



BAUM Fluoroplastics™

Plastic-Lined Piping Systems

*The Next Generation of Safety,
Quality and Innovation*



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BAUM Fluoroplastics

Baum Kunststoff GmbH, a German company founded by Roland Baum in 1986, is a worldwide leader in the plastic lined piping industry. They are known in the US as Baum Fluoroplastics™. Today they continue as a family owned and operated business and are currently managed by CEO Markus Baum.

Baum offers complete manufacturing capability from steel to plastic. Paste extrusion is done on specially designed extruders and lining uses highly automated production processes. Baum uses assets including state of the art transfer molding to ensure speed to market.

Today Baum manufactures plastic lined pipe, fittings, vessels, dip tubes, valves and expansion joints that are protected from corrosion using PTFE/PFA, PVDF or PP. All parts are supplied in accordance with ASTM F1545-97(2003).



*Markus Baum
Chief Executive Officer
BAUM Fluoroplastics*

Before you purchase a corrosion resistant piping system we invite you to compare.

- Baum PTFE liners are paste extruded. This ensures permeation resistance that exceeds the isostatically molded PTFE products common in the US. This claim is supported by independent testing by the Korrosionsinstitutet of Sweden.
- Many of the Baum fittings will be upgraded to injection molded PFA. This is an even higher quality polymer with mechanical properties and permeation resistance that normally come at a much higher price. Injection molding these fittings means that Baum products come with full penetration welds unlike the welded over designs.
- Baum metal housings will feature rotating A105 forged steel flanges and seamless A106 pipe as standard. Most domestic producers typically charge for similar upgrades.
- Quality is verified by rigorous testing and assured with insurance company certification. The Pressure Equipment Directive (PED) requires not only participation in an ISO quality program but 100% traceability, spark and hydro testing, constant batch testing and permanent marking. Individual Baum components can be traced online for your convenience.
- Greater flexibility in design... (Schedule 10 stainless steel systems, DIN dimensions, electro polished stainless steel exteriors, conductive PTFE, etc) is available.

With Baum's stringent quality programs, testing, traceability, and permanent marking the highest level of safety and quality are assured. While other manufacturers provide products that simply comply with the current standards, Baum products search for solutions that will last protecting personnel and the environment to a higher set of criteria. The bar has been raised! Baum products represent the next level of safety and product quality.

Technical Specifications

These specifications define the material, technical data, installation instructions and quality checks for our PTFE/PFA, PVDF and PP lined pipe and fittings.

They are in accordance with ASTM F1545-97 (2003) for general requirements, ANSI B16.5 for dimensions and B31.3 for pressure piping.

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1. Material

1.1 Steel parts

1.1.1 All steel pipe (carbon steel) meets ASTM A106 Gr. B, A587 Gr. B ERW, or A53 Gr. B ERW

1.1.2 Flanges comply with ASTM A105

1.1.3 Fittings comply with ASTM A234 Gr. WPB

1.1.4 Stainless steel is supplied per customer specification.

1.2 Lining

1.2.1 Liner Physical Properties (test method: ASTM D638)

PROPERTY	<u>PTFE</u>	<u>PFA</u>	<u>PP</u>	<u>PVDF</u>
Sp. Gravity	2.14 – 2.19	2.11 – 2.17	.90	1.75 – 1.78
Tensile Strength (psi)	4,500	3,800	3,000	5,000
Elongation (%)	350-400	300	300	50
Melt Point	625	580	338	340
Max. Service Temp.(°F)	450	450	225	275
Colors	Natural	Natural	Orange	Black

1.2.2 Plastics Conductivity

DIN/EC 60093 and DIN/EC 60167 does not exceed 10^8 Ohm.

1.2.3 FDA Compliance

Upon customers' request the lining of our piping parts complies with the regulations of the Food and Drug Administration (FDA).

1.3 External Coating

1.3.1 Sandblasting

All carbon steel parts are sandblasted according to SSPC-SP6.

1.3.2 Paint coating

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

2. General Technical Data

2.1 Pressure Equipment Directive (97/23/EC)

If the piping parts are applied within the pressure equipment directive (PED), they fulfill all requirements of construction, manufacturing and testing.

2.2 Steel pipe dimensions

Steel pipe according to ASTM A106

Gr. B: Standard Wall. Fittings according to ASME B16.9.

2.3 Flange connections

Flange connections comply with ANSI B16.5 (Class 150 and 300).

2.4 Liner thickness

All Baum liner thicknesses meet or exceed those specified in ASTM F1545-97(2003). Our liner thickness is intended to maximize your cost/benefit position while assuring vacuum and permeation resistance.

2.5 Please refer to chart below for liner thicknesses.

2.6 Temperature Operating Ranges

Polymer	Temperature Range
PTFE	-20° to 500°F
PFA	-20° to 500°F
PP	0° to 225°F
PVDF	-20° to 275°F

Please consult chemical resistance chart for temperature limitations for particular chemistries.

2.7 Operating Pressures

Temperature	Maximum Pressure Rating (w/ 150# flanges)
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100°F	250 psig
150°F	242 psig
200°F	235 psig
300°F	215 psig
400°F	200 psig
500°F	170 psig

2.8 Vacuum Resistance

See chart below.

2.9 Vent Holes

Vent holes should be kept open at all times. They have a dual function. First, they allow permeating gas to escape. Second, they serve as leakage indicators to ensure rapid repair.

2.10 Tolerances

Tolerances of pipe and fittings are defined in ASTM F1545-97 (2003) as well as in ASME B16.5. The liner thickness may vary approximately.

10%. This applies especially to the area of the flares where the liner thickness is up to 20% thinner by definition.

2.11 Protective Covers

Flares are protected with a water proof plywood cover or plastic cap. All bolts and nuts are galvanized and can easily be loosened.

2.5 General Technical Data

Liner Thickness & Vacuum Resistance

NPS (in)	1	1-1/2	2	3	4	6	8	10	12
PTFE / PFA									
Liner Thickness (in.)	.130	.150	.160	.160	.160	.275	.310	.310	.310
Vacuum (in. Hg)	Full	Full	Full	Full	Full	Full	Full	Consult Factory	Consult Factory
Temperature (°F)	450	450	450	450	450	450	450	Consult Factory	Consult Factory
PP									
Liner Thickness (in.)	.150	.175	.175	.175	.220	.250	.280	.380	.400
Vacuum (in. Hg)	Full	Full	Full	Full	Full	Full	Full	Full	Full
Temperature (°F)	225	225	225	225	225	225	225	225	225
PVDF									
Liner Thickness (in.)	.125	.125	.125	.125	.145	.160	.185		
Vacuum (in. Hg)	Full	Full	Full	Full	Full	Full	Full		
Temperature (°F)	275	275	275	275	275	275	Consult Factory		

Note 1: All vacuum data reflects testing done per ASTM F1545 -97(2003).

Note 2: 1"-8" fittings meet or exceed pipe liner thickness and vacuum ratings for same size and liner material. Vacuum ratings for 10" and larger fittings may have limitations. Consult factory.

