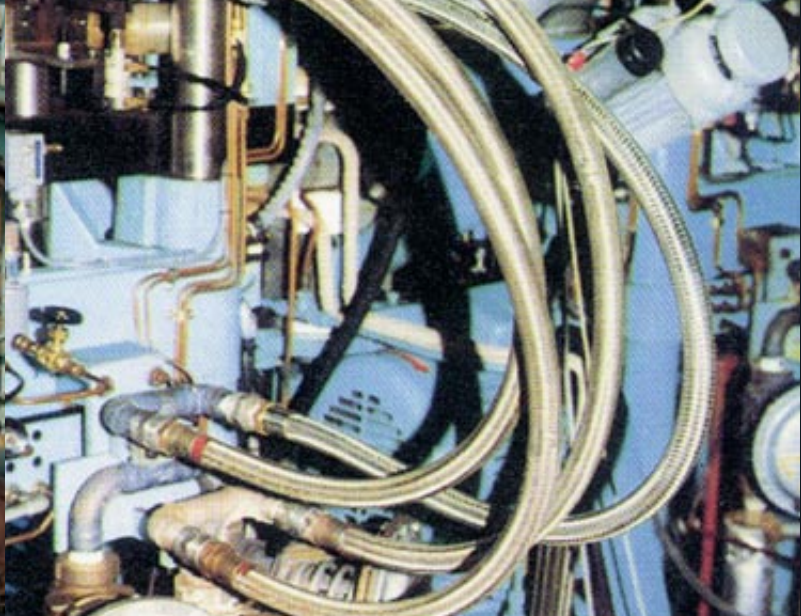


# TOMBO<sup>®</sup> BRAND

## TOMBO<sup>®</sup> Fluoropolymer Anti-Corrosion lining



**NICHIAS Corporation**

# TOMBO® Fluoropolymer Anti-Corrosion lining

For well over forty years now, NICHIAS Corporation has been a leading manufacturer of Fluoropolymer products. Thanks to the highly advanced technologies we have developed and our extensive experience in this field, our products and engineering services have gained an outstanding reputation for excellence.

Fluoropolymer products have superior physical properties such as anti-petrochemical and heat-resistant than usual plastic products.

Our Fluoropolymer lining material have also an advantage of purity for the contamination of fluid because no aging material such as plasticizer and stabilizer is used in process.

Nichias can offer our Fluoropolymer lining into a wide range of industries like semi-conductor, oil refinery, steel, biochemical, food and nuclear field.



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# TOMBO® Fluoropolymer Anti-Corrosion lining

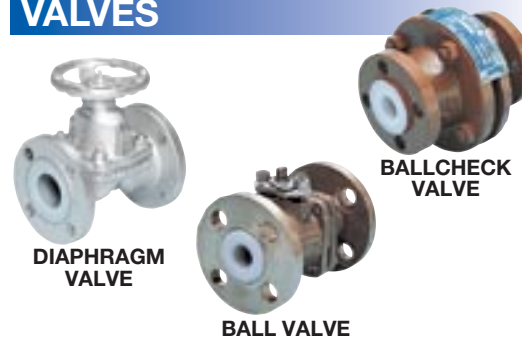
## PIPING MATERIALS



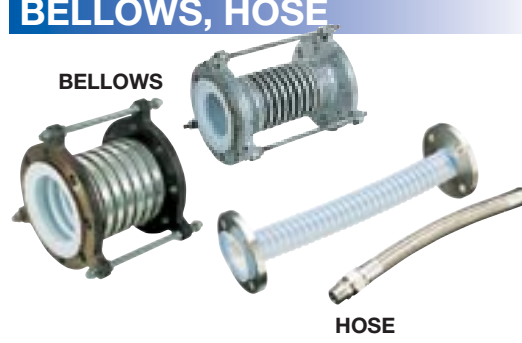
## LINED VESSEL



## VALVES



## BELLOWS, HOSE



## VESSEL ACCESSORIES



## Wide Variety of Top Quality Products

### PFA

FLUOROPIPING PFA is pipes and fittings lined with NAFLON PFA. NAFLON PFA is a versatile melt processable fluoropolymer having even better characteristics than NAFLON PTFE. PFA has better chemical resistance, temperature resistance and mechanical strength at high Temperature than PTFE and yet its continuous max.service temperature is 260°C, as good as PTFE. Tensile yield of PFA at 250°C is twice as good as that of PTFE. In addition, PFA has high purity characteristic that it does not contain impurities and does not leach out metal ions. High quality NAFLON PFA pipe & fitting lining is available for applications such as high purity chemicals and DI water for semi-conductor industry. The maximum service temperature is 180°C when used as piping material.

### VF2

FLUOROPIPING VF2 is pipes and fittings lined with NAFLON PVDF. Thanks to its low permeability, VF2 is widely used for chlorine gas and fluorine acid. High hardness allows slurry lines which require wear resistance of lining material. Continuous max. service temperature is 135°C.

### ETFE

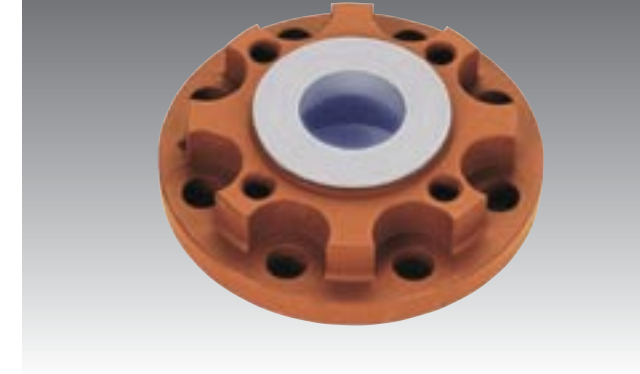
NAFLON ETFE is good for economical injection molding. NICHIAS ETFE DIAPHRAGM VALVE is a economical valve manufactured by injection molding. And it is applied to special shape fittings and equipment as a roto mold lining material.

### PTFE

NAFLON PTFE is well known with its characteristics of heat resistance, chemical resistance and all other excellent features that fluoropolymer has. NICHIAS PTFE FLUOROPIPING is available in expansion joints, bellows, hoses and such.

## PTFE

### REDUCING FLANGE



### REDUCING SPOOL



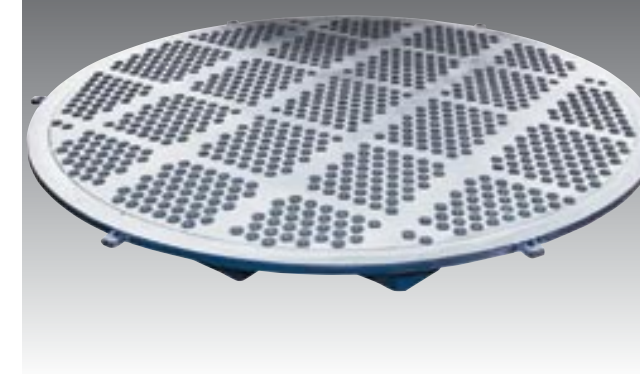
### PACKING SUPPORT TRAY



### THERMOSTAT COVER



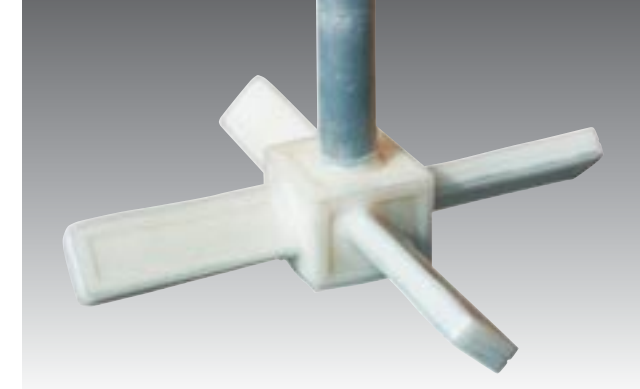
### DISTRIBUTION PLATE



### FLARED TUBE



### AGITATOR



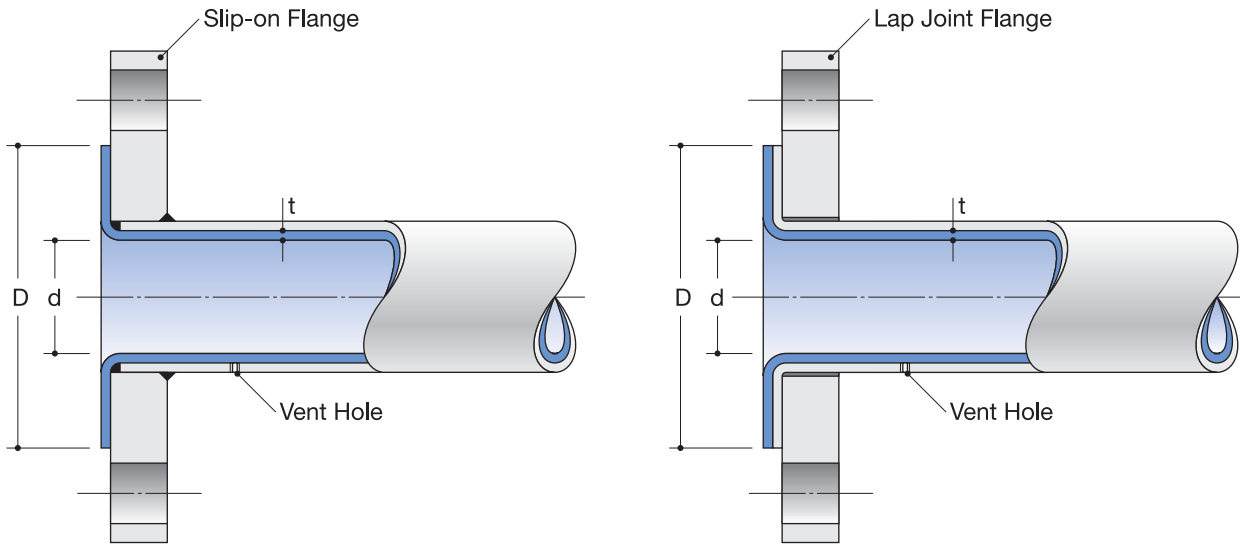
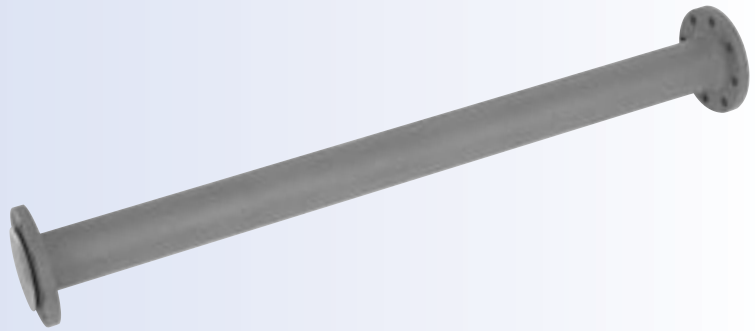
## CHARACTERISTICS OF LINING MATERIALS

