
100 X 25	165	151	48	4.5	23.0
100 X 40	165	151	68	4.5	25.0
100 X 50	165	151	88	4.5	27.0
100 X 80	165	151	117	4.5	29.0
150 X 25	203	203	48	5.5	40.0
150 X 40	203	203	68	5.5	44.0
150 X 50	203	203	88	5.5	47.0
150 X 80	203	203	117	5.5	50.0
150 X 100	203	203	151	5.5	53.0
200 X 80	229	256	117	6.5	74.0
200 X 100	229	256	152	6.5	77.0
200 X 150	229	256	203	6.5	79.0
250 X 200	279	312	256	6.5	114.0
300 x 150	305	365	203	7.5	155.0
300 x 200	305	365	256	7.5	165.0
300 x 250	305	365	311	7.5	174.0

NOTE: ALL DIMENSIONS IN MM.

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	RED. TEE CAST HOUSING	DUCTILE IRON	ASTM A−395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545−2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH RED. TEE PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545−2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545−2003)

NOTES:-

1. CAST ON FLANGED ENDS, AND FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. CAST FITTINGS ARE VENTED AT THE INJECTION BOSS.
3. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
4. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545−2003.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.
7. MIN. 1/8" RADIUS IN THE TRANSITION FROM RED. TEE WALL TO FLANGE FACE.

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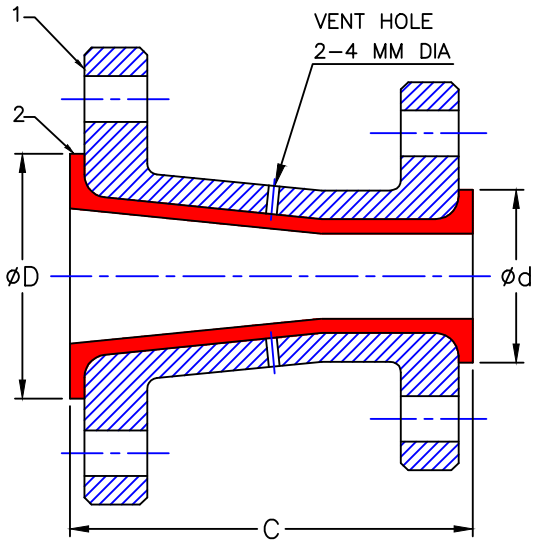
TECHNICAL DATA SHEET - CONCENTRIC REDUCER



PFA/PP/PVDF/HDPE LINED CONCENTRIC REDUCER

DIMENSIONAL DATAS

SIZE (NB)	C	øD	ød	LINING THK. (–0,+0.25)	WIGHT (kg.)
40 X 20	114	68	40	3.5	3
40 X 25	114	68	48	3.5	3
50 X 20	127	88	40	4.0	4
50 X 25	127	88	48	4.0	4
50 X 40	127	88	68	4.0	5
80 X 25	152	117	48	4.0	6
80 X 40	152	117	68	4.0	7
80 X 50	152	117	88	4.0	8
100 X 25	178	151	48	4.5	10
100 X 40	178	151	68	4.5	10
100 X 50	178	151	88	4.5	11
100 X 80	178	151	117	4.5	13
150 X 25	229	203	48	5.5	18
150 X 40	229	203	68	5.5	19
150 X 50	229	203	88	5.5	20
150 X 80	229	203	117	5.5	20
150 X 100	229	203	151	5.5	24
200 X 80	279	256	117	6.5	24
200 X 100	279	256	151	6.5	24
200 X 150	279	256	203	6.5	35
250 X 100	305	311	151	6.5	48
250 X 150	305	311	203	6.5	48
250 X 200	305	311	256	6.5	57
300 X 200	356	365	256	7.5	77
300 X 250	356	365	311	7.5	86

NOTE: ALL DIMENSIONS IN MM.

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	CON. RED. CAST HOUSING	DUCTILE IRON	ASTM A–395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545–2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH CON. RED. PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545–2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545–2003)

NOTES:-

1. CAST ON FLANGED ENDS, AND FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. CAST FITTINGS ARE VENTED AT THE INJECTION BOSS.
3. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
4. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545–2003.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.
7. MIN. 1/8" RADIUS IN THE TRANSITION FROM CON. RED. WALL TO FLANGE FACE.

HORIZON POLYMER

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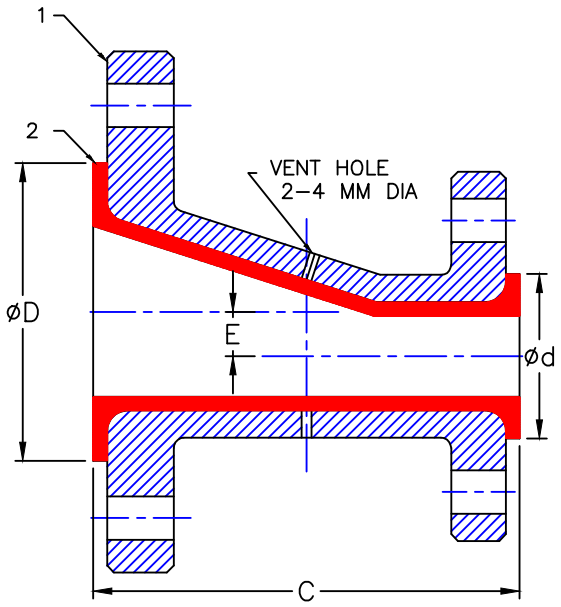
OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

TECHNICAL DATA SHEET - ECCENTRIC REDUCER



PFA/PP/PVDF/HDPE LINED ECCENTRIC REDUCER

DIMENSIONAL DATAS

SIZE (NB)	C	øD	ød	LINING THK. (–0,+0.25)	WIGHT (kg.)
40 X 20	114	68	40	3.5	3
40 X 25	114	68	48	3.5	3
50 X 20	127	88	40	4.0	4
50 X 25	127	88	48	4.0	4
50 X 40	127	88	68	4.0	5
80 X 25	152	117	48	4.0	6
80 X 40	152	117	68	4.0	7
80 X 50	152	117	88	4.0	8
100 X 25	178	151	48	4.5	10
100 X 40	178	151	68	4.5	10
100 X 50	178	151	88	4.5	11
100 X 80	178	151	117	4.5	13
150 X 25	229	203	48	5.5	18
150 X 40	229	203	68	5.5	19
150 X 50	229	203	88	5.5	20
150 X 80	229	203	117	5.5	20
150 X 100	229	203	151	5.5	24
200 X 80	279	256	117	6.5	24
200 X 100	279	256	151	6.5	24
200 X 150	279	256	203	6.5	35
250 X 100	305	311	151	6.5	48
250 X 150	305	311	203	6.5	48
250 X 200	305	311	256	6.5	57
300 X 200	356	365	256	7.5	77
300 X 250	356	365	311	7.5	86

NOTE: ALL DIMENSIONS IN MM.

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	ECC. RED. CAST HOUSING	DUCTILE IRON	ASTM A–395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545–2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH ECC. RED. PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545–2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545–2003)

NOTES:-

1. CAST ON FLANGED ENDS, AND FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. CAST FITTINGS ARE VENTED AT THE INJECTION BOSS.
3. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
4. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545–2003.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.
7. MIN. 1/8" RADIUS IN THE TRANSITION FROM ECC. RED. WALL TO FLANGE FACE.

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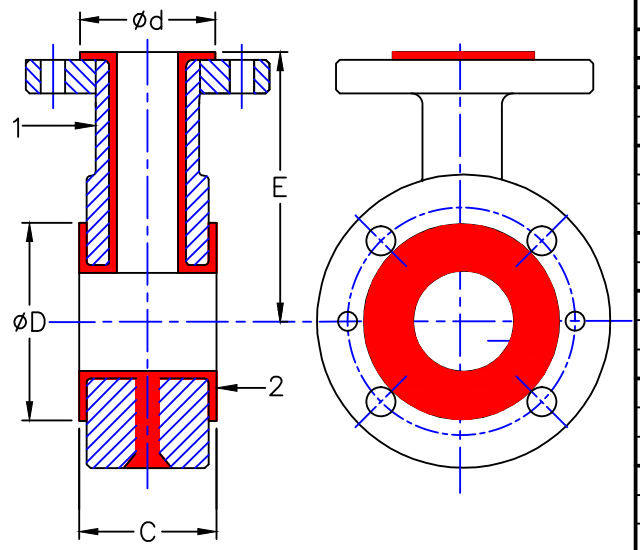
OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

TECHNICAL DATA SHEET - INSTRUMENT TEE



PFA/PP/PVDF LINED INSTRUMENT TEE

DIMENSIONAL DATAS

SIZE (NB)	E	øD	ød	C	LINING THK. (−0,+0.25)	WIGHT (kg.)
25 X 25	89	48	48	51	3.5	5.8
40 X 25	102	68	48	51	4.0	7
50 X 25	141	88	48	51	4.0	8.3
50 X 40	141	88	68	76	4.0	13
80 X 25	160	117	48	51	4.0	11.4
80 X 40	160	117	68	76	4.0	18
80 X 50	160	117	88	89	4.0	22
100 X 25	179	151	48	51	4.5	15
100 X 40	179	151	68	76	4.5	25
150 X 25	205	203	48	51	5.5	19
150 X 40	205	203	68	76	5.5	37
150 X 50	205	203	88	89	5.5	36
200 X 25	237	255	48	51	5.5	28
200 X 40	237	255	68	76	5.5	43
200 X 50	237	255	88	89	5.5	48
250 X 25	264	311	48	51	6.0	34
250 X 40	264	311	68	76	6.0	55
250 X 50	264	311	88	89	6.0	62
300 X 25	318	365	48	51	6.0	48
300 X 40	318	365	68	76	6.0	84
300 X 50	318	365	88	89	6.0	85

NOTE: ALL DIMENSIONS IN MM.

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	INS. TEE CAST HOUSING	DUCTILE IRON	ASTM A−395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545−2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH INS. TEE PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545−2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545−2003)

NOTES:-

1. CAST ON FLANGED ENDS, AND FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. CAST FITTINGS ARE VENTED AT THE INJECTION BOSS.
3. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
4. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545−2003.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.
7. MIN. 1/8" RADIUS IN THE TRANSITION FROM INS. TEE WALL TO FLANGE FACE.

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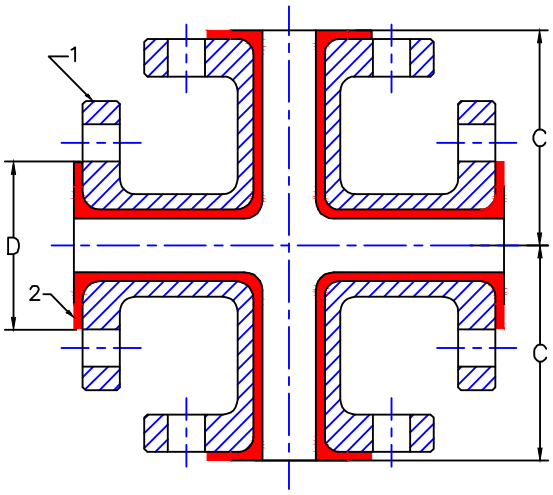
TECHNICAL DATA SHEET - EQUAL CROSS



DIMENSIONAL DATAS

SIZE (NB)	C	D	LINING THK (−0,+0.25)	WIGHT (kg.)
20	75	40	3.5	5.2
25	89	48	4.0	5.4
40	102	69	4.0	8.6
50	114	88	4.0	13.0
80	140	117	4.0	23.0
100	165	151	5.0	39.0
150	203	203	5.5	66.0
200	229	256	6.5	99.0
250	279	312	7.0	161.0
300	305	365	7.2	–

NOTE: ALL DIMENSIONS IN MM.

PFA/PP/PVDF LINED EQUAL CROSS

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	CROSS CAST HOUSING	DUCTILE IRON	ASTM A−395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545−2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH CROSS PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545−2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545−2003)

NOTES:-

1. CAST ON FLANGED ENDS, AND FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. CAST FITTINGS ARE VENTED AT THE INJECTION BOSS.
3. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
4. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545−2003.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.
7. MIN. 1/8" RADIUS IN THE TRANSITION FROM CROSS WALL TO FLANGE FACE.

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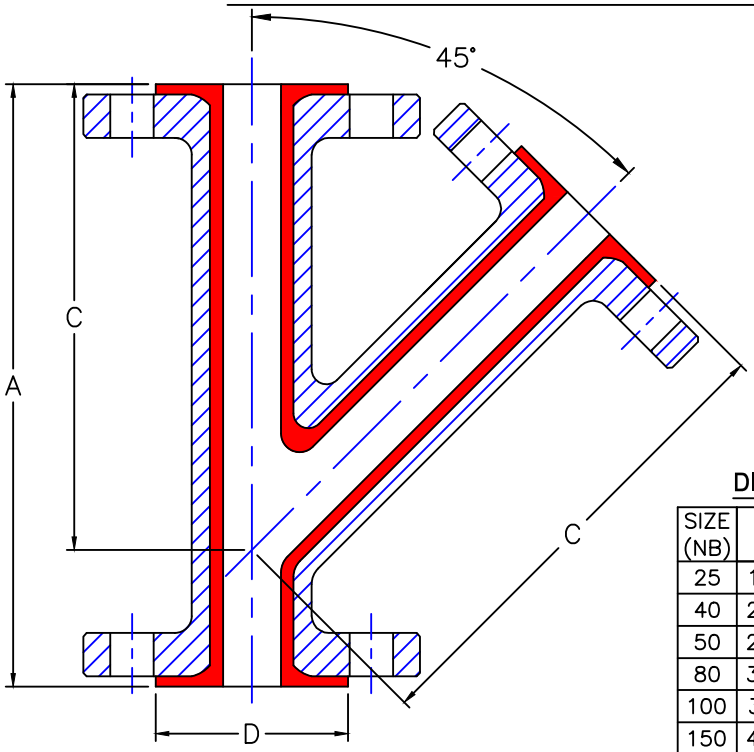
TECHNICAL DATA SHEET - LATERAL TEE EQUAL



DIMENSIONAL DATAS

SIZE (NB)	A	C	øD	LINING THK. (−0,+0.25)	WIGHT (kg.)
25	191	146	48	3.5	5
40	229	178	69	4.0	8
50	267	203	88	4.0	11
80	330	254	117	4.0	24
100	381	305	151	5.0	44
150	457	368	203	5.5	66
200	559	445	256	6.5	100

NOTE: ALL DIMENSIONS IN MM.

