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We can't think without glass


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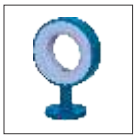
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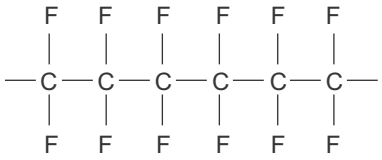
FLUOROPOLYMER SELECTION FOR CORROSIVE APPLICATIONS

Process engineers are faced with the decision of choosing the correct material for corrosive applications. Decision criteria are sometimes based on cost, availability, reliability, durability, and performance history. Fluoropolymers are often times the preferred choice in corrosive services due to their relative cost position compared due to their availability.

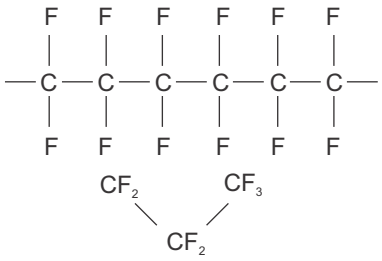
What is a fluoropolymers?

A fluoropolymer is an organic compound consisting of fluorine and carbon atoms but can also contain oxygen or hydrogen. The atoms are held together by bonds to form monomers such as tetrafluorethylene (TFE). When the monomer is polymerized they form into long chains to which TFE becomes polytetrafluoroethylene (PTFE). Fluoropolymers can be either fully fluorinated or partially fluorinated. Fully fluorinated simply means that fluorine atoms completely surround the carbon atoms while partially fluorinated means that fluorine atoms partially surround some of the carbon atoms. The strong chemical resistance of fluoropolymers is directly linked to the strong bond between the carbon and fluorine atom within the polymer. Therefore, fully fluorinated fluoropolymers are typically more resistant to more chemicals and have higher temperature resistance than partially fluorinated fluoropolymers.

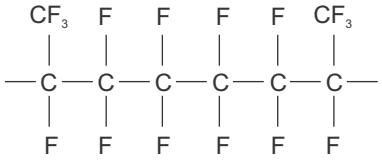
PTFE : PTFE is probably one of the most widely used fluoropolymers within the lined industry for components. It uses include seats, packing material, and Valve. The reason it is used for these components is due to its high molecular weight leading to its high strength compared to other fluoropolymers and its resistance to wear from cycling applications. PTFE provides excellent chemical resistance and also excellent mechanical strength. Fabrication of PTFE is accomplished by a press and sintering process. PTFE cannot be melt processed.



PFA : Perfluoroalkoxy, or PFA, is probably the most commonly applied valve liner or molded lined products . PFA is very similar to modified PTFE in that is has an additive of PPVE except the amount is increased from 1% to 4%. Chemical compatibility and temperature capabilities are unchanged but mechanical properties are changed. The most significant change results in this material now being able to be melt-processed.



FEP : Perfluoroethylenepropylene, or FEP, is another commonly applied valve liner. FEP is made from tetrafluorethylene and approximately 15 - 20 % hexafluoropropylene. Its chemical resistance is nearly the same as PTFE, Modified PTFE and PFA; however its thermal resistance is less than PTFE or PFA.



Application Decisions

So with all the available lining and component materials how are an engineer to choose the correct material for their corrosive application? Fortunately many lined and valve manufacturers have already chosen the material combinations that best fit most applications.

Summary

The correct decision on what fluoropolymer material to use for your corrosive application begins with truly understanding all the parameters of your application. Next, it involves an understanding of the capabilities of the materials you are considering.

TECHNICAL SPECIFICATIONS

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POLYFLURON PTFE is a virginal paste extruded PTFE exhibiting exceptional thermal, chemical, mechanical and electrical properties.

Exceptional properties :

* Nearly universal chemical resistance and insolubility
* High operating temperatures up to 260 °C/500 °F
* Flexibility to - 79°C
* High flexural fatigue resistance, nearly no material fatigue
* No aging by heat or UV radiation
* Exceptional electric insulator
* Very high purity (free of migrating additives or monomers). non-toxic
* Anti-adhesive surface, low coefficient of friction/wear, self-cleaning
* Excellent dimensional stability - no water absorption, no swelling
* Non-flammable

Field of use

Pressure load : 1 to 6 inch - up to 40 bar (PN 40);
8 to 24 inch - up to 25 bar (PN 25)

Vacuum : Full vacuum (-1 barg) for all dimensions up to 4 inch and 150°C. Vacuum-resistant versions for larger dimensions and higher temperatures on request.