Note 3: Vacuum ratings may not apply for short stack crosses, laterals, crosses, special angle elbows and sight flow indicators 4" and above. Consult factory.

Note 4: Certain chemicals may affect vacuum ratings. Consult factory

Note 5: Larger sizes require special attention. Factors such as length of spool, rapid cool down and sudden pressure drops should be anticipated and vacuum breakers should be considered.

3. Quality Management

3.1 Welding

Our welding processes are subject to the following criteria:

1. We are a recognized manufacturer in accordance with AD-Merkblatt HPO/TRD 201/DIN EN 729-2.
2. Our processes conform to AD-Merkblatt HP 2/1 & ANSI B31.3
3. Our operations are supervised by a recognized welding expert.
4. We only employ welders with an HP 3 certificate (i.e. Certified welders)

3.2 Material certificates

All pipe, flanges, elbows and welded fittings have a works certificate according to EN 10204-3.1.B.

3.3 Raw material Checks

Lining materials are only procured with material certificates WAZ 2.3 from manufacturers certified acc. to ISO 9001.

In addition, our own laboratory continually checks and records the physical data of semi-finished products from the production line.

3.4 Optical and dimensional checks

The dimensions of all pipe and fittings are checked visually.

3.5 Spark tests

All lined pipe (not conductive) and fittings undergo a 25.000 Volt spark test to verify continuity.

3.6 Hydrostatic tests

The hydrostatic test is conducted at 1-1/2 times nominal working pressure. Baum pipe and fittings are both spark and hydro tested. This exceeds the ASTM requirement which specifies either a spark test or hydrotest.

3.7 Marking

In accordance with ASTM F 1545-97 (2003), every factory pipe and fitting will be marked on the flange's circumference as follows:

Manufacturer's sign

Production lot

Lining material

Date of production

CE marking (if applicable)

Additional markings – e.g. material no. – are available upon customer demand.

3. Quality Management

3.8 Certificates



4. Baum Part Numbering System

5. Chemical Resistance

5.1 PTFE has a universal chemical resistance against almost all chemicals and solvents within its continuous operating temperature range with the exception of molten alkalis, elementary fluorine and certain halogens.

5.2 PFA is identical with PTFE.

5.3 PP - Please consult website. Please note: PP and PVDF chemical resistance can change with temperature and concentration of media.

6. PRODUCTS - This documentation is based on past experience. All information is to the best of our knowledge and is given without responsibility.

We assume no liability with respect to the execution and nature of our products as well as their performance.

We reserve the right to make product changes without prior notice.

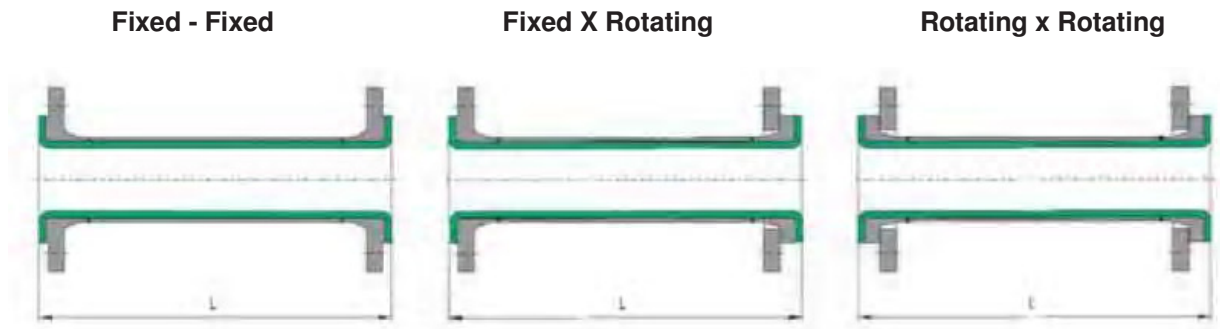
We reserve the right to change the lining material between PTFE and PFA based on processing capability.

7. Pipe and flange dimensions for lined pipes and fittings

NPS	Flange OD (in)		Raised Face Dia (in)	Pipe OD (in)	Standard Wall thk (in)	Pipe Schedule wall thk		
	Class 150	Class 300				Sch20	Sch30	Sch40
1/2"	3.50	3.75	1.38	0.840	0.109			0.109
3/4"	3.88	4.63	1.69	1.050	0.113			0.113
1"	4.25	4.88	2.00	1.315	0.133			0.133
1 1/2"	5.00	6.12	2.88	1.900	0.145			0.145
2"	6.00	6.50	3.62	2.375	0.154			0.154
2 1/2"	7.00	7.50	4.12	2.875	0.203			0.203
3"	7.50	8.25	5.00	3.500	0.216			0.216
4"	9.00	10.00	6.19	4.500	0.237			0.237
6"	11.00	12.50	8.50	6.625	0.280			0.280
8"	13.50	15.00	10.62	8.625	0.322		0.277	0.322
10"	16.00	17.50	12.75	10.750	0.365	0.250	0.307	0.365
12"	19.00	20.50	15.00	12.750	0.375	0.250	0.330	0.406
14"	21.00	23.50	16.25	14.000	0.375		0.375	0.438
16"	23.50	25.50	18.50	16.000	0.375	0.312	0.375	0.500
18"	25.00	28.00	21.00	18.000	0.375	0.312	0.438	0.562
20"	27.50	30.50	23.00	20.000	0.375	0.375	0.500	0.594
24"	32.00	36.00	27.25	24.000	0.375	0.375	0.562	0.688

Other schedules available upon request

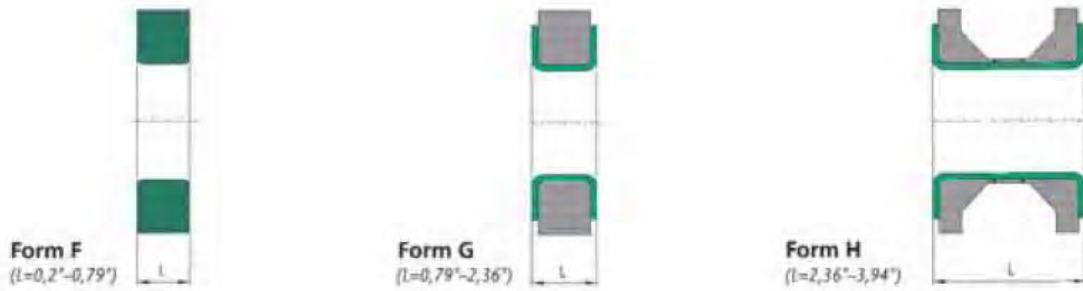
Lined Pipe (Class 150 and Class 300)



NPS	Std. Pipe Sch	L (inch)		Lining material		
		max.	min.	PTFE	PP	PVDF
1/2"	40	240.00	2.56	X		
3/4"	40	240.00	2.95	X		
1"	40	240.00	2.95	X	X	X
1 1/2"	40	240.00	3.15	X	X	X
2"	40	240.00	3.54	X	X	X
2 1/2"	40	240.00	3.54	X		
3"	40	240.00	3.94	X	X	X
4"	40	240.00	3.94	X	X	X
6"	40	240.00	3.94	X	X	X
8"	40	240.00	4.72	X	X	X
10"	30	120.00	5.12	X	X	
12"	20	120.00	5.12	X	X	
14"	STD	120.00	5.12	X		
16"	STD	120.00	5.12	X		
18"	STD	120.00	5.12	X		
20"	STD	78.75	5.51	X		
24"	STD	78.75	5.51	X		

Spools can be ordered with ductile iron flanges where service allows.