PFA/PP/PVDF LINED LATERAL-TEE

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	LATERAL CAST HOUSING	DUCTILE IRON	ASTM A−395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545−2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH LATERAL PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 29 BAR,(425 P.S.I.G, 0150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545−2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545−2003)

NOTES:-

1. CAST ON FLANGED ENDS, AND FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. CAST FITTINGS ARE VENTED AT THE INJECTION BOSS.
3. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
4. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545−2003.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.
7. MIN. 1/8" RADIUS IN THE TRANSITION FROM LATERAL WALL TO FLANGE FACE.

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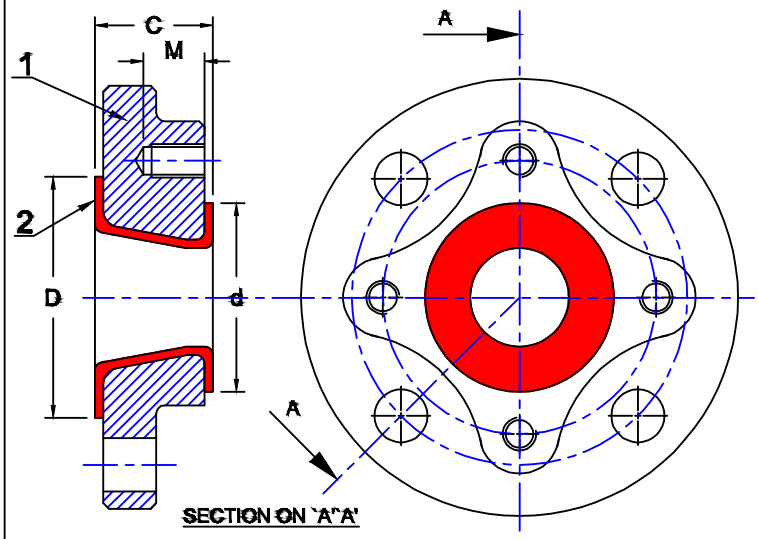
TECHNICAL DATA SHEET - REDUCING FLANGE



PFA/PP/PVDF LINED REDUCING FLANGE

DIMENSIONAL DATAS

SIZE (NB)	C	D	d	M	LINING THK. (-0,+0.25)	WEIGHT (kg.)
25 X 20	44	48	40	19	2.8	1.2
40 X 25	44	69	48	19	3.2	2.0
50 X 25	44	88	48	19	3.2	3.0
50 X 40	44	88	69	19	3.2	3.0
80 X 25	44	118	48	16	3.4	5.0
80 X 40	44	118	69	19	3.4	5.0
80 X 50	44	118	88	19	3.4	5.0
100 X 25	44	151	84	16	4.5	7.0
100 X 40	44	151	69	19	4.5	7.0
100 X 50	44	151	88	19	4.5	7.0
100 X 80	44	151	118	22	4.5	7.0
125 X 80	48	180	118	19	4.5	8.0
125 X 100	48	180	151	16	4.5	8.0
150 X 25	51	204	48	13	5.5	11.0
150 X 40	51	204	69	16	5.5	11.0
150 X 50	51	204	88	16	5.5	11.0
150 X 80	51	204	118	19	5.5	11.0
150 X 100	51	204	151	16	5.5	11.0
150 X 125	51	204	180	19	5.5	11.0
200 X 50	51	256	88	14.5	5.8	17.0
200 X 80	51	256	118	17.5	5.8	17.0
200 X 100	51	256	151	16	5.8	17.0
200 X 150	51	256	204	19	5.8	17.0
250 X 25	64	312	48	16	6.0	27.0
250 X 50	64	312	88	16	6.0	27.0
250 X 80	64	312	118	19	6.0	27.0
250 X 100	64	312	151	19	6.0	27.0
250 X 150	64	312	48	25	6.0	27.0
250 X 200	64	312	256	25	6.0	27.0
300 X 80	70	366	118	16	6.2	42.0
300 X 100	70	366	151	16	6.2	42.0
300 X 150	70	366	204	19	6.2	42.0
300 X 200	70	366	256	19	6.2	42.0
300 X 250	70	366	312	25	6.2	42.0

NOTE: ALL DIMENSIONS IN MM.

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	RED.FLANGE CAST HOUSING	DUCTILE IRON	ASTM A-395 60/40/18	ANSI B 16.42 / ANSI B 16.5
2	POLYMER	PFA	ASTM D 3307	ASTM F1545-2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

INSPECTION TESTS:-

1. EACH REDUCING FLANGE PRIOR TO SHIPMENT SHALL BE ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545-2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATA SHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545-2003).

NOTES:-

1. FLANGE DIMENSIONS AS PER ANSI B 16.5 # 150.
2. FLARE PORTION SHOULD BE CONCENTRIC WITH ELBOW BORE WITH ±1.6 MM.
3. LINER THICKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545-2003.
4. LINING MUST BE PROTECTED WITH WOODEN COVERS.
5. MINIMUM LINER FACE THICKNESS SHALL BE 80% OF MIN. LINER WALL THICKNESS.

HORIZON POLYMER

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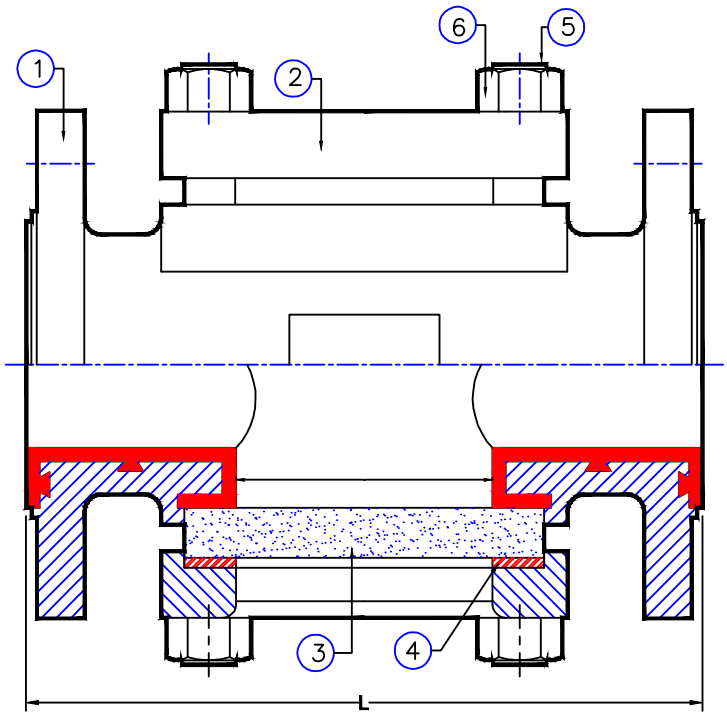
WORKS :- C1 -B, 1650/1618, GIDC INDL. ESTATE, CHHATRAL, DIST. GANDHINAGAR (N.G) - 382 729

OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

TECHNICAL DATA SHEET - SIGHT FLOW INDICATOR



DIMENSIONAL DATAS

SIZE		L		ØD		WEIGHT KG.	BOROSILLICATE GLASS DIM. DIN 7080	FLOW RATE	
NB	INCH	MM	INCH	MM	INCH			CUM/HR	US Gallons/min
25	1"	152.4	6.0	45	1.77	5.100	OD 63 x 12 THK.	27.3	31.7
40	1 ½"	176.0	7.0	58	2.28	7.200	OD 80 x 12 THK.	82.5	95.9
50	2"	203.0	8.0	77	3.03	11.100	OD 100 x 15 THK.	125.8	146.2
80	3"	241.0	9.5	100	3.94	17.400	OD 125 x 20 THK.	330.5	384.1
100	4"	292.0	11.5	125	4.92	37.300	OD 175 x 25 THK.	515.1	598.7
150	6"	356.0	14.0	175	6.88	58.100	OD 200 x 30THK.		
200	8"	458.0	18.0	219	8.62	127.00	OD 250 x 30THK.		

BILL OF MATERIAL

ITEM	QTY.	DESIGNATION	MATERIAL
1	1	BODY	DUCTILE IRON A395 –PFA
2	2	FLANGE	DUCTILE IRON A395 –PFA
3	2	GLASS	BOROSILLICATE GLASS
4	2	GASKET	PTFE
5	8/12	STUD	ASTM A193 B8
6	8/12	HEXAGON NUT	ASTM A193 B8

INSPECTION TESTS

BODY HYDRO TEST	150 PSI
SPARK TEST	25 KV
LINING THIKNESS	3.0 MM(MIN.)
FACE TO FACE DIM.	ANSI B 16.10
FLANGE DIM.	ANSIB16.5,CLASS 150 LBS

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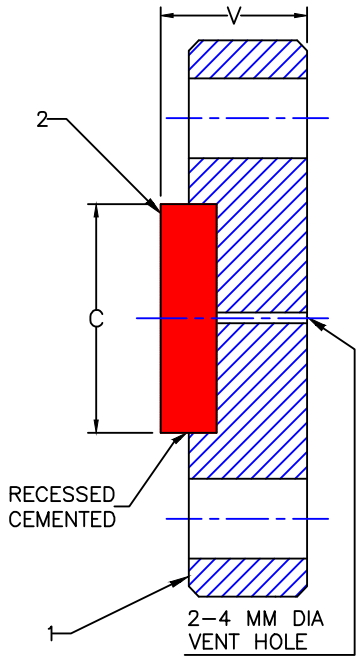
TECHNICAL DATA SHEET - BLIND FLANGE



DIMENSIONAL DATAS

SIZE (NB)	C	V	LINING THK (–0,+0.25)	WIGHT (kg.)
15	35	14.1	3.0	0.8
20	43	15.7	3.0	0.9
25	51	17.3	3.3	1.2
40	73	20.5	3.3	2.1
50	92	22.1	3.4	3.0
80	127	26.8	3.5	5.0
100	157	26.8	4.5	6.0
150	216	28.4	5.5	11.8
200	270	31.6	6.5	18.0
250	324	33.2	6.5	26.0
300	381	34.8	6.5	35.0

NOTE: ALL DIMENSIONS IN MM.

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	BLIND FLANGE	CARBON STEEL	ASTM A 105 / IS 2062 GR.A	ANSI B 16.5,#150
2	POLYMER	PTFE	ASTM D 4895	ASTM F1545–2003

INSPECTION TESTS:-

1. EACH BLIND FLANGES PRIOR TO SHIPMENT SHALL BE ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545–2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545–2003).

NOTES:-

1. LINING SHOULD BE FREE OF DEFECTS, LIKE PIN HOLES, CRACKS ETC.
2. LINING SHOULD BE CONCENTRIC WITH O.D OF C.S FLANGE.
3. LINING TO BE COVERED WITH WOODEN COVERS

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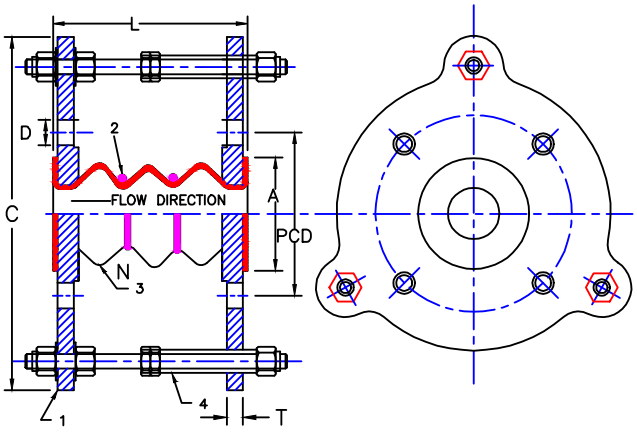
TECHNICAL DATA SHEET - BELLOW



BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	FLANGE	CARBON STEEL	IS 2062	ANSI B 16.5 150 CLASS.
2	SUPPORT RINGS	SS	SS 304	AS PER MANU.STD.
3	RESIN	PTFE	ASTM D 4895	ASTM F1545–2003
4	LIMIT INDICATOR	CARBON STEEL	AS PER MANU.STD.	AS PER MANU.STD.

PTFE BELLOWS

DIMENSIONAL DATA

SIZE (NB)	L	A	C	PCD	D	T	N	LINING THK. (–0,+0.25)	MOVEMENT			WIGHT (kg.)
									TRAVEL	PARALLEL	ANGULAR	
25	56	51	108	79.4	4X16	14	3	3.2	12	6	19	1.7
40	69	73	127	98.5	4X16	16	3	3.3	12	6	18	2.6
50	72	92	152	120.5	4X19	16	3	3.4	19	9	16	3.8
80	77	127	190	152.5	4X19	16	3	3.5	25	12	15	5,3
100	94	157	229	190.5	8X19	16	3	4.5	25	12	14	7.0
150	96	216	279	241.5	8X22	18	3	5.5	28	14	11	12.7
200	102	270	343	298.5	8X22	18	3	6.5	28	14	10	21.0
250	200	316	406	362.0	12X25.4	20	3	6.5				27.0
300	196	367	483	431.8	12X25.4	20	3	6.5				35.0
350	225	413	533	476.2	12X28.6	24	5	5.0	50	8	10	–
450	225	533	635	577.8	16X31.7	24	5	5.0	50	7	10	–
500	160	413	635	577.8	16X31.7	26	3	5.0	35	20	10	–

NOTE: ALL DIMENSIONS IN MM

INSPECTION TESTS:-

1. EACH BELLOW PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY [(TEST PRESSURE: 10 BAR,(145 P.S.I.G, @150#) HOLDING TIME OF 3 MINUTES)] & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545–2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545–2003).