Lining : Virginal paste-extruded PTFE) meeting DIN 2874.

Temperatures : -10° up to + 230°C;
lower service temperatures can be accommodated with the use of special steel materials.

Options

* Antistatic (electrically conductive) liner
* Stainless steel and low temperature steel
* Venting nozzles
* Grounding bolts and connections
* Custom shapes
* Special paint coatings

Stainless steel materials are available on request.

Ready reference for selection of fluoropolymer materials

	PTFE	PFA	FEP	HDPE	PP	PVDF
Theoretical maximum Temperature	260° C	260° C	205° C	121° C	121° C	135° C
Recommended difference between maximum Temperature	200° C	200° C	160° C	60° C-70° C	60° C	Temp. is different for different materials
Solvents	No known impact				Common Ketones	
Corrosion Resistance	Virtually all chemicals except fluorine & its chart to ensure compounds and violent reducing agents like metallic sodium and molten alkali metals		Refer detailed corrosion resistance chemical compatibility		Refer Corrosion Resistance Chart	

Quality Assurance

INSPECTION AND HANDLING

The performance and longevity of PTFE lined pipes & fittings components depends on the quality control of design and fabrication processes, as well as shipping, handling and storage practices. S.S. Scientific Products con-siders quality of paramount importance. Quality control teams inspect and test all PTFE lined pipe components to ensure they meet or exceed ASTM specifications. S.S. Scientific Products is ISO 9001:2015 certified.

Inspections Performed Prior to Lining

All metal pipe and fittings are visually inspected before lining. The interior will be smooth, clean and free of burrs, scale or any other deposits. Internal welds are ground smooth.

Pipe liners are examined for pinholes, cracks, gouges, nicks or foreign objects.

Tests and Inspections Performed After Lining

Fittings are hydro tested at 1.5 times the design pressure; spools are hydro tested upon request. All components are subjected to an electrostatic spark test.

The liner forming the flange gasket sealing face is visually inspected for smoothness. The liner will be free of defects (pinholes, cracks, gouges, nicks or foreign objects). Any imperfection will not exceed 10% of the surface.

Lined pipe and fittings are checked for dimensional accuracy and tolerances in accordance with dimensional data listed within this catalog and ANSI specifications.

After final inspection, a flange protector is installed on each flange prior to any further handling of the part.

Testing & Inspection

VISUAL : All Spool Pipes, Fittings & valves are inspected visually to ensure that there is

(1) No evidence of Pinholes, Porosity or Cracks.

(2) Fitment of the liner with the Pipes & Housing is Proper.

(3) The Gasket seating surface of the Lining is Free from Scratches, Dents, Nicks or any tool marks.

HYDROSTATIC TEST :

All pipes, fittings & valves are subjected to a 20 Kg/Cm ^{2} HYDROSTATIC PRESSURE test at room temperature using clean Water before & after lining to ensure that there is no evidence of any leakage.

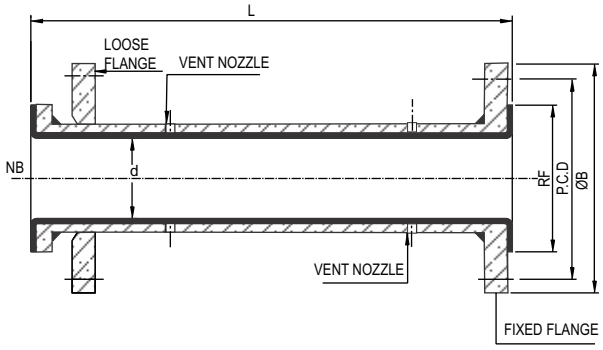
ELECTROSTATIC TEST :

All Spool Pipes, Assemblies & Fittings are subject to 15,000 V Non-Destructive HIGH VOLTAGE ELECTROSTATIC Spark

VACUUM TEST :