Spacers (Class 150 and Class 300)



Spacers in Form F and G are also available as tapered spacer with a variety of angles.

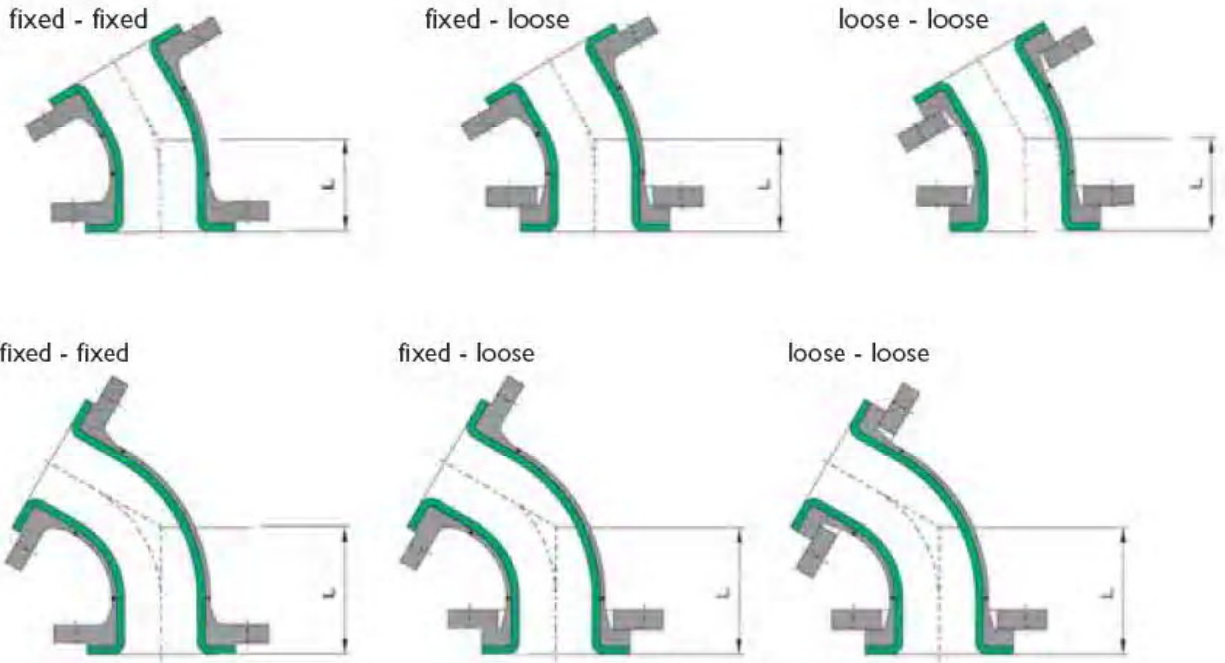
NPS	Lining material		
	PTFE	PP	PVDF
1/2"	X	X	X
3/4"	X	X	X
1"	X	X	X
1 1/2"	X	X	X
2"	X	X	X
2 1/2"	X	X	X
3"	X	X	X
4"	X	X	X
6"	X	X	X
8"	X	X	X
10"	X	X	
12"	X	X	
14"	X		
16"	X		
18"	X		
20"	X		
24"	X		

Blind Flanges



NPS	Class 150 (L) inch	Class 300 (L) inch	Lining material
			PTFE
1/2"	0.47	0.67	X
3/4"	0.50	0.75	X
1"	0.56	0.81	X
1 1/2"	0.69	0.93	X
2"	0.75	1.00	X
2 1/2"	0.88	1.12	X
3"	0.94	1.26	X
4"	0.94	1.43	X
6"	1.00	1.64	X
8"	1.12	1.81	X
10"	1.19	2.08	X
12"	1.25	2.20	X
14"	1.38	2.31	X
16"	1.44	2.49	X
18"	1.56	2.62	X
20"	1.69	2.75	X
24"	1.88	2.87	X