NOTES:-

1. ANSI B 16.5 TO BE REFERED FOR PCD & NUMBER OF HOLES ONLY.
2. FLANGE THICKNESS, DRILLING OR TAPPING AND FLANGE OD AS PER MANU. STD.
3. LINER THIKNESS INDICATED ARE NOMINAL THICKNESS AS PER MANUFACTURER STD. HOWEVER THE SAME WILL NOT BE LESS THAN THE MINIMUM AS SPECIFIED IN ASTM F 1545–2003.
4. FLANGE THICK. AND DESIGN IS AS PER MANUFACTURER STANDARD TO ENABLE ASSEMBLY OF BELLOWS AND ALSO TO PERFORM WHEN INSTALLED. THEREFORE IT IS NOT POSSIBLE TO ACCOMMODATE FLANGE THICKNESS AS PER ANSI 150 CLASS.
5. LINING MUST BE PROTECTED WITH WOODEN COVERS.
6. LENGTH OF THE BELLOW SHALL BE FACTORY SET AND WILL ACCOMMODATE TRAVEL/ANGULAR MOVEMENTS.

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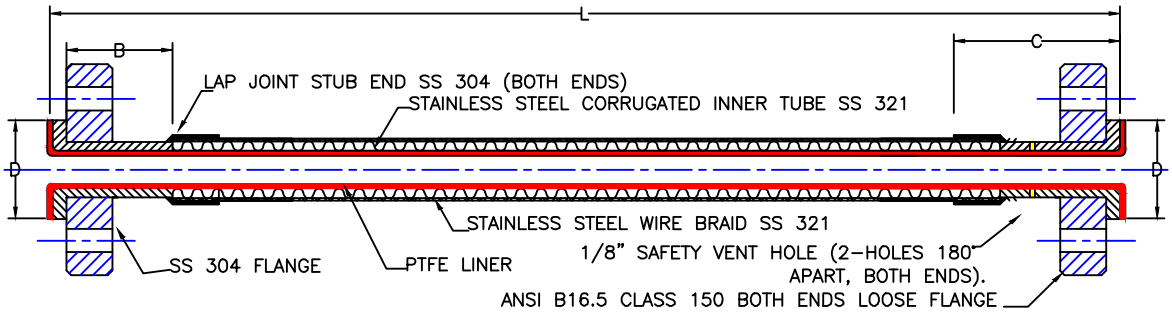
TECHNICAL DATA SHEET - HOSE PIPE



PTFE LINED CHEMICAL TRANSFER HOSE

DIMENSIONAL DATAS

SIZE (NB)	B	C	D	LINER	LINING THK (–0,+0.25)	FLANGE	FLANGE DIM.STD.	L	LENGTH		BEND RADIUS (INCH.)
									MIN.	MAX.	
25	52	71	48	PTFE	2.67	SS 304	ANSI B16.5 #150	AS REQ.	150	3000	12"
40	52	78	68	PTFE	2.67	–DO–	–DO–	–DO–	150	3000	15"
50	65	90	88	PTFE	3.2	–DO–	–DO–	–DO–	150	3000	21"
80	65	90	117	PTFE	3.2	–DO–	–DO–	–DO–	200	3000	28"
100	92	104	152	PTFE	3.5	–DO–	–DO–	–DO–	300	3000	46"
150	106	129	203	PTFE	3.8	–DO–	–DO–	–DO–	350	3000	65"

NOTE: ALL DIMENSIONS IN MM.

INSPECTION TESTS:-

1. EACH CHEMICAL TRANSFER HOSE PIPE PRIOR TO SHIPMENT SHALL BE HYDROSTATICALLY ((TEST PRESSURE: 20 BAR, (300P.S.I.G,@150#) HOLDING TIME OF 3 MINUTES)) & ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV,IN ACCORDANCE WITH SEC.7 OF ASTM F1545–2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545–2003).

NOTES:-

1. SMOOTH EXTRUDED PTFE TUBE IS USED FOR LINING THE HOSE.
2. ALL PROCESS CONTACT PARTS WILL BE HAVE PTFE.
3. LINING MUST BE PROTECTED WITH WOODEN COVERS.
4. MINIMUM LINER THICKNESS AT FLARE SHALL BE 80% OF MIN. LINER WALL THICKNESS.

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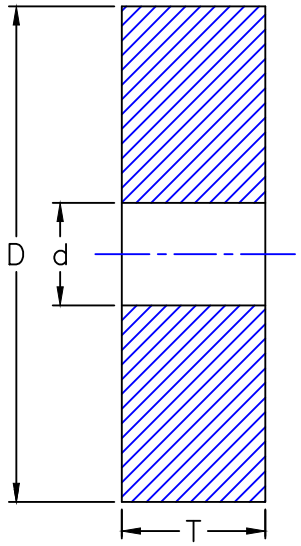
TECHNICAL DATA SHEET - SOLID SPACER



PTFE SOLID SPACER

DIMENSIONAL DATAS

SIZE (NB)	D	d	T
15	35	14	AS REQ.
20	43	16	–DO–
25	64	25	–DO–
40	83	38	–DO–
50	102	51	–DO–
80	133	76	–DO–
100	171	102	–DO–
150	219	152	–DO–
200	276	203	–DO–
250	336	251	–DO–
300	406	302	–DO–

NOTE: ALL DIMENSIONS IN MM

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1.	SOLID SPACER	PTFE	ASTM A 4894 /ASTM A 4895	AS PER MANUFACTURER STD.

INSPECTION TESTS:-

1. DIMENSIONAL & VISUAL INSPECTION AS PER DATA SHEET, ITP, AND MANUFACTURER STANDARDS.

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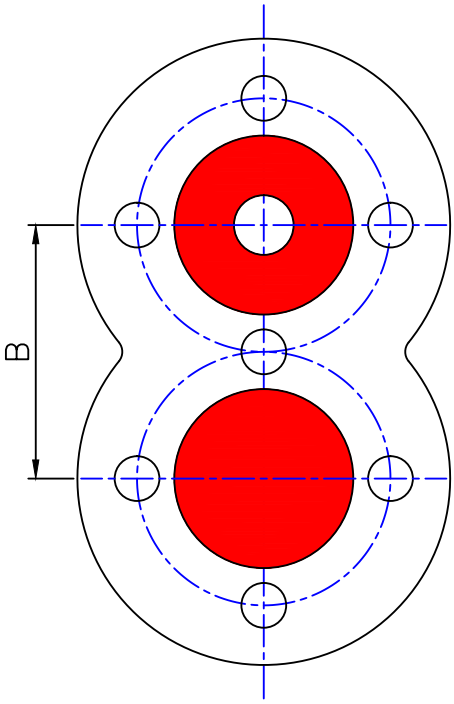
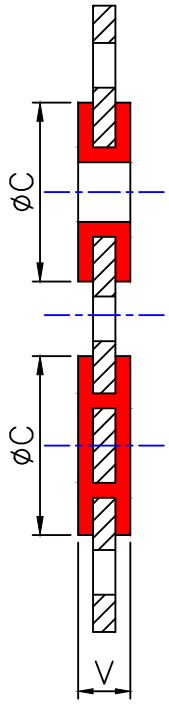
TECHNICAL DATA SHEET - SPECTACLE BLIND





LINED SPECTACLE BLIND

DIMENSIONAL DATAS

SIZE (NB)	B	C	V	LINING THK. (-0,+0.25)	WIGHT (kg.)
25	79.4	48	20	3.4	1.8
40	98.4	69	20	3.4	3.2
50	120.6	88	20	3.4	4.5

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	SPECTACLE BLIND	DUCTILE IRON	ASTM A-395 (60/40/18)	ANSI B 16.5,#150
2	POLYMER	PFA	ASTM D 3307	ASTM F1545-2003

INSPECTION TESTS:-

1. EACH SPECTACLE BLIND PRIOR TO SHIPMENT SHALL BE ELECTROSTATICALLY TESTED WITH OUTPUT VOLTAGE OF 25KV, IN ACCORDANCE WITH SEC.7 OF ASTM F1545-2003 & SHALL SUBSEQUENTLY BE VISUALLY INSPECTED FOR WORKMANSHIP & DIMENSIONALLY CHECKED TO VERIFY CONFORMANCE TO REQUIREMENTS OF APPLICABLE STANDARDS/DATASHEETS.
2. THE GASKET SEATING SURFACE OF THE LINING SHALL BE FREE OF SURFACE DEFECTS THAT COULD IMPAIR SEALING EFFECTIVENESS (5.4.2 OF ASTM F 1545-2003).

NOTES:-

1. LINING SHOULD BE FREE OF DEFECTS, LIKE PIN HOLES, CRACKS ETC.
2. LINING SHOULD BE CONCENTRIC WITH O.D OF C.S FLANGE.
3. LINING TO BE COVERED WITH WOODEN COVERS

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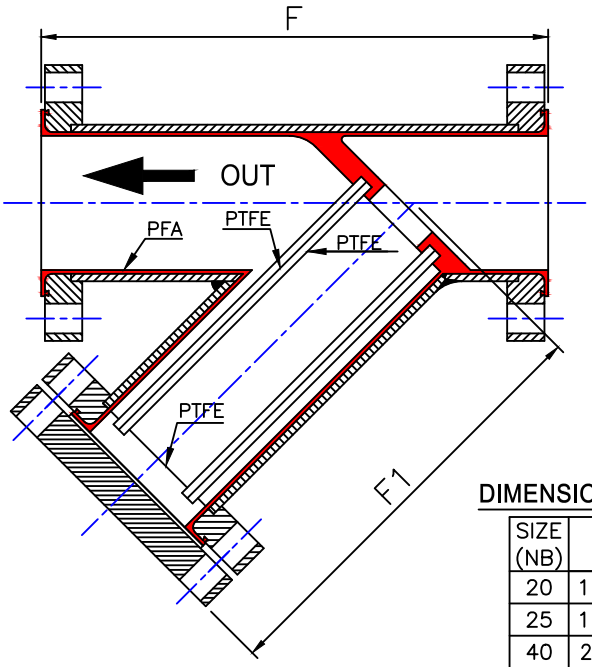
TECHNICAL DATA SHEET - ' Y ' TYPE STRAINER



LINED 'Y' TYPE STRAINER

DIMENSIONAL DATAS

SIZE (NB)	F	F1
20	165	125
25	165	125
40	200	150
50	229	165
80	318	280
100	368	305

BILL OF MATERIAL

PART NO.	ITEM	MATERIAL	SPEC./STD	DIMENSIONAL STD
1	SEAMLESS PIPE	CARBON STEEL	ASTM A-106 GR B SCH 40/30	ANSI B 36.10
2	FLANGE (FLAT FACE)	CARBON STEEL	ASTM A-105 / IS 2062 GR.A	ANSI B 16.5 150 CLASS
4	RESIN	PTFE	ASTM D 3307	ASTM F1545-2003
		PP	ASTM D 4101	
		PVDF	ASTM D 3222	
		HDPE	ASTM D 3350	

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HORIZON POLYMER ENGINEERING PVT LIMITED

PRODUCT FEATURES

FLUORO POLYMER LINED PIPING SYSTEMS

HORIZON POLYMER

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Scope:

This specification defines the constituent materials, properties and performance of the products available in the Fluoroline range of lined pipe work which generally confirm to ASTM F1545. Deviation from the ASTM standard is taken to include substitution of British Standard and Indian Standard (B.I.S).

Material Specifications:

Lining Material Specifications, Range And Temperature Limit (For Lined Pipe Work):

Polymer Material	Polymer Material	Liner Colour	Product Code	ASME Class	Size Range	Temp. Limits
Poly Tetra Fluoro Ethylene (PTFE)	ASTM D1457 Type I & II, ASTM D 4894, ASTM D 4895	White	Fluoroline T	150 / 300	25 to 300	-60 ^{0}C to +200 ^{0}C
Per Fluoro Alkoxy Alkane (PFA)	ASTM D 3307 Type II	Natural White	Fluoroline T	150 / 300	25 to 300	-60 ^{0}C to +200 ^{0}C
Fluorinated Ethylene Propylene (FEP)	ASTM D 2116	White	Fluoroline F	150 / 300	25 to 300	-60 ^{0}C to +175 ^{0}C
Poly Vinylidene Fluoride (PVDF)	ASTM D3222	Black	Fluoroline K	150 / 300	25 to 300	-60 ^{0}C to +120 ^{0}C
Polypropylene Co – Polymer (PP)	ASTM D 4101	Orange	Fluoroline P	150 / 300	25 to 300	-60 ^{0}C to +100 ^{0}C

The material properties of the Polymer and Specific Gravity for PTFE should confirm to the test results as specified in the ASTM F 1545 when tested in accordance with relevant Test Methods.

In very low temperature (-29 deg C) application with Fluoroline T, consideration must be given to the suitable material of Housings. Fabricated and Cast Steel Housings are also available for low temperature service.

For information on the Chemical resistance of Fluoroline K and P systems please refer to the Factory Technical Services Department.

Housing for Pipe Spools:

Carbon Steel Pipes: Pipe material (Seamless quality) to ASTM A 106 Gr-B sizes 25 to 200NB are supplied in Schedule 40 wall thickness whereas 250NB and 300NB are supplied in Schedule 30. Dimensional standard will be in accordance to ANSI B 36.10.

Flanges: Slip-on & Lap Joint Flanges (Flat face): For ASME B 16.5 Class 150 and Class 300 with collar for Lap Joint are generally supplied from material IS 2062. Flanges in material A 105 are provided if specifically requested.
Low temperature steels and stainless steel pipes are available for which the requirement with service conditions should be referred to factory.

Fittings:
The housing materials, as a standard for all fittings are generally of Ductile Iron Castings conforming to ASTM A 395 and or its Indian equivalent. Alternatively, steel housings are also fabricated using pipe, flanges and plate material if necessary.

Elbows lined with PTFE are also supplied made from pipe material with fixed flanges welded on both ends.

Housing material for Reducing Flanges will be of IS 2062 Gr. A - Plate material.

Housing material for Lined Spacers will be from IS 2062 Gr.-A - Plate material only.