Lining Materials		<b>PFA</b> perfluoro-alkoxy	<b>VF<sub>2</sub></b> polyvinylidene fluoride	<b>ETFE</b> ethylene-tetrafluoroethylene	<b>PTFE</b> polytetrafluoroethylene
Characteristics (UNIT)	ASTM Testing Method	$\begin{pmatrix} \text{F} & \text{F} \\   &   \\ -\text{C} & -\text{C}- \\   &   \\ \text{F} & \text{O} \\   &   \\ & \text{Rf} \end{pmatrix}_n$	$\begin{pmatrix} \text{F} & \text{H} \\   &   \\ -\text{C} & -\text{C}- \\   &   \\ \text{F} & \text{H} \end{pmatrix}$	$\begin{pmatrix} \text{F} & \text{H} \\   &   \\ -\text{C} & -\text{C}- \\   &   \\ \text{F} & \text{H} \end{pmatrix}_n + \begin{pmatrix} \text{F} & \text{F} \\   &   \\ -\text{C} & -\text{C}- \\   &   \\ \text{F} & \text{F} \end{pmatrix}_m$	$\begin{pmatrix} \text{F} & \text{F} \\   &   \\ -\text{C} & -\text{C}- \\   &   \\ \text{F} & \text{F} \end{pmatrix}_n$
		Melting Temp. (°C)	—	310	156 ~ 178
Density	D792	2.12 ~ 2.17	1.75 ~ 1.78	1.70	2.14 ~ 2.20
Tensile Strength (MPa) {kgf/cm <sup>2</sup> }	D638	27.5 ~ 29.4 { 280 ~ 300 }	24.5 ~ 50.0 { 250 ~ 510 }	45.1 { 460 }	13.7 ~ 34.3 { 140 ~ 350 }
Elongation (%)	D638	300	12 ~ 430	100 ~ 400	200 ~ 400
Impact Strength J/m {kgf.cm/cm}	D256	Not Destruction	159.8 ~ 373.6 { 16.3 ~ 38.1 }	Not Destruction	159.8 { 16.3 }
Hardness (shore)	2240	D64	D75 ~ 77	D75	D55 ~ 55
Modulus of Elasticity GPa {10 <sup>3</sup> kgf/cm <sup>2</sup> }	D790	0.82 { 8.4 }	2.00 ~ 2.48 { 20.4 ~ 25.3 }	13.7 { 14.0 }	0.55 { 5.6 }
Thermal Conductivity (W/m·k) {10 <sup>4</sup> cal/m·sec·°C}	C177	0.25 { 6.0 }	0.10 ~ 0.13 { 2.4 ~ 3.1 }	0.24 { 5.7 }	0.25 { 6.0 }
Linear Thermal Expansion (10 <sup>-5</sup> /°C)	D696	12	7 ~ 14	5.9	10
Continuous Max Service Temp. (°C)	—	260	150	150 ~ 180	260
Effect of Sunlight	—	None	None	None	None

## MANUFACTURING RANGE

		<b>PFA</b>	<b>VF<sub>2</sub></b>	<b>ETFE</b>	<b>PTFE</b>
<b>STRAIGHT PIPE</b>		15 <sup>A</sup> ~ 300 <sup>A</sup>	25 <sup>A</sup> ~ 100 <sup>A</sup>	—	—
<b>FITTING</b>		15 <sup>A</sup> ~ 300 <sup>A</sup>	25 <sup>A</sup> ~ 100 <sup>A</sup>	—	—
<b>VALVE</b>	DIAPHRAGM VALVE	15 <sup>A</sup> ~ 150 <sup>A</sup>	—	—	—
	BALL VALVE	15 <sup>A</sup> ~ 100 <sup>A</sup>	—	—	—
	BALLCHECK VALVE	20 <sup>A</sup> ~ 150 <sup>A</sup>	—	—	—
	LINECHECK VALVE	20 <sup>A</sup> ~ 80 <sup>A</sup>	—	—	—
<b>BELLOWS, HOSE</b>		●	—	—	●
<b>LINED VESSEL</b>	SHEET (LOOSE)	●	—	—	—
	SHEET (ADHESION)	●	●	—	●
	COATING	●	●	●	—
<b>VESSEL ACCESSORIES</b>		●	—	—	—

# STRAIGHT PIPE



(Unit : mm)

Nominal Pipe size	d	D	t	Weight(kg)			Minimum Spool Length	Liner Availability		
				Standard Liner Thk.	1st 200mm with 2 flanges			Each add 100mm	PFA	VF2
					ANSI 150LBS	JIS 10K				
<b>1/2B (15A)</b>	13	34	1.5	1.2	1.4	0.1	65	●		
<b>3/4 (20)</b>	18	43	1.5	1.6	1.9	0.2	70	●		
<b>1 (25)</b>	24	51	1.5	2.2	2.9	0.3	75	●	●	
<b>1 1/2 (40)</b>	38	73	1.75	3.6	4.1	0.5	80	●	●	
<b>2 (50)</b>	49	92	1.75	5.5	5.0	0.6	85	●	●	
<b>2 1/2 (65)</b>	62	105	1.9	8.5	7.3	1.0	90	●	●	
<b>3 (80)</b>	74	127	2.0	10.5	7.8	1.3	95	●	●	
<b>4 (100)</b>	97	155	2.6	14.0	9.9	1.8	95	●	●	
<b>5 (125)</b>	120	185	3.0	18.0	15.0	2.5	105	●		
<b>6 (150)</b>	145	216	3.0	22.0	19.0	3.2	105	●		
<b>8 (200)</b>	194	266	3.0	35.0	26.0	4.7	110	●		
<b>10 (※250)</b>	240	324	3.0	48.0	29.0	6.0	120	●		
<b>12 (※300)</b>	290	374	3.0	72.0	45.0	7.9	120	●		

Note : 1. Standard Flange Rating : Equal to ANSI B16.5,150LBS and JIS10K

2. Maximum Spool Length : 5,400mm,or

5,500mm with slip-on flanges

Please consult us for suitable pipe lengths at high temperature.

3. Spacers or distant pieces are recommended as substitutes for less than the minimum spool length.

4. Minimum spool length is with slip-on flanges.

Add another100mm for lap joint flanges.

Pipe with a slip-on flange on a end and a lap joint flange on the other for intermediate length is available.

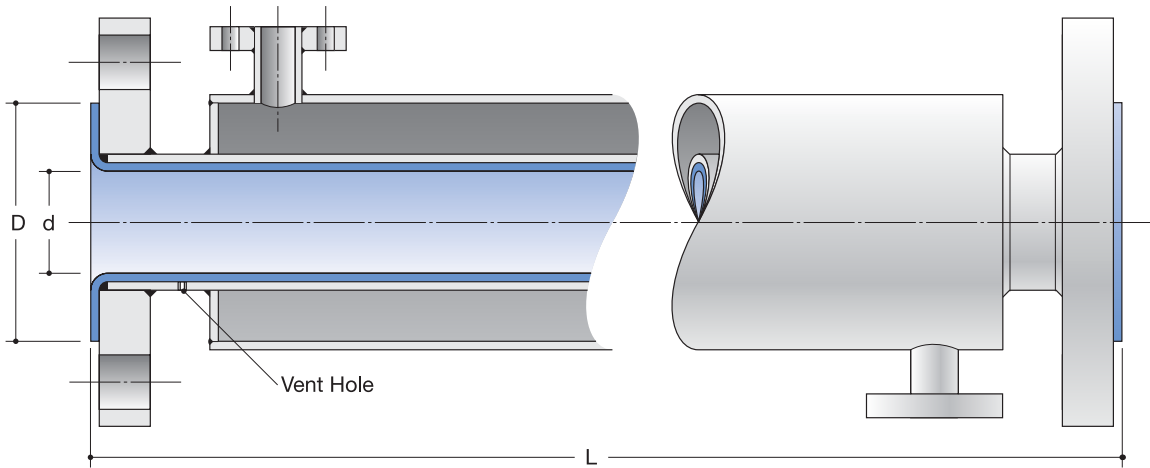
5. Butt welded tubing is used for 10" & 12" NPS, Seamless PFA liner and butt welded PTFE liner are available on request.

