

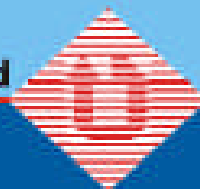
# DufLine<sup>®</sup>

## PTFE Lined Pipe Systems



[www.duflon.com](http://www.duflon.com)

DuFlon Polymers Private Limited



## General Terminology and Specifications

A105	ASTM specification for Forged Steel
A106	ASTM specification for Seamless Carbon Steel Pipe
A216	ASTM specification for Cast Steel (grade WCB)
A395	ASTM specification for Ferritic Ductile Iron
F1545	ASTM specification for consolidated plastic lined piping standards
ASTM	American Society for Testing and Materials
ANSI	American National Standards Institute
DIN	German Industrial Standard
JIS	Japanese Industrial Standard
PTFE	Polytetrafluoroethylene, manufactured by DuPont under the trade name of Teflon® and is the resin used exclusively by Duflon for all of it's PTFE manufacturing
PFA	Perfluoroalkoxy, also manufactured by DuPont under the trade name of Teflon® and is the resin used exclusively by Duflon for all of it's PFA manufacturing
FEP	Perfluoro Ethylene-Propylene
PVDF	Polyvinylidene Fluoride, manufactured by Arkema under the trade name Kynar®
PP	Polypropylene
ETFE	Ethylenetetrafluoroethylene, manufactured by DuPont under the trade name Tefzel®
ECTFE	Ethylene chlorotrifluoro ethylene, manufactured by Solvay Solexis under the trade name Halar®
NPS	Nominal Pipe Size
DI	Cast Ductile Iron
FS	Forged Steel
CS	Cast Steel
Class 150	Pressure rating standard to 150 Psi (steam)
Class 300	Pressure rating standard to 300 Psi (steam)
Full Vacuum	29.6 inches of mercury

# Company Profile

DuFlon was incorporated in the year 1988 with the primary objective of implementing hi-tech engineered polymer processing. Years of experience have made DuFlon an ultimate specialist in manufacturing PTFE/PFA molding and lining products that meet the strictest standards of precision. It has successfully implemented an 80,000 sq ft state-of-the art PTFE processing plant at the Mahad Industrial Area (Plant-I and Plant-II), Dist.Raigad, Maharashtra, India.

DuFlon's highly dedicated Human Resources pool of over 200 employees is committed to developing high quality PTFE products and solutions. The entire DuFlon family has made it possible to offer "Total PTFE Solutions" to diverse industry groups in India and abroad. Duflon has positioned itself as the "Supplier of Choice" for a number of large and medium corporations across the globe.

DuFlon Polymers Private Limited is a 100% EOU (Export-Oriented Unit) Indian company specializing in PTFE / PFA Lined Pipe and Fittings (ranging from 1" to 18"), Dip Tubes, etc. that is offered as per ASTM standards. It is also a leading Fluoropolymers processor, exporter and manufacturer of PTFE/PFA/FEP OEM products.

Our range of products are used in various industries across the globe including Chemicals, Petrochemicals, Refining, Chlor-Alkali, Food & Beverage, Textile, Pharmaceutical, Pulp & Paper, Semiconductor, Fertilizers, Mining, etc.

## Key Notes about our company and Duflon

DuPont's Preferred Processor Network in India.

One of the largest processors of Teflon in South Asia.

PTFE Paste Extruded Liners up to 18"

Single Piece PTFE lined fittings up to 18" by Iso-static Technology.

TUV Cert ISO 9001:2000.

Company operates globally on the SAP ERP system.

Winner of the prestigious Niryat Shree award from the Government of India for two consecutive years for outstanding export performance and growth.



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## **Quality Assurance and Control**

At DuFlon, quality assumes paramount importance. Our quality inspection team ensures that all products meet or exceed ASTM specifications. DuFlon is TUV Certified ISO 9001:2000.

Metal pipe and fittings are visually inspected prior to lining. Interior shall be smooth, clean, and free of burrs, scale or any other deposits. Internal welds shall be ground smooth prior to lining.

Pipe liners shall be examined for pinholes, cracks, gouges, nicks, or foreign objects prior to the lining process.

Components are hydro-tested at 1.5 times the design pressure as is an Electrostatic spark test of 10,000 volts. Warning: Any Electrostatic testing over 10,000 volts should not be conducted without prior approval as undue damage may occur to the liner.

Liner forming the flange gasket sealing face shall be free of defects as described above. Any imperfection shall not be greater than 10%.

Lined pipe and fittings shall be checked for dimensional accuracy and tolerances in accordance to dimensional data listed within this catalog and ANSI specifications.

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

## Lining Data

Liner Properties	Unit	PTFE	PFA
Operating Temperature Range	° F	-20° – 450° F	0° – 450° F
Specific Gravity	g/cm <sup>3</sup>	2.14 – 2.19	2.12 – 2.17
Liner Color	NA	White	Natural
Tensile Strength of Liner at Yield (average)	psi	3500	4200
Elongation of Liner at Yield	%	350 - 400	300
Melt Point	° F	625	580
Thermal Conductivity “K” Factor of Liner	NA	1.7	1.3
	BTU-in/hr-sq.ft. -° F		

## Duflon Lined Pipe Dimensions

Duflon manufactures plastic lined pipe from 1” – 12” sizes in various grades of metal systems from Carbon Steel to Stainless Steel. These systems are available in ANSI class 150# , class 300# and DIN Flange dimensions. Duflon plastic lined pipe can be easily field fabricated. Duflon also offers many extras such as Vent Hole extensions, Steam Jacketed Pipe and Special Paint systems just to name a few.

Nominal Size	Steel Pipe Dimensions		Liner Thickness, in.
	OD	Wall	PTFE
1”	1.315	.133	.130
1 ½”	1.900	.145	.150
2”	2.375	.154	.160
3”	3.500	.216	.160
4”	4.500	.237	.160
6” HW	6.625	.280	.275
8” HW	8.625	.322	.310
10” HW	10.750	.365	.320
12” HW	12.750	.250	.425
6” Std	6.625	.280	.197
8” Std	8.625	.322	.217
10” Std	10.750	.307	.275
12” Std	12.750	.250	.275

1” – 4” Full Vacuum Rated @ 450° F

6” – 12” Std - Not Rated for Vacuum

6” – 12” HW – Full Vacuum Rated @ 450° F, Consult Factory

Certain chemicals may affect vacuum ratings, consult factory.