Steel castings to ASTM A216 Gr. WCB, stainless steel Castings and fabrications can be made available for which the requirement with service conditions should be referred to factory.

Dimensional Standard:

Lined Pipe work is generally to ANSI B 31.3 with minor modifications to suit the lining process.

S. G. Iron Fittings with Cast Iron flanges are dimensioned to B 16.42

Tolerance for Pipe Fabrication, flanges and fittings shall be as stated in ASTM F 1545

Lined fittings (Plastic flare to plastic flare) shall conform to the nominal centre to face dimensions as specified in relevant standards with the applicable tolerances. Dimensional details for each fitting are covered in the relevant data sheet available as a part of this specification.

Construction:

1. Pipe spools are fabrication to proprietary drawings covering standard spool, minimum spool lengths by Nominal Bore size and Jacketed pipes.

2. Approved weld procedures for flange attachment & setting are adopted and welding carried out by qualified welders.

3. When fabricating pipes and fittings, end connection shall be manufactured to provide a minimum 1/8 inch radius or chamfer in the transition from pipe wall to flange or lap face. This radius or chamfer is required to reduce stress concentration in the plastic liner as it is flared or moulded over the flange face or stub end.

4. All pipe spools have lap joint flange (flange rotates on pipe) at one end and fixed flange at the other end.

5. The interior surfaces of all Housings shall be clean and free of burrs, rust, scale or other protrusions which may be adversary affect the integrity or performance of the lining.

6. As a standard Lined pipes are manufactured up to a maximum length of 3 mtr in all sizes and for all liner material. Longer lengths can be made available for which the factory has to be consulted.

7. All fittings are with fixed either cast on or welded.

8. All Pipes & Fittings must be vented in compliance with ASTM F 1545. Vent Systems are designed to release any gases between the liner and housing-preventing buildup of those gases which could premature failure of the lined system.

9. Precaution should be taken to see that these Vent holes drilled (2mm Dia to 4mm Dia) in to the metal housing prior to lining. Two pairs of vent holes for each pipe spool 180 deg. Apart and located 150mm from each flange face are provided. Each pair of these vent holes are drilled rotated 90 deg. to each other. For pipe assemblies 500mm or less only one pair of vent holes located between the flanges are required. Cast fittings (lined by injection molding) are vented at the injection boss. In addition these vent holes serve as weep holes in the event the liner is damaged. Vent hole extensions are necessary in the event pipes and fittings are required to be insulated or if the emission of vented materials are to be kept away from the flange bolts.

10. All lining shall fit snugly into the pipe and fitting housings. Any bulges in lining or indication of poor contact with the housing shall be a cause for rejection.

11. Plastic pipe liner shall be locked into the pipe housing using the thermo - lock process to provide dimensional stability which would be necessary as the pipe would have to withstand the thermal cyclic conditions and also to provide maximum vacuum resistance at elevated temperatures.

12. The gasket seating surface of the lining shall be free of surface defects that would impair sealing effectiveness. Scratches, dents, nick or tool marks on the seating surface shall not be deeper than 10% of the face thickness. Minimum liner thickness on the flare face shall be 80% of minimum liner wall thickness.

Product Testing:

Hydrostatic Test: All class 150 pipe assemblies and fittings are subjected to a 29 bar (425 psig) and for class 300 to 46.5 bar (675 psig) hydrostatic pressure test at room temperature using clean water. The procedure and duration of this test is to be carried out as laid down in ASTM F 1545. The pressure gauge and vent holes in the pipe and fitting housing are to be observed throughout the pressure test for any evidence of leakage which is a cause for rejection.

Electrostatic Test: The liner of all completed assemblies is subjected to 25KV non-destructive electrostatic test which is carried out to detect any defects like pipe holes, porosity, cracks etc. in the liner. A visible and audible spark occurs at the probe section when electrical contact is made with metal housing because of the defect in the liner. This shall be a cause for rejection.

Painting:

As a standard, the exterior surface of all pipes and fittings and accessory items are painted using a suitable red oxide primer. In addition a one inch wide colour code band is painted on the periphery of the pipe or fitting using enamel paint. For pipes this band is provided near the fixed flange end of the pipe. The colour band serves as an identification of liner material as stated below:

Lining material	Colour band
PTFE/PFA/FEP	Black
PVDF	Blue
PP	White

Special paints if required are to be specified at the time of making the offer.

Marking:

In general, all pipes and fittings will carry the following marking hard stamped on the flange OD.

i) Manufacturer's Name : HPEL
ii) Liner Material Identification : PTFE / PFA / FEP / PVDF / PP
iii) Nominal Pipe Size :
iv) Work Order No. :

For Pipe Spools the size and length of the pipe is marked on the run of the pipe using an indelible black ink. Further identifications can be provided if requested in the order.

End Cover:

All lined pipe work will have their flare covered with either wooden or plastic covers. These covers are not to be removed except at the time of installation. In case inspection is carried out at site on receiving the material the end covers are to be immediately placed back after inspection is completed. Failure to do this may result in damage or deformation of the flare face.

Storage:

Lined pipe work should not be stored in open are and preferably on level ground. Field flare pipes should not be stored outside and also for considerable period of time. This could cause the liner to get jammed with the pipe housing and make it difficult to slide/move the liner inside the pipe.

Material Certification:

Pipes are procured correlating material with Mill's Test Certificate. Flanges and Castings are procured from approved suppliers against certificates endorsed by manufacturer's/foundries' independent Quality Controller. Liner and Polymer are procured against manufacturer's Certificate of conformity or Certificate of Analysis. For all suppliers, originating from our works we will provide our internal Test Certificate certifying the material specifications and tests carried out on lined pipe work. Further certificates relating to Housing and Lining material will not form a part of documentation unless specifically requested and agreed by us.

Pressure/Temperature Ratings:

	150 #		300 #	
Temperature, ^{0}C	PSI (g)	Bar (g)	PSI (g)	Bar (g)
20	250	17.2	450	31
50	244	17.0	425	29.3
100	235	16.0	390	26.9
150	215	14.8	345	23.8
200	200	13.9	295	20.3

Pressures rating for # 150 dimensioned fittings are based on the rating in ANSI B 16.5 Pressure ratings for # 300 dimensional fittings are based on the rating in ANSI B 16.5 #300, down rated to compensate for the decrease in mechanical properties at elevated temperature of the lining materials.

Vacuum / Temperature Ratings:

Material	Temp. ^{0}C	25	40	50	80	100	150	200	250	300
PTFE	20	Full	Full	Full	Full	Full	Full	Full	Full	Full
	100	Full	Full	Full	Full	Full	Full	Full	Full	
	175	Full	Full	Full	Full	Full	Full	Full		
	230	Full	Full	Full	Full	Full	Full			
PVDF	20	Full	Full	Full	Full	Full	Full	Full	Full	Full
	80	Full	Full	Full	Full	Full				
	138	Full	Full	Full	Full	Full				
PP	20	Full	Full	Full	Full	Full	Full	Full	Full	Full
	93	Full	Full	Full	Full	Full	Full	Full	Full	

Limits of vacuum service are established by methods which comply with the relevant ASTM F methods for lined pipes.

Liner Thickness Details:

Size ,NB	For Pipes		Flare Dia, mm	Average ID,mm	PTFE Liner Thickness, mm (min.)	PVDF Liner Thickness, mm (min.)	PP Liner Thickness, mm (min.)	Fittings PFA / PVDF / PP / FEP – Thickness (mm)
	Std length, mm	Min. length, mm						
20	1000	90	43	17	2.50	NA	NA	2.50
25	3000	90	48	21	3.30	3.15	3.80	3.50
40	3000	95	70	35	3.40	3.15	4.00	4.00
50	3000	110	90	46	3.40	3.15	4.40	4.00
80	3000	120	118	72	3.50	3.15	4.40	4.00
100	3000	125	152	97	4.50	3.60	5.30	5.00
150	3000	140	210	145	5.50	4.00	5.60	5.50
200	3000	145	267	198	6.00	4.00	5.60	6.50
250	3000	155	316	249	6.50	5.60	6.30	6.50
300	3000	160	367	299	6.50	5.60	6.30	6.50

For PTFE Lined pipes of sizes 150NB and above, factory should be consulted for selection of liner with optimum thickness which would be most ideal for pipes to operate under partial/full vacuum conditions.

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Technical Specifications

Fluoro Polymer Lined Pipes and Fittings

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HORIZON POLYMER ENGINEERING (P) LIMITED
Standard Enquiry Specification for PTFE / PFA Lined Pipes & Fittings as per ASTM F 1545 – 97

Service Condition:

Media Handled :

Operating Temp :

Operating Pressure :

Vacuum :

Presence of Solid particles, if any :

Material of Construction:

Pipes : ASTM A 106 Gr. B Sch. 40 up to 200 NB & Sch. 30 for 250 NB & 300 NB

Flange / Collar : ASTM A 105 (N) / IS 2062

Fittings : Ductile Iron ASTM A 395

Lining : PTFE – Pipes and PFA – Fittings

PTFE

The lining is made from virgin PTFE (Polytetrafluoroethylene) without any pigments — its colour
is white, by paste extruded method, conforming to ASTM D 4895. The material is inserted in a pre calibrated form into the steel parts and then thermally stress relieved, thus guaranteeing a stress-neutral and firm fitting in the steel part.
The minimum physical data according to ASTM F1545 are:

Tensile strength : 3500 PSI

Elongation : 300%

Specific gravity : 2.15 – 2.19 g/cm^3

PFA

The injected material is pure PFA (Perfluoroalkoxy) without any pigments - the colour is white opaque, conforming to ASTM D 3307 Type II

The minimum physical data according to ASTM F1545 is:

Tensile strength : 3800 PSI

Elongation : 300%

Qualification tests:

High temp test, Low temp test, Steam and cold water test, Vacuum test as per ASTM F 1545

Dimensional Standard:

Pipes : ASME B 36.10
Fittings : ASME B 16.42 / ASME B 16.5, 150 #
Flanges : ASME B 16.5 ASA 150 #
Note : The Pipe, Flanges & Collar thickness in mm will be as under along with Average ID after Lining

Size, NB	20	25	40	50	80	100	150	200	250	300
Pipe	2.87	3.38	3.68	3.91	5.49	6.02	7.11	7.04	9.30	10.40
Flange	12.5	14.3	17.5	19.0	23.8	23.8	25.4	28.6	30.2	31.7
Collar	11	12	12	14	16	18	18	20	22.5	22.5
Average ID after	17.0	21.0	35.0	46.0	72.0	97.0	145.0	198.0	249.0	299.0

Minimum Liner Thickness (mm):

Size, NB	20	25	40	50	80	100	150	200	250	300
PTFE	2.50	3.30	3.40	3.40	3.50	4.50	5.50	6.00	6.50	6.50
PFA	3.00	4.00	4.00	4.00	4.00	5.00	5.50	6.50	6.50	7.00

Vacuum / Temperature Ratings

Temp	25	40	50	80	100	150	200	250	300
20° C	Full	Full	Full	Full	Full	Full	Full	Full	Full
100° C	Full	Full	Full	Full	Full	Full	Full	Full	
175° C	Full	Full	Full	Full	Full	Full	Full		
230° C	Full	Full	Full	Full	Full	Full			

Pressure / Temperature Ratings:

Temperature	150 #		300 #	
	PSI (g)	Bar (g)	PSI (g)	Bar (g)
20 ^{0}C	250	17.2	450	31
50 ^{0}C	244	17.0	425	29.3
100 ^{0}C	235	16.0	390	26.9
150 ^{0}C	215	14.8	345	23.8
200 ^{0}C	200	13.9	295	20.3

HORIZON POLYMER ENGINEERING PVT LIMITED

ANNEXURE

Table-A

Description	Flanges	Hydro Test	Electrostatic Test at 25 KV
Lined Pipe and fittings	# 150	29 bar (425 psig)	Yes
	# 300	46.5 bar (675 psig)	Yes
	PN 16	24 bar (350 psig)	Yes
	PN 10	15 bar (220 psig)	Yes
	BS 10 "E"	21 bar (300 psig)	Yes
Reducing and blind flanges, lined spacers			Yes
Lined dip pipes, sparkers, thermo wells			Yes
Flexible couplings R6904 2 convolutes	25-250 NB	17 bar (240 psig)	No.
Expansion joints R6905 3 convolutes	25-150 NB	15 bar (220 psig)	No
Expansion joints R6905 3 convolutes	200, 250 NB	12.5 bar (180 psig)	No
Bellows R 6906 5 convolutes	25 – 250 NB	10.5 bar (150 psig)	No.
Sight glasses	All ratings	10 bar (145 psig)	Yes
Transfer hoses	All ratings	21 bar (300 psig)	Yes

Tolerances:

Tolerance of lined pipes & fittings are defined according to ASTM F 1545. The liner thickness
may vary approximately 10%. This applies especially to the area of the flares, due to the flaring
process.

Description	Tolerance
Pipe Length	± 2.50 mm
Fixed Flange Bolt Alignment	+ 1.00 mm
Flange Perpendicularity With Pipe	5.00 mm / Meter Of Diameter

External Coating
All carbon steel parts are sandblasted according to SA 2 ½

All PTFE-lined carbon steel products are painted with an epoxy-zinc-chromate primer to protect
them from corrosion.

Inspection:

Rubber Roller Test of PTFE Liner.

Mechanical Properties of PTFE Liner, viz. Tensile Strength, Elongation & Specific Gravity

Visual & Dimensional Check

Hydrostatic Test is carried out at 29 bar after lining.

Electrostatic Test at 25000 Volts will be carried out on all non – conductive lined pipes and fittings.

Protective covers

Flares are protected with a water proof plywood cover or plastic cap.