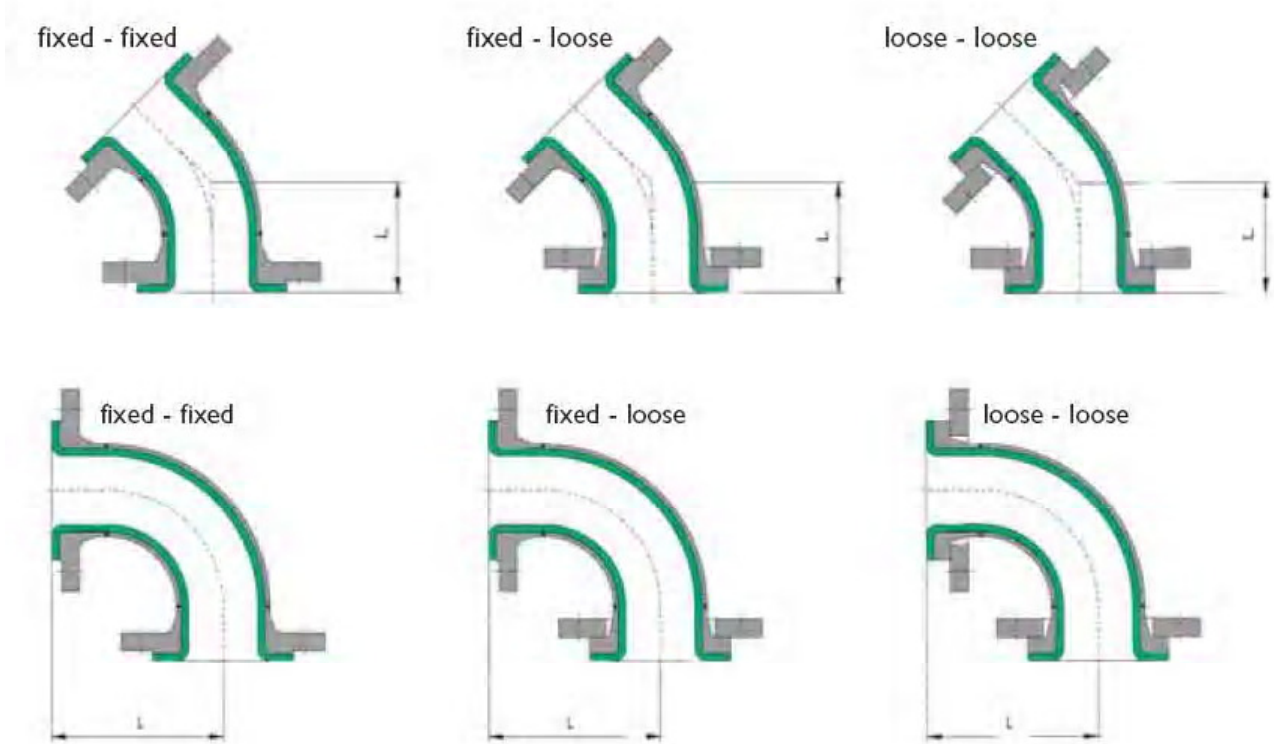
Elbows 30° & 60°



NPS	Class 150 L (in)	Lining Materials
		PTFE
1/2"	1.80	X
3/4"	1.80	X
1"	1.80	X
1 1/2"	2.20	X
2"	2.50	X
2 1/2"	3.00	X
3"	3.00	X
4"	4.00	X
6"	5.00	X
8"	5.50	X
10"	6.50	X
12"	7.50	X
14"	7.50	X
16"	8.00	X
18"	9.40	X
20"	8.90	X
24"		

Construction dimensions for Class 300 upon request.
 30° & 60° elbow dimensions are not defined in but have been calculated following ANSI B16.5.
 Please specify the desired lay length when contacting BAUM.

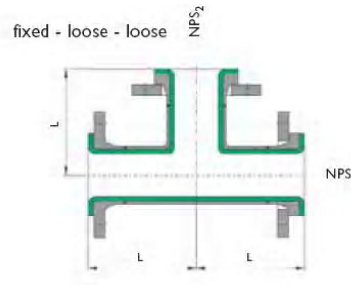
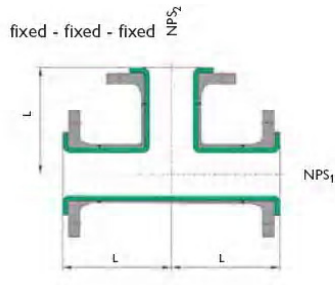
Elbows 45° & 90°



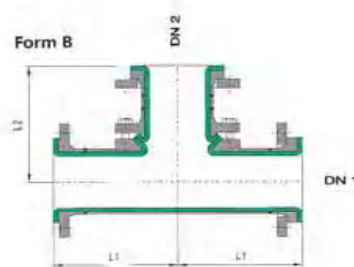
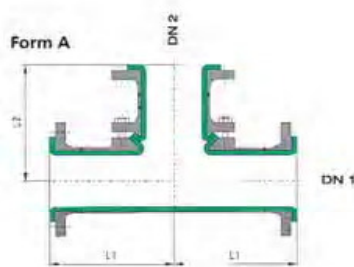
NPS	45° elbows		90° elbows		Lining Material		
	Class 150 L (in)	Class 300 L (in)	Class 150 L (in)	Class 300 L (in)	PTFE	PP	PVDF
1/2"	1.25	1.75	3.00		X		
3/4"	1.50	2.00	3.25		X		
1"	1.75	2.25	3.50	4.00	X	X	X
1 1/2"	2.25	2.75	4.00	4.50	X	X	X
2"	2.50	3.00	4.50	5.00	X	X	X
3"	3.00	3.50	5.50	6.00	X	X	X
4"	4.00	4.50	6.50	7.00	X	X	X
6"	5.00	5.50	8.00	8.50	X	X	X
8"	5.50	6.00	9.00	10.00	X	X	X
10"	6.50	7.00	11.00	16.50	X	X	
12"	7.50	8.00	12.00	19.00	X	X	
14"	7.50	8.50	14.00	21.50	X		
16"	8.00	9.50	15.00	24.00	X		
18"	8.50	10.00	16.50	26.50	X		
20"	9.50	10.50	18.00	29.00	X		
24"	11.00	12.00	22.00		X		

Nominal pipe sizes 1/2" and 3/4" are not defined in ASME B16.5.
PP and PVDF are only available with fixed flanges.

Tees



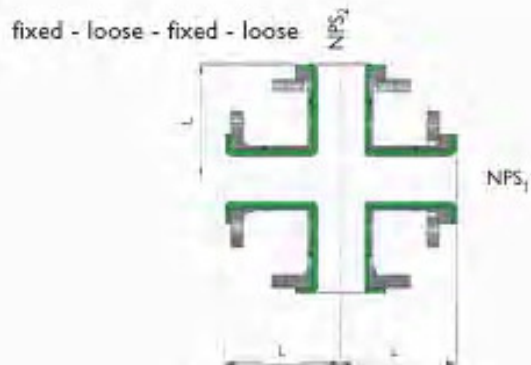
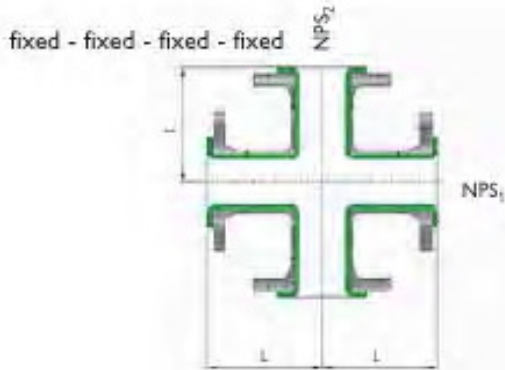
5" & above are 2-piece construction



NPS1	NPS2	Class 150 L (in)	Class 300 L (in)	Lining material			
				PTFE	PFA	PP	PVDF
1/2"	1/2"	3.00	3.50		X		
3/4"	3/4"	3.25	3.75		X		
3/4"	1/2"	3.25	3.75		X		
1"	1"	3.50	4.00		X	X	X
1"	3/4"	3.50	4.00		X		
1"	1/2"	3.50	4.00		X		
1 1/2"	1 1/2"	4.00	4.50		X	X	X
1 1/2"	1"	4.00	4.50		X	X	X
1 1/2"	3/4"	4.00	4.50		X		
2"	1" - 2"	4.50	5.00		X	X	X
3"	1" - 3"	5.50	6.00		X	X	X
4"	1" - 4"	6.50	7.00		X	X	X
6"	3" - 6"	8.00	8.50	X		X	X
8"	4" - 8"	9.00	10.00	X		X	X
10"	4" - 10"	11.00	11.50	X		X	
12"	6" - 12"	12.00	13.00	X		X	
14"	8" - 14"	14.00	15.00	X			
16"	10" - 16"	15.00	16.50	X			
18"	12" - 18"	16.50	18.00	X			
20"	14" - 20"	18.00	19.50	X			
24"	16" - 24"	22.00	22.50	X			

Nominal pipe sizes 1/2" and 3/4" are not defined in ANSI B16.5. Please determine the desired lay length when contacting BAUM. PFA-lined Tees are also available as Lateral-Tees upon request.