Standard 1” – 8” fittings meet or exceed pipe liner thickness and vacuum ratings for same size and liner. Consult factory for 10” and larger.

# Standards of Construction

Duflon manufactured pipe and fittings are in full compliance with ASTM F1545.

Duflon products are manufactured to the following specifications/requirements:

- Liners:** PTFE – Polytetrafluoroethylene ASTM D4894, D4895  
PFA – Perfluoroalkoxy ASTM D3307
- Pipe:** 1" – 8" size, Schedule 40 Carbon Steel per ASTM A53, Gr. B Type E  
Schedule 40 Carbon Steel per ASTM A587, ERW  
Schedule 40 Carbon Steel per ASTM A106  
  
10" size, Schedule 30 Carbon Steel per ASTM A106/A53, Gr. B Type E  
12" size, Schedule 20 Carbon Steel per ASTM A106/A53, Gr. B Type E
- Flanges:** Lap Joint, 1" – 12" size, Ductile Iron ASTM A395, ANSI B16.42 Class 150  
Lap Joint, 1" – 12" size, Carbon Steel ASTM A105, ANSI B16.5 Class 150
- Fittings:** Fabricated Carbon Steel components per ASTM A587, A53 & A234 as per manufacturers drawings. Dimensions are per ANSI B16.5 Class 150.  
Rotating lap joint or fixed flanges per specification above. Ductile Iron Casting (60-40-18) per ASTM A395. Cast Steel per ASTM A216 Gr. WCB

**Dimensional:** ASTM B16.42 and B16.5

**Fabrication Tolerances:** Pipe and Fittings

<u>Dimensions</u>	<u>Tolerance, inches</u>
Length & Centerline	± 1/8"
Fixed Flange Bolt Hole Alignment	± 1/16"

Perpendicular of Flange with centerline of the pipe 3/32 in/ft of the pipe diameter.

**Minimum Radius:** Minimum Inside Diameter Radius

<u>Size</u>	<u>Radius</u>
1"	1/8"
1 1/2" & 2"	1/4"
3" & Over	3/8"

## Standards of Construction (cont'd)

### Pressure Capabilities:

Temperature	ANSI Class 150	ANSI Class 300
100° F	250 psig	450 psig
150° F	242 psig	415 psig
200° F	235 psig	390 psig
300° F	215 psig	345 psig
400° F	200 psig	295 psig
500° F	170 psig	245 psig

### Venting:

PFA and PTFE fittings, except blind flanges, reducing flanges, reinforced spacers and instrument connections are vented with one vent hole near the center of the fitting. PFA and PTFE lined pipe spools 3 feet and under have one vent hole near the center of the spool. Pipe spools over 3 feet have two vent holes one near each flange.

### External Protective Coating and Marking:

Metal surfaces of pipe and fittings shall be given a protective coating of primer prior to leaving the manufacturing facility. This is to protect the metal surfaces from rust. For all other primer and paint requirements please contact the factory.

Each pipe spool and fitting shall be marked with a color band identifying Manufacturer Name, Liner Type and ASTM. Each Spool will also be identified with Size, Length and Tag number on one end of the flange protector. SS Tags are available. Do not plug vent holes.

### Processes

Duflon is a performance piping system that uses innovative fluoropolymer processing technology to assure a product of the highest quality that provides long-term performance. We use the Paste Extrusion process to manufacture pipe liners that increase permeation resistance, a smoother interior and structurally stable liners. Duflon fittings are manufactured with two processes. Our PTFE fittings use the Isostatic Molding process and our PFA fittings are manufactured using the Injection Molding process.

# Inspection and Handling

## Inspection:

Metal pipe and fittings are visually inspected prior to lining. Interior shall be smooth, clean, and free of burrs, scale or any other deposits. Internal welds shall be ground smooth prior to lining.

Pipe liners shall be examined for pinholes, cracks, gouges, nicks, or foreign objects prior to the lining process.

Components are hydro-tested at 1.5 times the design pressure as is an Electrostatic spark test of 10,000 volts. Warning: Any Electrostatic testing over 10,000 volts should not be conducted without prior approval as undue damage may occur to the liner.

Liner forming the flange gasket sealing face shall be free of defects as described above. Any imperfection shall not be greater than 10%.

Lined pipe and fittings shall be checked for dimensional accuracy and tolerances in accordance to dimensional data listed within this catalog and ANSI specifications.

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

## Handling, Shipping and Storage:

Prior to shipment, all lined products must have their sealing surfaces covered by a flange protector. The flange protector should only be removed for installation. In cases where testing is required prior to installation, flange protectors should be re-installed immediately after testing.

Slings, chains or lifting equipment shall not be placed inside lined products or otherwise contact the plastic liner. Extreme care must be taken at all times when loading, transporting and unloading products to and from a truck/trailer. Using chains and slings for lifting rather than dragging the spools.

Avoid storage in direct sunlight or other severe conditions. Storage under cover is recommended.

Consult Duflon when handling and installing in extreme temperatures. Liner becomes brittle in temperatures below 40° F.

Protection of the flare faces is necessary during handling, sandblasting and painting. Do not plug vent holes.

Failure to follow shipping and handling instructions will void factory warranty.

# Installation

## Installation Instructions:

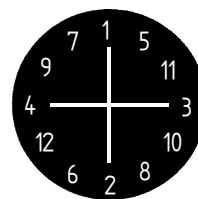
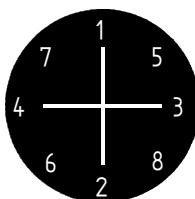
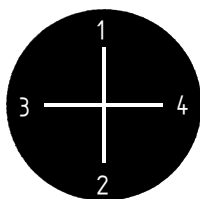
Do not remove flange protectors prior to installation to prevent damage to the sealing surface. Flange protectors should be replaced any time the item is removed from service.