5. Fitting Material : Pipe -JIS G 3454, STPG 370E, Schedule 40

Flange -JIS 10K : JIS G 3101 SS400

ANSI 150LBS : JIS G3202 SFVC 2A

# JACKET PIPE



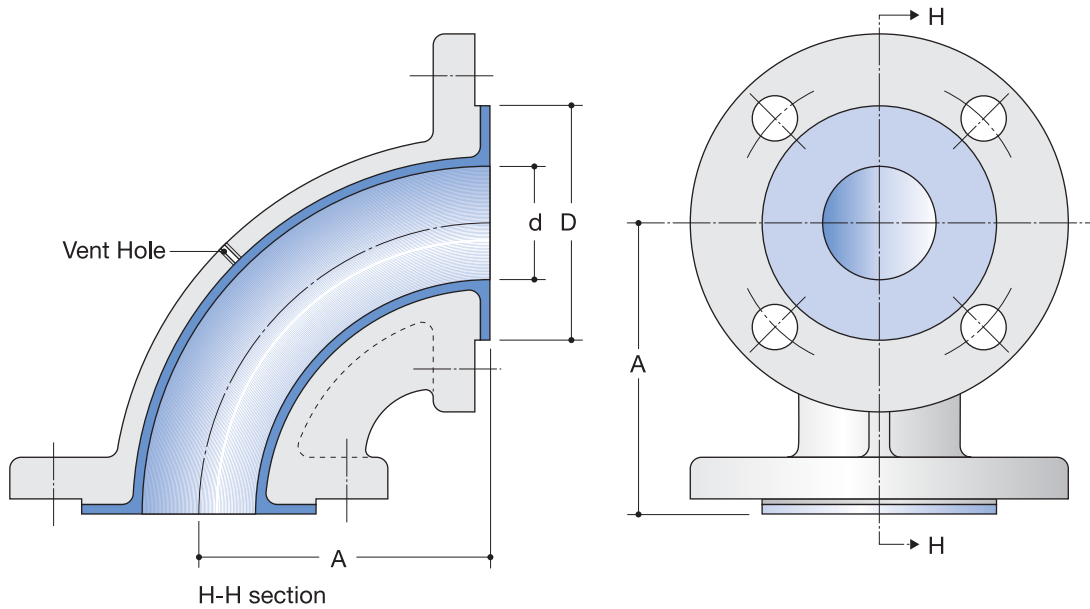
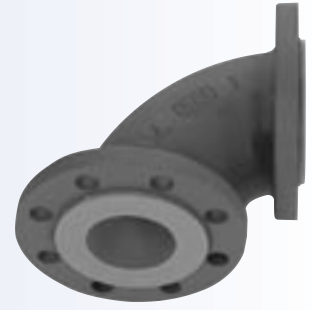
(Unit : mm)

Nominal Pipe size	d	D	Liner Availability
			PFA
1/2B (15A)	13	34	●
3/4 (20)	18	43	●
1 (25)	24	51	●
1 1/2 (40)	38	73	●
2 (50)	49	92	●
2 1/2 (65)	62	105	●
3 (80)	74	127	●
4 (100)	97	155	●
5 (125)	120	185	●
6 (150)	145	216	●
8 (200)	194	266	●

- Note : 1. Standard Flange Rating : Equal to ANSI B16.5, 150LBS and JIS10K  
 2. For Maximum Length and flanges, please refer to STRAIGHT PIPE.  
 3. Larger sizes over 10" NPS are available on request.  
 4. Fitting Material : Pipe - JIS G 3454, STPG 370E, Schedule 40  
                           jacket pipe - JIS G 3452, SGP  
                           Flange - JIS 10K : JIS G 3101 SS400  
                                       ANSI 150LBS : JIS G3202 SFVC 2A



# 90° ELBOW



(Unit : mm)

Nominal Pipe size	A	d		D		Weight(kg)		Liner Availability	
		ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	PFA	VF2
<b>1/2B (15A)</b>	80	13	13	34	34	1.2	1.4	●	
<b>3/4 (20)</b>	80	17	17	43	43	1.6	1.9	●	
<b>1 (25)</b>	89	25	25	57	57	2.4	3.4	●	●
<b>1 1/2 (40)</b>	102	38	38	76	76	4.0	4.4	●	●
<b>2 (50)</b>	114	50	50	95	95	6.0	5.5	●	●
<b>2 1/2 (65)</b>	130	58	58	105	105	9.1	8.3	●	●
<b>3 (80)</b>	140	76	76	127	127	11.7	9.3	●	●
<b>4 (100)</b>	165	102	97	157	150	20.0	13.7	●	●
<b>5 (125)</b>	190	120	120	180	180	23.0	22.0	●	
<b>6 (150)</b>	203	152	152	216	216	33.7	33.7	●	
<b>8 (200)</b>	229	203	194	270	261	52.8	44.0	●	
<b>10 (※250)</b>	279	241	239	324	318	80.9	77.6	●	
<b>12 (※300)</b>	305	292	288	381	365	129.0	107.1		

Note: 1. Face to face dimension are in accordance with ANSI B16.5 150 LBS series.

2. Standard Flange Rating : Equal to ANSI B16.5, 150LBS and JIS 10K

3. Fitting Material : Cast ductile iron, JIS B 8243, FCD-S

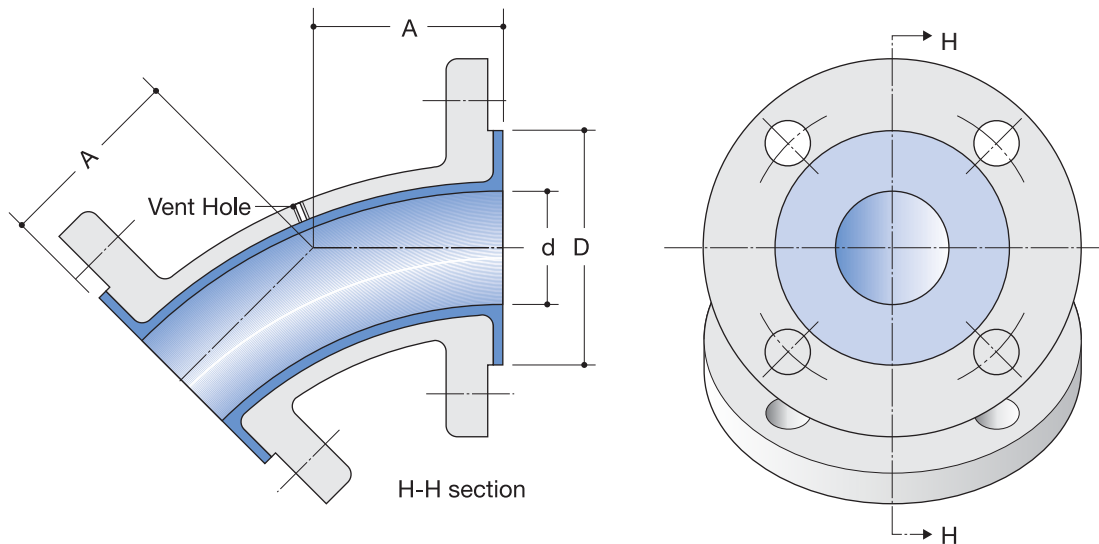
For 1/2" & 3/4" & 1" NPS: Pipe - JIS G 3452, SGP

Flange - JIS 10K : JIS G 3101 SS400

ANSI 150LBS : JIS G3202 SFVC 2A

4. PFA lined elbows from 1/2" to 2" are tube inserted type. Other sizes are molded type.

# 45° ELBOW



(Unit : mm)

Nominal Pipe size	A	d	D		Weight(kg)		Liner Availability
			ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	PFA
<b>1/2B (15A)</b>	44.5	13	34	34	1.1	1.3	●
<b>3/4 (20)</b>	44.5	17	43	43	1.6	1.9	●
<b>1 (25)</b>	63.5	23	51	51	2.2	2.9	●
<b>1 1/2 (40)</b>	63.5	37	73	73	3.6	4.1	●
<b>2 (50)</b>	63.5	48	92	92	5.5	5.0	●
<b>2 1/2 (65)</b>	76.2	62	105	105	8.6	7.3	●
<b>3 (80)</b>	76.2	73	127	127	11.1	8.2	●
<b>4 (100)</b>	101.6	97	155	155	14.9	10.6	●
<b>5 (125)</b>	114.0	120	180	180	18.0	15.0	●
<b>6 (150)</b>	127.0	152	216	216	26.5	21.3	●
<b>8 (200)</b>	140.0	194	261	261	45.1	44.3	●
<b>10 (250)</b>	140.0	239	318	318	43.0	40.0	●

