

ULTIMATE SOLUTION FOR CORROSIVE FLUID TRANSFER



# PRODUCT CATALOGUE



























*Borolab*







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## GENERAL SPECIFICATION

### PIPE LINES

Size Available	: 25 NB to 300 NB
Spool Length (Max.)	: 3000 mm
Type of end Connection	: Both sides fixed or one side fixed and one side loose flange
Pipe Specification	: Carbon Steel Seamless Pipes Confirming to ASTM A – 106 Gr. B, Sch.40
Lining	: PTFE Lined Extruded from Virgin PTFE Granules Thickness 3.5 mm for pipe lines up to 50 NB 4.5 - 5 mm for pipe lines 80 NB up to 200 NB 6 mm for pipes 200 NB up to 300 NB Lining Tolerance: $\pm 1.0$ mm
Earthing Provision	: On request

### PTFE LINED SPACER

Size Available	: 25 NB to 300 NB
Length of spacer	: 25 mm to 60 mm
Spacer Specifications	: CS Plate Flanges as per ASTM A- 105
Liner	: PTFE conforming to ASTM: D - 1457, Type-III, Class-2 / ASTM: D-4895, Type-I GR III Class C
Lining	: PTFE Lined Extruded from Virgin PTFE Granules Thickness 3.5 mm for pipe lines up to 50 NB 4.5 - 5 mm for pipe lines 80 NB up to 200 NB 6 mm for pipes 200 NB up to 300 NB Lining Tolerance : $\pm 1.0$ mm

### PTFE – SOLID TYPE SPACER

Size Available	: 25 NB to 300 NB
Length of spacer	: 05 mm to 25 mm
Spacer Specifications	: PTFE – Extruded Bush or Moulded Bush Conforming to ASTM: D-1457
Liner	: PTFE conforming to ASTM: D 1457, Type-III, Class-2 / ASTM: D-4895, Type-I GR III Class C

### ELBOW

Size Available	: 25 NB to 300 NB
Standard Degrees	: 90 and 45
Type of end Connection	: Both sides fixed flanges
Earthing Provision	: On request
Material	: Formed and Fabricated from CS Seamless pipe ASTM A-106 Gr.B, Sch. 40. Flanges made from IS 2062 plates and dimensions as per ANSI B 16.5 Class 150#
Lining	: PTFE Lined Extruded from Virgin PTFE Granules Thickness 3.5 mm for pipe lines up to 50 NB 4.5 - 5 mm for pipe lines 80 NB up to 150 NB Lining Tolerance: $\pm 1.0$ mm Moulded FEP/PFA for sizes from 200 NB and above 3-4 mm thick.



## GENERAL SPECIFICATION

### EQUAL AND UN-EQUAL TEE / CROSS

Size Available	: 25 NB to 300 NB
Type of end Connection	: Fixed flange
Earthing Provision	: On request
Material	: Sizes upto 150 NB SG Iron Casting As per IS 1865:1991 Gr. 400/15 and ASTM A-395. 200 NB to 300 NB fabricated from pipe & flanges from plate
Lining	: FEP / PFA Moulded 4 mm thick with a tolerance of $\pm 1.0$ mm

### CONCENTRIC / ECCENTRIC REDUCER

Size Available	: 25 NB to 300 NB
Type of end Connection	: Fixed flange
Earthing Provision	: On request
Material	: Upto 150 NB reducers SG Iron Casting as per IS 1865 : 1991 Gr. 400/15. 200 NB to 300 NB fabricated from pipe & flanges from IBR plate conforming to IS 2062 and dimensions as per ANSI B 16.5 CLASS 150#
Lining	: FEP / PFA Moulded 4 mm thick with a tolerance of $\pm 1.0$ mm

### REDUCING FLANGE

Size Available	: 25 NB to 300 NB
Earthing Provision	: On request
Material	: Upto 150 NB reducing flange SG Iron Casting as per IS 1865 : 1991 Gr. 400/15. 200 NB to 300 NB fabricated from pipe & flanges from IBR plate conforming to IS 2062 and dimensions as per ANSI B 16.5 CLASS 150#
Lining	: FEP / PFA Moulded 4 mm thick with a tolerance of $\pm 1.0$ mm

### INSTRUMENT TEE

Size Available	: 25 NB to 300 NB F/F: 51 mm and 40 NB to 200 NB F/F: 76 mm
Earthing Provision	: On request
End Connection	: Flanges as per ANSI 150#
Material	: Upto 150 NB Instrument Tee SG Iron Casting as per IS 1865 : 1991 Gr. 400/15. 200 NB to 300 NB fabricated from pipe & flanges from IBR plate conforming to IS 2062 and dimensions as per ANSI B 16.5 CLASS 150#
Lining	: FEP / PFA Moulded 4 mm thick with a tolerance of $\pm 1.0$ mm

### BLIND FLANGE

Size Available	: 25 NB to 300 NB
Earthing Provision	: On request
Material	: Upto 150 NB Blind flange SG Iron Casting as per IS 1865:1991 Gr. 400/15. 200 NB to 300 NB fabricated from pipe & flanges from IBR plate conforming to IS 2062 and dimensions as per ANSI B 16.5 CLASS 150#
Lining	: FEP / PFA Moulded 4 mm thick with a tolerance of $\pm 1.0$ mm



## PTFE (POLY TETRA FLUORO ETHYLENE) PROPERTIES

PTFE grade used are as per ASTM D 1457 Type III and ASTM D 4895 standard

Mechanical	Value	Test Method
1. Density	2.156 - 2.18 g/cm <sup>3</sup>	As per DN 53479
2. Tensile Strength	≥ 26 N/mm <sup>2</sup>	As per DN 53455
3. Elongation at Break	≥ 275%	As per DN 53455
4. Hardness	55-60 Shore'D'	As per DN 53516

Thermal	Value	Test Method
1. Melting Point	320 - 340° C	As per ISO 12086
2. Temperature Strength	-200 to 260° C	
3. Coefficient of Linear Expansion	20° C - 100° C 16 x 10 <sup>-5</sup> K <sup>-1</sup> 20° C - 200° C 19.5 x 10 <sup>-5</sup> K <sup>-1</sup> 20° C - 300° C 25 x 10 <sup>-5</sup> K <sup>-1</sup>	As per DIN 53328
4. Softening Point	110° C	As per DIN 53640
5. Conductivity	0.25 W / mk	As per DIN 52612
6. Flammability	Non Flammable	
7. Specific Heat at 0° C	0.96 kj / kg x k	
8. Specific Heat at 50° C	1.05 kj / kg x k	

Electrical	Value	Test Method
1. Dimensional Strength (film 0.2 mm Thick)	40 - 80 kv / mm	As per VDE 0303 part 2
2. Dielectric Constant From 50 - 10 <sup>7</sup> Hz	2.1	As per DIN 53483
3. Volume Resistivity	10 <sup>18</sup> Ω x cm	As per DIN 53482
4. Surface Resistivity	≥ 10 <sup>17</sup> ?	As per DIN 53482
5. Arc Resistance	L 4 Degree	As per VDE 0303 part 5

Others	Value	Test Method
1. Water Absorption	≤ 0.01 %	As per DIN 53495
2. Weather Resistance	Excellent	
3. Chemical Resistance	Excellent	
4. Coefficient of Permeability	2 - 8 x 10 <sup>-7</sup> cm <sup>3</sup> .cm/cm.sec.bar	
5. FDA Compliant	Yes	21 CFR 1771550
6. UL Listed	Yes	File 54681 QMFZ2

## POLYMER LINING

### WHY PTFE / FEP / PFA LINING

The Chemical Process Industry (CPI) faces many challenges while highly corrosive and pure media both while processing and while treating the process wastes and effluents. The combination of elevated temperatures and pressures affects severely the life of conventional systems and successful containment of corrosion needs alternative systems which are cost effective, safe and environmentally responsible.

These conditions have created need for more corrosion resistance equipments and piping suitable for aggressive chemicals and multi-component mixture irrespective of composition over a wide range of pH. There are materials which can solve most of the corrosion problems; however, some process conditions exceed the capabilities of even the most expensive and exotic metals and alloys.

As an alternative, Fluoropolymers as these materials are generally called, provide successful containment facilities in most of the cases. Fluoropolymers are highly corrosion resistant to a wider range of chemicals at varying concentrations and pH.

	PTFE	PFA	FEP
Theoretical maximum Temperature	260°C	260°C	205°C
Recommended Difference between maximum Temperature	200°C	200°C	160°C

Solvents	No Known impact	
Corrosion Resistance	Virtually all chemicals except fluorine & its compounds and violent reducing agents like metallic sodium and molten alkali metals.	Refer detailed corrosion resistance chart to ensure chemical compatibility



## SELECTION CRITERIA OF FLUOROPOLYMER

Selection of the right engineering plastic material for hazardous or corrosive fluids is the most essential element in the process industry. Certain special conditions may affect the performance or service life of the fluoropolymer. For the proper selection of plastic lined products, the following information should be taken into consideration.