Recommended bolt torque is in foot-pounds.

ANSI Class 150 System

Size	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"
<b>PTFE / PFA Minimum</b>	12	24	36	41	46	66	96	87	110
<b>PTFE / PFA Maximum</b>	25	55	75	110	125	125	15	200	200

Note: Use the lower torque when bolting dissimilar liner materials.



Bolt Torque Sequence

Recommended torque ratings are based on lightly lubricated A193 B7 bolts and A194 2H nuts. Finger tighten all nuts and bolts and then with a calibrated torque wrench tighten each flange connection with a criss-cross method. We recommend tightening in the criss-cross method in increments of 20% up to 80%. Tighten the final torque requirement in a sequential clockwise pattern around the flange. Maximum recommended torque is suggested for systems that will be operating at or near the maximum pressure and temperature limits of the liner or small molecular gases.

After initial installation it is recommended that after 24 hours, a temperature cycle or a pressure cycle (hydro test), the torque of each bolt be checked and any falling below the recommended value should be re-torqued. Values should only be exceeded by 10% increments when necessary to re-affect the seal. All torquing on the process system should be done when the system is ambient and cool.

Re-torquing should be done annually especially if the system experiences elevated temperatures or extreme temperature swings.

Welding should not be performed before or after installation.

## Installation (cont'd)

Gaskets must be used when bolting to dissimilar products such as metal, glass lined, fiberglass, etc. Otherwise gaskets are not required when bolting lined piping systems together unless repeated connections and disconnections are made.

Vent holes should not be plugged nor the use of sharp tools to clean the plugged holes.

Vent hole extensions are recommended for insulated pipe and fittings.

Do not remove pipe spools and fittings from systems at elevated temperatures. A flange protector must be installed immediately after removal.

ANSI Class 150 Bolt and Stud Lengths				
Size	Bolt Length		Stud Length	
	Fixed	Lap Joint	Fixed	Lap Joint
1"	2 1/2	2 3/4	3	3 1/4
1 1/2"	2 3/4	3	3 1/4	3 1/4
2"	3 1/4	3 1/2	4	4 1/4
3"	3 1/2	4	4 1/4	4 1/2
4"	3 1/2	4	4 1/4	4 1/2
6"	4 1/4	4 1/2	5	5 1/4
8"	4 1/4	4 3/4	5	5 1/2
10"	4 1/2	5 1/4	5 1/2	6
12"	4 3/4	5 1/2	5 1/2	6 1/4

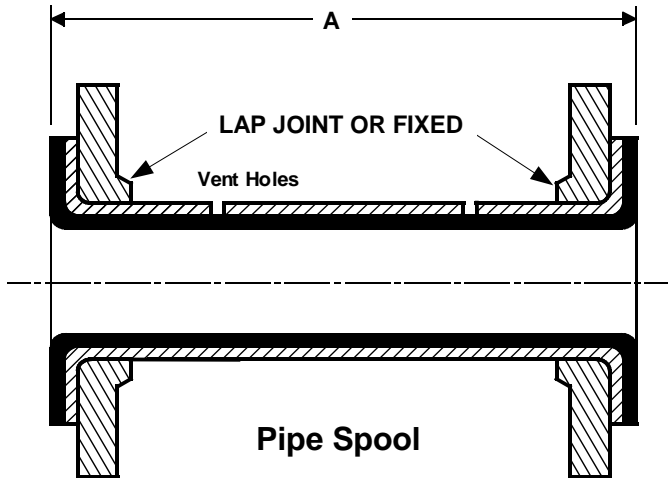
All Dimension in Inches.

Thicknesses are calculated using A-193-B7 bolts, A-194-2H nuts and flat washers on both sides.

# Flanged Pipe Spools

Size	Weight (Lbs.)		A - Minimum Spool Length	
	1 <sup>st</sup> Foot	Ea. Add. Foot	With weld	Without weld
1"	6	2	3 1/4	5 1/4
1 1/2"	9	3	3 1/2	6 1/2
2"	15	4	3 3/4	7 1/2
3"	26	8	4	10 1/2
4"	39	11	4 1/2	10 3/4
6"	62	21	5 1/2	16 1/2
8"	98	31	6 1/2	17
10"	129	40	9	27
12"	179	53	9	27

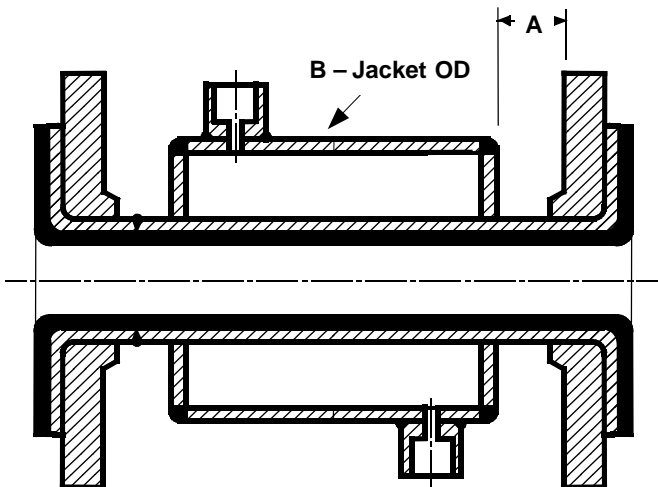
Length in inches



1. 1" – 8" Maximum Length 20'.
2. 10" & 12" Maximum Length 10'.
3. For lengths shorter than the minimum listed, see distance pieces and spacers.
4. Custom Lengths should be rounded to the nearest 1/16".
5. Lap Joint Standard / Fixed when specified.
6. Vent Hole extensions are available for pipe & fittings.