Note: 1. Standard Flange Rating: Equal to ANSI B16.5, 150LBS and JIS 10K

2. Fitting Material : Smaller than 6" NPS : Pipe - JIS G 3452, SGP

Flange - JIS 10K: JIS G 3101 SS400

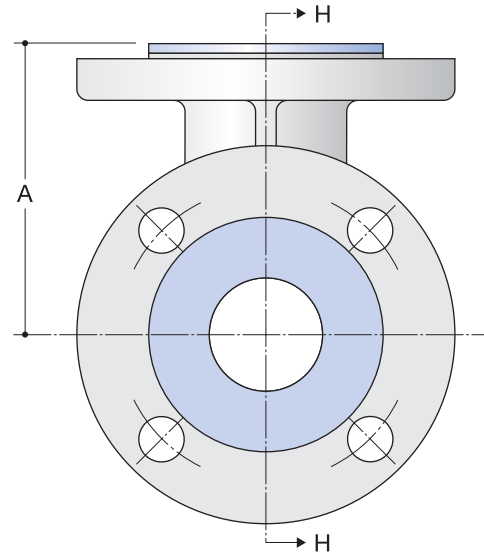
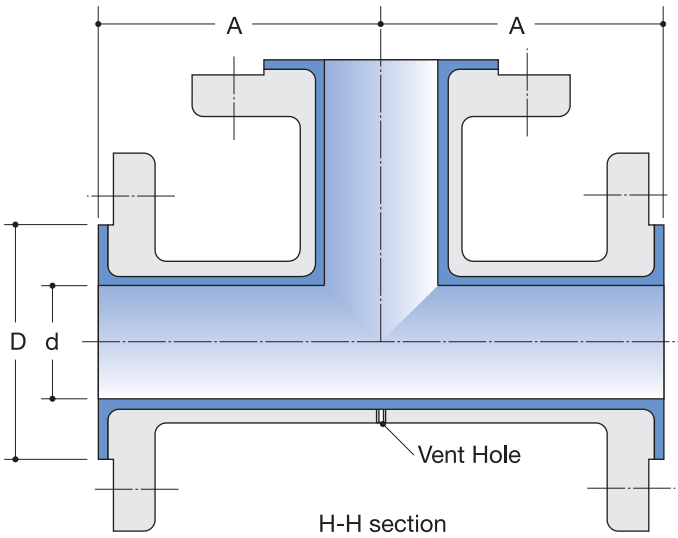
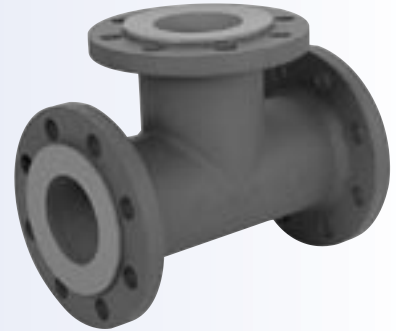
ANSI 150LBS: JIS G 3202 SFVC 2A

6" and over : Cast ductile iron, JIS B 8243, FCD-S

3. Elbows from 1/2" & 4" NPS is tube inserted type. Other sizes are molded type.



# TEE



(Unit : mm)

Nominal Pipe size	A	d		D		Weight(kg)		Liner Availability	
		ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	PFA	VF2
<b>1/2B (15A)</b>	80	10	15	40	50	3.7	3.7	●	●
<b>3/4 (20)</b>	80	20	20	50	50	3.7	3.7	●	●
<b>1 (25)</b>	89	25	25	57	57	3.9	4.9	●	●
<b>1 1/2 (40)</b>	102	38	38	76	76	7.0	6.9	●	●
<b>2 (50)</b>	114	50	50	95	95	9.2	8.5	●	●
<b>2 1/2 (65)</b>	130	58	58	105	105	14.2	12.8	●	●
<b>3 (80)</b>	140	76	76	127	127	15.7	14.0	●	●
<b>4 (100)</b>	165	102	97	157	150	29.5	23.0	●	●
<b>5 (125)</b>	190	116	116	180	180	34.0	32.0	●	
<b>6 (150)</b>	203	152	152	216	216	48.3	48.3	●	
<b>8 (200)</b>	229	203	194	270	261	78.3	56.4	●	
<b>10 (※250)</b>	279	241	236	324	318	141.0	133.7	●	
<b>12 (※300)</b>	305	292	288	381	365	194.8	154.4		

Note: 1. Face to face dimension are in accordance with ANSI B16.5 150 LBS series.

2. Standard Flange Rating : Equal to ANSI B16.5,150LBS and JIS 10K

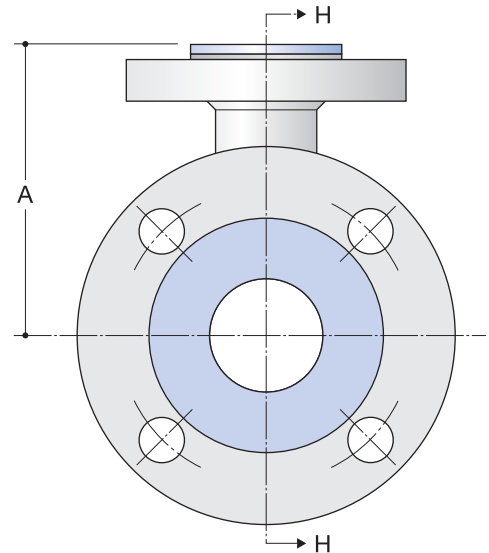
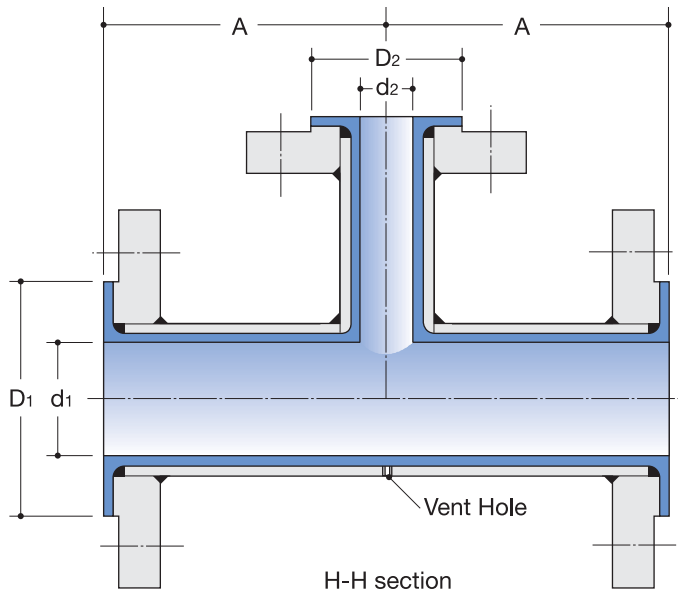
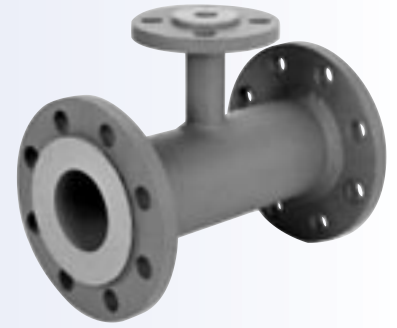
3. Fitting Material : Cast ductile iron, JIS B 8243,FCD-S

For JIS 10K 125A, ANSI 150LB 1/2B, 5B, 10B, 12B, PIPE JIS G 3452 SPG

Flange JIS 10K : JIS G 3101 SS400

ANSI 150LBS: JIS G3202 SFVC 2A

# REDUCING TEE



●PFA ●VF2

Size Liner Availability	1/2B(15A)	3/4B(20A)	1B(25A)	1 1/2B(40A)	2B(50A)	2 1/2B(65A)	3B(80A)	4B(100A)	5B(125A)	6B(150A)
3/4B (20)	● ●									
1 (25)	● ●	● ●								
1 1/2 (40)	● ●	● ●	● ●							
2 (50)	● ●	● ●	● ●	● ●						
2 1/2 (65)	● ●	● ●	● ●	● ●	● ●					
3 (80)	● ●	● ●	● ●	● ●	● ●	● ●				
4 (100)		● ●	● ●	● ●	● ●	● ●	● ●			
5 (125)			● ●	● ●	● ●	● ●	● ●	● ●		
6 (150)			● ●	● ●	● ●	● ●	● ●	● ●	● ●	
8 (200)				● ●	● ●	● ●	● ●	● ●	● ●	● ●
10 (250)					● ●	● ●	● ●	● ●	● ●	● ●

Please consult us for availability of other combinations for liners and sizes.

(Unit : mm)

Nominal Pipe size	A	d1 or d2	D1 or D2		Weight(kg)	
			ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K
1/2B (15A)	—	10	40	40	—	—
3/4 (20)	80	20(15)	50	50	2.2	2.7
1 (25)	89	25(21)	57	57	3.2	3.7
1 1/2 (40)	102	33	76	76	5.1	5.5
2 (50)	114	44	95	95	7.9	7.1
2 1/2 (65)	130	56	105	105	12.0	10.4
3 (80)	140	70	127	127	16.5	12.4
4 (100)	165	93	150	150	23.8	16.5
5 (125)	190	116	180	180	32.0	30.0
6 (150)	203	138	212	212	37.0	31.9
8 (200)	229	189	270	261	60.0	52.4
10 (※250)	279	236	318	318	86.4	74.3

Note: 1. Face to face dimension are in accordance with ANSI B16.5 150 LBS series.