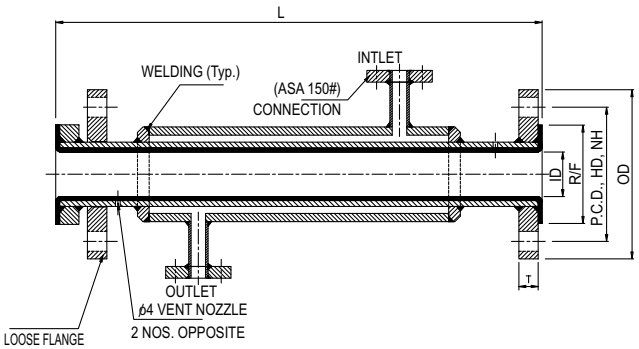
Spool Pipes, Assemblies & Fittings are subjected to full Vacuum test at 90 DEG. C to ensure that there should not be any Bulging or Buckling or Collapse of the liner.

Lined Spool Pipe



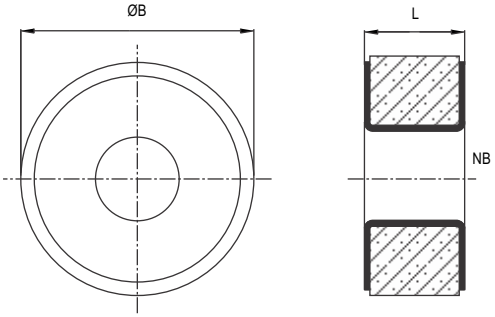
Nominal Bore NB		Internal Dia (d)	PTFE Liner Thickness (t)	FLANGE PCD	Flange Hole Dia	Raised Face Dia(R/F)	Maxi. Length	Pipe Schedule
(mm)	(inches)	(±1 mm)	(mm)	(mm)	(mm)	(mm)	(mm)	
25	1	19.5	3.3	79.4	15.9	51	3000	40
40	1.5	33.8	3.3	98.4	15.9	73	3000	40
50	2	45.4	3.3	120.6	19.0	92	3000	40
80	3	70.8	3.3	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

Lined Jacketed Spool Pipe



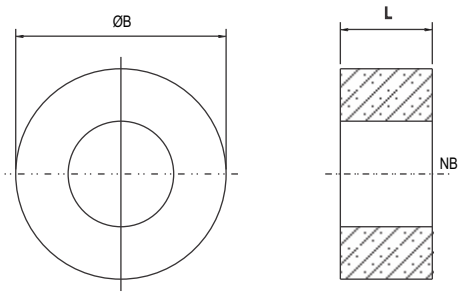
SIZE (NB)	T	OD	R/F	P.C.D	HOLES DIA HD	NO. OF HOLE NH
25	14.3	108	51	79.4	16	4
40	17.5	127	73	98.4	16	4
50	19	152.4	92	120.6	19	4
80	23.8	190.5	127	152.4	19	4
100	23.8	228.6	157	190.5	19	8
150	25.4	279.4	216	241.3	22.2	8

Lined Specer



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				

PTFE Solid Spacer



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

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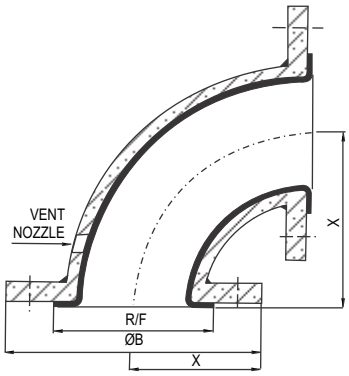
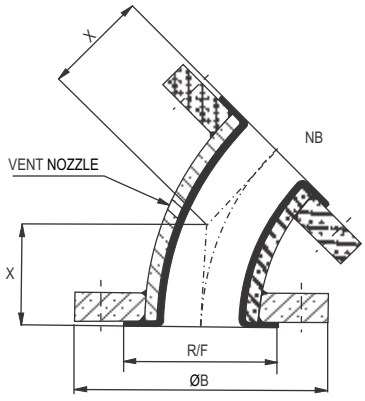
Lined Bend 90°