Size	A	B	Weight	
			1 <sup>st</sup> Foot	Ea. Add. Foot
1"	1 1/2	2 1/2	10	6
1 1/2"	1 1/2	3 1/2	17	11
2"	1 1/2	4 1/2	25	14
3"	2	5 9/16	40	22
4"	2	6 5/8	56	30
6"	2	8 5/8	85	48
8"	2	10 3/4	122	72

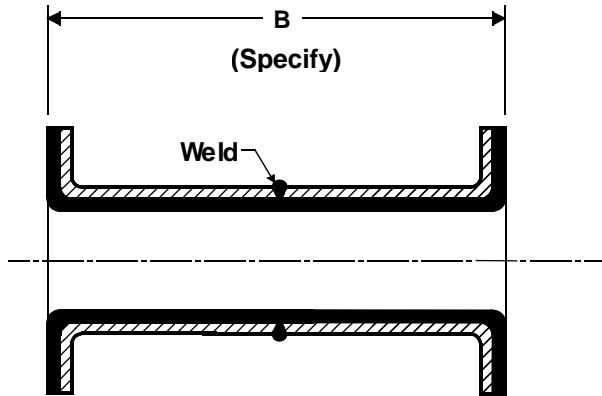
Length in inches



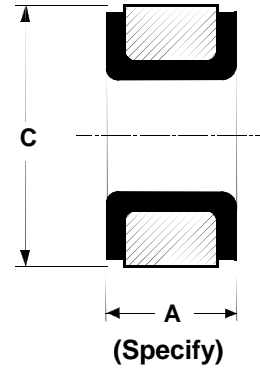
## Jacketed Spool

1. 1" – 8" Maximum Length 20'.
2. Custom Lengths should be rounded to the nearest 1/16".
3. Lap Joint Standard / Fixed when specified.

# Reinforced Spacers



**Distance Piece**

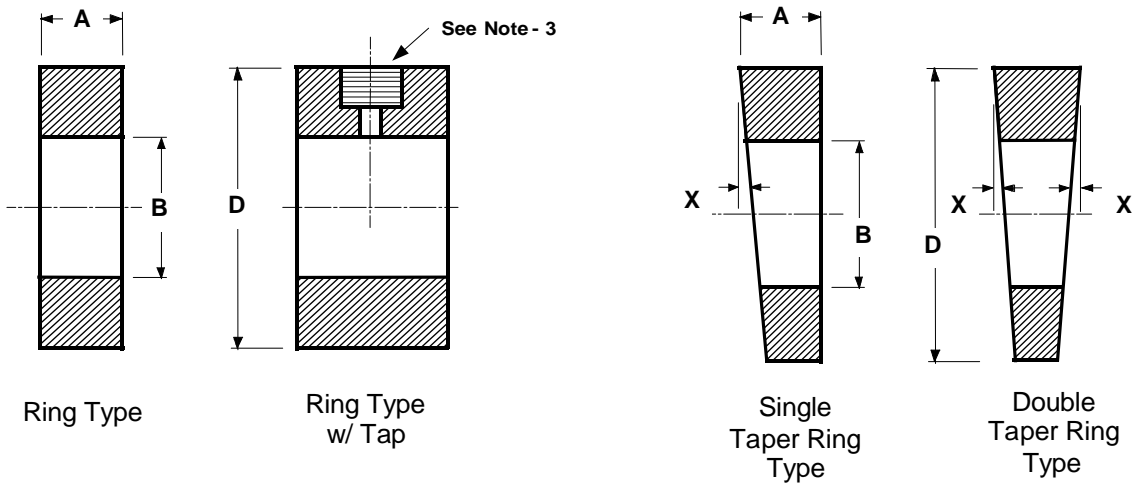
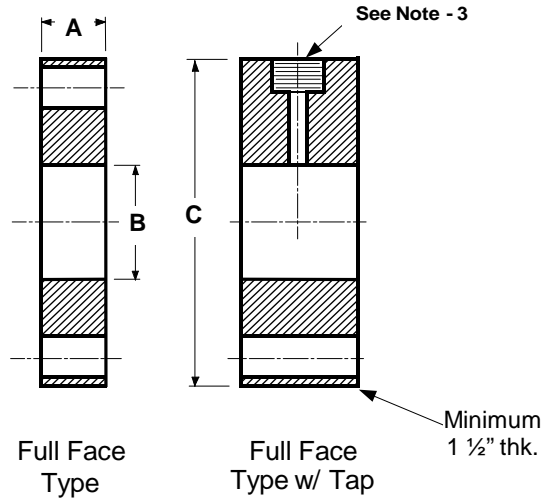


**Armored Spacer**

Size	A Specify Length	B Specify Length	C
1"	1/2 thru 3	3 thru 3 1/4	2 1/2
1 1/2"	1/2 thru 3	3 thru 3 1/2	3 1/4
2"	1/2 thru 3	3 thru 3 3/4	4
3"	1/2 thru 3	3 thru 4	5 1/4
4"	1/2 thru 3	3 thru 4 1/2	6 3/4
6"	1/2 thru 3	3 thru 5 1/2	8 5/8
8"	1/2 thru 3	3 thru 6 1/2	10 5/8
10"	1/2 thru 3	3 thru 9	12 7/8
12"	1/2 thru 3	3 thru 9	15 5/8

Length in inches

# Solid Spacers



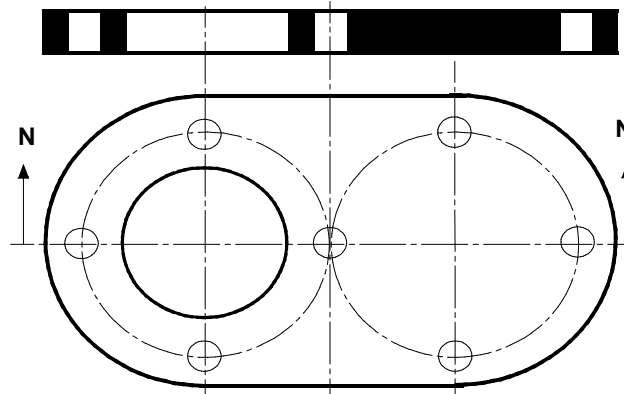
Size	B	C	D
1"	1	4 1/4	2 1/2
1 1/2"	1 1/2	5	3 1/4
2"	2	6	4
3"	3	7 1/2	5 1/4
4"	4	9	6 3/4
6"	6	11	8 5/8
8"	8	13 1/2	10 5/8
10"	10	16	12 7/8
12"	12	19	15 5/8

Length in inches

1. "A" Dimension: 1/4" thru 3" to be specified in increments of 1/16".
2. Angle "X" to be specified.
3. Orifice Tap 1/2" or 3/4" NPT to be specified.
4. Dimensions for ANSI class 150.
5. Spacers can be tapered on the ID for Lined Butterfly Valve requirements.
6. Material Available – PTFE, PFA, PVDF, PPL.