### 1. APPLICATION

- Primary chemical and its concentration
- Secondary chemicals and their concentration
- Trace chemicals and Impurities present
- Presence of solids
- Flow rates
- Fluid purity requirements (metal ions, pigments)

### 2. OPERATING CONDITIONS

- Normal operating temperature and range
- Peak temperature during start ups, shut downs or disturbed conditions
- Mixing Areas (Exothermic or heat of mixing temperature condition)
- Normal operating pressure and range
- Peak pressure during start ups, shut downs or disturbed conditions
- Vacuum conditions and range
- Vacuum conditions during start ups, shut downs or disturbed conditions
- Cyclic conditions from batch operations, start ups, shut downs or disturbed conditions
- Line cleaning method (chemical, steam, high pressure water, pigging)

Selection of fluoropolymer with above guideline is essential to avoid certain phenomenal problems in the plastic lined products like Permeation and Environmental Stress Cracking.

### PERMEATION

Permeation is the small molecular transport through the plastic liner. Permeation is a combination of absorption, diffusion, desorption and solution mechanisms. It is a function of several variables including the properties of the permeating species (i.e. molecular size, solubility, parameters, concentration), properties of the plastics (i.e. crystallinity, density, thickness, thermal history) and operation parameters (i.e. temperature pressure gradients and cycling). Permeation data published in literature refers to thin coatings or films and should not be applied to plastic-lined products.

All fluoropolymer lined products are subject to some permeation of certain fluids. Normally PTFE lined products in conjunctions with the fluids having permeation in PTFE are substituted by other type of fluoropolymer to avoid permeation phenomenon.

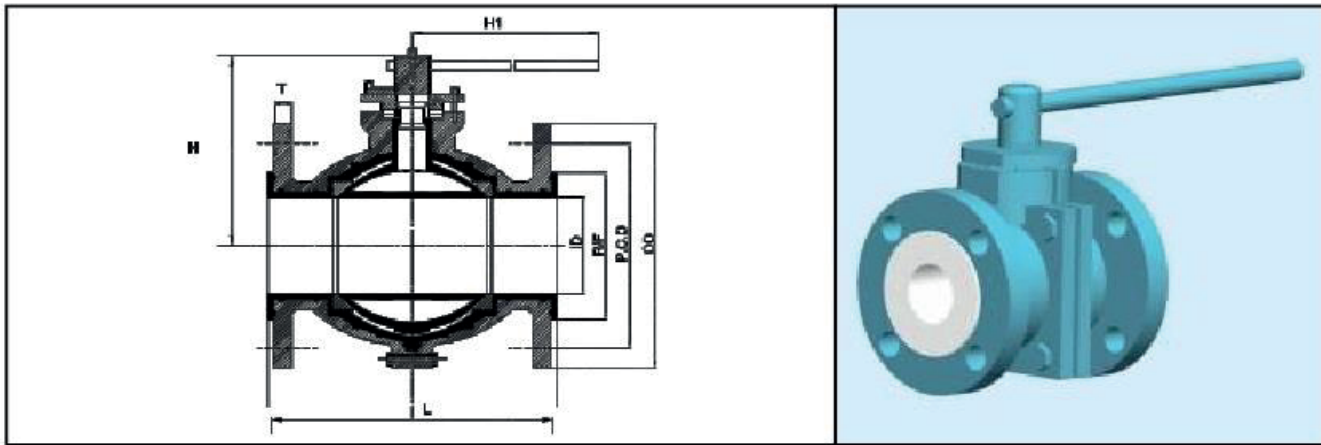
### ENVIRONMENTAL STRESS CRACKING

(ESC) Environmental Stress Cracking is well known but not always well understood phenomenon with plastics. ESC occurs in plastic lined parts when liner is exposed to a chemical under mechanical or thermal stress. ESC can lead to failures at stresses below tensile strength of the plastic material. In some instances, the presence of contaminant may act as accelerator. For example, iron or copper contamination in conc. Sulphuric or hydrochloric acid can result in stress cracking of PP (Polypropylene) liners. All plastics, including PTFE are known to be susceptible to ESC.

The occurrence of ESC is hard to predict. It is dependent on the chemistry of process, operating conditions, physical system layout and quality of field fabrication. If the chosen fluoropolymer may be susceptible to ESC with a specific chemical, that does not mean the particular fluoropolymer will not work, but additional data must be gathered to ensure that the liner is compatible with the chemical.



## PTFE (FEP/PFA) LINED BALL VALVE



Valve Size	L	H	H1	T	OD	ID	R/F	P. C. D.	Holes Dia.	No. of Hole
(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	
15	108	100	175	11.5	88.9	12.5	35.0	60.3	16.0	4
25	127	100	175	12.6	108.0	25.0	51.0	79.4	16.0	4
40	165	125	205	16.0	127.0	40.5	73.0	98.4	16.0	4
50	178	130	300	17.5	152.4	50.0	92.0	120.6	19.0	4
65	190	150	300	20.7	177.8	64.0	105.0	139.7	19.0	4
80	203	170	400	22.2	190.5	77.0	127.0	152.4	19.0	4
100	229	230	480	23.2	228.6	100.0	157.0	190.5	19.0	8
150	267	300	550	24.0	279.4	148.0	215.0	241.3	22.2	8

### HOUSING MATERIAL

Body : Ductile Iron GGG40.3 / ASTM A395. , Cast Steel ASTM A216 Gr. WCB, Cast Iron IS2108 FG 260  
 Liner : a) FEP (PTFE) – ASTM D 2116, Type IV,  
 b) PFA (PTFE) – ASTM D 3307, Type II,

### OPTIONS

Flanges : As per ANSI B16.5 / B 16.42  
 Body : WCB / SS 304 / SS 306  
 Drilling : ASA #150 / DIN 2632/2633/ BS 10 Table D, E or F / Customer Specification

### DESIGN SPECIFICATION

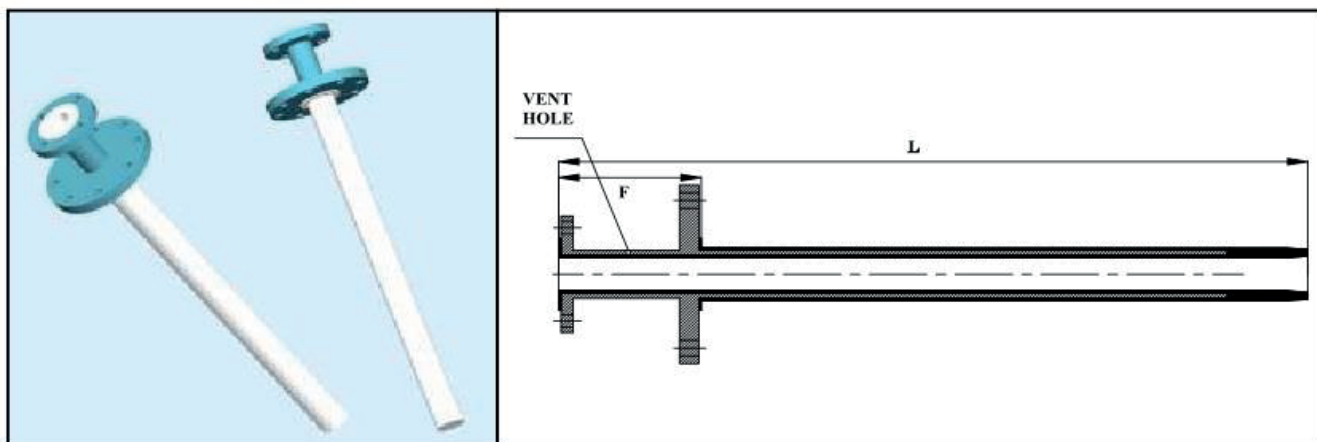
Face to face : ANSI B 16.10 / DIN / 3202 / BS EN 558 – 1/2  
 Lining Thickness : 3 to 5 mm

### TEST & INSPECTION DATA

Hydraulic Test : Body - 20 kg/cm<sup>2</sup>, Seat - 11 kg/cm<sup>2</sup>  
 Pneumatic Test : 6 kg/cm<sup>2</sup>  
 Spark Test : 15 KV D.C.