HORIZON POLYMER ENGINEERING PRIVATE LIMITED

SPECIFICATION - PTFE / PFA LINED PIPES & FITTINGS AS PER ASTM F 1545 - 97

A	**Material of Construction:**					
	Pipes	ASTM A 106 Gr. B Sch. 40 up to 200 NB & Sch. 30 for 250 NB & 300 NB				
	Flanges	IS 2062 Gr. A / ASTM A 105				
	Fittings	Ductile Iron Conforming To ASTM A 395 & ASTM A 234 Gr WPB for 25 NB to 100 NB NB Elbows				
	PTFE	ASTM D1457 Type III, ASTM D 4894 /ASTM D 4895	Colour	White	Temp. Limit	-30^0C to $+200^0$C
	PFA	ASTM D 3307 Type II	Colour	Natural White	Temp. Limit	-30^0C to $+200^0$C
B	**Dimensional Standards**					
	Pipes	ANSI B 36.10				
	Ductile Iron	ANSI B 16.42 / ANSI B 16.5				
	Flanges	ANSI B 16.5 ASA 150#				
	Lining	ASTM F 1545 Standard				
C	**Nominal**	**g Thickness as per Manufacturer's Design and Tolerance:**				
	Pipes	20 NB: 2.50 mm; 25 NB: 3.30 mm; 40 / 50 NB: 3.40 mm; 80 NB: 3.50 mm; 100 NB: 4.50 mm; 150 NB: 5.50 mm; 200 NB: 6.00 mm; 250 / 300 NB: 6.50 mm				
	Fittings	25 NB TO 80 NB: 4.00 mm; 100 NB: 5.00 mm; 150 NB: 5.50 mm; 200 / 250 NB 6.50 mm				
	Sp. Gravity	2.15 to 2.19 for PTFE				

D	**INSPN AFTER LINING**	**In House**	**TPI**	**Mechanical Prop erties:**			
	Hydro Test	At 29 Bar	100%	10%		PTFE	PFA
	Spark Test	At 25 KV	100%	10%	Tensile Strength, PSI (min)	3500	3800
	Dimensions	As per ANSI B 16.5 / ASTM F 1545			Elongation, % (min)	300	300

E	**General Notes**	
	All pipes have lap joint flange at one end and fixed flange at the other end. Lined pipes are available up to a Length of 6 mtrs max.	
	All fittings are supplied with fixed cast on or welded flanges only.	
	Suitable vent holes are provided for all pipes & fittings.	
	All pipe work will be supplied with suitable wooden end covers to protect the flare faces.	
	Material test certificates will be provided only if requested in the order.	
	External Surfaces of All Pi pes and Fittings will be painted with one coat of Red Oxide Primer	

F	**Vacuum / Temperature**	**Ratings:**							
	Temp. 0C	25	40	50	80	100	150	200	250
	20	Full	Full	Full	Full	Full	Full	Full	Full
	100	Full	Full	Full	Full	Full	Full	Full	Full
	175	Full	Full	Full	Full	Full	Full	Full	
	230	Full	Full	Full	Full	Full	Full		

G	**Pressure / Temperature**	**Ratings:**			
	Temperature	150#		300#	
		PSI (g)	Bar (g)	PSI (g)	Bar (g)
	200 C	250	17.2	450	31.0
	500 C	244	17.0	425	29.3
	1000 C	235	16.0	390	26.9
	1500 C	215	14.8	345	23.8
	2000 C	200	13.9	295	20.3

HORIZON POLYMER

HORIZON POLYMER ENGINEERING PVT LTD

WORKS :- C1 -B, 1650/1618, GIDC INDL. ESTATE, CHHATRAL, DIST. GANDHINAGAR (N.G) - 382 729

OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

HORIZON POLYMER ENGINEERING PRIVATE LIMITED

SPECIFICATION - PP LINED PIPES & FITTINGS AS PER ASTM F 1545 - 97

A	**MATERIAL OF CONSTRUCTIONS:**					
	Pipes	ASTM A 106 Gr. B Sch. 40 up to 200 NB & Sch. 30 for 250 NB & 300 NB				
	Flanges	IS 2062 GR A / ASTM A 105				
	Fittings	Ductile Iron Casting Conforming To ASTM A 395				
	PP (Polymer)	ASTM D 4101	Colour	Orange	Temp. Limit.	-20°C to + 105°C
B	**DIMENSIONAL STANDARDS:**					
	Pipes	ANSI B 36.10				
	Ductile Iron Castings	ANSI B 16.42 / ANSI B 16.5				
	Flanges	ANSI B 16.5 ASA 150#				
	Lining	ASTM F 1545 Standard				
C	**NOMINAL LINING THICKNESS AS PER MANUFACTURER"S DESIGN & TOLERANCE:**					
	Pipes	25 NB to 80 NB: 3.15 mm; 100 NB: 3.60 mm; 150 NB / 200 NB: 4.00 mm; 250 B: 5.60 mm				
	Fittings	25 NB TO 80 NB: 4.00 mm; 100 NB: 5.00 mm; 150 NB: 5.50 mm; 200 / 250 NB: 6.50 mm				

D	**INSPN AFTER LINING**		**In-House**	**TPI**	**Mechanical Properties:**	
	Hydro Test	At 29 Bar	100%	10%	Tensile Strength, PSI (min)	5000
	Spark Test	At 25 KV	100%	10%		
	Dimensions	As per ANSI B 16.5 / ASTM F 1545			Elongation, % (min)	8

E	**GENERAL NOTES:**
	All pipes have lap joint flange at one end and fixed flange at the other end. Lined pipes are available up to a Length of 6 mtrs max.
	All fittings are supplied with fixed cast on or welded flanges only.
	Suitable vent holes are provided for all pipes & fittings.
	All pipe work will be supplied with suitable wooden end covers to protect the flare faces.
	Material test certificates will be provided only if requested in the order.
	External Surfaces of All Pipes and Fittings will be painted with one coat of Red Oxide Primer.

F **VACUUM / TEMPERATURE RATINGS:**

Temp. °C	25	40	50	80	100	150	200	250
20	Full	Full	Full	Full	Full	Full	Full	Full
80	Full	Full	Full	Full	Full			
93	Full	Full	Full	Full	Full			

G **PRESSURE / TEMPERATURE RATINGS:**

Temperature	150		300	
	PSI (g)	Bar (g)	PSI (g)	Bar (g)
20° C	250	17.2	450	31
50° C	244	17	425	29.3
100° C	235	16	390	26.9
150° C	215	14.8	345	23.8
200° C	200	13.9	295	20.3

HORIZON POLYMER ENGINEERING PRIVATE LIMITED

SPECIFICATION FOR PVDF LINED PIPES & FITTINGS AS PER ASTM F 1545 – 97

A	**MATERIAL OF CONSTRUCTIONS:**					
	Pipes	ASTM A 106 Gr. B Sch. 40 up to 200 NB & Sch. 30 for 250 NB & 300 NB				
	Flanges	IS 2062 GR A / ASTM A 105				
	Fittings	Ductile Iron Casting Conforming To ASTM A 395				
	PVDF	ASTM D 3222	Colour	Black	Temp. Limit.	- 20°C to + 120°C
B	**DIMENSIONAL STANDARDS:**					
	Pipes	ANSI B 36.10				
	Ductile Iron castings	ANSI B 16.42 / ANSI B 16.5				
	Flanges	ANSI B 16.5 ASA 150#				
	Lining	ASTM F 1545 Standard				
C	**NOMINAL LINING THICKNESS AS PER MANUFACTURER"S DESIGN & TOLERANCE:**					
	Pipes	25 NB: 3.80 mm; 40 NB: 4.00 mm; 50 NB: 4.40 mm; 80 NB: 4.40 mm; 100 NB: 5.30 mm; 150 NB: 5.60 mm; 200 NB: 5.60 mm; 250 NB: 6.30 mm				
	Fittings	25 NB TO 80 NB: 4.00 mm; 100 NB: 5.00 mm; 150 NB: 5.50 mm; 200 / 250 NB: 6.50				

D	**INSPN AFTER LINING**	**In-House**	**TPI**	**Mechanical Properties:**	
	Hydro Test	At 29 Bar	100%	10%	Tensile Strength, PSI (min)	3000
	Spark Test	At 25 KV	100%	10%		
	Dimensions	As per ANSI B 16.5 / ASTM F 1545			Elongation, % (min)	10

E	**GENERAL NOTES:**
	All pipes have lap joint flange at one end and fixed flange at the other end. Lined pipes are available up to a Length of 6 mtrs max.
	All fittings are supplied with fixed cast on or welded flanges only.
	Suitable vent holes are provided for all pipes & fittings.
	All pipe work will be supplied with suitable wooden end covers to protect the flare faces.
	Material test certificates will be provided only if requested in the order.
	External Surfaces of All Pipes and Fittings will be painted with one coat of Red Oxide Primer.

F **VACUUM / TEMPERATURE RATINGS:**

Temp. °C	25	40	50	80	100	150	200	250
20	Full	Full	Full	Full	Full	Full	Full	Full
93	Full	Full	Full	Full	Full	Full	Full	Full

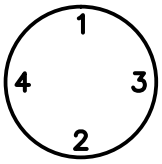
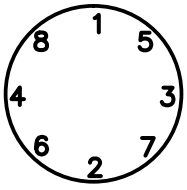
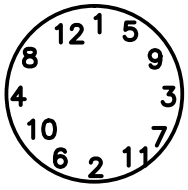
G **PRESSURE / TEMPERATURE RATINGS:**

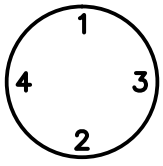
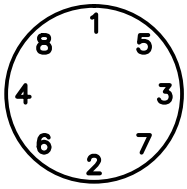
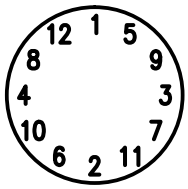
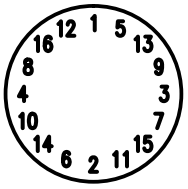
Temperature	150		300	
	PSI (g)	Bar (g)	PSI (g)	Bar (g)
20° C	250	17.2	450	31
50° C	244	17	425	29.3
100° C	235	16	390	26.9
150° C	215	14.8	345	23.8
200° C	200	13.9	295	20.3

Recommended Bolt/Stud Lengths

ASM E 150 lbs Systems					ASM E 300 lbs Systems				
Pipe Size, inch	No of Bolts or Stud per Joint	UNC Bolts Stud, Size	Bolts Length, inch	Stud Length, inch	Pipe Size, inch	No of Bolts or Stud per Joint	UNC Bolts Stud, Size		Stud Length, inch
1	4	½–12	2½	3½	1	4	5/8–11	2 3/4	3 3/4
1½	4	½–12	2 3/4	3½	1½	4	3/4–10	3	4
2	4	5/8–11	3	4	2	8	5/8–11	3¼	4¼
3	4	5/8–11	4	5	3	8	3/4–10	4¼	5¼
4	8	5/8–11	4	5	4	8	3/4–10	4½	5½
6	8	3/4–10	4	5	6	12	3/4–10	4½	5½
8	8	3/4–10	4½	5½	8	12	7/8–9	5	6
10	12	7/8–9	5	6	10	16	1–8	6	7
12	12	7/8–9	4½	5½	12	16	1 1/8–7	6½	7½

Torque Values:

		NPS ASME Class 150								
		1	1½	2	3	4	6	8	10	12
Bolts Torque Ft/lbs	With PTFE / PFA Liners	10	15	25	40	30	60	75	70	95
	With PVDF / PP Liners	20	30	50	80	60	120	150	140	170
No. of Holes Flange		4	4	4	4	8	8	8	12	12
Bolts Torque Sequence										

		NPS ASME Class 300								
		1	1½	2	3	4	6	8	10	12
Bolts Torque Ft/lbs	With PTFE / PFA Liners	15	25	15	25	40	40	60	65	95
No. of Holes Flange		4	4	8	8	8	12	12	16	16
Bolts Torque Sequence										

HORIZON POLYMER ENGINEERING PVT. LTD.

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HEAT TRACING METHOD

There are three basic system used in heat tracing plastic lined piping systems: liquid, electrical and steam. Factors that need to be considered in the selection of heat tracing methods include temperature to be maintained, operating, installation, and maintenance costs as well as the temperature handling capabilities of the liner to be used. Additionally, to prevent the potential for localized liner over-heating, it is recommended that liquid, electrical, and steam tracing not be placed directly on pipe and pipe components. It is recommended that insulating cement, wood strips, or other buffer be utilized at installation.

LIQUID TRACING is generally used where there is a need for close control of operating temperatures. The use of heat transfer cement should follow the manufacturer's recommendations. Flanges, Fittings, and other sources of generated heat loss should also be adequately traced.

ELECTRICAL TRACING is available in cable or strip form, both has been used successfully in tracing lined piping systems. Caution must be taken in the design to assure there will be no localized overheating that may lead to liner failure.

All electrical tracing is given a "T-Rating" as described by the National Electrical Code. This rating is the lightest temperature that cable can attain when drawing maximum wattage in an insulated environment. Specifying a "T-Rating" or a self-limiting cable that does not exceed the liner temperature limit is necessary.

When using cable type tracing, place it along the length of the pipe in a "W" wrap configuration. This will allow easier maintenance when necessary. Also, make sure that upon installation, the cable does not overlap causing an area of concentrated heating.

STEAM TRACING should be limited to use with PTFE of PVDF lined piping systems, and consideration must be given to the temperature handling capabilities of the linings. Standoffs, metallic tape wrapping, as well as "W" wrapping are all methods to reduce the possibility of localized overheating.

SUPPORTING OF HORIZON PLASTIC-LINED PIPING PRODUCTS

A contributing factor for leaks in plastic-lined piping is excessive loading at flange connections due to improper piping support. To prevent such loading, Horizon recommends that stress analysis be performed that includes all potential sources of loading on the piping system. The maximum calculated Bending Stress due to Dead Loads should not exceed the Design Allowable Stress.

The Design Allowable Stress, due to pressure, weight and other sustained loading is determined by dividing the Basic Hot Allowable Stress (Sh) for the metal pipe by an appropriate Safety Factor (FS). For example, a value of 10,000 psi is obtained for A106 steel pipe when a Safety Factory of 2 is applied to the Basic Hot Allowable Stress value of 20,000 psi as listed in ASME B 31.3. However, when calculating piping spans using accepted engineering practices, the magnitude of pipe deflection is generally the limiting factor in determining span distance. An industry accepted practices is to limit pipe deflection to no more than ¼ of an inch.