# Spectacle Blinds

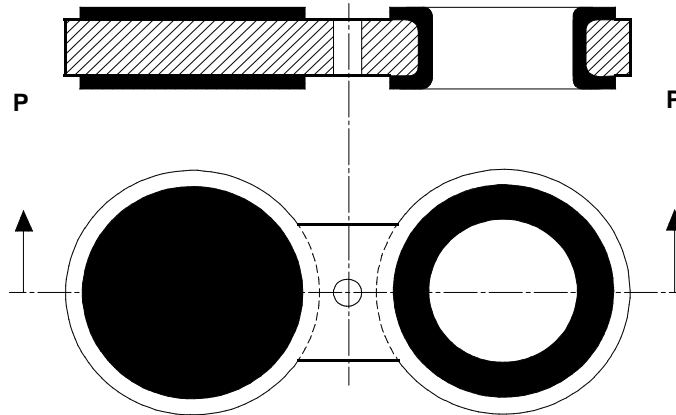
Section N - N



**Solid Style**

1. Material - PTFE.
2. Size – 1" thru 12"
3. Available in Ring Type and Full Face
4. Thickness – ½", ¾" and 1" (to be specified)
5. ID can be Mesh or Standard ID – to be specified

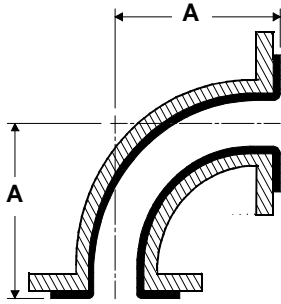
Section P - P



**Armored Style**

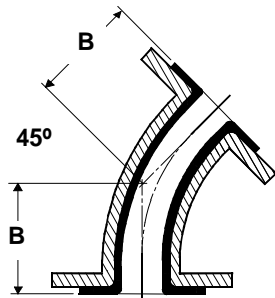
1. Available 1" thru 12".
2. Ring Type only.
3. Material – Mild Steel lined with PTFE or PFA.
4. Thickness – ½", ¾" and 1" (to be specified).