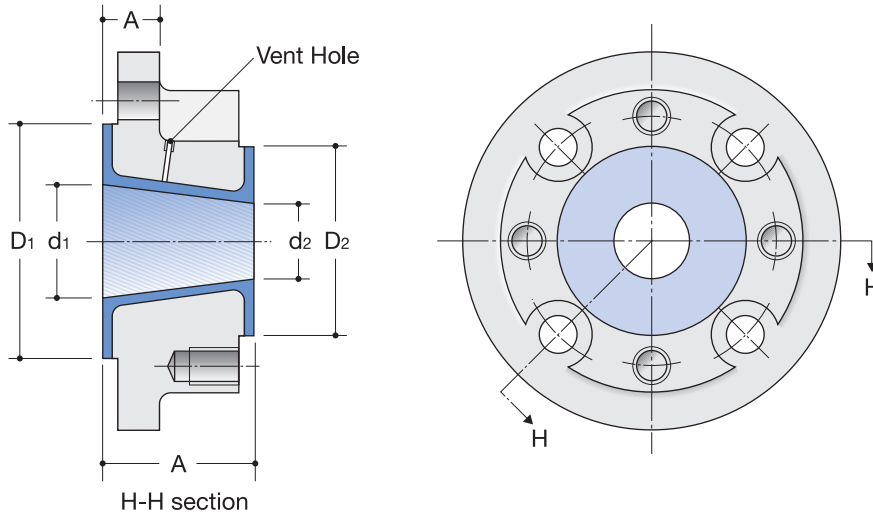
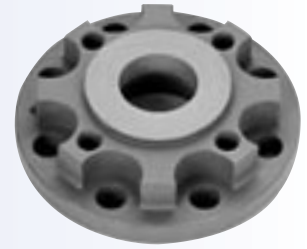
2. Standard Flange Rating : Equal to ANSI B16.5,150LBS and JIS 10K

3. Fitting Material : Pipe -JIS G 3454,STPG 370E,Schedule 40

Flange -JIS 10K : JIS G 3101 SS400

ANSI 150LBS : JIS G3202 SFVC 2A

# REDUCING FLANGE



	Nominal Pipe size	d1 & d2	D1 & D2	Nos of Bolts	P. C. D.	Bolts Hole Diameter	Tapping	
							Thread	Depth
ANSI 150 LBS	1/2B	10	40	4	60.3	16	U1/2	16
	3/4	15	47	4	69.9	16	U1/2	16
	1	25	57	4	79.4	16	U1/2	16
	1 1/2	38	76	4	98.4	16	U1/2	16
	2	51	95	4	120.6	20	U5/8	20
	3	76	127	4	152.4	20	U5/8	20
	4	97	157	8	190.5	20	U5/8	20
	5	116	180	8	215.9	23	U3/4	28
	6	152	216	8	241.3	23	U3/4	28
	8	194	270	8	298.4	23	U3/4	28
	10	241	324	12	361.9	26	U7/8	33
	12	288	381	12	431.8	26	U7/8	—

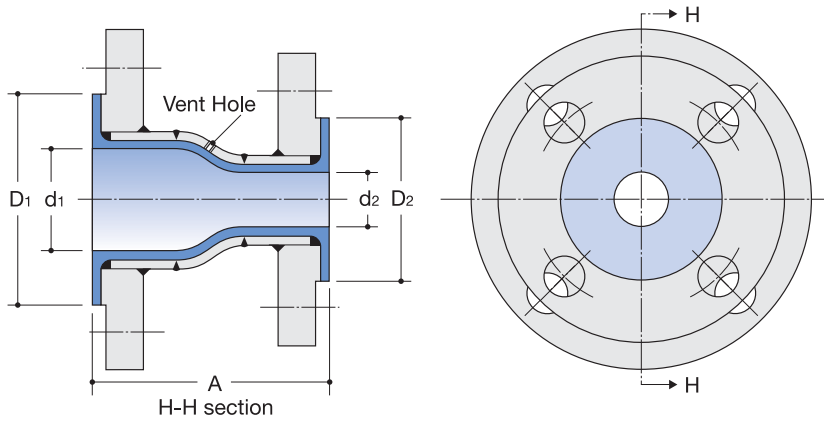
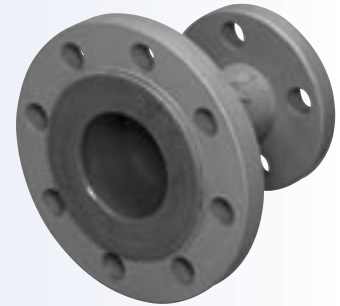
	Nominal Pipe size	d1 & d2	D1 & D2	Nos of Bolts	P. C. D.	Bolts Hole Diameter	Tapping	
							Thread	Depth
JIS 10K	15A	10	49	4	70	15	M12	16
	20	15	52	4	75	15	M12	16
	25	25	57	4	90	19	M16	16
	40	38	76	4	105	19	M16	16
	50	51	95	4	120	19	M16	20
	80	76	127	8	150	19	M16	20
	100	97	150	8	175	19	M16	20
	125	116	180	8	210	23	M20	28
	150	152	212	8	240	23	M20	28
	200	194	261	12	290	23	M20	28
	250	241	324	12	355	25	M22	—
	300	288	365	16	400	25	M22	—

ANSI 150LBS				JIS 10K				Liner Availability	
Nominal Pipe size	A	t	Weight(kg)	Nominal Pipe size	A	t	Weight(kg)	PFA	VF2
※ $3/4$ B - $1/2$ B	51	18	1.8	※20A- 15A	51	20	2.0	●	
※1 - $1/2$	51	18	2.1	※25- 15	51	20	2.4	●	●
※1 - $3/4$	51	18	2.4	※25- 20	51	20	2.7	●	●
※ $1\frac{1}{2}$ - $1/2$	51	21	2.7	※40- 15	51	22	3.0	●	●
※ $1\frac{1}{2}$ - $3/4$	51	21	2.7	※40- 20	51	22	3.0	●	●
※ $1\frac{1}{2}$ - 1	51	21	2.6	※40- 25	51	22	2.9	●	●
※2 - $1/2$	51	22	3.4	※50- 15	51	22	3.2	●	●
※2 - $3/4$	51	22	3.4	※50- 20	51	22	3.2	●	●
※2 - 1	51	22	3.4	※50- 25	51	22	3.2	●	●
※2 - $1\frac{1}{2}$	51	22	3.2	※50- 40	51	22	3.0	●	●
$2\frac{1}{2}$ - $3/4$	51	25	5.1	65- 20	51	24	4.8	●	●
$2\frac{1}{2}$ - 1	51	25	5.3	※65- 25	51	24	4.9	●	●
※ $2\frac{1}{2}$ - $1\frac{1}{2}$	51	25	5.5	※65- 40	51	24	5.0	●	●
※ $2\frac{1}{2}$ - 2	51	25	5.8	※65- 50	51	24	5.3	●	●
3 - $3/4$	52	26	5.9	80- 20	52	24	4.6	●	●
3 - 1	52	26	5.9	80- 25	52	24	4.6	●	●
※3 - $1\frac{1}{2}$	52	26	5.6	80- 40	52	24	4.3	●	●
※3 - 2	52	26	5.4	80- 50	52	24	4.2	●	●
3 - $2\frac{1}{2}$	52	26	5.4	80- 65	52	24	5.2	●	●
4 - 1	55	30	7.2	100- 25	55	24	5.0	●	●
4 - $1\frac{1}{2}$	55	30	6.8	100- 40	55	24	4.6	●	●
4 - 2	55	30	6.5	100- 50	55	24	4.3	●	●
4 - $2\frac{1}{2}$	55	30	6.3	100- 65	55	24	4.1	●	●
4 - 3	55	30	6.3	※100- 80	55	24	4.1	●	
5 - 2	55	32	9.4	125- 50	60	28	8.0	●	
5 - 3	55	32	9.5	※125- 80	60	28	8.5	●	
5 - 4	55	32	9.5	※125-100	60	28	8.2	●	
6 - 1	60	32	13.3	150- 25	60	28	11.9	●	
6 - $1\frac{1}{2}$	60	32	12.6	150- 40	60	28	11.2	●	
6 - 2	60	32	11.9	150- 50	60	28	10.5	●	
6 - $2\frac{1}{2}$	60	32	13.5	150- 65	60	28	12.9	●	
6 - 3	60	32	11.5	150- 80	60	28	10.1	●	
※6 - 4	60	32	11.0	※150-100	60	28	9.6	●	
※6 - 5	60	32	11.9	※150-125	60	28	10.5	●	
8 - 2	60	35	20.3	200- 50	60	28	15.9	●	
8 - 3	60	35	20.0	200- 80	60	28	15.4	●	
8 - 4	60	35	19.6	200-100	60	28	15.2	●	
※8 - 6	60	35	17.3	200-150	60	28	13.9	●	
10 - 3	60	37	29.7	250- 80	60	30	24.9	●	
10 - 4	60	37	28.8	250-100	60	30	24.0	●	
10 - 6	60	37	27.0	250-150	60	30	22.2	●	
10 - 8	60	37	25.2	※250-200	60	30	20.4	●	
12 - 3	62	38	43.2	300- 80	62	30	29.6	●	
12 - 4	62	39	41.4	300-100	62	30	27.8	●	
12 - 6	62	38	39.2	300-150	62	30	25.6	●	
12 - 8	62	38	37.8	300-200	62	30	24.2	●	
※12 - 10	62	38	35.6	300-250	62	30	23.0	●	

Note: 1. Use a loose flange on a connecting straight pipe for (※) sizes.  
2. Standard Flange Rating : Equal to ANSI B16.5, 150LBS and JIS 10K  
3. Fitting Material : JIS G 3101, SS400



# CONCENTRIC REDUCER



● PFA ● VF2

Size Liner Availability	1/2B(15A)	3/4(20)	1(25)	1 1/2(40)	2(50)	2 1/2(65)	3(80)	4(100)	5(125)	6(150)	8(200)
3/4B (20A)	* ● ●										
1 (25)	* ● ●	* ● ●									
1 1/2 (40)	* ● ●	* ● ●	* ● ●								
2 (50)	* ● ●	* ● ●	* ● ●	* ● ●							
2 1/2 (65)		● ●	● ●	● ●	● ●						
3 (80)		* ● ●	* ● ●	* ● ●	* ● ●	● ●					
4 (100)			* ● ●	* ● ●	* ● ●	● ●	* ● ●				
5 (125)					●		● ●	●			
6 (150)							* ● ●	* ● ●	●		
8 (200)								●		●	
10 (250)										●	●

Fitting Material : \* Mark : Cast ductile iron JIS B7243,FCD-S  
Others : Steel

(Unit : mm)