Crosses

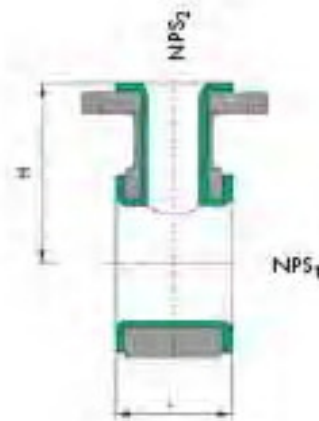


NPS1	NPS2	Class 150 L (in)	Class 300 L (in)	Lining material			
				PTFE	PFA	PP	PVDF
1/2"	1/2"	3.00	3.50		X		
3/4"	3/4"	3.25	3.75		X		
3/4"	1/2"	3.25	3.75		X		
1"	1"	3.50	4.00		X	X	X
1"	3/4"	3.50	4.00		X		
1"	1/2"	3.50	4.00		X		
1 1/2"	1 1/2"	4.00	4.50		X	X	X
1 1/2"	1"	4.00	4.50		X	X	X
1 1/2"	3/4"	4.00	4.50		X		
2"	1" - 2"	4.50	5.00		X	X	X
3"	1" - 3"	5.50	6.00		X	X	X
4"	1" - 4"	6.50	7.00		X	X	X
6"	3" - 6"	8.00	8.50	X		X	X
8"	4" - 8"	9.00	10.00	X		X	X
10"	6" - 10"	9.00	10.00	X		X	
12"	6" - 12"	12.00	13.00	X		X	
14"	8" - 14"	14.00	15.00	X			
16"	10" - 16"	15.00	16.50	X			
18"	12" - 18"	16.50	18.00	X			
20"	14" - 20"	18.00	19.50	X			
24"	16" - 24"	22.00	22.50	X			

Nominal pipe sizes 1/2" and 3/4" are not defined in ASME B16.5. Please determine the desired lay length when contacting BAUM.

PP & PVDF crosses are available with fixed flanges only.

Instrument Tees



NPS1	NPS2	Class 150		Class 300		Lining Material			
		L (in)	H (in)	L (in)	H (in)	PTFE	PFA	PP	PVDF
1"	1"	2.00	3.54	2.00	4.33		X	X	X
1"	3/4"	2.00	3.54	2.00	4.33		X		
1"	1/2"	2.00	3.54	2.00	4.33		X		
1 1/2"	1 1/2"	3.00	4.33	3.00			X	X	X
1 1/2"	1"	2.00	4.33	2.00			X	X	X
1 1/2"	3/4"	2.00	4.33	2.00			X		
1 1/2"	1/2"	2.00	4.33	2.00			X		
2"	2"	4.00	4.53	4.00	5.12		X	X	X
2"	1 1/2"	3.00	4.53	3.00	5.12		X	X	X
2"	1"	2.00	4.53	2.00	5.12		X	X	X
2"	3/4"	2.00	4.53	2.00	5.12		X		
2"	1/2"	2.00	4.53	2.00	5.12		X		
3"	2"	4.00	5.31	4.00			X	X	X
3"	1 1/2"	3.00	5.31	3.00			X	X	X
3"	1"	2.00	5.31	2.00			X	X	X
3"	3/4"	2.00	5.31	2.00			X		
3"	1/2"	2.00	5.31	2.00			X		

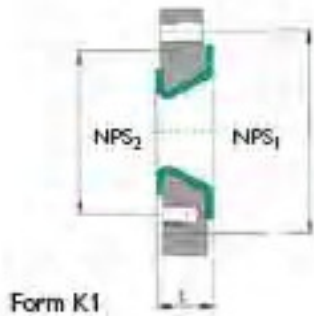
The dimensions of instrument tees are not defined in ASME B16.5

Instrument Tees (cont'd)

NPS1	NPS2	Class 150		Class 300		Lining Material			
		L (in)	H (in)	L (in)	H (in)	PTFE	PFA	PP	PVDF
4"	2"	4.00	5.91	4.00	6.69		X	X	X
4"	1 1/2"	3.00	5.91	3.00	6.69		X	X	X
4"	1"	2.00	5.91	2.00	6.69		X	X	X
4"	3/4"	2.00	5.91	2.00	6.69		X		
4"	1/2"	2.00	5.91	2.00	6.69		X		
6"	2"	4.00	7.09	4.00	8.07		X	X	X
6"	1 1/2"	3.00	7.09	3.00	8.07		X	X	X
6"	1"	2.00	7.09	2.00	8.07		X	X	X
6"	3/4"	2.00	7.09	2.00	8.07		X		
6"	1/2"	2.00	7.09	2.00	8.07		X		
8"	2"	4.00	8.27	4.00	9.45		X	X	X
8"	1 1/2"	3.00	8.27	3.00	9.45		X	X	X
8"	1"	2.00	8.27	2.00	9.45		X	X	X
8"	3/4"	2.00	8.27	2.00	9.45		X		
8"	1/2"	2.00	8.27	2.00	9.45		X		
10"	2"	4.00	9.45	4.00	12.80		X	X	
10"	1 1/2"	3.00	9.45	3.00	12.80		X	X	
10"	1	2.00	9.45	2.00	12.80		X	X	
12"	1" - 2"	4.00		4.00			X	X	
12"	1 1/2"	3.00		3.00			X	X	
12"	1	2.00		2.00			X	X	

The dimensions of instrument tees are not defined in ASME B16.5.