# Flanged Fittings



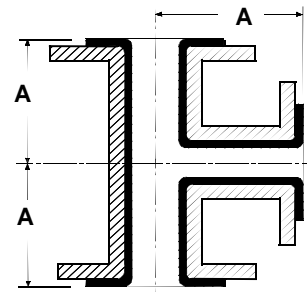
**90° Elbow**

Figure# D100 - Fixed  
Figure# D100L - Lap Joint



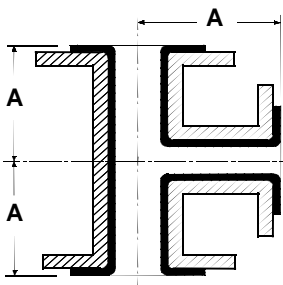
**45° Elbow**

Figure# D200 - Fixed  
Figure# D200L - Lap Joint



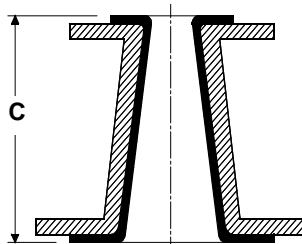
**Equal Tee**

Figure# D300 - Fixed  
Figure# D300L - Lap Joint



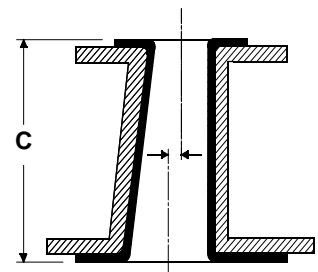
**Reducing Tee**

Figure# D350 - Fixed  
Figure# D350L - Lap Joint



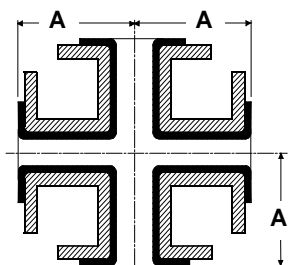
**Concentric Reducer**

Figure# D400 - Fixed



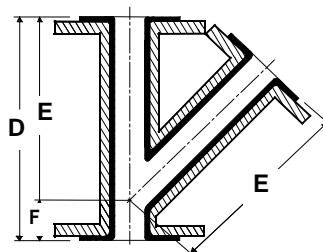
**Eccentric Reducer**

Figure# D450 - Fixed



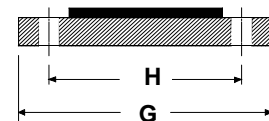
**Cross**

Figure# D500 - Fixed  
Figure# D500L - Lap Joint



**45° Lateral**

Figure# D600 - Fixed



**Blind Flange**

Figure# D700

## ANSI 150# Flanged Fitting Dimensions

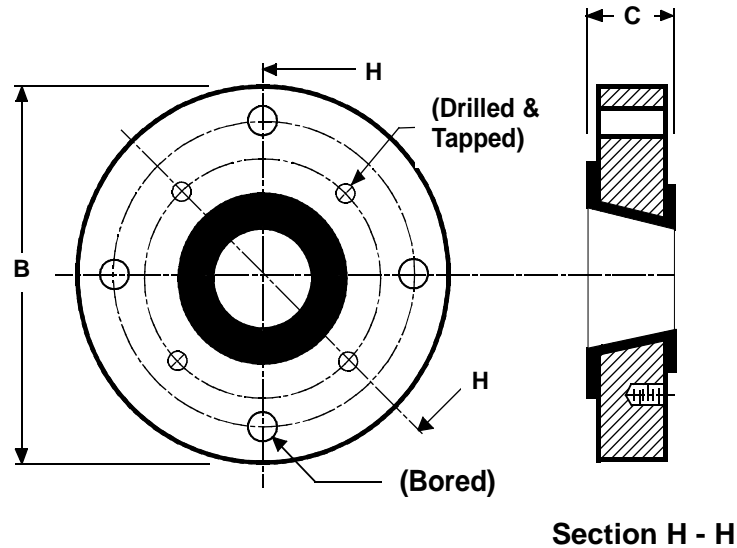
Size	A	B	C	D	E	F	G	H
1"	3 1/2	1 3/4	4 1/2	7 1/2	5 3/4	1 3/4	4 1/4	3 1/8
1 1/2"	4	2 1/4	4 1/2	9	7	2	5	3 7/8
2"	4 1/2	2 1/2	5	10 1/2	8	2 1/2	6	4 3/4
3"	5 1/2	3	6	13	10	3	7 1/2	6
4"	6 1/2	4	7	15	12	3	9	7 1/2
6"	8	5	9	18	14 1/2	3 1/2	11	9 1/2
8"	9	5 1/2	11	22	17 1/2	4 1/2	13 1/2	11 3/4
10"	11	6 1/2	12	25 1/2	20 1/2	5	16	14 1/4
12"	12	7 1/2	14	30	24 1/2	5 1/2	19	17

Dimensions in inches

### Weight (Lbs.)

Size	90 ell	45 ell	Tee	Conc. Red.	Ecc. Red	Cross	Lateral	Blind Flange
1"	6	4	10	6	6	12	12	2
1 1/2"	9	7	13	7	7	20	18	3
2"	15	11	19	10	10	26	25	4
3"	25	21	38	16	16	48	53	8
4"	41	37	68	28	28	87	95	16
6"	75	64	121	48	48	148	141	27
8"	124	108	179	80	80	221	221	45
10"	202	155	219	131	131	312		71
12"	244	209	315	180	180	328		101

# Reducing Flange

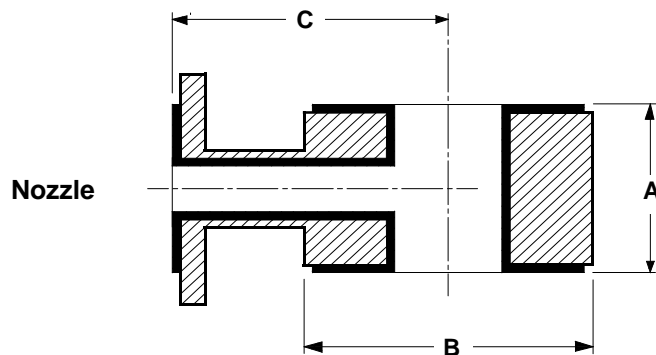


Size	B	C	Weight (Lbs.)
1" x 1/2"	4 1/2	1 3/8	6
1" x 3/4"	4 1/2	1 3/8	6
1 1/2" x 1"	5	1 3/8	6
2" x 1"	6	1 3/8	8
2" x 1 1/2"	6	1 3/8	8
3" x 1"	7 1/2	1 3/8	15
3" x 1 1/2"	7 1/2	1 3/8	14
3" x 2"	7 1/2	1 3/8	13
4" x 1"	9	1 7/8	28
4" x 1 1/2"	9	1 7/8	27
4" x 2"	9	1 7/8	22
4" x 3"	9	1 7/8	20
6" x 1"	11	1 7/8	37
6" x 1 1/2"	11	1 7/8	35
6" x 2"	11	1 7/8	31
6" x 3"	11	1 7/8	29
6" x 4"	11	1 7/8	26
8" x 2"	13 1/2	2 1/8	61
8" x 3"	13 1/2	2 1/8	58
8" x 4"	13 1/2	2 1/8	50
8" x 6"	13 1/2	2 1/8	40
10" x 4"	16	2 1/8	85
10" x 6"	16	2 1/8	76
10" x 8"	16	2 1/8	75
12" x 6"	19	2 1/8	114
12" x 8"	19	2 1/8	100
12" x 10"	19	2 1/8	96

Dimensions in inches

Note – Depending on the reduction, some I.D.'s may not be tapered as shown. Consult Factory for details.

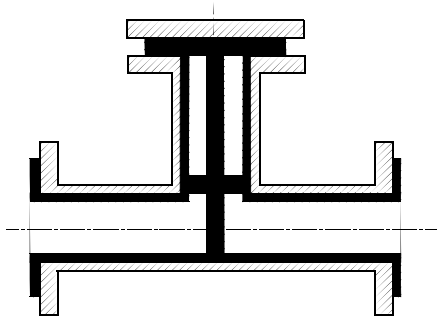
# Instrument Tee



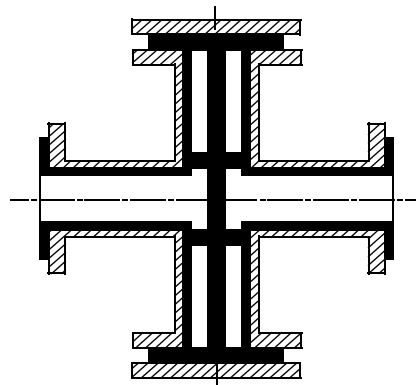
Size	Nozzle Size	A	B	C	Weight (Lbs.)
1"	1"	2	2 1/2	3 1/2	5
1 1/2"	1"	2	3 1/4	4	7
1 1/2"	1 1/2"	4	3 1/4	4	11
2"	1"	2	4	4 1/2	11
2"	1 1/2"	4	4	4 1/2	13
2"	2"	4	4	4 1/2	13
3"	1"	2	5 1/4	5 1/2	13
3"	1 1/2"	4	5 1/4	5 1/2	26
3"	2"	4	5 1/4	5 1/2	26
4"	1"	2	6 3/4	6 1/2	17
4"	1 1/2"	4	6 3/4	6 1/2	30
4"	2"	4	6 3/4	6 1/2	30
6"	1"	2	8	8	22
6"	1 1/2"	4	8	8	41
6"	2"	4	8	8	41
8"	1"	2	10 5/8	9	65
8"	1 1/2"	4	10 5/8	9	84
8"	2"	4	10 5/8	9	84
10"	1"	2	12 7/8	11	89
10"	1 1/2"	4	12 7/8	11	109
10"	2"	4	12 7/8	11	109
12"	1"	2	15 5/8	12	102
12"	1 1/2"	4	15 5/8	12	139
12"	2"	4	15 5/8	12	139