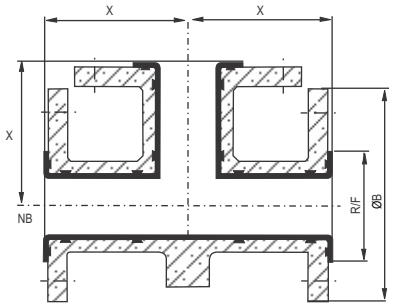
Nominal Bore NB		Center Line to face (X)	Flange OD (ØB)	Raised Face Dia (R/F)	Liner Thickness	Steel Thickness
(mm)	(inches)	(mm)	(mm)	(mm)	(mm)	(mm)
25	1	89	108.0	51	3.3	3.3
40	1.5	102	127.0	73	3.3	3.6
50	2	114	152.4	92	3.3	3.9
80	3	140	190.5	127	4.5	5.4
100	4	165	228.6	157	4.5	6.0
150	6	203	279.4	216	5.0	7.1
200	8	229	342.9	270		
250	10	279	406.4	324	Upon Request	
300	12	305	482.4	381		

Lined Bend 45°



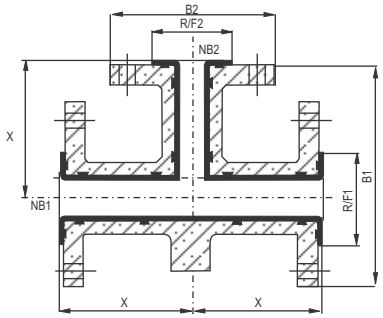
Nominal Bore NB		Center Line to face (X)	Flange OD (ØB)	Raised Face Dia (R/F)	Liner Thickness	Steel Thickness
(mm)	(inches)	(mm)	(mm)	(mm)	(mm)	(mm)
25	1	44	108.0	51	3.3	3.3
40	1.5	57	127.0	73	3.3	3.6
50	2	63	152.4	92	3.3	3.9
80	3	76	190.5	127	4.5	5.4
100	4	102	228.6	157	4.5	6.0
150	6	127	279.4	216	5.0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

Lined Equal Tees



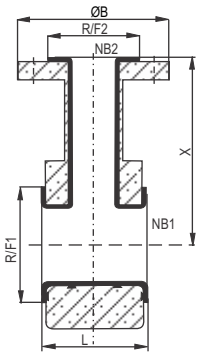
Nominal Bore NB		Center Line to face (X)	Flange OD (ØB)	Raised Face Dia (R/F)	Liner Thickness	Steel Thickness
(mm)	(inches)	(mm)	(mm)	(mm)	(mm)	(mm)
25	1	89	108.0	51	4.0	8.0
40	1.5	102	127.0	73	4.0	8.0
50	2	114	152.4	92	4.0	9.0
80	3	140	190.5	127	4.0	10.0
100	4	165	228.6	157	4.0	11.5
150	6	203	279.4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

Lined Unequal Tees



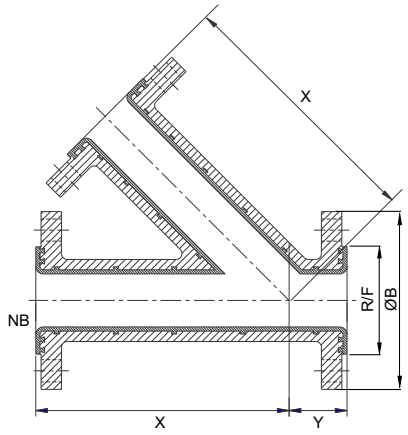
Nominal Bore				Body (NB1)		Branch (NB2)		Center Line to Face (X)
NB1		NB2		Flange OD B1	Raised Face R/F1	Flange OD B2	Raised Face R/F2	
(mm)	(inches)	(mm)	(inches)	(mm)	(mm)	(mm)	(mm)	(mm)
40	1.5	25	1	127.0	73	108.0	51	102
50	2	25	1	152.4	92	108.0	51	114
50	2	40	1.5	152.4	92	127.0	73	114
80	3	25	1	190.5	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

Lined Instrument Tee



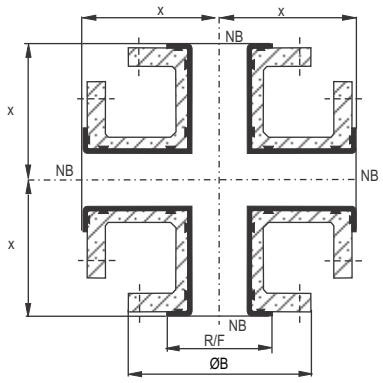
Nominal Bore NB1		Center Line to face (X)	Flange OD (ØB)	Raised Face Dia (R/F1)	Liner Thickness
(mm)	(inches)	(mm)	(mm)	(mm)	(mm)
25	1	89	108.0	51	4.0
40	1.5	102	127.0	73	4.0
50	2	114	152.4	92	4.0
80	3	140	190.5	127	4.0
100	4	165	228.6	157	4.0
150	6	203	279.4	216	4.0
200	8	229	342.9	270	4.0
250	10	279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