Initially, pipe hangers should be positioned such that the piping does not exceed the Design Allowable Stress and the desired pipe deflection. Usually, hangers are located near each flange but not so close as to interfere with the pipe installation. Added support is also recommended where flow changes direction, and in areas of height load concentration, such as clusters of valves or fittings. Additional support and dampening is recommended where vibration can occur.

The reason that we recommend having support at or near the flanges on conventional plasticlined piping is that if the piping is not properly supported, one could over stress the flared or molded PTFE plastic sealing surface and hence cause a leak. Gasket stresses exceeding 5,000 psi for PTFE, 6500 psi for PP and 8,000 psi for PVDF, should be avoided. These are best avoided by support at or near flange, fitting and or valve concentrations located in the pipe run.

Support spans for flanged piping are generally determined from accepted engineering formulas for single pipe spans with free ends.

An important part of supporting plastic lined piping is that the supports should allow the pipe to move freely in response to thermal expansion and contractions. The Manufacturers Standardization Society (MSS) specifications MSS SP 58 and 69 provide good references for supports and hangers for certain applications.

INSTALLATION & MATINTENANCE INSTRUCTIONS FOR FLUOROLINE LINED PIPES & FITTINGS

Installation and maintenance of plastic lined pipe work should be performed by trained personnel only. The following procedures supplement standard piping procedures and practices.

Flange covers should not be removed until flanges are ready to be bolted into position, otherwise sealing faces may become damaged or distorted. If covers are removed for inspection purposes, they must be replaced immediately afterwards. They should also be fitted to any pipe work removed from a system.
Gaskets are not required except where the Fluoroline pipe work is connected to a flange face of another material, such as glass, carbon, ceramic, reinforced plastic etc.

Blot should be tightened using proper bolt torques. The torque values given in the table apply to lined pipes & fittings with class 150 and class 300 flanges.

Threads must be clean and well lubricated and washers should be used to ensure correct torque. Bolts should be tightened alternately and evenly.

If a flange leak occurs and the bolts of the leaking side have been properly torque, they should **not be tightened further otherwise** permanent damage to the sealing face may result. Instead, the bolts on the opposite side should be loosened a half turn at a time, and then the bolts on the leaking side should be tightened by the same amount.

If the leak persists, the bolts should be removed and the sealing faces examined for scratches or dents across and entire face which could produce a leak path. Any scratches or dents not exceeding 10% of the liner thickness may be eliminated by hand polishing with fine abrasive cloth or paper.

If leakage occurs after the system has been cycled to an elevated temperature and back to ambient temperature, bolts should be re-torque after the cool down period. No further tightening would be necessary.

No welding brazing, soldering or flame cutting, which can permanently damage the plastic liner, should be done close to the metal housing, unless adequate precautions are taken to prevent them being exposed to excessive heat.

Safety vent holes should not be plugged with paint, cement, etc. The vent holes are essential to release gases which may be generated at elevated temperatures and trapped between liner and housing. If not vented, these gases may collapse the liner. Vent holes also serve to warn of any accidental damage to liner before leakage reaches dangerous proportions.
Smooth metal guides, 0.03” to 0.06”, may be used to facilitate sliding the sealing faces into position when making final connections or installing individual sections into an existing line.

BOLTS MUST BE LOOSENED WHILE ASYSTEM IS MORE THAN 150 deg C ABOVE AMBIENT TEMPERATURE, OTHERWISE FLARE DISTORTION OR LINER PULL-IN MAY OCCUR.

Storage of the pipe work should be under cover, protected from rain, and placed to avoid risk of flooding.

To secure the sealing faces and protect them from damage while not in use, flange covers or blind flange should be installed immediately on all piping items which are removed from a system

HORIZON POLYMER

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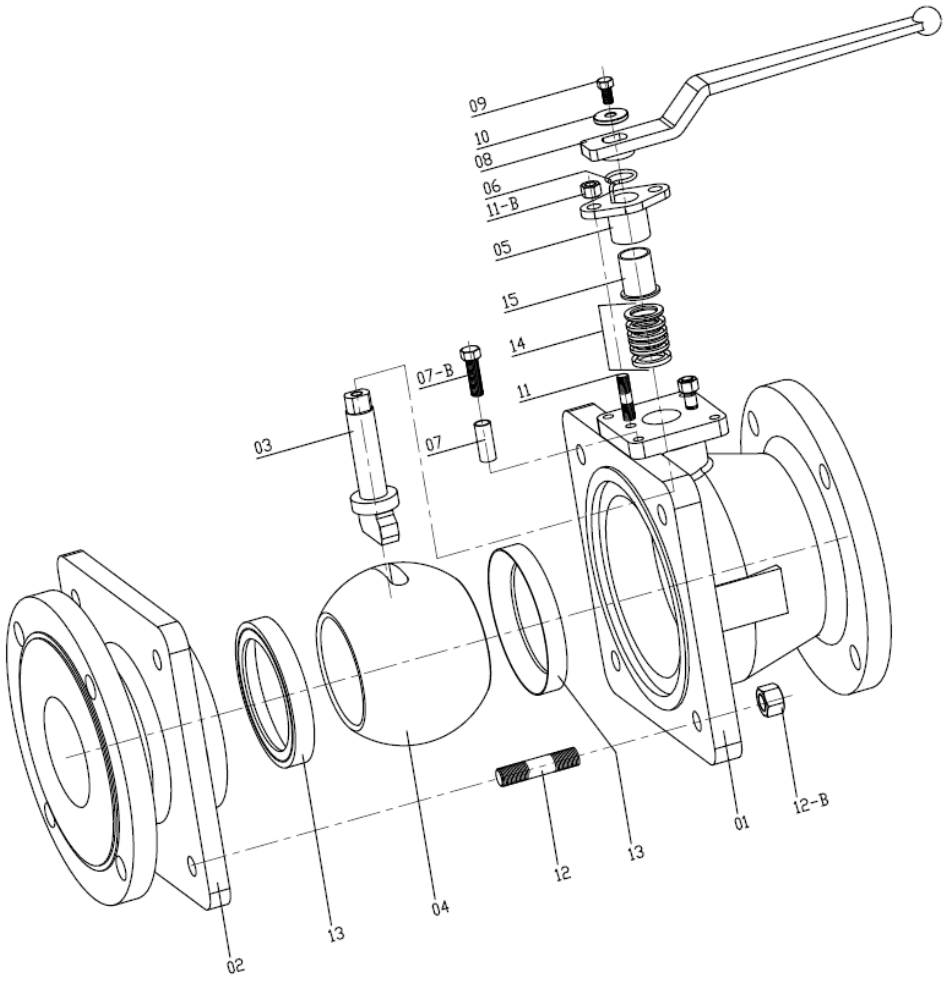
SPECIAL FEAUTERS OF LINED BALL VALVES

- HORIZON PFA Lined Ball Valves are robust and created to handle corrosive fluids from -60° C to +200° C
- The Body, Adaptor, Ball and Stem of the Valves are lined as individual components. The Body material is generally cast ductile iron l cast steel and is also available in CF8ICF8M.
- The liner, generally PFA, is locked by dovetail holes which are provided at the time of machining the casting and the lining of the valve components is done on a special purpose injection moulding machine which has a unique built in system with control points to ensure that lining process is controlled. This is important because every component to be lined has to undergo a Heating & Cooling cycle at the time of lining I moulding.
- Our Lined Valves are suitable to operate at full vacuum.
- We do not process I use re-ground or re-processed polymer.
- The Body design minimizes the dead space between the ball, stem and housing.
- The free floating Ball Valve principle makes it possible for the Ball to seal against the downstream seat ring ensuring a positive sealing force even when the line pressure is low.
- Anti Blow-out stem is provided.
- Valves with lockable handle arrangement can be provided on special requests.
- Antistatic device provides protection against a damaging electrostatic discharge.
- The PFA lined Ball can be easily replaced with a Ceramic Ball whereby the life of the valve can be increased if the valve is required to handle other than clear liquid or to work at the bottom of the tank.
- As a standard Horizon will offer only PFA lined Valves as it has a much higher rating for chemical resistance and can be used at higher temperatures well as FEP has its limitations. Secondly, PFA lined Valves and fittings will come in handy when you are required to change your process or make a new product where the process conditions are more severe. The same piping can be used and you can avoid the cost of once against procuring a new set of valves.
- Extremely low torque ensuring bubble tight shut-off facilitates manual quarter turn operation. On the other hand, it is huge saving in cost when selecting actuators for the valves because of low torque values.
- HORIZON valves are equipped with an ISO mounting flange simplifying the mounting of any standard Actuator.
- Safety design features provide protection for the operators and environment,
- The short pattern face to face dimensions allow direct replacement of a fully lined or sleeve Plug Valve with a HORIZON lined Ball Valve without altering the existing pipe work.
- HORIZON is the only company in India who have qualified their Valves to the European Norms under "PED Directive" whereby all valves supplied to European Community will bear the "CE" marking.

HORIZON POLYMER ENGINEERING PVT. LTD.

DIS-ASSEMBLY MANUAL



HORIZON POLYMER ENGINEERING PVT LTD

WORKS :- C1 -B, 1650/1618, GIDC INDL. ESTATE, CHHATRAL, DIST. GANDHINAGAR (N.G) - 382 729

OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

Disassembly instructions for Lined Ball valve

When work needs to be carried out on an installed lined valve the works safety requirements and the general installation and maintenance instructions for fluorocarbon resin lined valves must be observed.

Prior to disassembly, the lined valve must be cleared of all fluids according to the above mentioned instructions. Particular care must be taken to ensure that the lined valve is opened and closed repeatedly during the rinsing and draining procedure. This will eliminate all remaining pressure within the lined valve body.

Put body on workbench with a soft cover (rubber mat)

Remove hexagon bolt (09) and lock washers (10)

Open lined valve completely. Remove hand lever (08) from stem

Disassemble grounding device (06)

Remove hexagon nuts (11B)

Disassemble gland follower (05). If necessary, stud bolts (11) can also be removed now.

Remove body bolts (12) and separate side piece (02) from body (01)

Remove first ball seat ring (13)

To remove the ball (04), put hand lever in closed position (90 degree to the longitudinal axis of the lined valve)

The ball (04) can easily be pushed out of the body.

Remove hand lever (08)

Remove stem (03) by pushing it down through the body. Care must be taken not to damage the liner.

Remove second ball seat ring (13)

Chevron packing (14) can easily be removed

Assembly instructions for Lined Ball valve

The general installation and maintenance instructions must be observed.

Screw stud bolts (11) into body (01)

Insert stem (03) from inside of the body in such a way that the flat side is parallel to body longitudinal axis.

Insert chevron packing (14)

Install gland follower (5) and hexagon nuts (11B)

Install grounding device (06) and hand lever (08) onto stem (03) and tighten it by using lock washer (10) and hexagon bolts (09)

Insert first ball seat ring (13) into body (01)

Insert ball (04) to lined valve stem (03) by pushing the ball in a downward motion through lined valve body (01)

Insert second ball seat ring (13) into side piece (02)

Turn hand lever 90 degree off longitudinal axis of the body.

Install side piece (02) on to body (01) making sure that recess for stem (03) is on the correct side.

Install body bolts (12) and hexagon nuts (12B) and tighten by criss - cross method.

Bolts to be further tightened at the time when valve is being hydrostatically tested till no leakage or drop in pressure is noticed. Over tighting of bolts may result in higher operating torque leading to lining getting damaged in ball and /or stem. Operating torque should be within specified limits

IMPORTANT NOTE

Prior to installing the valves in service all valves repaired/serviced and re- assembled should be tested both for body and seat as per procedure given in API 598.

Disassembly instructions for Lined Ball valve.ANSI FP.

When work needs to be carried out on an installed lined valve the works safety requirements and the general installation and maintenance instructions for fluorocarbon resin lined valves must be observed.

Prior to disassembly, the lined valve must be cleared of all fluids according to the above mentioned instructions. Particular care must be taken to ensure that the lined valve is opened and closed repeatedly during the rinsing and draining procedure. This will eliminate all remaining pressure within the lined valve body.

Put body on workbench with a soft cover (rubber mat)

Remove hexagon bolt (16) and lock washers (15)

Open lined valve completely. Remove hand lever (09) from stem

Disassemble grounding device (14) Remove allen bolt (17)

Disassemble gland flange (11). Remove Bellevellie-spring set (08) and Gland-Bush (05).

Remove body bolts (10) and separate side piece (02) from body (01)

Remove first ball seat ring (06)

To remove the ball (04), put hand lever in closed position (90 degree to the longitudinal axis of the lined valve)

The ball (04) can easily be pushed out of the body.

Remove hand lever (09)

Remove stem (03) by pushing it down through the body. Care must be taken not to damage the liner.

Remove second ball seat ring (06)

Chevron packing (07) can easily be removed

Assembly instructions for Lined Ball valve

The general installation and maintenance instructions must be observed.

Insert stem (03) from inside of the body in such a way that the flat side is parallel to body longitudinal axis.

Insert chevron packing (14). Insert Gland-Bush (PTFE Graphite + SS 304).(05).

Insert Belleville spring set (08). Install gland flange (11) and Allen-Bolts.(17)

Install grounding device (14) and hand lever (09) onto stem (03) and tighten it by using lock washer (15) and hexagon bolts (16)

Insert first ball seat ring (06) into body (01)

Insert ball (04) to lined valve stem (03) by pushing the ball in a downward motion through lined valve body (01)

Insert second ball seat ring (13) into side piece (02)

Turn hand lever 90 degree off longitudinal axis of the body.

Install side piece (02) on to body (01) making sure that recess for stem (03) is on the correct side.

Install body bolts (10) and hexagon nuts (10B) and tighten by criss - cross method.