Nominal Pipe size	A	D1	d1	D2	d2
3/4B x 1/2B (20A x 15A)	102	50	19	40	13
1 x 1/2 (25 x 15)	102	57	25	40	13
1 x 3/4 (25 x 20)	102	57	25	50	19
1 1/2 x 3/4 (40 x 20)	114	76	33	50	19
1 1/2 x 1 (40 x 25)	114	76	33	57	21
2 x 3/4 (50 x 20)	127	95	45	50	19
2 x 1 (50 x 25)	127	95	45	57	21
2 x 1 1/2 (50 x 40)	127	95	45	76	35
2 1/2 x 1 1/2 (65 x 40)	127	105	57	76	35
2 1/2 x 2 (65 x 50)	127	105	57	95	46
3 x 3/4 (80 x 20)	152	127	71	50	19
3 x 1 (80 x 25)	152	127	71	57	21
3 x 1 1/2 (80 x 40)	152	127	71	76	35
3 x 2 (80 x 50)	152	127	71	95	46
3 x 2 1/2 (80 x 65)	152	127	71	105	57
4 x 1 (100 x 25)	178	150	95	57	25
4 x 1 1/2 (100 x 40)	178	150	95	76	35
4 x 2 (100 x 50)	178	150	95	95	45
4 x 2 1/2 (100 x 65)	178	150	95	105	57
4 x 3 (100 x 80)	178	150	95	127	71
5 x 2 (125 x 50)	203	180	116	95	45
5 x 3 (125 x 80)	203	180	116	127	71
5 x 4 (125 x 100)	203	180	116	150	92
6 x 3 (150 x 80)	229	212	141	127	68
6 x 4 (150 x 100)	229	212	141	150	92
6 x 5 (150 x 125)	200	212	141	180	116
8 x 4 (200 x 100)	279	270(261)	190	150	92
8 x 6 (200 x 150)	279	270(261)	190	212	141
10 x 6 (250 x 150)	305	324	239	212	141
10 x 8 (250 x 200)	305	324	239	270(261)	141

Note: 1. Face to face dimension are in accordance with ANSI B16.5 150 LBS series.

2. Standard Flange Rating : Equal to ANSI B16.5, 150LBS and JIS 10K

3. Fitting Material : Pipe JIS G 3454, STPG 370E, Schedule 40

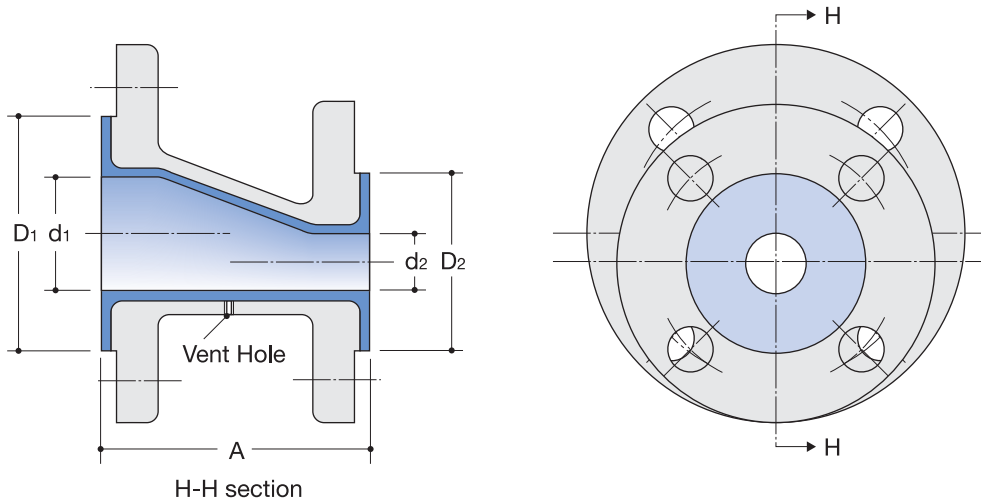
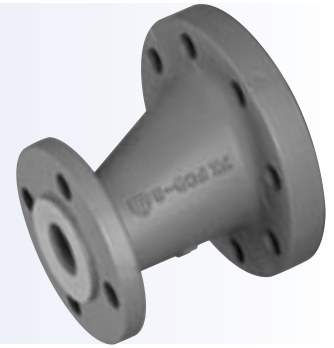
Flange-JIS 10K : JIS G 3101 SS400

ANSI 150LBS : JIS G3202 SFVC 2A

4. Consult us for availability of other combinations for sizes.

5. ( ) Dimension is for JIS 10K

# ECCENTRIC REDUCER



●PFA ●VF2

Size Liner Availability	1/2B(15A)	3/4(20)	1(25)	1 1/2(40)	2(50)	3(80)	4(100)	6(150)
3/4B (20A)	● ●							
1 (25)	● ●	● ●						
1 1/2 (40)		● ●	● ●					
2 (50)		* ● ●	* ● ●	* ● ●				
2 1/2 (65)								
3 (80)				* ● ●	* ● ●			
4 (100)					● ●	● ●		
5 (125)						● ●		
6 (150)						●	●	
8 (200)								* ●

Consult us for availability of other combination for liner material and size.

Fitting Material : \* Mark : Cast ductile iron JIS B7243,FCD-S  
Others : Steel

(Unit : mm)

Nominal Pipe size	A	D1	d1	D2	d2
1B X 3/4 (25A X 20A)	102	57	21	50	15
1 1/2 X 3/4 (40 X 20)	114	76	34	50	21
1 1/2 X 1 (40 X 25)	114	76	34	57	21
2 X 3/4 (50 X 20)	127	95	51	50	25
2 X 1 (50 X 25)	127	95	51	57	25
2 X 1 1/2 (50 X 40)	127	95	51	76	37
3 X 1 1/2 (80 X 40)	152	127	76	76	37
3 X 2 (80 X 50)	152	127	76	95	50
4 X 2 (100 X 50)	178	150	94	95	45
4 X 3 (100 X 80)	178	150	97	127	76
6 X 3 (150 X 80)	229	212	155	127	75
6 X 4 (150 X 100)	229	212	140	150	90
8 X 6 (200 X 150)	279	261	190	212	140

Note: 1. Face to Face dimension are in accordance with ANSI B16.5, 150LBS series and JIS 10K.

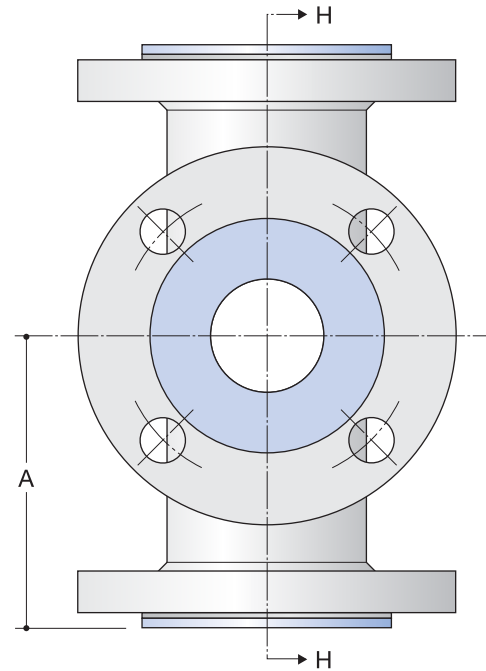
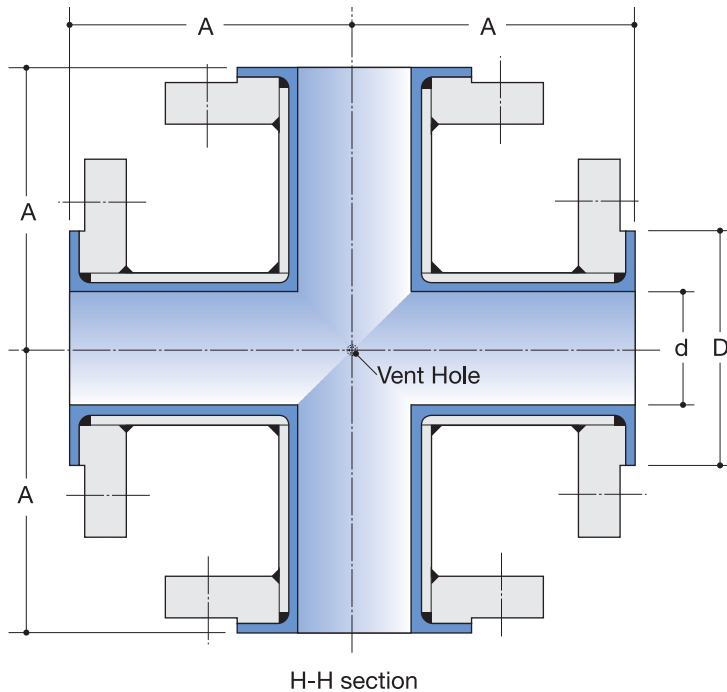
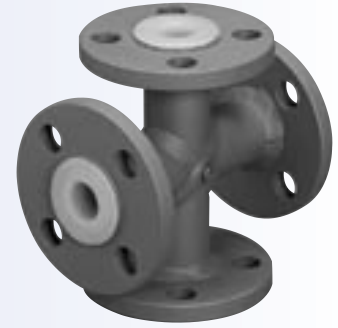
2. Standard Flange Rating : Equal to ANSI B16.5, 150LBS and JIS 10K