45° Equal Lateral Tee



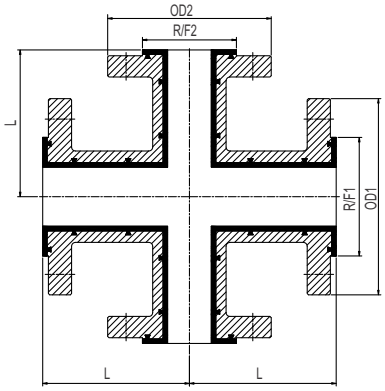
Nominal Bore NB		Centre Line to Face (X)	Centre Line to Face (Y)	Flange OD (ØB)	Raised Face Dia (R/F)	Liner Thickness
mm	inches	mm	mm	mm	mm	mm
25	1"	146	44	108.0	51	4.0
40	1 1/2"	148	51	127.0	73	4.0
50	2"	203	64	152.4	92	4.0
80	3"	254	76	190.5	127	4.0
100	4"	305	76	228.6	157	4.0
150	6"	368	89	279.4	216	4.0

Lined Equal Cross



Nominal Bore NB		Center Line to face (X)	Flange OD ØB	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		

Lined Unequal Cross



Nominal Bore NB		Center Line to face (X)	Flange OD ØB	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		

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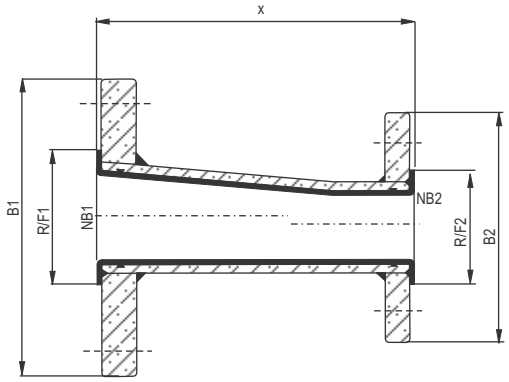
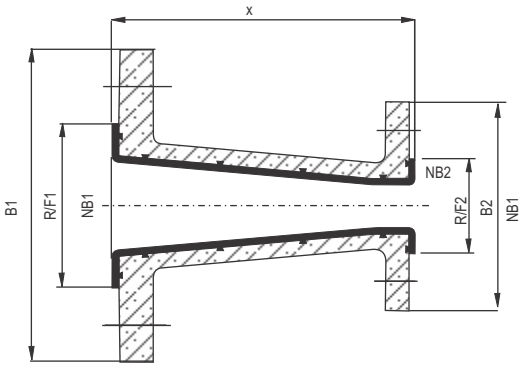
Lined Eccentric Reducer

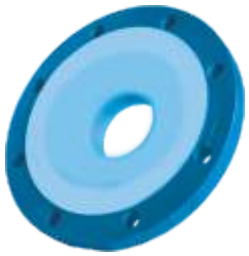


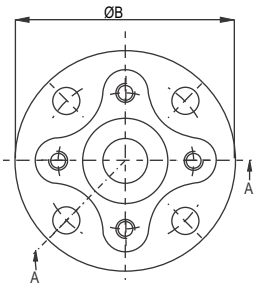
Lined Concentric Reducer

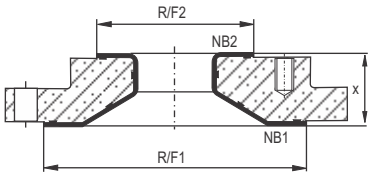


Nominal Bore NB1		Nominal Bore NB2		B1	R/F 1	B2	R/F 2	Face to Face (X)	Liner Thickness	Steel Thickness
(mm)	(inches)	(mm)	(inches)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
40	1.5	25	1	127.0	73	108.0	51	114	4.0	8.0
50	2	25	1	152.4	92	108.0	51	127	4.0	8.0
50	2	40	1.5	152.4	92	127.0	73	127	4.0	8.0
80	3	25	1	190.5	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	6	406.4	324	279.4	216	305	Upon Request	
250	10	200	8	406.4	324	342.9	270	305		
300	12	250	8	482.6	381	342.9	270	356		
300	12	250	10	482.6	381	406.4	324	356		