## LINED DIP PIPE



Pipe Nominal Bore / Process flange Size (NB)		Face to Face (F) Min.	Total Length (L) Mix.	PTFE Liner Thickness	Pipe Schedule	Vessel Flange Schedule		NB Min. Inlet Nozzle ID
(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	Min.(mm)	Max.(mm)	(mm)
25	1	60	3000	2.5	40	40	600	45
40	1.5	70	3000	2.8	40	50	600	60
50	2	75	3000	3.0	40	80	600	73
80	3	85	3000	3.0	40	100	600	101
100	4	90	2800	4.5	40	150	600	130

### PRODUCT FEATURES

All wetted parts PTFE Lined, giving optimum corrosion resistance

Liner Construction : Single piece, past extruded PTFE  
Carbon Steel construction providing good mechanical strength

### AVAILABLE DIP PIPE

- Lined Dip Pipe with Sparger
- Lined Slanted (Angular) Dip Pipe
- Lined 'J' type Dip Pipe
- PTFE solid 'J' type Dip Pipe
- Solid PTFE & PTFE Lined feed pipe for Columns

### HOUSING MATERIAL

- Pipe : ANSI B 36.10, ASTM A 106 Gr. B schedule 40
- Flanges : ANSI B 16.5 ASA 150#, ASTM A 105
- Liner : PTFE In accordance with ASTM D 1457

### OPTIONS

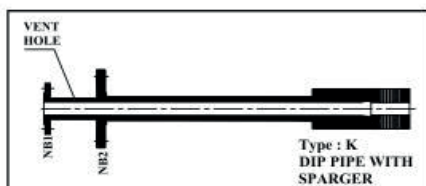
- Flange : Fixed/Rotating, PN 10/16, BS 10, Table D/E
- Liner : PTFE
- Extras : Earthing Studs / Lugs Vent Extensions

### DESIGN SPECIFICATION

- Flange : As per ANSI B 16.5/B 16.42
- Face to face : As per ANSI B 16.5 # 150
- Lining Thickness : 3 to 5 mm
- Other Flange Drilling like DIN PN 2632/2633, BS 10 Table D, E or F are also available on request

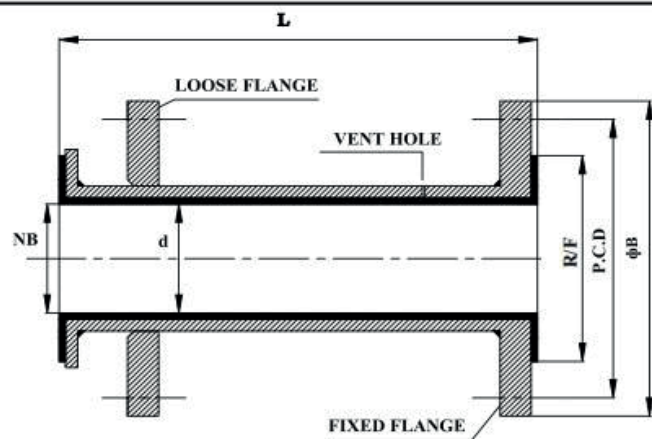
### TEST & INSPECTION DATA

- Hydraulic Test : 20 kg/cm<sup>2</sup> After Lining
- Spark Test : 15 KV D.C. After Lining





## LINED SPOOL PIPE



Nominal Bore (NB)		Internal Dia. (d)	PTFE Liner Thickness (t)	FLANGE P. C. D	Flange Hole Dia.	Raised Face Dia. (R/F)	Max. Length	Pipe Schedule
mm	Inches	(± 1 mm)	(mm)	(mm)	(mm)	(mm)	(mm)	
25	1	19.5	3.3	79.4	15.9	51	3000	40
40	1.5	33.8	3.3	98.4	15.9	73	3000	40
50	2	45.4	3.3	120.6	19.0	92	3000	40
80	3	70.8	3.3	152.4	19.0	127	3000	40
100	4	95.2	3.8	190.5	19.0	157	3000	40
150	6	145.1	4.5	241.3	22.2	216	3000	40
200	8	197.4	5.0	298.4	22.2	270	3000	30
250	10	249.3	6.0	362.0	25.4	324	3000	30
300	12	300.1	6.0	431.8	25.4	381	3000	30

### HOUSING MATERIAL

- Pipe : 1. Seamless Carbon Steel ASTM A 106 Gr. B.Sch-40  
 2. ASTM A 312 TP 304, Sch-40
- Flanges : 1. Made from Is 2062 Plates / ASTM A 105  
 2. ASTM A 351 Gr.CF8
- Liner : PTFE In accordance with ASTM D 1457

### OPTIONS

- Pipe : Jacketed Spool Pipe can be supplied on request
- Flanges : DIN PN 10 / 16, BS 10, ASME 300, Mixed
- Material : Stainless Steel
- Extras : Earthing Studs / Lugs Vent Extensions

### NOTE

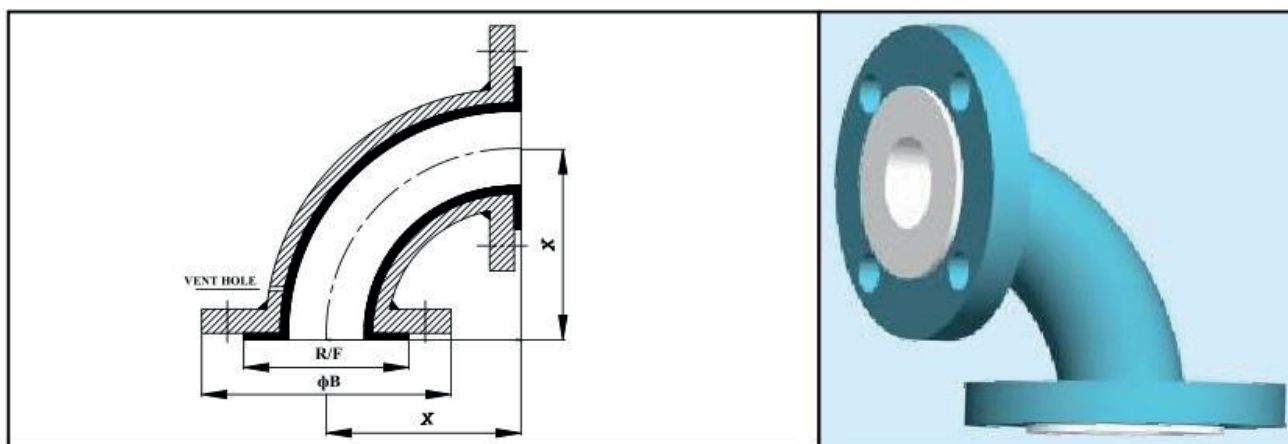
Special heavy duty PTFE Liners available for full vacuum. Details can be provided on request Other flanges drilling like DIN 2632 / 2633, BS 10 Table D, E o F are also available on request. Tolerance: ± 3.5 mm (0 to 1 mtr.) and ± 5.0 mm (1 to 3 mtr.).

### TEST & INSPECTION DATA

- Hydraulic Test : 20 kg/cm<sup>2</sup> After Lining
- Spark Test : 15 KV D.C. After Lining



## 90° LINED ELBOW



Nominal Bore (NB)		Center Line to face (X)	Flange OD (φB)	Raised Face Dia (R/F)	Liner Thickness	Steel Thickness
(mm)	Inches	(mm)	(mm)	(mm)	(mm)	(mm)
25	1	89	108.0	51	3.3	3.3
40	1.5	102	127.0	73	3.3	3.6
50	2	114	152.4	92	3.3	3.9
80	3	140	190.5	127	4.5	5.4
100	4	165	228.6	157	4.5	6.0
150	6	203	279.4	216	5.0	7.1
200	8	229	342.9	270	Upon Request	
250	10	279	406.4	324		
300	12	305	482.6	381		

### HOUSING MATERIAL

Body : Formed from ASTM A 106 Gr.B Pipes  
 Flanges : Made from IS 2062 Plates  
 Liner : PTFE In accordance with ASTM D 1457

### OPTIONS

Bend : Jacketed 90° elbow can be supplied on request  
 Flanges : 1. Rotating Flange is also available on request  
           2. Fixed On/Off Center Din/PN 10/16, BS 10, ASME 300 Mixed  
 Material : Stainless Steel  
 Extras : Earthing Studs / Lugs Vent Extensions  
 Geometry : Long Radius, Other Angles

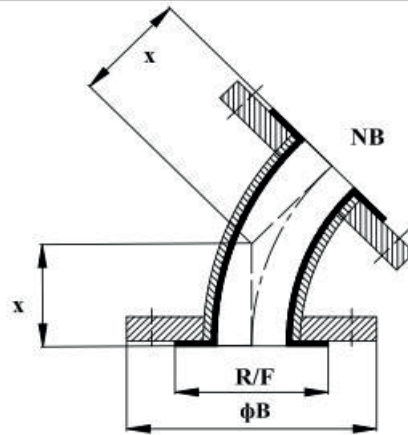
### DESIGN SPECIFICATION

Flange : As per ANSI B 16.5/B 16.42  
 Face to face : As per ANSI B 16.5 # 150  
 Lining Thickness : 3 to 5 mm  
 Other Flange Drilling like DIN 2632/2633, BS 10 Table D, E or F are also available on request

### TEST & INSPECTION DATA

Hydraulic Test : 20kg/cm<sup>2</sup> After Lining  
 Spark Test : 15 KV D.C. After Lining