Bolts to be further tightened at the time when valve is being hydrostatically tested till no leakage or drop in pressure is noticed. Over tighting of bolts may result in higher operating torque leading to lining getting damaged in ball and /or stem. Operating torque should be within specified limits

IMPORTANT NOTE

Prior to installing the valves in service all valves repaired/serviced and re- assembled should be tested both for body and seat as per procedure given in API 598.

Disassembly instructions for Lined Ball – Check valve.

When work needs to be carried out on an installed lined Ball-Check valve the works safety requirements and the general installation and maintenance instructions for fluorocarbon resin lined valves must be observed.

Prior to disassembly, the lined Ball-Check valve must be cleared of all fluids according to the above mentioned instructions. Particular care must be taken to ensure that the lined valve is opened and closed repeatedly during the rinsing and draining procedure. This will eliminate all remaining pressure within the lined valve body.

Put body on workbench with a soft cover (rubber mat)

Remove hexagon bolt and lock washers

Open lined Ball-Check valve completely.

Remove body bolts and separate side piece from body.

Remove first PTFE Ball.

The ball (04) can easily be pushed out of the body.

Assembly instructions for Lined Ball –Check valve.

The general installation and maintenance instructions must be observed.

Insert PTFE BALL to lined valve Body by pushing the ball in a downward motion through lined valve body.

Install Side piece on to Body.

Install body bolts and hexagon nuts and tighten by criss - cross method .

Bolts to be further tightened at the time when valve is being hydrostatically tested till no leakage or drop in pressure is noticed.

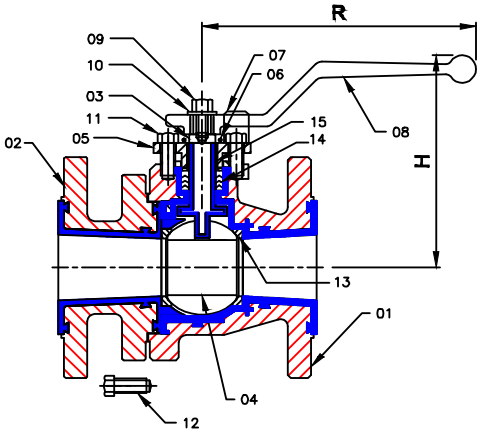
Avoid any damage to occur on lining assembly & testing.

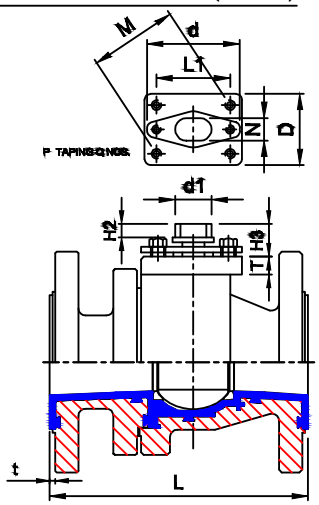
IMPORTANT NOTE

Prior to installing the valves in service all valves repaired/serviced and re- assembled should be tested both for body and seat as per procedure given in API 598

ANSI B16.10/ANSI B16.5 150 LBS.
SIZE 25 -150 NB

TECHNICAL DATA SHEET - STANDARD BORE BALL VALVE (ANSI)





ACTUATOR MOUNTING DETAILS :-

SIZE NB	F	d1	D	H2	H3	L	L1	M	N	P	Q	T	X
25 1"	51	10	53	12	22	127	35	50	8	M8	4	10	74
40 1 1/2"	73	10	53	12	22	165	35	50	8	M8	4	12	78
50 2"	92	16	68	12	32	178	49.5	70	12	M8	4	12	105
80 3"	122	16	68	12	32	203	49.5	70	12	M8	4	15	117
100 4"	157	22	92	17	42	229	72	102	16	M10	4	15	172
150 6"	206	22	98	17	42	267	72	102	16	M10	4	15	190

TORQUE RATING				
SIZE NB	0 psi p		150 psi p	
	In. Lbs.	NM.	In. Lbs.	NM.
25 1"	50	5.5	50	5.5
40 1 1/2"	125	14	170	19
50 2"	135	15	170	19
80 3"	325	37	570	64
100 4"	663	75	814	92
150 6"	1080	122	1795	203

DIMENSION / WEIGHT DETAILS IN ACCORDANCE WITH ANSI B16.10:

SIZE NB	L		H		R		I.D		t (lining thk.)		FLG.DIM AS PER ANSI B16.5 ASA 150 LBS				
	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	OD MM	PCD MM	HOLEØ MM	THK. MM	WEIGHT KG.
25 * 1"	127	5.0	115	4.53	160	6.30	20	0.79	3.5	0.14	108.0	79.2	16 X 4	11.17	4.900
40 1 1/2"	165	6.5	120	4.71	160	6.30	25	0.98	3.5	0.14	127.0	98.6	16 X 4	14.22	7.400
50 2"	178	7.0	155	6.11	215	8.47	40	1.58	4.0	0.16	152.4	120.7	19 X 4	15.70	11.240
80 3"	203	8.0	168	6.62	215	8.47	50	1.97	4.0	0.16	190.5	152.4	19 X 4	19.00	16.340
100 4"	229	9.0	205	8.07	313	12.32	80	3.15	4.0	0.16	228.6	190.5	19 X 8	23.80	30.780
150 6"	267	10.50	230	9.06	313	12.32	100	4.0	4.0	0.16	279.4	241.3	22 X 8	25.40	52.000

* IN 15NB VALVES LENGTH WILL BE INCREASED BY 40mm.(15 NOS)

VALVE MATERIAL SPECIFICATION :-

ITEM	QTY.	DESIGNATION	MATERIAL
01	1	BODY	DUCTILE IRON A395 GR.60-40-18/A216 GR.WCB(for 25NB)-PFA LINED
02	1	SIDE PIECE	DUCTILE IRON A395 GR.60-40-18/A216 GR.WCB(for 25NB)-PFA LINED
03	1	STEM	SS AISI 410-PFA LINED
04	1	BALL *	DUCTILE IRON A395 GR.60-40-18/351 GR.CF8-PFA LINED
05	1	GLAND FOLLOWER	SS ASTM A 351 CF 8
06	1	GROUNDING DEVICE	SS AISI 316
07	1	STOPPER	SS AISI 304
08	1	HAND LEVER	ASTM A395 GR.60-40-18/A216 GR.WCB
09	1	HEXAGON BOLT	ASTM A193 B8 / SS AISI 304
10	1	PLAIN WASHER	ASTM A193 B8 / SS AISI 304
11	2	STUD BOLT	ASTM A193 B8 / SS AISI 304
12	4/6	HEXAGON BOLT/ STUD	ASTM A193 B7 / SS AISI 304
13	2	SEAT RING	PTFE (VIRGIN)
14	5	PACKING	CHEVRON PTFE
15	1	GLAND BUSH	PTFE GRAPHITE

* Ceramic ball (Al2O3) available for ball valves sizes 25 NB through 150 NB.

FLOW RATE		
SIZE	CUM / HR	US Gallons/min
25 1"	5.4	24
40 1 1/2"	9.0	40
50 2"	42.0	185
80 3"	43.8	193
100 4"	133.5	588
150 6"	238.5	1050

MANUFACTURING STANDARD
1) FACE TO FACE : AS PER ANSI B16.10
2) FLANGE DIMENSION : AS PER ANSI B16.5
3) LINING : AS PER ASTM F1545-95

TESTING STANDARD : API 598

DESIGN STANDARD : BS-5351

CONSTRUCTION OF VALVE : 2 PIECE DESIGN BALL VALVE

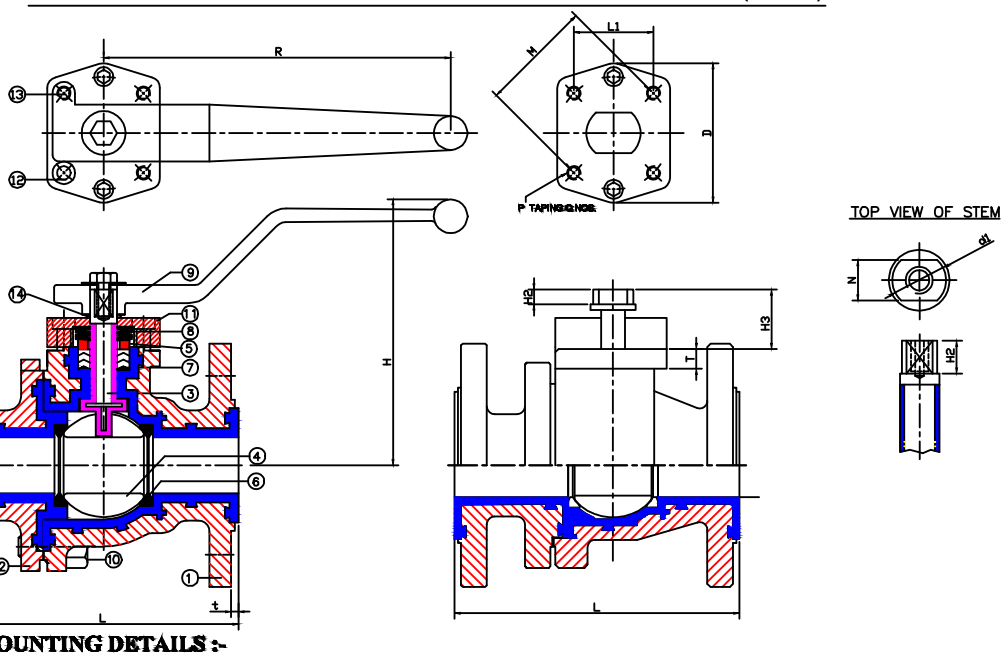
TESTING DETAIL'S :
1) SHELL TEST – HYDRO TEST AT 30Kg/cm²(400 PSI)
2) SEAT TEST – PNEUMATIC TEST AT 7Kg/cm²
3) SPARK TEST – 25 KVA.

HORIZON POLYMER

HORIZON POLYMER ENGINEERING PVT. LTD.
WORKS :- C1 -B, 1650/1618, GIDC INDL. ESTATE, CHHATRAL, DIST. GANDHINAGAR (N.G) - 382 729
OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

ANSI B16.10/ANSI B16.5- 150 LBS.
SIZE 25 -100 NB

TECHNICAL DATA SHEET - FULL BORE BALL VALVE (ANSI)



ACTUATOR MOUNTING DETAILS :-

SIZE NB	d1	D	H2	H3	L1	M	N	P	Q	T
25 1"	10	53	12	22	35	50	8	M8	4	12
40 1 1/2"	16	68	12	32	49.5	70	12	M8	4	12
50 2"	16	68	12	32	49.5	70	12	M8	4	15
80 3"	22	92	17	42	72	102	16	M10	4	15
100 4"	22	98	17	42	72	102	16	M10	4	15

TORQUE RATING				
SIZE NB	0 psi △ P		150 psi △ P	
	In. Lbs.	NM.	In. Lbs.	NM.
25 1"	75	8	75	8
40 1 1/2"	135	15	170	19
50 2"	325	37	355	40
80 3"	575	65	620	70
100 4"	1080	122	1795	203

DIMENSION / WEIGHT DETAILS IN ACCORDANCE WITH ANSI B16.10 :-

SIZE NB	L		H		R		ID		t		WEIGHT
	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	KG.
25	127	5.0	86	3.39	160	6.299	25	1	3.5	0.14	4.30
40	165	6.5	111	4.37	215	8.464	40	1.5	4.0	0.16	8.86
50	178	7.0	125	4.92	215	8.464	50	2	4.0	0.16	11.70
80	203	8.0	175	6.89	313	12.322	80	3	4.0	0.16	21.80
100	229	9.0	210	8.27	313	12.322	100	4	4.0	0.16	39.00

VALVE MATERIAL SPECIFICATION :-

ITEM	QTY.	DESIGNATION	MATERIAL
1	1	BODY	DUCTILE IRON A395 –PFA/FEP/PVDF
2	1	SIDE PIECE	DUCTILE IRON A395 –PFA/FEP/PVDF
3	1	STEM	SS AISI 410 PFA/FEP/PVDF
4	1	BALL *	SS304 CF8/A216 WCB/DUCTILE IRON A395 –PFA/FEP/PVDF
5	1	GLAND BUSH	S.S. 304+GRAPHITE
6	2	SEAT RING	PTFE–TFM
7	5	GLAND PACKING	PTFE CHEVRON RING
8	1	BILEVILE SPRING	STAINLESS STEEL
9	1	HAND LEVER	ASTM A395/A 216 Gr. WCB
10	4/6	HEXAGON BOLT/STUD	ASTM A193 B7 / SS AISI 304
11	1	GLAND FLANGE	SS AISI 304 / CF8
12	1	STOPPER PIN	SS AISI 304
13	1	LOCKING ARRANGEMENT	SS AISI 304
14	1	ANTISTATIC DEVICE	SS AISI 304

*Ceramic ball (Al_2O_3) available for ball valves sizes 25 NB through 100 NB.

FLOW RATE		
SIZE	CUM / HR	US Gallons/min
25 1"	9.0	40
40 1 1/2"	42.0	185
50 2"	43.8	193
80 3"	133.5	588
100 4"	238.5	1050

MANUFACTURING STANDARD
1) FACE TO FACE : AS PER ANSI B16.10
2) FLANGE DIMENSION : AS PER ANSI B16.5
3) LINING : AS PER ASTM F1545–95

TESTING STANDARD : API 598

DESIGN STANDARD : BS–5351

CONSTRUCTION OF VALVE : 2 PIECE DESIGN BALL VALVE

TESTING DETAILS :
1) SHELL TEST – HYDRO TEST AT 30Kg/cm²(400 PSI)
2) SEAT TEST – PNEUMATIC TEST AT 7Kg/cm²
3) SPARK TEST – 25 KVA.