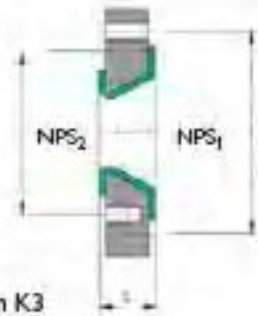
Reducing Flanges



Form K1
Concentric
NPS₁ through holes
NPS₂ threaded holes



Form K2
Concentric
NPS₁ threaded holes
NPS₂ threaded holes

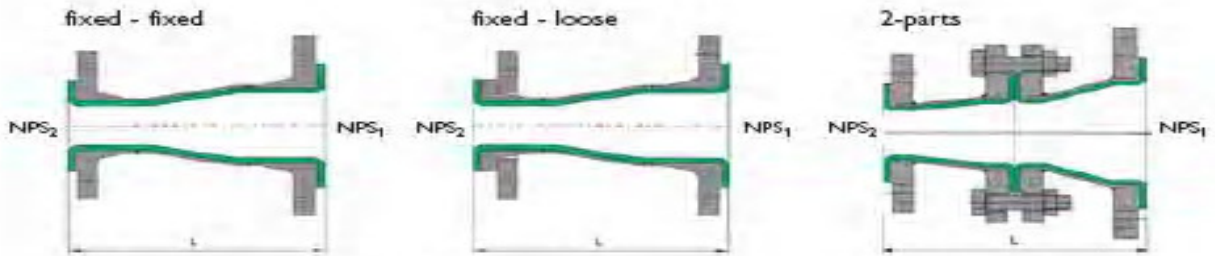


Form K3
Concentric
NPS₁ threaded holes
NPS₂ threaded holes on centre line

NPS1	NPS2	Class 150		Lining material	
		L (in)	Form	PTFE	PFA
3/4"	1/2"	1.38	K3	X	
1"	1/2" - 3/4"	1.38	K3	X	
1 1/2"	1"	1.38	K3	X	
1 1/2"	3/4"	1.38	K2	X	
2"	1 1/2"	1.38	K3	X	
2"	1"	1.38	K2	X	
2"	3/4"	1.38	K2		X
3"	2"	1.38	K2	X	
3"	1 1/2"	1.38	K2		X
3"	1"	1.38	K1		X
4"	3"	1.77	K3	X	
4"	2"	1.77	K2	X	
4"	1" - 1 1/2"	1.77	K1		X
6"	4"	1.77	K2	X	
6"	1" - 3"	1.77	K1		X
8"	6"	1.77	K2	X	
8"	1" - 4"	1.77	K1		X
10"	8"	1.77	K2	X	
10"	6"	1.77	K1	X	
10"	1" - 4"	1.77	K1		X
12"	10"	1.97	K2	X	
12"	1" - 8"	1.97	K1	X	
14"	12"	1.97	K2	X	
14"	1" - 10"	1.97	K1	X	
16"	14"	1.97	K2	X	
16"	1" - 12"	1.97	K1	X	
18"	1" - 16"	1.97	K1	X	
20"	18"	1.97	K2	X	
20"	1" - 16"	1.97	K1	X	
24"	1" - 20"	1.97	K1	X	

Class 300 concentric/eccentric reducing flanges available upon request.

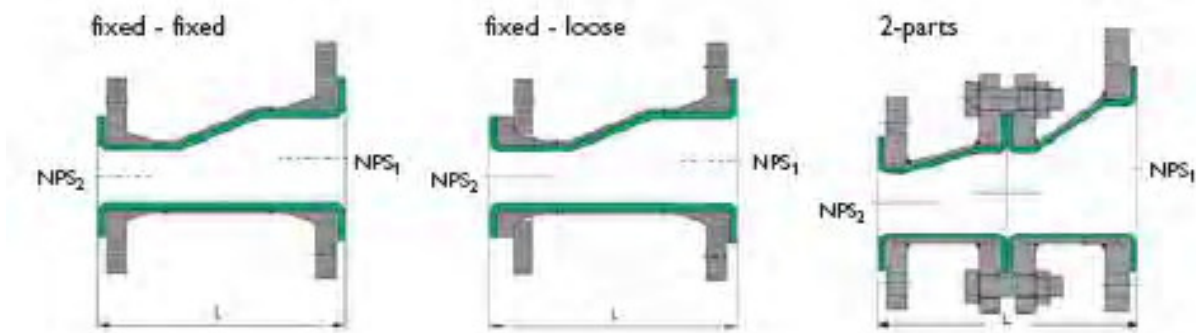
Concentric Reducers



NPS1	NPS2	Class 150/300		Lining material			
		L (in)	Form	PTFE	PFA	PP	PVDF
3/4"	1/2"	4.50		X			
1"	1/2"	4.50		X			
1 1/2"	1"	4.50			X	X	X
1 1/2"	3/4"	4.50			X		
2"	1 1/2"	5.00		X		X	X
2"	1"	5.00			X	X	X
3"	2"	6.00		X		X	X
3"	1" - 1 1/2"	6.00			X	X	X
4"	3"	7.00		X		X	X
4"	2"	7.00			X	X	X
6"	4"	9.00		X	X	X	X
6"	3"	9.00	2-parts	X	X	X	X
8"	6"	11.00		X	X	X	X
8"	4"	11.00	2-parts	X	X	X	X
10"	8"	12.00		X	X	X	
10"	6"	12.00	2-parts	X	X	X	
12"	10"	14.00		X	X	X	
12"	6" - 8"	14.00	2-parts	X	X	X	
14"	12"	16.00		X			
14"	8" - 10"	16.00	2-parts	X			
16"	14"	18.00		X			
16"	10" - 12"	18.00	2-parts	X			
18"	16"	19.00		X			
18"	12" - 14"	19.00	2-parts	X			
20"	16" - 18"	20.00		X			
20"	14"	20.00	2-parts	X			
24"	18"	24.00		X			
24"	14" - 16"	24.00	2-parts	X			

Nominal pipe sizes 1/2" and 3/4" are not defined per ANSI B16.5. Please determine the desired length when contacting BAUM.

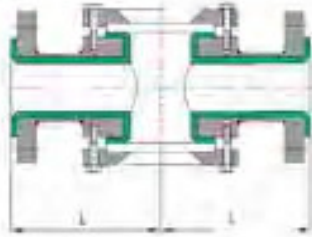
Eccentric Reducers



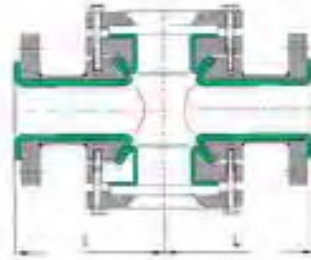
NPS1	NPS2	Class 150/300		Lining material			
		L (in)	Form	PTFE	PFA	PP	PVDF
3/4"	1/2"	4.50		X			
1"	1/2"	4.50		X			
1 1/2"	1"	4.50		X		X	X
1 1/2"	3/4"	4.50			X		
2"	1 1/2"	5.00		X		X	X
2"	1"	5.00			X	X	X
3"	2"	6.00		X		X	X
3"	1 1/2"	6.00			X	X	X
3"	1"	6.00			X	X	X
4"	3"	7.00		X		X	X
4"	2"	7.00			X	X	X
6"	4"	9.00	2-parts	X	X	X	X
6"	3"	9.00	2-parts	X	X	X	X
8"	6"	11.00		X	X	X	X
8"	4"	11.00	2-parts	X	X	X	X
10"	8"	12.00		X	X	X	
10"	6"	12.00	2-parts	X	X	X	
12"	10"	14.00		X	X	X	
12"	8"	14.00	2-parts	X	X	X	
12"	6"	14.00	2-parts	X	X	X	
14"	12"	16.00		X			
14"	8" - 10"	16.00	2-parts	X			
16"	14"	18.00		X			
16"	12"	18.00	2-parts	X			
16"	10"	18.00	2-parts	X			
20"	16" - 18"	19.00		X			
20"	14"	19.00	2-parts	X			
20"	18"	20.00		X			
20"	14" - 16"	20.00	2-parts	X			
24"	20"	24.00					
24"	18"	24.00	2-parts	X			
24"	16"	24.00	2-parts	X			

Bull's Eye Sight Indicators (Class 150)