## 45° LINED ELBOW



Nominal Bore (NB)		Center Line to face (X)	Flange OD (φB)	Raised Face Dia (R/F)	Liner Thickness	Steel Thickness
(mm)	Inches	(mm)	(mm)	(mm)	(mm)	(mm)
25	1	44	108.0	51	3.3	3.3
40	1.5	57	127.0	73	3.3	3.6
50	2	63	152.4	92	3.3	3.9
80	3	76	190.5	127	4.5	5.4
100	4	102	228.6	157	4.5	6.0
150	6	127	279.4	216	5.0	7.1

### HOUSING MATERIAL

Bend : Formed from ASTM A 106 Gr.B Pipes  
 Flanges : Made from Is 2062 Plates  
 Liner : PTFE In accordance with ASTM D 1457

### OPTIONS

Flanges : 1. Rotating Flange is also available on request  
 2. Fixed On/Off Center Din/PN 10/16, BS 10, ASME 300 Mixed  
 Material : Stainless Steel  
 Extras : Earthing Studs / Lugs Vent Extensions  
 Geometry : Long Radius, Other Angles

### DESIGN SPECIFICATION

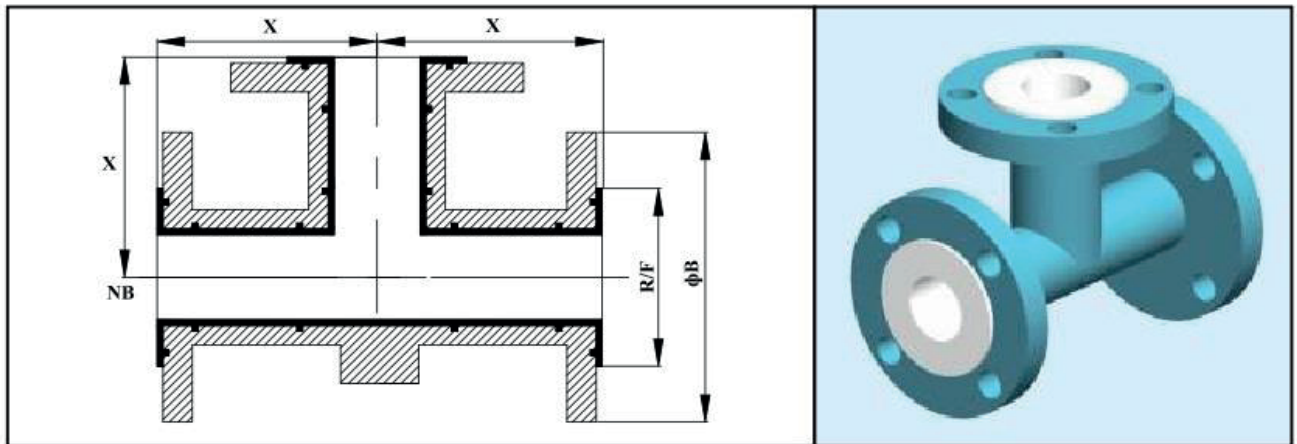
Flange : As per ANSI B 16.5/B 16.42  
 Face to face: As per ANSI B 16.5 # 150  
 Lining Thickness: 3 to 5 mm  
 Other Flange Drilling like DIN 2632/2633, BS 10  
 Table D, E or F are also available on request

### TEST & INSPECTION DATA

Hydraulic Test : 20kg/cm<sup>2</sup> After Lining  
 Spark Test : 15 KV D.C. After Lining



## LINED EQUAL TEE



Nominal Bore (NB)		Center Line to face (X)	Flange OD (φB)	Raised Face Dia (R/F)	Liner Thickness	Steel Thickness
(mm)	Inches	(mm)	(mm)	(mm)	(mm)	(mm)
25	1	89	108.0	51	4.0	8.0
40	1.5	102	127.0	73	4.0	8.0
50	2	114	152.4	92	4.0	9.0
80	3	140	190.5	127	4.0	10.0
100	4	165	228.6	157	4.0	11.5
150	6	203	279.4	216	4.0	12.0
200	8	229	342.9	270	Upon Request	
250	10	279	406.4	324		
300	12	305	482.6	381		

### HOUSING MATERIAL

Flanges	: Made from Is 2062 Plates
Tee	: Pipe as per ASTM A 106 Gr.B
Cast Tee	: SG Iron as per IS 1865-1991
Liner	: FEP

### OPTIONS

Flanges	: Rotating, Fixed On/Off Center Din/PN 10/16, BS 10, ASME 300 Mixed
Material	: Stainless Steel
Liner	: PFA
Extras	: Earthing Studs / Lugs Vent Extensions
Geometry	: Non Standard Dimensions

### DESIGN SPECIFICATION

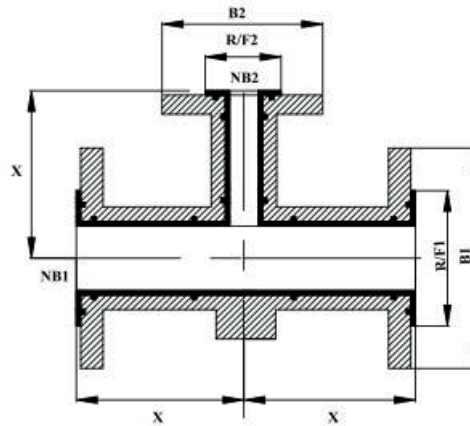
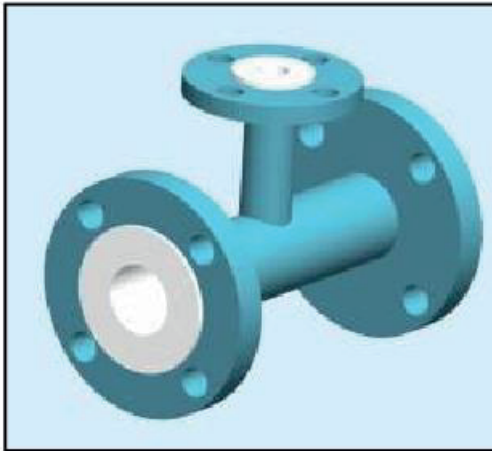
Flange	: As per ANSI B 16.5/B 16.42
Face to face	: As per ANSI B 16.5 # 150
Lining Thickness	: 3 to 5 mm
Other Flange Drilling like DIN 2632/2633, BS 10 Table D, E or F are also available on request Sizes above 6" are fabricated from pipe	

### TEST & INSPECTION DATA

Hydraulic Test	: 20 kg/cm <sup>2</sup> After Lining
Spark Test	: 15 KV D.C. After Lining



## LINED UNEQUAL TEE



Nominal Bore (NB)		Body (NB 1)		Body (NB 2)		Center Line to Face (X)
NB1	NB2	Flange OD B1	Raised Face R/F1	Flange OD B2	Raised Face R/F2	
(mm) (inches)	(mm) (inches)	(mm)	(mm)	(mm)	(mm)	(mm)
40 1.5	25 1	127.0	73	108.0	51	102
50 2	25 1	152.4	92	108.0	51	114
50 2	40 1.5	152.4	92	127.0	73	114
80 3	25 1	190.5	127	108.0	51	140
80 3	40 1.5	190.5	127	127.0	73	140
80 3	50 2	190.5	127	152.4	92	140
100 4	25 1	228.6	157	108.0	51	165
100 4	40 1.5	228.6	157	127.0	73	165
100 4	50 2	228.6	157	152.4	92	165
100 4	80 3	228.6	157	190.5	127	165
150 6	25 1	279.4	216	108.0	51	203
150 6	40 1.5	279.4	216	127.0	73	203
150 6	50 2	279.4	216	152.4	92	203
150 6	80 3	279.4	216	190.5	127	203
150 6	100 4	279.4	216	228.6	157	203

### HOUSING MATERIAL

Flanges : Made from Is 2062 Plates  
 Tee : Pipe as per ASTM A 106 Gr.B  
 Cast Tee : SG Iron as per IS 1865-1991  
 Liner : FEP

### OPTIONS

Flanges : Rotating, Fixed On/Off Center DIN PN 10/16, BS 10, ASME 300 Mixed  
 Material : Stainless Steel  
 Liner : PFA  
 Extras : Earthing Studs / Lugs Vent Extensions  
 Geometry : Non Standard Dimensions