Lined Reducing Flange

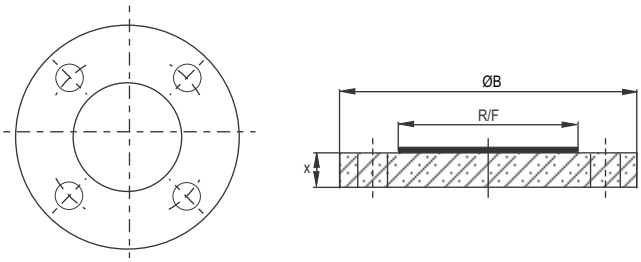






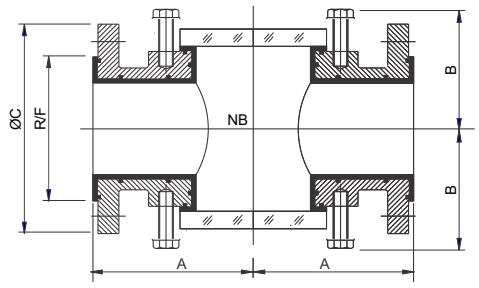
Nominal Bore NB1		Nominal Bore NB2		Thickness (X)	ØB	R/F 1	R/F 2	Liner Thickness
(mm)	(inches)	(mm)	(inches)	(mm)	(mm)	(mm)	(mm)	(mm)
40	1.5	25	1	35	127.0	73	51	5.0
50	2	25	1	35	152.4	92	51	5.0
50	2	40	1.5	35	152.4	92	73	5.0
65	2.5	25	1	35	177.8	105	51	5.0
65	2.5	40	1.5	35	177.8	105	73	5.0
65	2.5	50	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

Lined Blind Flange



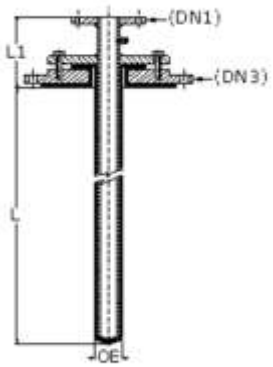
Nominal Bore NB		Liner Thickness	Flange OD (ØB)	Raised Face Dia (R/F)	Liner Thickness (X)
(mm)	(inches)	(mm)	(mm)	(mm)	(mm)
25	1	3.0	108.0	51	14.3
40	1.5	3.0	127.0	73	17.5
50	2	3.0	152.4	92	19.0
80	3	3.0	190.5	127	23.8
100	4	3.0	228.6	157	23.8
150	6	3.0	279.4	216	25.4
200	8	3.0	342.9	270	28.6
250	10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

Lined Double Window Sight Glass



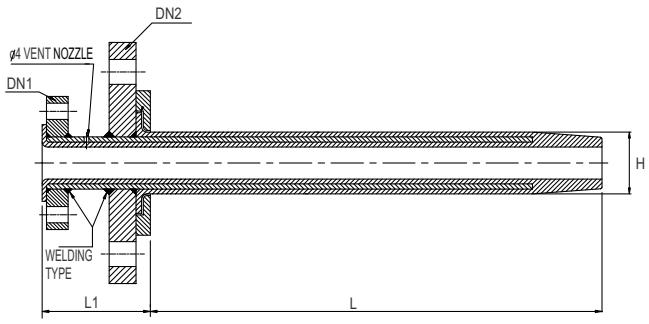
Nominal Bore of Pipe		Center Line to Face (A)	Center to Flange Face (B)	Flange OD ØC	Raised Face Diameter (R/F)	Liner Thickness	Steel Thickness
mm	inches	mm	mm	mm	mm	mm	mm
25	1"	89	65	108.0	51	4.1	8.0
40	1.5"	102	75	127.0	73	4.5	8.0
50	2"	114	85	152.4	92	4.5	9.0
65	2.5"	127	100	177.8	105	4.5	9.5
80	3"	140	110	190.5	127	5	9.5
100	4"	165	130	228.6	157	5	11.5
150	6"	203	170	279.4	216	5	12.0