Form A

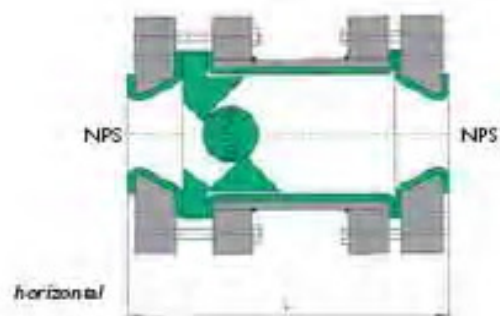
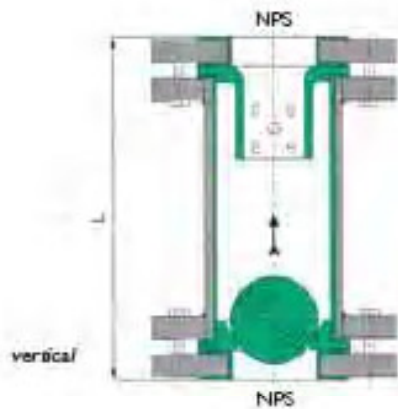


Form B



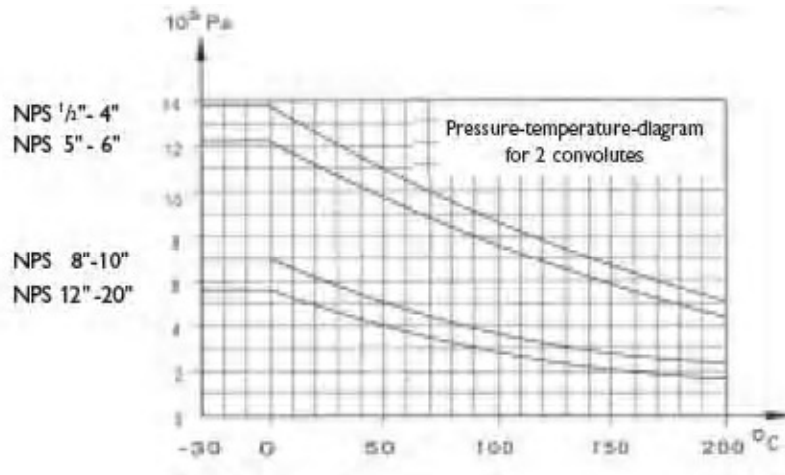
NPS	Class 150		Lining material	
	L (in)	Form	PTFE	PFA
1"	3.50	A		X
1 1/2"	4.00	A		X
2"	4.50	A		X
3"	5.50	A		X
4"	6.50	A		X
6"	8.00	B	X	
8"	9.00	B	X	
10"	11.00	B	X	
12"	12.00	B	X	
14"	14.00	B	X	
16"	15.00	B	X	

Ball Check Valves (Class 150)



NPS	Class 150 L (in)	Lining Material - PTFE
1"	7.00	X
1 1/2"	8.00	X
2"	9.00	X
3"	11.00	X
4"	13.00	X
6"	16.00	X
8"	18.00	X

PTFE Expansion Joints, 2 convolute, Class 150



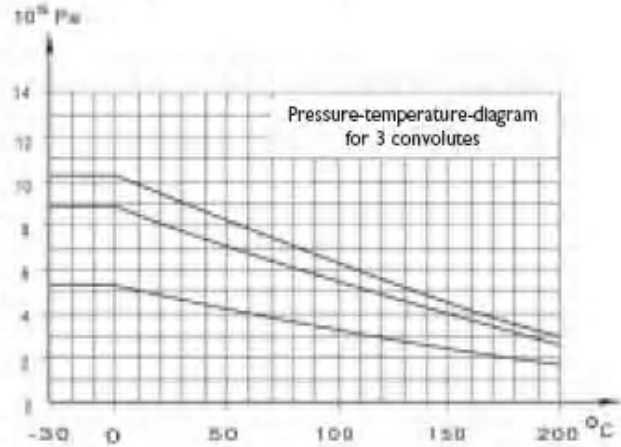
NPS	Neutral Length (in)	Maximum Allowable Movements			Vacuum Resistance			
		Axial (in)	Lateral (in)	Angular (deg)	in Hg	@ max. °F	in Hg	@ max. °F
1/2"	1.10	0.16	0.08	7	29.6	392		
3/4"	1.10	0.16	0.08	7	29.6	392		
1"	1.38	0.24	0.12	7	29.6	392		
1 1/2"	1.38	0.24	0.12	7	29.6	392		
2"	1.57	0.24	0.12	7	29.6	392		
2 1/2"	2.24	0.35	0.20	7	29.6	392		
3"	2.24	0.35	0.20	7	29.6	392		
4"	2.64	0.51	0.24	7	29.6	392		
6"	2.95	0.51	0.24	7	29.6	302		
8"	4.02	0.51	0.24	7	29.6	122	24.5	302
10"	5.51	0.59	0.24	7	28.0	113	20.7	212
12"	5.91	0.79	0.39	7	25.8	113	11.7	212
14"	6.30	0.79	0.39	7	25.8	113	11.7	212
16"	7.01	0.98	0.39	7	25.8	113	11.7	212
18"	7.28	0.98	0.39	7	20.7	113	10.9	212
20"	9.06	0.98	0.39	7			6.3	212

1. The above shown chart is only valid at neutral length and with limit bolts in place.
2. Above mentioned types of travel (axial, lateral or angular) are considered independently. The percentage values must not exceed 100% when added together.
3. The figures stated are average values at room temperature.
4. Bolt holes are threaded.
5. Class 300 and other designs are available upon request.

PTFE Expansion Joints, 3 convolute, Class 150



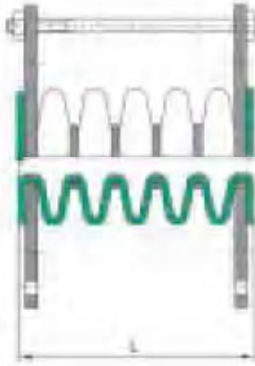
NPS 1/2" - 4"
 NPS 5" - 6"
 NPS 8"-20"



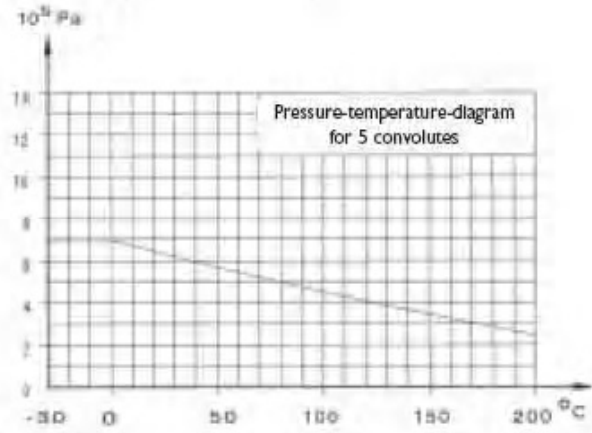
NPS	Neutral Length (in)	Maximum Allowable Movements			Vacuum Resistance			
		Axial (in)	Lateral (in)	Angular (deg)	in Hg	@ max. °F	in Hg	@ max. °F
1/2"	1.46	0.24	0.16	14	29.6	392		
3/4"	1.46	0.24	0.16	14	29.6	392		
1"	1.81	0.51	0.24	14	29.6	392		
1 1/2"	1.81	0.51	0.24	14	29.6	392		
2"	2.20	0.59	0.35	14	29.6	392		
2 1/2"	3.03	0.75	0.35	14	29.6	392		
3"	3.03	0.98	0.51	14	29.6	392		
4"	3.58	0.98	0.51	14	29.6	392		
6"	3.98	1.10	0.55	14	29.6	302		
8"	5.39	1.10	0.55	14	29.6	122	24.5	302
10"	7.87	1.18	0.55	14	28.0	113	20.7	212
12"	7.72	1.18	0.59	14	25.8	113	11.7	212
14"	8.46	1.26	0.71	14	25.8	113	11.7	212
16"	9.17	1.38	0.79	14	25.8	113	11.7	212
18"	11.02	1.18	0.79	14	20.7	113	10.9	212
20"	12.87	1.18	0.98	14			8.2	212