### DESIGN SPECIFICATION

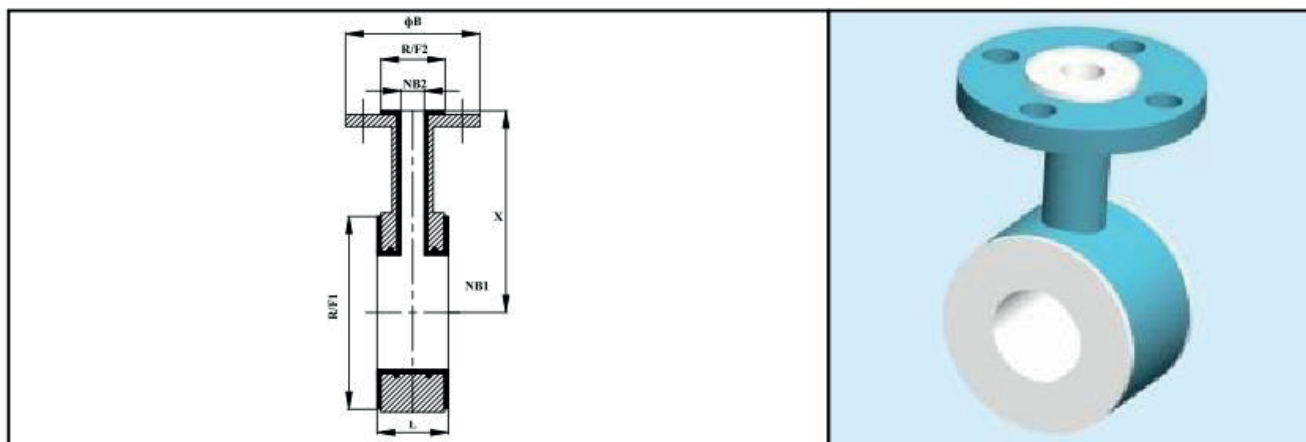
Flange : As per ANSI B 16.5/B 16.42  
 Face to face : As per ANSI B 16.5 # 150  
 Lining Thickness : 3 to 5 mm  
 Other Flange Drilling like DIN PN 2632/2633, BS 10 Table D, E or F are also available on request Sizes above 6" are fabricated from pipe

### TEST & INSPECTION DATA

Hydraulic Test : 20 kg/cm<sup>2</sup> After Lining  
 Spark Test : 15 KV D.C. After Lining



## LINED INSTRUMENT TEE



Nominal Bore (NB1)		Center Line to face (X)	Flange OD ( $\phi B$ )	Raised Face Dia (R/F1)	Liner Thickness
(mm)	Inches	(mm)	(mm)	(mm)	(mm)
25	1	89	108.0	51	4.0
40	1.5	102	127.0	73	4.0
50	2	114	152.4	92	4.0
80	3	140	190.5	127	4.0
100	4	165	228.6	157	4.0
150	6	203	279.4	216	4.0
200	8	229	342.9	270	4.0
250	10	279	406.4	324	4.0

Nominal Bore (NB1)		Axial Length NB 2 (L)	Flange OD ( $\phi B$ )	Raised Face Dia (R/F2)	Liner Thickness
(mm)	Inches	(mm)	(mm)	(mm)	(mm)
25	1	51	108.0	51	6.0
40	1.5	76	127.0	73	6.0

### HOUSING MATERIAL

#### Fabricated Tee

Body : MS Round Bar  
 Flanges : Made from IS 2062 Plates  
 Pipe : ASTM A 106 Grade B

#### Cast Tee

SG Iron to IS 1865 : 1991 Grade 400 / 15  
 Liner : FEP

### OPTIONS

Flanges : Fixed, DIN  
 PN10/16, BS 10, ASME 300 Mixed  
 Material : Stainless Steel  
 Liner : PFA  
 Extras : Earthing Studs / Lugs Vent Extensions  
 Geometry : Non Standard Dimensions

### DESIGN SPECIFICATION

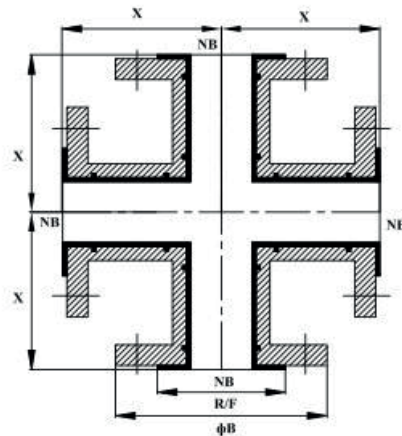
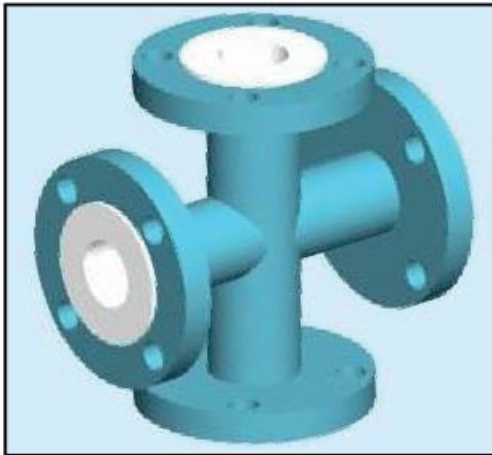
Flange : As per ANSI B 16.5/B 16.42  
 Face to face : As per ANSI B 16.5 # 150  
 Lining Thickness : 3 to 5 mm  
 Other Flange Drilling like DIN PN 2632/2633, BS 10 Table D, E or F are also available on request.

### TEST & INSPECTION DATA

Hydraulic Test : 20 kg/cm<sup>2</sup> After Lining  
 Spark Test : 15 KV D.C. After Lining



## LINED EQUAL CROSS



Nominal Bore (NB)		Center Line to face (X)	Flange OD (φB)	Raised Face Dia (R/F)	Liner Thickness	Steel Thickness
(mm)	Inches	(mm)	(mm)	(mm)	(mm)	(mm)
25	1	89	108.0	51	3.7	8.0
40	1.5	102	127.0	73	3.9	8.0
50	2	114	152.4	92	4.0	9.0
80	3	140	190.5	127	4.0	10.0
100	4	165	228.6	157	4.0	11.0
150	6	203	279.4	216	4.0	12.0
200	8	229	342.9	270	Upon Request	
250	10	279	406.4	324		
300	12	305	482.6	381		

### HOUSING MATERIAL

Casting : IS 1865: 1991 Grade 400/15

Liner : FEP

### Material for Fabricated Fitting

Flanges : Made from Is 2062 Plates

Pipes : ASTM A 106 Gr.B

Liner : FEP

### DESIGN SPECIFICATION

Flange : As per ANSI B 16.5/B 16.42

Face to face : As per ANSI B 16.5 # 150

Lining Thickness : 3 to 5 mm

Other Flange Drilling like DIN PN 2632/2633, BS 10 Table D, E or F are also available on request. Sizes above 6" are fabricated from pipe

### OPTIONS

Flanges : Rotating, Fixed On/Off Center DIN PN 10/16, BS 10, ASME 300 Mixed

Material : Stainless Steel

Liner : PFA

Extras : Earthing Studs / Lugs Vent Extensions

Geometry : Non Standard Dimensions

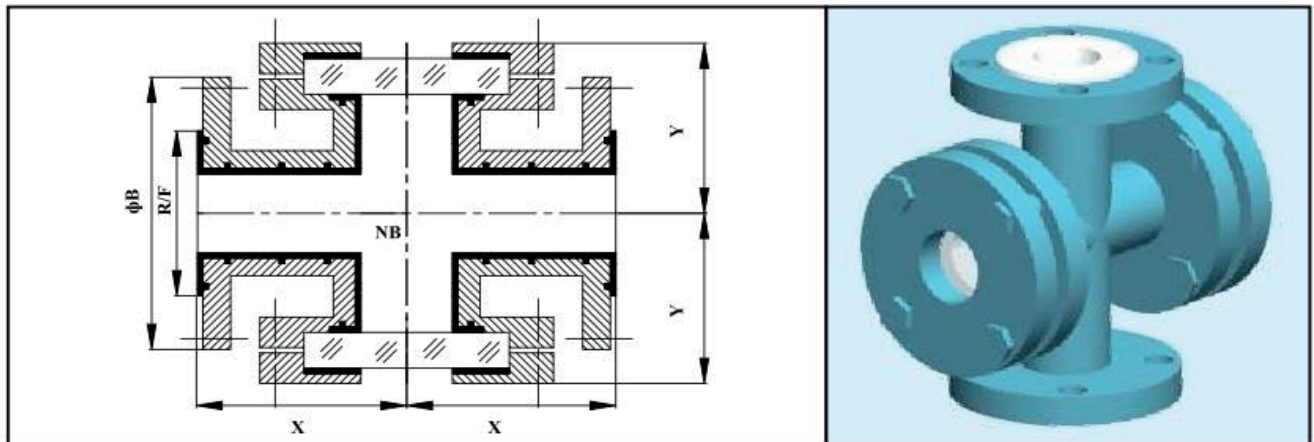
### TEST & INSPECTION DATA

Hydraulic Test : 20 kg/cm<sup>2</sup> After Lining

Spark Test : 15 KV D.C. After Lining



## LINED SIGHT FLOW INDICATOR



Nominal Bore (NB)		Center Line to face (X)	Center Line to face (Y)	Flange OD (? B)	Raised Face Dia (R/F)	Liner Thickness	Steel Thickness
mm	Inches	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
25	1	89	65	108.0	51	4.1	8.0
40	1.5	102	75	127.0	73	4.5	8.0
50	2	114	85	152.4	92	4.5	9.0
65	2.5	127	100	177.8	105	4.5	9.5
80	3	140	110	190.5	127	5.0	9.5
100	4	165	130	228.6	157	5.0	11.5
150	6	203	170	279.4	216	5.0	12.0