Closed End Dip Pipes



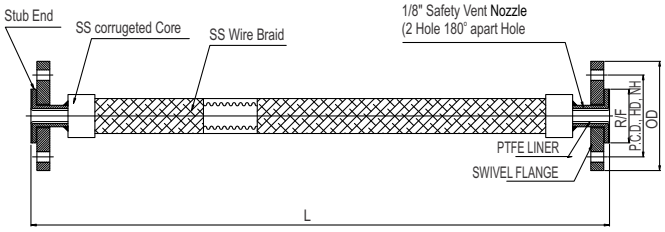
Size DN1	DN3 min	DN3 max	ø E	L max	L1	Liner thickness min
Mm	mm	mm	mm	mm	mm	mm
25	65	300	45	3000	150	3.05
40	80	300	62	3000	150	3.2
50	100	300	78	3000	150	3.5
80	150	300	102	3000	150	4
100	150	300	133	2800	150	4.5

Lined Dip Pipes



Pipe Nominal Bore / Process Flange Size (NB)		Face to Face (F) Min.	Total Length (L) Max.	PTFE Liner Thickness	Pipe Schedule	Vessel Flange Schedule		NB Min'm Inlet Nozzle ID
(mm)	(inches)	(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

Lined Hose Pipe



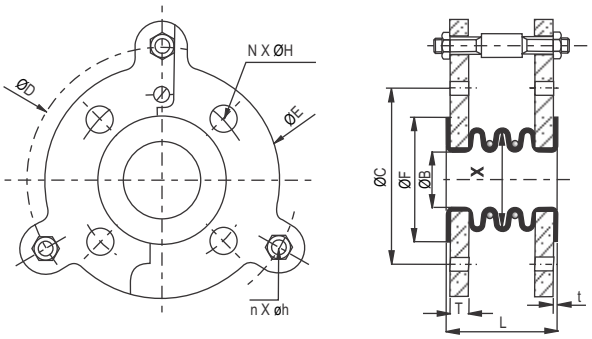
SIZE (NB)	T	OD	R/F	P.C.D	HOLES DIA HD	NO. OF HOLE NH
25	14.3	108	51	79.4	16	4
40	17.5	127	73	98.4	16	4
50	19	152.4	92	120.6	19	4
80	23.8	190.5	127	152.4	19	4
100	23.8	228.6	157	190.5	19	8
150	25.4	279.4	216	241.3	22.2	8

PTFE 'T' Bush Nozzles Of Glass Lined Reactor (GLR)

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

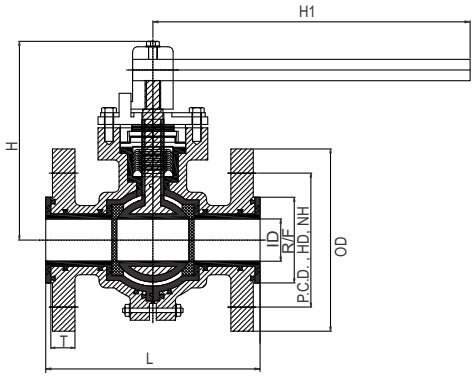
Sr. No.	Description	LING Material PTFE	Shape
1	50 NB - 500 NB	Virgin	Round
2	300 NB x 400 NB	Virgin	Oval
3	350 NB x 450 NB	Virgin	Oval

PTFE High Pressure Bellow



Nominal Size (mm)	ØB (mm)	X (mm)	C (mm)	ØD (mm)	ØE (mm)	ØF (mm)	L (mm)	T (mm)	t (mm)	N x ØH (mm)	n x Øh (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

PFA, FEP Lined Ball Valve



Valve Size (mm)	L	H	H1	T	OD	ID	R/F	P.C.D	Holes Dia HD	No. of Hole NH
25	127	120	200	14.3	108	25	51	79.4	16	4
40	165	135	250	17.5	127	40	73	98.4	16	4
50	178	155	300	19	152.4	50	92	120.6	19	4
80	203	208	350	23.8	190.5	75	127	152.4	19	4
100	229	230	450	23.8	228.6	95	157	190.5	19	8
150	267	260	550	25.4	279.4	145	216	241.3	22.2	8