1. The above shown chart is only valid at neutral length and with limit bolts in place.
2. Above mentioned types of travel (axial, lateral or angular) are considered independently. The percentage values must not exceed 100% when added together.
3. The figures stated are average values at room temperature.
4. Bolt holes are threaded.
5. Class 300 and other designs are available upon request.

PTFE Expansion Joints. 5 convolute. Class 150



NPS 1/2" - 20"



NPS	Neutral	Maximum Allowable Movements			Vacuum Resistance
	Length (in)	Axial (in)	Lateral (in)	Angular (deg)	
1/2"	2.17	0.31	0.20	20	Not Recommended for Vacuum Service
3/4"	2.17	0.31	0.20	20	
1"	2.68	0.31	0.47	20	
1 1/2"	3.15	0.51	0.47	20	
2"	3.46	0.75	0.47	20	
2 1/2"	4.45	0.98	0.51	20	
3"	4.45	0.98	0.63	20	
4"	5.47	0.98	0.63	20	
6"	6.02	1.26	0.63	20	
8"	8.15	1.26	0.63	20	
10"	11.81	1.26	0.63	20	
12"	11.34	1.38	0.71	20	
14"	12.80	1.38	0.71	20	
16"	13.50	1.57	0.98	20	
18"	18.50	1.57	0.98	20	
20"	20.47	1.57	0.98	20	

1. The above shown chart is only valid at neutral length and with limit bolts in place.
2. Above mentioned types of travel (axial, lateral or angular) are considered independently. The percentage values must not exceed 100% when added together.
3. The figures stated are average values at room temperature.
4. Bolt holes are threaded.
5. Class 300 and other designs are available upon request.



Instructions for Handling & Installation of BAUM Lined Pipe & Fittings.

1. Flange Protectors: DO NOT remove flange protectors until pipe and fittings are ready to be installed. The protectors keep the flare from being damaged and/or recovering. Flange protectors should be replaced after inspection and when removed from service. Scratches or dents not exceeding 20% of liner thickness can be eliminated by hand-polishing with fine abrasive paper or cloth.

2. Bolting: Recommended 150# system bolt torques are for lightly oiled A193 B7 bolts and A194 2H nuts as follows in chart below. (torques vary with bolt and nut materials- consult factory)

Pipe Size	Bolt Torque (Ft. - Lbs.)			Pipe Size	Bolt Torque (Ft. - Lbs.)		
	PTFE/PFA	PP	PVDF		PTFE/PFA	PP	PVDF
	Min.	Min.	Min.		Min.	Min.	Min.
1"	10	15	20	6"	60	80	100
1 1/2"	15	20	25	8"	75	100	120
2"	25	40	55	10"	70	100	-
3"	40	60	80	12"	90	120	-
4"	30	40	55	14 -40"	Consult Factory		

Note: Higher torques are recommended for services at the upper end of pressure, temperature and /or small molecule gas service. Lower torques can be used for less demanding service. Use the lowest torque required to achieve a seal in the required service. Use the lowest torque with cup washers, systems using gaskets, and systems that may be frequently disassembled.

Torquing of bolts:

Grease all bolts and nuts with a suitable grease.

Finger tighten all nuts.

With a torque wrench, using the criss-cross method, tighten each bolt to the above listed torque.

After 24-30 hours or a temperature or pressure cycle, check the torque for each bolt and retorque those falling below the above-listed torque values.

Torque values listed above should be exceeded only when necessary to effect a seal. Increase in 10% increment of allowed torque. If a seal is not achieved at 150% of published torque disconnect and check for scratches.

Retorque annually.

3. Gaskets: PTFE envelope gaskets must be used only when flanging lined items to flanges of dissimilar material. Use the lower of the listed product torque recommendations in this case.

4. Vent Holes:

- A. DO NOT plug vent holes.
- B. DO NOT use a sharp instrument to clean plugged vent holes.
- C. Vent hold extensions are recommended for insulated pipe systems.

5. Disassembly: DO NOT remove pipe spools, fittings or valves from system when temperature exceeds 30° F above ambient. Upon removal of pipe fittings or valves from a system, a flange protector must be bolted to each flange.

6. Welding: DO NOT perform any welding on the metal after liner is in place.

7. Low Temperature: Cold temperatures can cause brittleness in PP & PVDF lined products. Handling and storage is not recommended below 0° F (-18 C) Heat tracing is advised below 32° F. Temperature should not exceed liner rating and should utilize stand-off strips or heat transfer cement.

8. Support Spacing: Plastic-lined piping is considered a schedule 40 flanged system. Supports should follow the outline in the "Piping Handbook by Crocker & King. Special care should be taken not to overstress the plastic flange faces. Do not exceed 10,000psi of stress longitudinally or axial. Plan hangers or supports near the flange or where flow changes direction, and in areas of high load to prevent excessive deflection.

9. Grounding: The standard epoxy primer will not consistently conduct electricity consider grounding studs and jumper cables.

Paint System:

All BAUM products are blasted to near white metal and painted with zinc rich epoxy primer for their protection as standard. Special systems or color coding to your specification can be provided. Consult factory for pricing.

Sandblasting:

When field blasting, ends must be protected either by installing or by blasting with end covers in place. No other special precautions need to be taken.

Heat Tracing:

Steam or electric heat tracing can be used with the following precautions:

1. Stand off strips or heat transfer cement should be used to prevent direct contact.
2. Tracing temperature must not exceed the maximum recommended liner temperature, with the given media.
3. When electric heating cable or tape is used, place cable in "W" wrap and cover with a parallel covering of 2" wide aluminum tape to spread heat.

Heat tracing is recommended for both polypropylene and PVDF at temperatures below freezing.

The information, recommendations and opinions set forth here in are offered solely for your consideration, inquiry and verification, and are not, in part or total, to be construed as constituting a warranty or representation for which we assume legal responsibility.



BAUM Fluoroplastics™

Plastic-Lined Piping Systems



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