HORIZON POLYMER

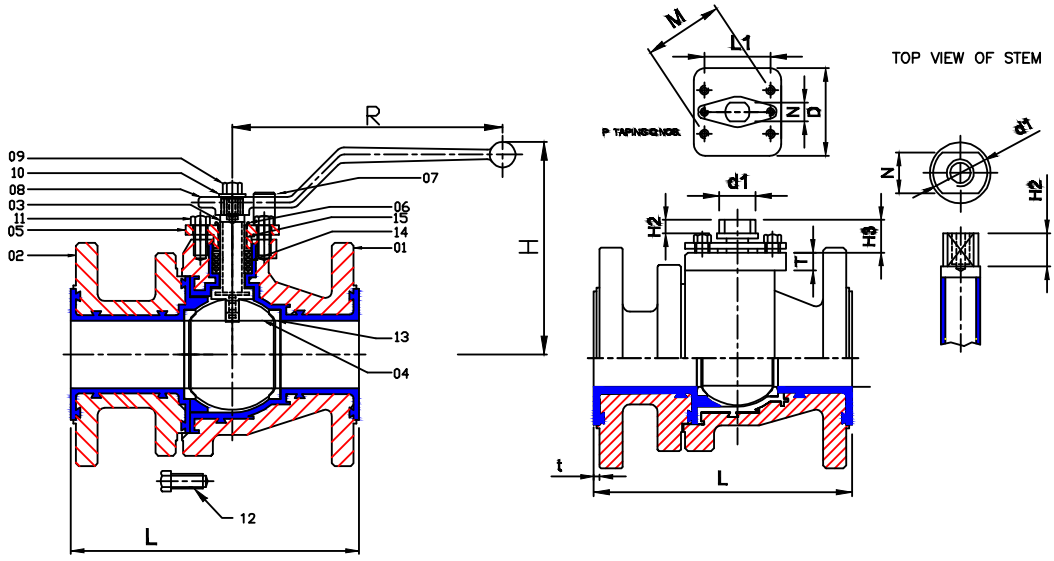
HORIZON POLYMER ENGINEERING PVT. LTD.

WORKS :- C1 -B, 1650/1618, GIDC INDL. ESTATE, CHHATRAL, DIST. GANDHINAGAR (N.G) - 382 729

OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

DIN 3202 /F1/DIN2501/ PN16
SIZE 25 -100 NB

TECHNICAL DATA SHEET - FULL BORE BALL VALVE (DIN)



ACTUATOR MOUNTING DETAILS :-

SIZE NB	d1	D	H2	H3	L1	M	N	P	Q	T	TORQUE RATING SIZE NB	0 psi △P In. Lbs.	0 psi △P NM.	150 psi △P In. Lbs.	150 psi △P NM.
25 1"	10	53	12	22	35	50	8	M8	4	12	25 1"	125	14	170	19
40 1 1/2"	16	68	12	32	49.5	70	12	M8	4	12	40 1 1/2"	135	15	170	22
50 2"	16	68	12	32	49.5	70	12	M8	4	15	50 2"	325	37	570	48
80 3"	22	92	17	42	72	102	16	M10	4	15	80 3"	663	65	814	70
100 4"	22	98	17	42	72	102	16	M10	4	15	100 4"	1080	122	1795	203

DIMENSION / WEIGHT DETAILS IN ACCORDANCE WITH DIN 3202 / F1

SIZE NB	L MM	L INCH	H MM	H INCH	R MM	R INCH	D MM	D INCH	t MM	t INCH	WEIGHT KG.
25 1"	160	6.299	120	4.724	160	6.299	25	1	3.5	0.14	6.20
40 1 1/2"	200	7.874	145	5.708	215	8.464	40	1.5	4.0	0.16	12.00
50 2"	230	9.055	160	6.299	215	8.464	50	2	4.0	0.16	17.00
80 3"	310	12.204	205	8.070	313	12.322	80	3	4.0	0.16	35.50
100 4"	350	13.779	220	8.661	313	12.322	100	4	4.0	0.16	51.50

VALVE MATERIAL SPECIFICATION :-

ITEM	QTY.	DESIGNATION	MATERIAL
01	1	BODY	DUCTILE IRON A395 - PFA / FEP / PVDF
02	1	SIDE PIECE	DUCTILE IRON A395 - PFA / FEP / PVDF
03	1	STEM	SS AISI 410 - PFA / FEP / PVDF
04	1	BALL *	SS 304 CF8 /A216 WCB / DUCTILE IRON A395 - PFA / FEP / PVDF
05	1	GLAND FOLLOWER	SS ASTM A 351 CF8
06	1	GROUNDING DEVICE	SS AISI 316
07	1	STOPPER	SS AISI 304
08	1	HAND LEVER	ASTM A395/A 216 Gr. WCB
09	1	HEXAGON BOLT	ASTM A193 B8 / SS AISI 304
10	1	PLAIN WASHER	ASTM A193 B8 / SS AISI 304
11	2	STUD BOLT	ASTM A193 B8 / SS AISI 304
12	4/6	HEXAGON BOLT/ STUD	ASTM A193 B7 / SS AISI 304
13	2	SEAT RING	PTFE-TFM
14	5	PACKING	CHEVRON PTFE
15	1	GLAND BUSH	PTFE GRAPHITE

* Ceramic ball (Al_2O_3) available for ball valves sizes 25 NB through 100 NB.

FLOW RATE

SIZE	CUM / HR	US Gallons/min
25 1"	9.0	40
40 1 1/2"	42.0	185
50 2"	43.8	193
80 3"	133.5	588
100 4"	238.5	1050

MANUFACTURING STANDARD
1) FACE TO FACE : AS PER ANSI B16.10
2) FLANGE DIMENSION : AS PER ANSI B16.5
3) LINING : AS PER ASTM F1545-95

TESTING STANDARD : API 598

DESIGN STANDARD : BS-5351

CONSTRUCTION OF VALVE : 2 PIECE DESIGN BALL VALVE

TESTING DETAILS :
1) SHELL TEST - HYDRO TEST AT 30Kg/cm²(400 PSI)
2) SEAT TEST - PNEUMATIC TEST AT 7Kg/cm²
3) SPARK TEST - 25 KVA.

HORIZON POLYMER

HORIZON POLYMER ENGINEERING PVT. LTD.

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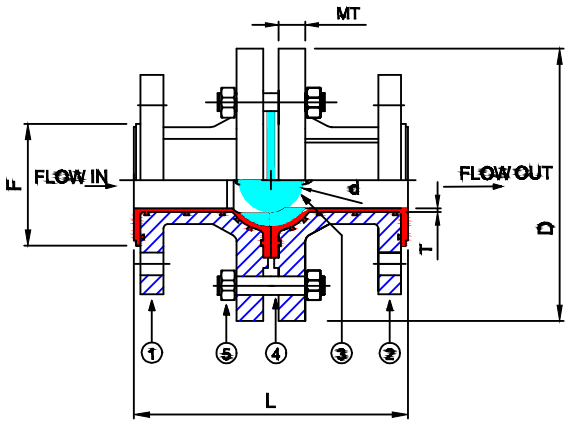
OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

TECHNICAL DATA SHEET - LINED BALL CHECK VALVE



DIMENSION / WEIGHT DETAILS IN ACCORDANCE WITH ANSI B16.10:

SIZE NB		d		L		D		F	LINING THK. T	MID.FLG. THK. MT	FLG.DIM AS PER ANSI B16.5 ASA 150 LBS				WEIGHT	
		MM	INCH	MM	INCH	MM	INCH	MM	MM	MM	OD MM	PCD MM	HOLEØ MM	THK. MM	KG.	
25	1"	30	1.181	152	6.0	140	5.512	51	3.5	12	108.0	79.2	16 X 4	11.17	5.00	
40	1½"	50	1.969	178	7.0	165	6.496	72	3.5	15	127.0	98.6	16 X 4	14.22	8.35	
50	2"	60	2.362	203	8.0	185	7.283	92	3.5	15	152.4	120.7	19 X 4	15.70	11.40	
80	3"	100	3.973	241	9.5	250	9.843	127	4.0	17	190.5	152.4	19 X 4	19.00	22.00	
100	4"	125	4.921	292	11.5	285	11.220	157	4.0	19	228.6	190.5	19 X 8	23.80	38.00	
150	6"	180	7.087	356	14.0	395	15.551	206	4.0	22	279.4	141.3	22 X 8	25.40	70.00	

VALVE MATERIAL SPECIFICATION :-

ITEM	QTY.	DESIGNATION	MATERIAL
01	1	BODY PIECE	DUCTILE IRON A395 GR.60-40-18/A-216 GR.WCB, PFA LINED
02	1	SIDE PIECE	DUCTILE IRON A395 GR.60-40-18/A-216 GR.WCB, PFA LINED
03	1	BALL	PTFE AND FLOATING IN CONTRUCTION
04	1	STUD BOLTS	ASTM A193 B7 / SS AISI 304
05	1	HEXAGONAL NUT	ASTM A193 B7 / SS AISI 304

TEST (After Lining & Assembly):-

BODY HYDRO TEST	30 Kg/cm² (400 PSI)
SEAT AIR TEST	7KGS/CM SQUARE
SPARK TEST	25 KV

MANUFACTURING STANDARD 1) FACE TO FACE : AS PER ANSI B16.10 2) FLANGE DIMENSION : AS PER ANSI B16.5 3) LINING : AS PER ASTM F1545-95
TESTING STANDARD : API 598
DESIGN STANDARD : BS-5351
CONSTRUCTION OF VALVE : 2 PIECE DESIGN BALL VALVE
DETAIL OF SEAT : AS LINED ITSELF

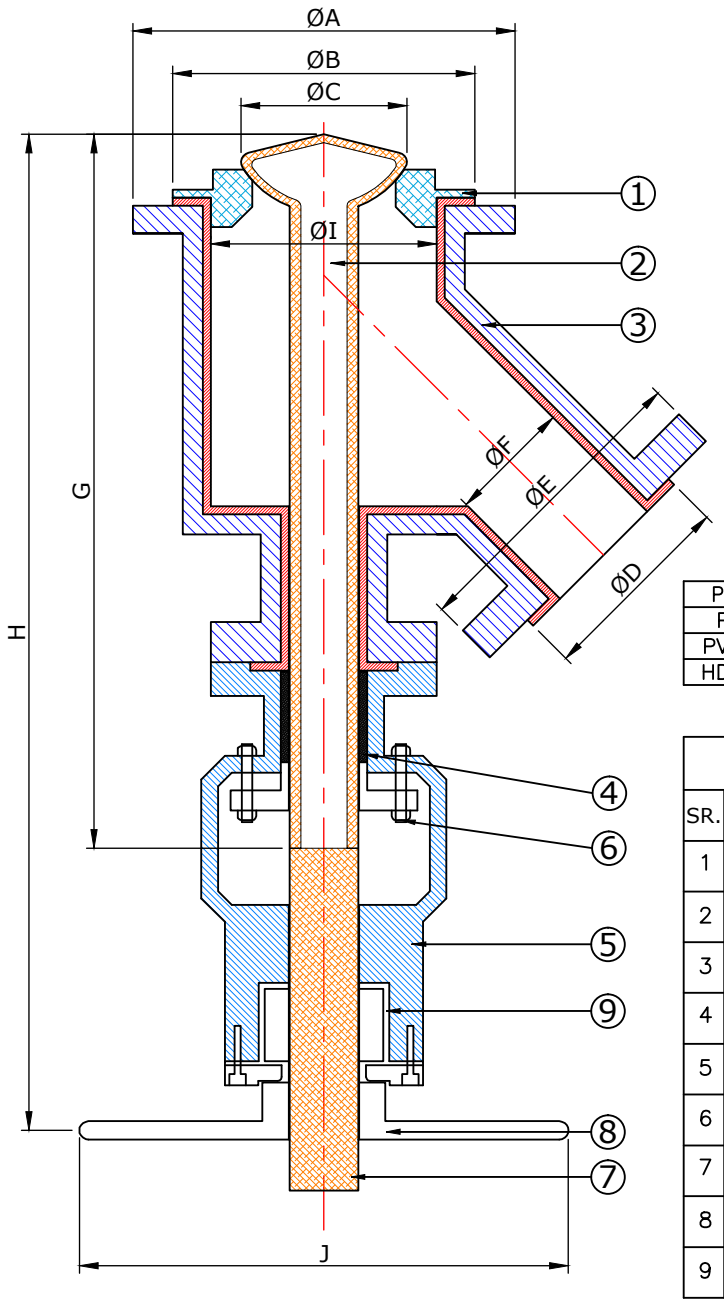
HORIZON POLYMER

HORIZON POLYMER ENGINEERING PVT. LTD.

WORKS :- C1 -B, 1650/1618, GIDC INDL. ESTATE, CHHATRAL, DIST. GANDHINAGAR (N.G) - 382 729

OFFICE :- 204/205, SUMER KENDRA,PANDURANG BHUDHKAR MARG, WORLI, MUMBAI-400 018. INDIA

TECHNICAL DATA SHEET - FLUSH BOTTOM VALVE



Test Pressure :

Body Test : 10kg/cm^2(Hyd.)

Seat Test : 10kg/cm^2(Hyd.)

PFA	ASTM D 3307	ASTM F1545–2003
PP	ASTM D 4101	
PVDF	ASTM D 3222	
HDPE	ASTM D 3350	

BILL OF MATERIAL

SR.	PART NAME	MATERIAL
1	Valve Seat	PTFE
2	Spindle	CS/SS+PFA/PP/PVDF/HDPE LINED
3	Body	CI/DI/WCB/SS + PFA/PP/PVDF/HDPE LINED
4	Gland	PTFE
5	Bonnet	CI / DI / WCB / SS
6	Fastennrs	MS / SS
7	Serew	MS / SS
8	Wheel	CI / DI / WCB / SS
9	Wheel Nut	MS / SS

Size	A	B	C	D	E	F	G	H	I	J
50 x 25	152	90	40	100	108	25	150	220	50	150
80 x 50	190	127	70	160	152	50	330	430	78	200
100 x 80	230	160	88	220	190	75	400	500	100	200
150 x 100	305	210	140	320	230	100	500	600	150	250

HORIZON POLYMER

HORIZON POLYMER ENGINEERING PVT. LTD.

WORKS :- C1 -B, 1650/1618, GIDC INDL. ESTATE, CHHATRAL, DIST. GANDHINAGAR (N.G) - 382 729

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