### HOUSING MATERIAL

Body : SG Iron as per IS 1865-1991 Gr. 400/15  
 Liner : FEP

### OPTIONS

Flanges : DIN PN 10/16, BS 10, ASME 300 Mixed  
 Material : Stainless Steel  
 Liner : PFA  
 Extras : Earthing Studs / Lugs Vent Extensions

### DESIGN SPECIFICATION

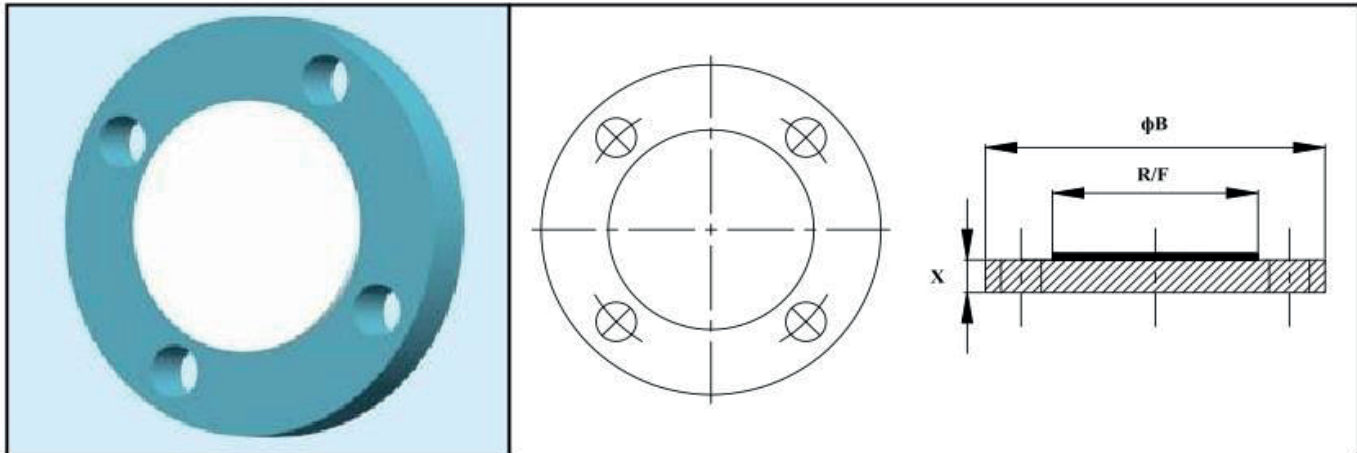
Flange : As per ANSI B 16.5/B 16.42  
 Face to face : DIN 3202  
 Lining Thickness : 3 to 5 mm  
 Other Flange Drilling like DIN 2632/2633, BS 10 Table D, E or F are also available on request

### TEST & INSPECTION DATA

Hydraulic Test : 10 kg/cm<sup>2</sup> After Lining  
 Spark Test : 15 KV D.C. After Lining



## LINED BLIND FLANGE



Nominal Bore (NB)		Liner Thickness	Flange OD	Raised Face Dia (R/F)	Liner Thickness (X)
(mm)	Inches	(mm)	(mm)	(mm)	(mm)
25	1	3.0	108.0	51	14.3
40	1.5	3.0	127.0	73	17.5
50	2	3.0	152.4	92	19.0
80	3	3.0	190.5	127	23.8
100	4	3.0	228.6	157	23.8
150	6	3.0	279.4	216	25.4
200	8	3.0	342.9	270	28.6
250	10	3.0	406.4	324	30.2
300	12	3.0	482.6	381	31.7

### HOUSING MATERIAL

Flanges : Made from Is 2062 Plates  
 Liner : PTFE in accordance with ASTM D 1457

### OPTIONS

Flanges : DIN PN 10/16, BS 10, ASME 300 Mixed  
 Material : Stainless Steel  
 Liner : PFA  
 Extras : Earthing Studs / Lugs Vent Extensions

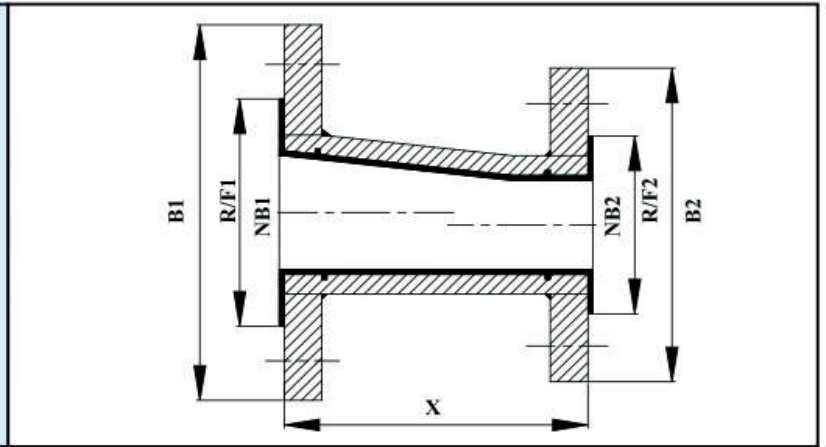
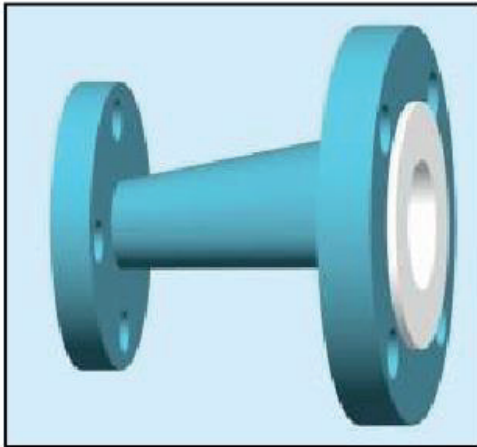
### DESIGN SPECIFICATION

Flange : As per ANSI B 16.5/B 16.42  
 Face to face : As per ANSI B 16.5 # 150  
 Lining Thickness : 3 to 5 mm  
 Other Flange Drilling like DIN PN 2632/2633, BS 10 Table D, E or F are also available on request. Sizes above 6" are fabricated from pipe

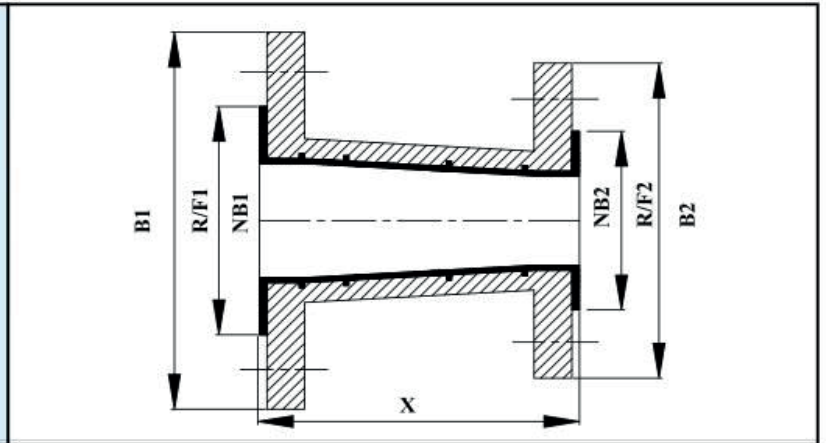
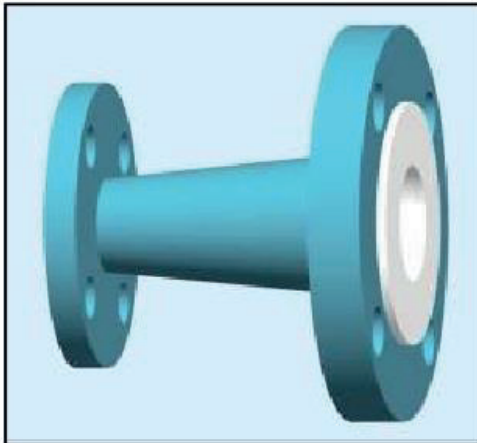
### TEST & INSPECTION DATA