3. Fitting Material : Pipe - JIS G 3454, STPG 370E, Schedule 40

Flange - JIS 10K: JIS G 3101 SS400

ANSI 150LBS- JIS G3202 SFVC 2A

# CROSS

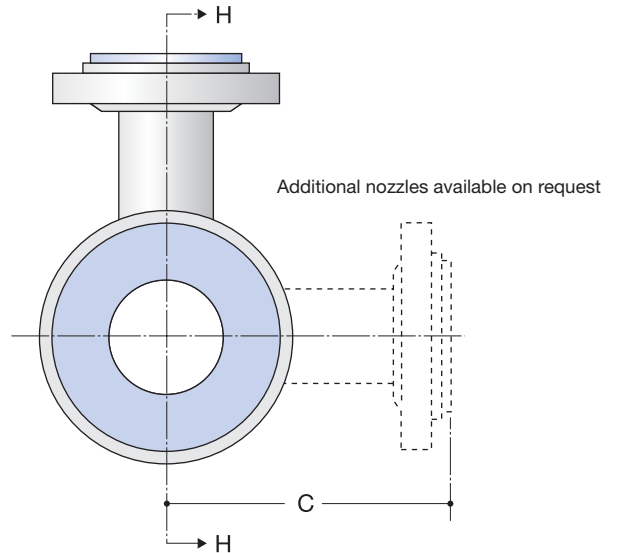
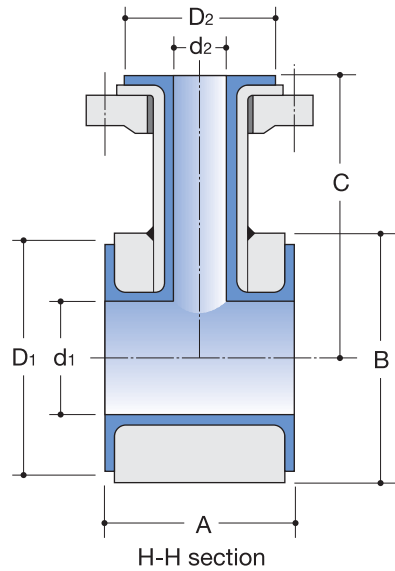


(Unit : mm)

Nominal Pipe size	A	d	D		Weight(kg)		Liner Availability	
			ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	PFA	VF2
<b>1/2B (15A)</b>	80	10	40	40	2.3	2.7	●	●
<b>3/4 (20)</b>	80	15	50	50	3.0	3.6	●	●
<b>1 (25)</b>	89	25	57	57	4.5	5.7	●	●
<b>1 1/2 (40)</b>	102	34	76	76	6.8	8.0	●	●
<b>2 (50)</b>	114	46	96	95	10.8	10.0	●	●
<b>2 1/2 (65)</b>	130	58	115	115	17.5	15.1	●	●
<b>3 (80)</b>	140	70	127	127	23.0	16.5	●	●
<b>4 (100)</b>	165	93	150	150	32.0	23.2	●	●
<b>6 (150)</b>	203	138	212	212	52.6	47.0	●	●

- Note: 1. Face to face dimension are in accordance with ANSI B16.5, 150LBS series and JIS 10K.  
 2. Standard Flange Rating : Equal to ANSI B16.5,150LBS and JIS 10K  
 3. Fitting Material : Pipe - JIS G 3454, STPG 370E, Schedule 40  
 Flange - JIS 10K - JIS G 3101 SS400  
 ANSI 150LBS - JIS G3202 SFVC 2A  
 4. Lap joint flange is also available.

# INSTRUMENTATION CONNECTION



(Unit : mm)

Nominal Pipe size	A	B		C		D1		d1		Nozzle Size		Liner Availability	
		ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	PFA	VF2
<b>1B (25A)</b>	75	66	74	141.5	142.0	57	57	25	25	1/2B~1B	15A~25A	●	●
<b>1 1/2 (40)</b>	75	86	89	148.5	148.0	76	76	38	38	1/2~1	15~25	●	●
<b>2 (50)</b>	75	105	104	155.0	155.0	95	95	51	51	1/2~1 1/2	15~40	●	●
<b>2 1/2 (65)</b>	75	122	122	158.5	158.5	105	105	58	58	1/2~2	15~50	●	●
<b>3 (80)</b>	100	137	134	167.5	167.5	127	127	76	76	1/2~2	15~25	●	●
<b>4 (100)</b>	100	175	159	178.0	178.0	157	150	97	97	1/2~1 1/2	15~40	●	
<b>6 (150)</b>	100	222	220	206.0	204.5	216	212	150	150	1/2~2	15~50	●	
<b>8 (200)</b>	150	279	270	231.0	226.5	270	261	203	194	1/2~2	15~40	●	
<b>10 (250)</b>	150	340	333	250.0	250.0	324	322	239	241	1/2~2	15~50	●	
<b>12 (300)</b>	150	410	378	276.0	273.0	381	365	288	288	1/2~2	15~40	●	

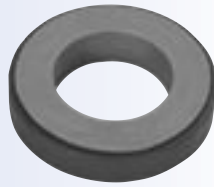
## Nozzle size

Nominal Nozzle size	d2	D2	
		ANSI 150LBS	JIS 10K
<b>1/2B (15A)</b>	10	40	49
<b>3/4 (20)</b>	15	47	52
<b>1 (25)</b>	20	57	57
<b>1 1/2 (40)</b>	35	76	76
<b>2 (50)</b>	47	95	95

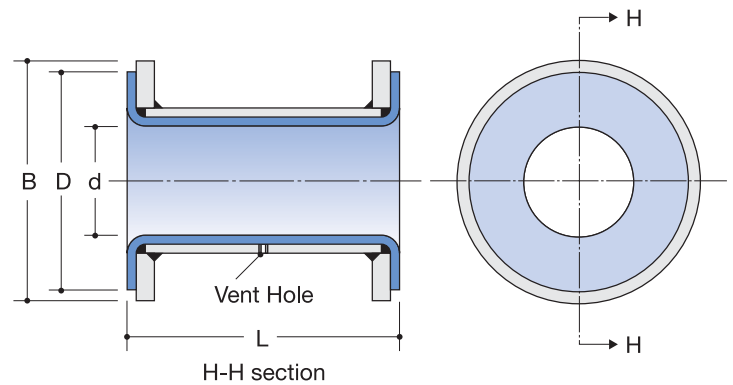
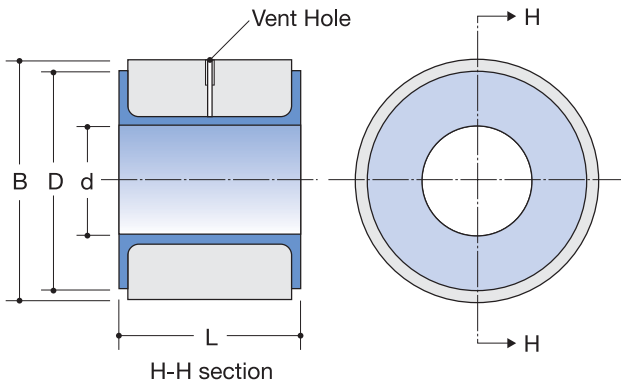
Note: 1. Standard Flange Rating : Equal to ANSI B16.5, 150LBS and JIS 10K  
 2. Fitting Material : Body-JIS G3101, SS 400E  
 Pipe-JIS G 3454, STPG 370E, Schedule 40  
 Flange-JIS 10K : JIS G 3101 SS400  
 ANSI 150LBS-JIS G4501 S25C



# SPACER



# DISTANCE PIECE



## SPACER

(Unit : mm)

Nominal Pipe size	B		D		d	L (Standard Length)	Liner Availability	
	ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K			PFA	VF2
1/2B (15A)	47	55	40	40	15	10 20 30 40 50	●	
3/4 (20)	57	63	43	43	20		●	
1 (25)	67	74	57	57	25		●	●
1 1/2 (40)	86	89	76	76	38		●	●
2 (50)	105	104	95	95	51		●	●
2 1/2 (65)	124	121	105	105	64		●	●
3 (80)	137	134	127	127	76		●	●
4 (100)	175	159	157	150	97		●	●
5 (125)	—	190	—	180	122		●	
6 (150)	220	220	212	212	152		●	
8 (200)	279	270	270	261	196		●	
10 (250)	340	333	324	322	245		●	
12 (300)	410	378	381	365	292	●		

Note: 1. Standard Fitting Material : JIS G 3101, SS 400  
2. Any required length between 10 - 50mm available on request.

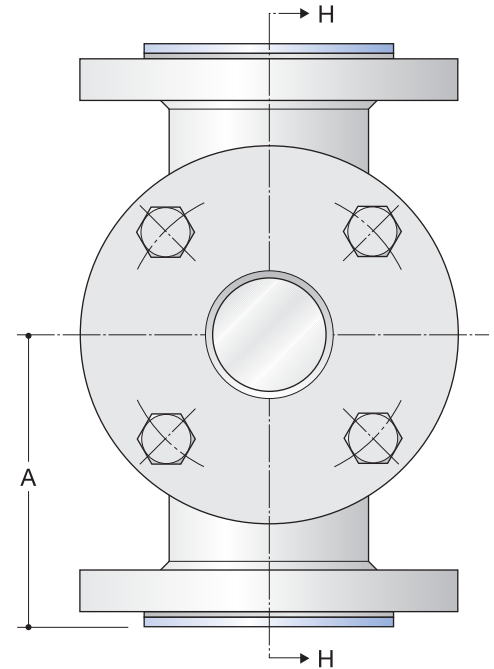
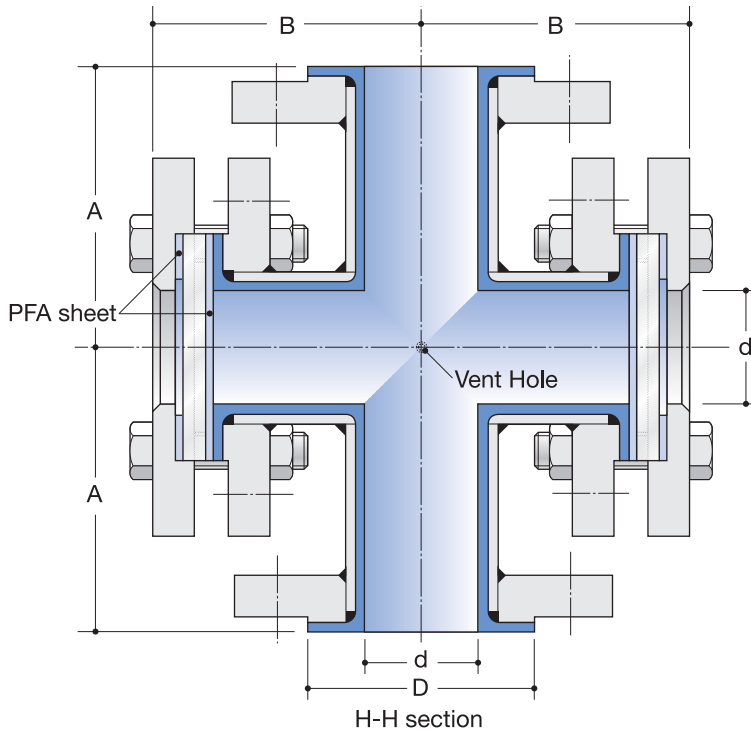
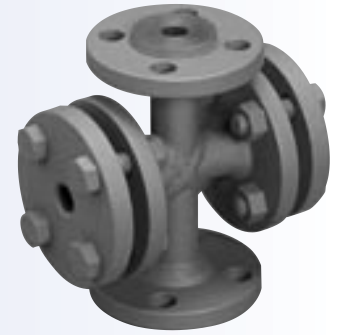
## DISTANCE PIECE