Dimensions in inches

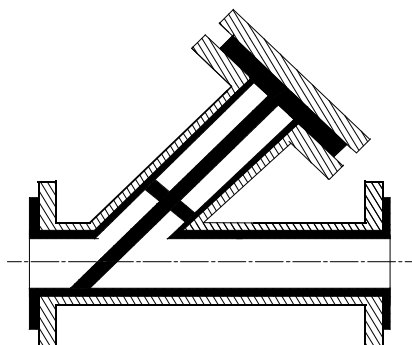
# Strainer Assemblies



**Tee Assembly**



**Cross Assembly**

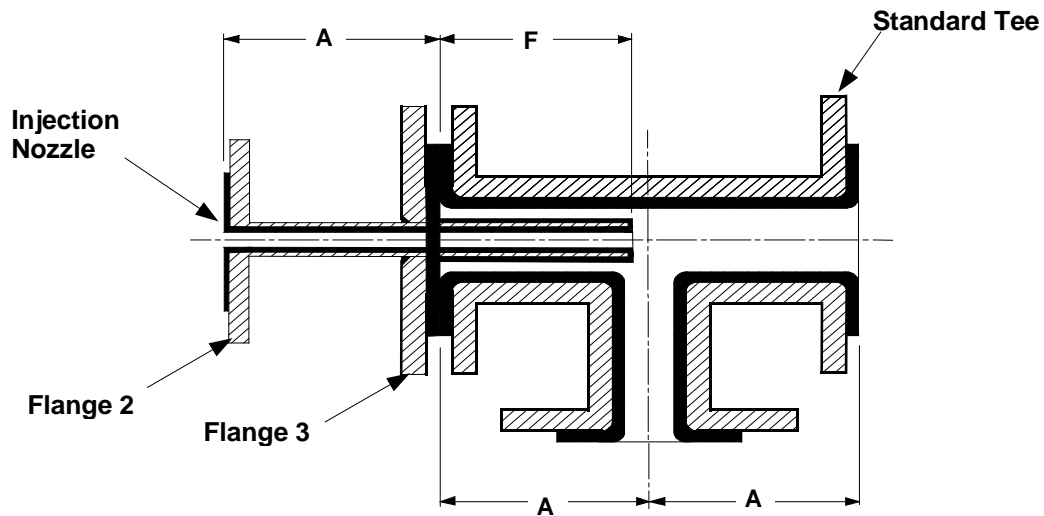


**45 Lateral Assembly**

Size	Weight (Lbs.)		
	Tee	Cross	Lateral
1"	16	18	17
1 1/2"	21	25	22
2"	32	36	34
3"	58	63	60
4"	91	97	93
6"	133	144	140
8"	225	236	231

1. Dimensions are standard for Tee, Cross and Lateral. See appropriate page for details.
2. Strainer plate material is PTFE.
3. Screen hole pattern to be specified. Minimum hole diameter is 1/16".

# Mixing Tee Assembly

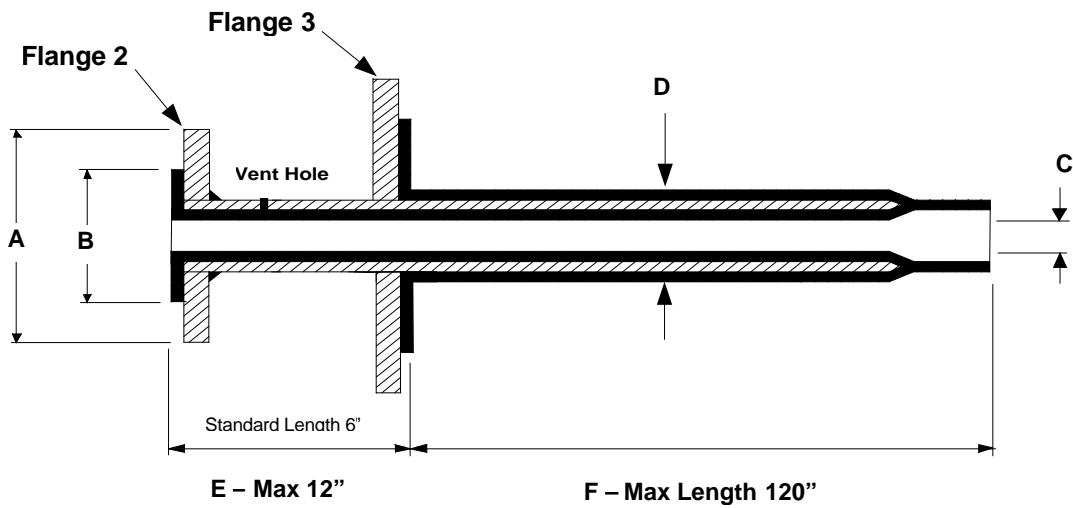


Tee Size	Injection Nozzle Size	A	F	Weight Lbs.
2"	1"	4 1/2	4	36
3"	1", 1 1/2", 2"	5 1/2	5	67
4"	1", 1 1/2", 2", 3"	6 1/2	6	99
6"	1", 1 1/2", 2", 3", 4"	8	7 1/2	141
8"	1", 1 1/2", 2", 3", 4", 6"	9	8 1/2	238

Dimensions in inches

1. Injection nozzle lining PTFE / PFA.
2. Do not inject live steam through the fitting branch. Use the run only.
3. Flange 2 is the same size as the injection nozzle size.
4. Dimension "A" will change when a reducing flange is used to connect to flange 3.