Spark Test : 15 KV D.C. After Lining

### LINED ECCENTRIC REDUCER



### LINED CONCENTRIC REDUCER





## LINED ECCENTRIC REDUCER AND LINED CONCENTRIC REDUCER

Nominal Bore (NB)				B1	R/F1	B2	R/F2	Face to Face (X)	Liner Thickness	Steel Thickness
NB1		NB2								
(mm)	(inches)	(mm)	(inches)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
40	1.5	25	1	127.0	73	108.0	51	114	4.0	8.0
50	2	25	1	152.4	92	108.0	51	127	4.0	8.0
50	2	40	1.5	152.4	92	127.0	73	127	4.0	8.0
80	3	25	1	190.5	127	108.0	51	152	4.0	8.0
80	3	40	1.5	190.5	127	127.0	73	152	4.0	8.0
80	3	50	2	190.5	127	152.4	92	152	4.0	8.0
100	4	25	1	228.6	158	108.0	51	178	4.0	9.0
100	4	40	1.5	228.6	158	127.0	73	178	4.0	9.0
100	4	50	2	228.6	158	152.4	92	178	4.0	9.0
100	4	80	3	228.6	158	190.5	127	178	4.0	9.0
150	6	50	2	279.4	216	152.4	92	229	4.0	11.0
150	6	80	3	279.4	216	190.5	127	229	4.0	11.0
150	6	100	4	279.4	216	228.6	158	229	4.0	11.0
200	8	100	4	342.9	270	228.6	158	279		
200	8	150	6	342.9	270	279.4	216	279		
250	10	200	8	406.4	324	279.4	216	305	Upon Request	
250	10	200	8	406.4	324	342.9	270	305		
300	12	250	10	482.6	381	342.9	270	356		
300	12	250	10	482.6	381	406.4	324	356		

### HOUSING MATERIAL

Flanges	: Made from Is 2062 Plates
Eccentric Reducer	: ASTM A 234 Grade WPB
Cast	: SG Iron as per IS 1865-1991 Grade 400/15
Liner	: FEP

### DESIGN SPECIFICATION

Flange	: As per ANSI B 16.5/B 16.42
Face to face	: As per ANSI B 16.5 # 150
Lining Thickness	: 3 to 5 mm
Other Flange Drilling like DIN PN 2632/2633, BS 10 Table D, E or F are also available on request	

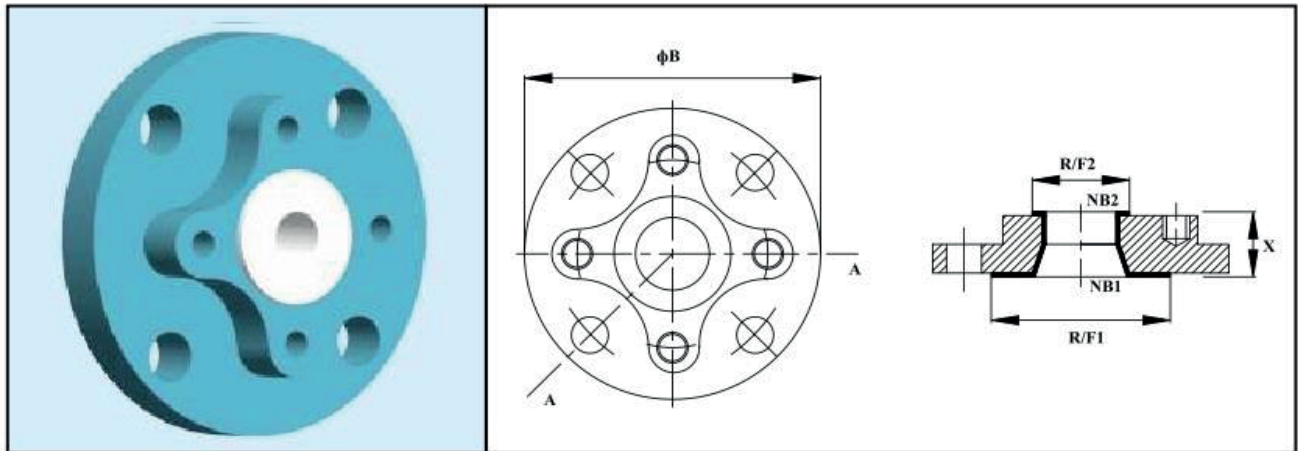
### OPTIONS

Flanges	: Rotating, DIN PN 10/16, BS 10, ASME 300 Mixed
Material	: Stainless Steel
Liner	: PFA
Extras	: Earthing Studs/Lugs Vent Extensions
Geometry	: Non Standard Dimensions

### TEST & INSPECTION DATA

Hydraulic Test	: 20 kg/cm <sup>2</sup> After Lining
Spark Test	: 15 KV D.C. After Lining

## LINED REDUCING FLANGE



### HOUSING MATERIAL

Flanges : IS 1865-1991 Grade 400/15  
 Liner : FEP

### OPTIONS

Flanges : Drilling DIN PN 10/16, BS 10, ASME 300 Mixed Thread Metrics  
 Material : Stainless Steel  
 Liner : PFA  
 Extras : Earthing Studs / Lugs Vent Extensions

### DESIGN SPECIFICATION

Flange : As per ANSI B 16.5/B 16.42  
 Face to face : As per ANSI B 16.5 # 150  
 Lining Thickness : 3 to 5 mm  
 Other Flange Drilling like DIN 2632/2633, BS 10 Table D, E or F are also available on request

### TEST & INSPECTION DATA

Spark Test : 15 KV D.C. After Lining

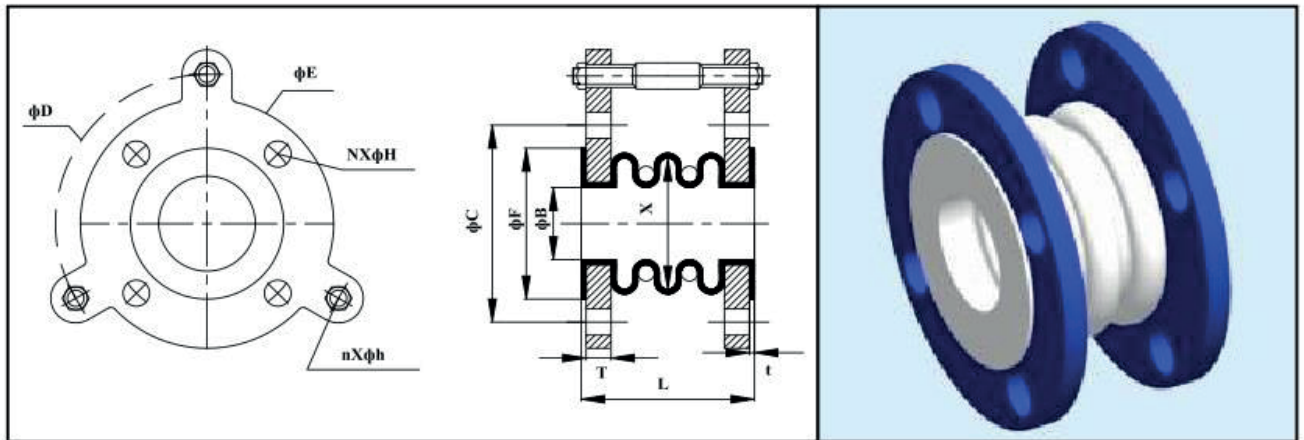


**LINED REDUCING FLANGE**

Nominal Bore (NB)				Thickness (X)	? B	R/F 1	R/F 2	Liner Thickness
NB1		NB2						
(mm)	(Inches)	(mm)	(Inches)	(mm)	(mm)	(mm)	(mm)	(mm)
40	1.5	25	1	35	127.0	73	51	5.0
50	2	25	1	35	152.4	92	51	5.0
50	2	40	1.5	35	152.4	92	73	5.0
65	2.5	25	1	35	177.8	105	51	5.0
65	2.5	40	1.5	35	177.8	105	73	5.0
65	2.5	50	2	35	177.8	105	92	5.0
80	3	25	1	45	190.5	127	51	5.0
80	3	40	1.5	45	190.5	127	73	5.0
80	3	50	2	45	190.5	127	92	5.0
100	4	25	1	45	228.6	157	51	5.0
100	4	40	1.5	45	228.6	157	73	5.0
100	4	50	2	45	228.6	157	92	5.0
100	4	80	3	45	228.6	157	127	5.0
125	5	25	1	45	254.0	186	51	5.0
125	5	40	1.5	45	254.0	186	73	5.0
125	5	50	2	45	254.0	186	92	5.0
125	5	80	3	45	254.0	186	127	5.0
125	5	100	4	45	254.0	186	157	5.0
150	6	25	1	54	279.4	216	51	5.0
150	6	40	1.5	54	279.4	216	73	5.0
150	6	50	2	54	279.4	216	92	5.0
150	6	80	3	54	279.4	216	127	5.0
150	6	100	4	54	279.4	216	157	5.0
200	8	25	1	54	342.9	270	51	5.0
200	8	40	1.5	54	342.9	270	73	5.0
200	8	50	2	54	342.9	270	92	5.0
200	8	80	3	54	342.9	270	127	5.0
200	8	100	4	54	342.9	270	157	5.0
200	8	150	6	54	342.9	270	216	5.0
250	10	25	1	54	406.4	324	51	4.5
250	10	40	1.5	54	406.4	324	73	4.5
250	10	50	2	54	406.4	324	92	4.5
250	10	80	3	54	406.4	324	127	4.5
250	10	100	4	54	406.4	324	157	4.5
250	10	150	6	54	406.4	324	216	4.5
250	10	200	8	54	406.4	324	270	4.5
300	12	25	1	54	482.6	381	51	4.5
300	12	40	1.5	54	482.6	381	73	4.5
300	12	50	2	54	482.6	381	92	4.5
300	12	80	3	54	482.6	381	127	4.5
300	12	100	4	54	482.6	381	157	4.5
300	12	150	6	54	482.6	381	216	4.5
300	12	200	8	54	482.6	381	270	4.5
300	12	250	10	54	482.6	381	324	4.5