## Double Flange Dip Pipe

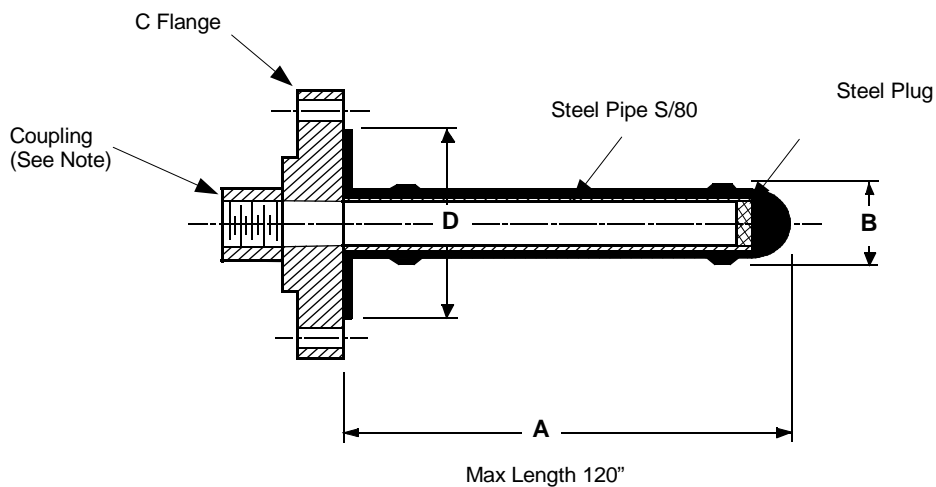


Pipe Size	A	B	C	D	Flange 2	Flange 3
1"	4 1/4	2	11/16	1 11/16	1	2, 3
1 1/2"	5	2 7/8	1 3/16	2 5/16	1 1/2	3, 4
2"	6	3 5/8	1 5/8	2 3/4	2	3, 4
3"	7 1/2	5	2 9/16	3 15/16	3	4, 6
4"	9	6 1/8	3 7/16	4 15/16	4	6, 8
6"	11	8 3/8	5 3/8	7 1/16	6	8, 10
8"	13 1/2	10 1/2	7 9/16	9 1/4	8	10, 12

Dimensions in inches

1. Check nozzle ID of equipment before ordering to assure proper fit.
2. Distance between flanges to be specified.
3. The use of reinforced dip tubes recommended for agitation service.
4. Single Flange Dip Tubes are available. The nozzle flange will always be on size larger than the pipe size. The flare diameter will be standard for the pipe size.
5. Lining Material PTFE / PFA

# Thermowell



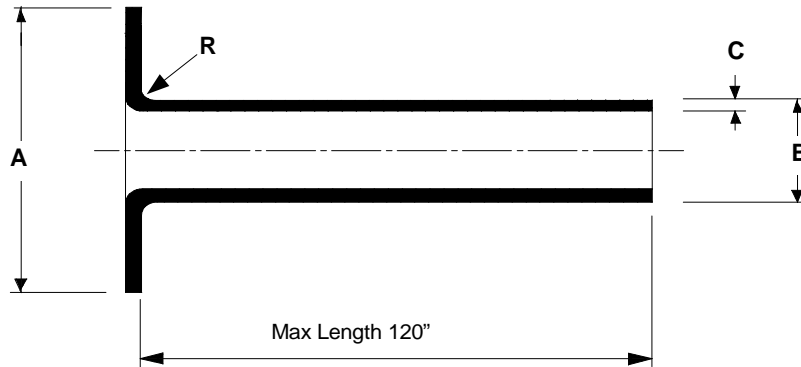
Pipe Size	B	C Flange	D
1/2"	1 3/16	1 1/2", 2"	1 11/16
3/4"	1 3/8	1 1/2", 2"	2 5/16
1"	1 11/16	2", 3"	2 3/4
1 1/2"	2 5/16	3", 4"	3 15/16
2"	2 3/4	3", 4"	4 15/16
3"	3 15/16	4", 6"	7 1/16
4"	4 15/16	6", 8"	9 1/4

Flange Size	D
1 1/2"	3 1/4
2"	4
3"	5 1/4
4"	6 3/4
6"	8 5/8
8"	10 7/8

Dimensions in inches

1. Lined reducing flanges are available for nozzle openings larger than the Thermowell flange.
2. Male and female couplings are available.
3. Check nozzle ID of equipment before ordering to assure proper fit.
4. Lining material PTFE / PFA

# Solid Nozzle Liner



Pipe Size	A	B	C	R	Max Length
1"	2	1.030	.130	1/8	120
1 1/2"	2 7/8	1.600	.150	1/4	120
2"	3 5/8	2.045	.160	1/4	120
3"	5	3.000	.160	3/8	120
4"	6 1/8	4.000	.160	3/8	120
6"	8 3/8	6.030	.197	3/8	120
8"	10 1/2	7.950	.217	3/8	120

Dimensions in inches

1. The Nozzle liner is designed for equipment nozzles that have a radius equal to the "R" dimension.
2. Nozzles liners are not designed for agitation.
3. Material PTFE.

## Chemical Resistance

DuFlon offers an extensive chemical resistance chart available on the following website @ [www.regalplastics.net](http://www.regalplastics.net). The chemical resistance chart is intended as a guide. The changes in chemical composition or special working conditions could lead to deviations. If there is any doubt about the behavior of the product under specific conditions, a test installation should be performed. The data shown is based upon information available at the time of printing.

### Process Considerations

The following factors should be considered in the selection and specification of lined piping.

1. Process chemical to include primary and trace concentrations, contaminants, solids and particle size.
2. Normal and design operating pressures including minimum and maximum.
3. Vacuum conditions.
4. Normal and design operating temperatures including minimum and maximum.
5. Ambient Temperature for the particular region.
6. Cleaning methods.
7. Insulation or heat tracing.
8. Maximum flow rate and fluid velocity.
9. Possible upset conditions.

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This information provided is for reference purpose only. Claim for loss or damage of whatsoever nature due to the use of the product will not be accepted. This publication is not a license to operate under or intended to suggest infringement of any existing patent, We reserve the right to change the specification without prior notice. Please confirm the specifications prior to placing an order.

# DufLine

## PTFE Lined Piping Systems



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