## PTFE HIGH PRESSURE BELLOW



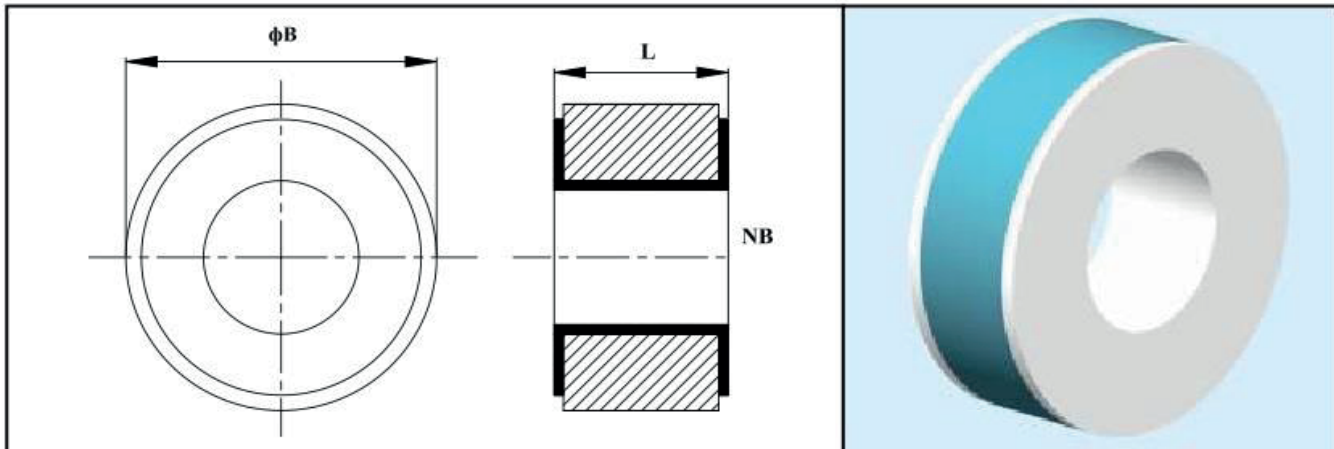
Nominal Size	? B	X	C	? D	? E	? F	L	T	t	N x ? H	nx ? h
(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
15	21	31	60.3	111	88.9	35	50	10	2	4 x 14	3 x 10
25	33	50	79.4	129	108.0	51	50	10	2	4 x 14	3 x 10
40	48	69	98.4	148	127.0	73	55	10	2	4 x 14	3 x 10
50	58	84	120.6	180	152.4	92	70	12	3	4 x 18	3 x 12
65	73	103	139.7	205	177.8	105	80	12	3	4 x 18	3 x 12
80	90	116	152.4	218	190.5	127	100	12	4	4 x 18	3 x 12
100	110	154	190.5	256	228.6	157	100	14	4	8 x 19	3 x 12
150	160	197	241.3	313	279.4	216	100	16	4	8 x 22	3 x 14
200	210	240	298.4	376	342.9	270	150	16	4	8 x 22	3 x 14
250	262	310	361.9	445	406.4	324	150	20	5	12 x 25	3 x 14
300	310	380	431.8	521	482.6	381	150	20	5	12 x 25	3 x 14
450	462	524	577.8	680	635.0	533	150	25	5	16 x 32	3 x 19
500	512	581	635.0	743	698.5	584	150	25	5	20 x 32	3 x 25
600	612	695	749.3	858	812.8	692	150	25	5	20 x 32	3 x 25

### MATERIAL

- Flanges : C.S.Glav.  
 Bellows (Moulded) : 100% PTFE - ASTM D 4895  
 Drilling : ASME B 16.5  
 Fasteners : M.S.Galv. BS 1083/ BS 916  
 Note : Number of convolutes depends on length of expansion bellows



## LINED SPACER



Nominal Bore (NB)		Diameter B	Length(L) Min.	Length(L) Max.	Liner Thickness	Wall Thickness
(mm)	Inches	(mm)	(mm)	(mm)	(mm)	(mm)
25	1	64	26	60	3.3	18.5
40	1.5	83	26	60	3.3	20.7
50	2	102	26	70	3.3	24.5
80	3	133	26	70	3.3	27.8
100	4	171	26	70	4.5	34.8
150	6	219	26	80	5.0	32.5
200	8	275	Upon Request			
250	10	336				
300	12	405				

### HOUSING MATERIAL

Body : Made from IS 2062 Plates  
 Liner : PTFE in accordance with ASTM D 1457

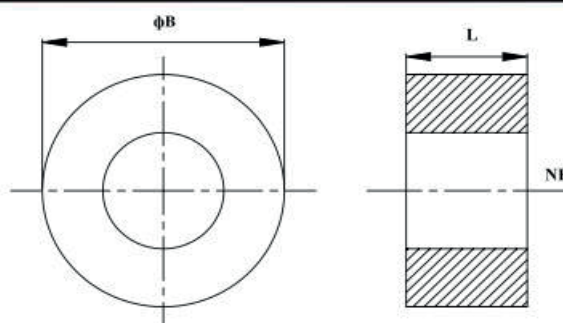
### OPTIONS

Material : Stainless Steel  
 Extras : Earthing Studs / Lugs Vent Extensions to suit DIN PN 10/16 BS 10, ASME 300 Flange

### TEST & INSPECTION DATA

Spark Test : 15 KV D.C. After Lining

## PTFE SOLID TYPE SPACER



### HOUSING MATERIAL

PTFE : ASTM D 1457

### OPTIONS

Form : Can be tapered to suit  
DIN PN 10/16, BS 10,  
ASME 300 flange

Nominal Bore (NB)		Diameter B	Length(L) Min.	Length(L) Max.
(mm)	Inches	(mm)	(mm)	(mm)
25	1	64	5	80
40	1.5	83	5	80
50	2	102	5	80
80	3	133	5	80
100	4	171	5	80
150	6	219	5	80
200	8	275	5	80
250	10	336	5	80
300	12	405	5	80

## PTFE GASKET / PTFE ENVELOPE GASKET

PTFE lined piping technology was developed to meet serve operating conditions in the chemical handling to solve the problems of Corrosion, Erosion and maintenance free operation for many years. This product is for substitute for MS / SS piping & PP / HDPE plastic piping which causes corrosion and maintenance problems frequently.

### MATERIAL OF CONSTRUCTION

Insert Gasket : Style 20 – Metallic / Non-metallic

AF 120 – Non Asbestos

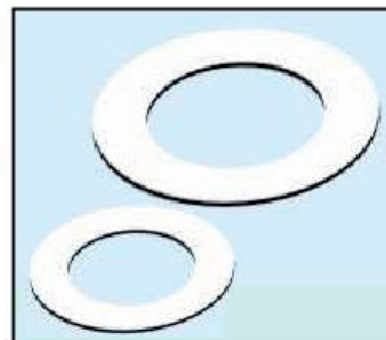
Teflon : 0.6 mm thick Virgin

Joint : Though Thermal Fusion

Size in range : 1.5" (40 NB) to 10" (250 NB) (Slit Type)

250 mm to 2000 mm (Jointed Type)

Above 2000 mm will be done on Customer Request



## PTFE 'T' BUSH NOZZLES OF GLASS LINED REACTOR (GLR)



PTFE lined piping technology was developed to meet serve operating conditions in the chemical handling to solve the problems of Corrosion, Erosion and maintenance free operation for many years. This product is for substitute for MS / SS piping & PP / HDPE plastic piping which causes corrosion and maintenance problems frequently.

Sr No.	Description	Lining Material PTFE	Shape
1	50 NB- 500 NB	Virgin	Round
2	300 NB X 400 NB	Virgin	Oval
3	350 NB x 450 NB	Virgin	Oval







# Borolab



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