(Unit : mm)

Nominal Pipe size	B		D		d	L (Standard Length)	Liner Availability	
	ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K			PFA	VF2
1/2B (15A)	47	55	34	34	13	60	●	
3/4 (20)	57	63	43	43	17	60	●	
1 (25)	67	74	51	51	23	60,70	●	●
1 1/2 (40)	86	89	73	73	37	60,70	●	●
2 (50)	105	104	92	92	48	60,70,80	●	●
2 1/2 (65)	124	124	105	105	62	60,70,80	●	●
3 (80)	137	134	127	127	73	60,70,80,90	●	●
4 (100)	175	159	155	155	97	60,70,80,90	●	●
5 (125)	—	190	—	185	120	60,70,80,90,100	●	
6 (150)	222	220	216	212	144	60,70,80,90,100	●	
8 (200)	279	270	266	266	193	60,70,80,90,100	●	

Note: 1. Fitting Material : Pipe - JIS G 3454, STPG 370E, Schedule 40  
Stub End - JIS G 3101, SS 400  
2. Non-standard length available on request.

# SIGHT FLOW INDICATOR



(Unit : mm)

Nominal Pipe size	A	B	d	D	Weight(kg)		Liner Availability
					ANSI 150LBS	JIS 10K	PFA
<b>1/2B (15A)</b>	80	80	10	40	3.3	4.0	●
<b>3/4 (20)</b>	80	80	15	50	4.2	5.1	●
<b>1 (25)</b>	89	81	25	57	4.6	8.0	●
<b>1 1/2 (40)</b>	102	90	34	76	9.4	11.1	●
<b>2 (50)</b>	114	97	46	95	15.0	13.8	●
<b>2 1/2 (65)</b>	130	110	58	115	23.9	20.3	●
<b>3 (80)</b>	140	115	70	127	30.8	21.7	●
<b>4 (100)</b>	165	133	93	150	42.6	29.5	●
<b>6 (150)</b>	203	168	138	212	68.0	59.7	●

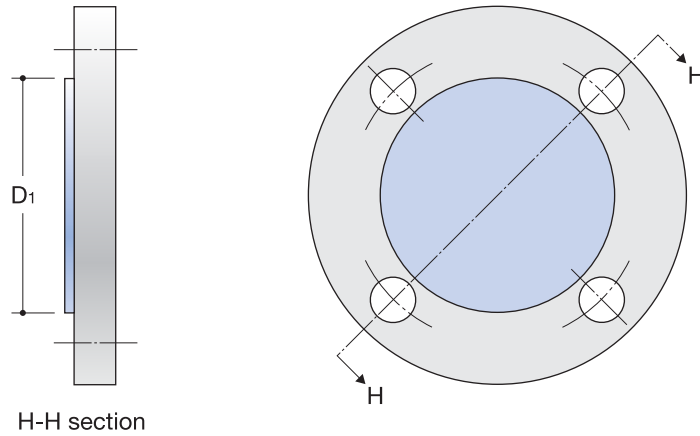
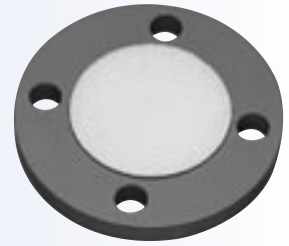
Note: 1. Standard Flange Rating: Equal to ANSI B16.5, 150LBS and JIS 10K

2. Fitting Material : Pipe - JIS G 3454, STPG 370E, Schedule 40  
 Flange - JIS 10K : JIS G 3101 SS400  
 ANSI 150LBS-JIS G3202 SFVC 2A

3. Glass Material : Tempered glass

4. Bolt & Nut Material : JIS G 3101 SS400

# BLIND FLANGE



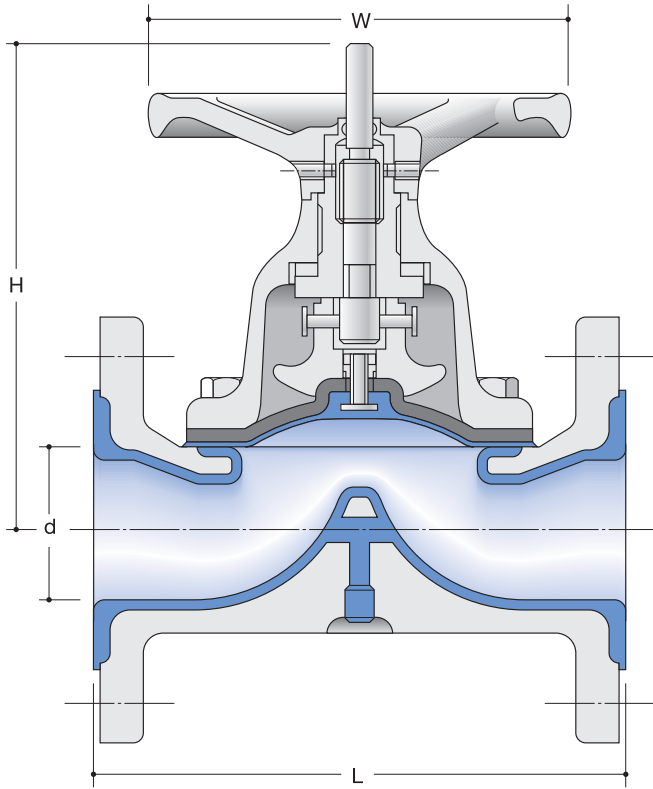
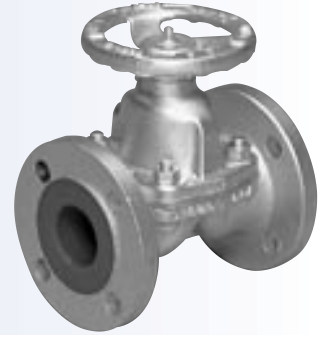
(Unit : mm)

Nominal Pipe size	D		Weight(kg)		Liner Availability
	ANSI 150LBS	JIS 10K	ANSI 150LBS	JIS 10K	PFA
<b>1/2B (15A)</b>	35	35	0.5	0.7	●
<b>3/4 (20)</b>	43	50	0.9	0.8	●
<b>1 (25)</b>	51	57	1.0	1.3	●
<b>1 1/2 (40)</b>	73	76	1.9	1.9	●
<b>2 (50)</b>	92	95	2.4	2.3	●
<b>2 1/2 (65)</b>	105	105	3.3	3.3	●
<b>3 (80)</b>	127	127	4.2	3.6	●
<b>4 (100)</b>	155	155	7.9	4.7	●
<b>5 (125)</b>	185	185	9.0	7.0	●
<b>6 (150)</b>	216	216	12.0	10.3	●
<b>8 (200)</b>	270	261	20.6	14.3	●
<b>10 (250)</b>	324	318	32.1	22.9	●
<b>12 (300)</b>	381	365	50.2	28.1	●

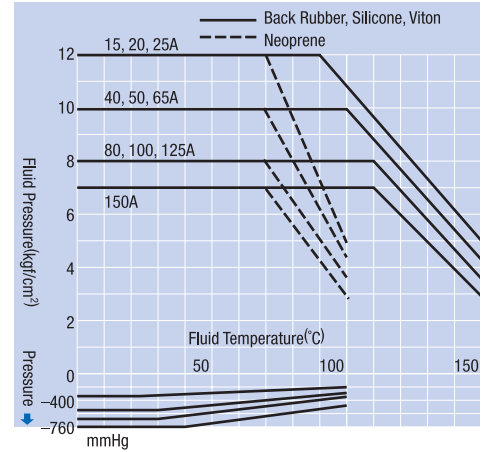
Note : 1.Flange Material : JIS 10K-JIS G 3101 SS400  
ANSI 150LBS-JIS G3202 SFVC 2A

# DIAPHRAGM VALVE

## ETFE.PFA



Diaphragm Valve, Temperature-Pressure Rating



### Standard Specification

Available Size	1/2"-6" (15A-150A)
Body Material	Cast Ductile Iron, JIS B 8243 FCD-S
Lining Material	ETFE or PFA
Diaphragm Material	PTFE
Backer Material	Chloroprene Rubber (Silicone Rubber and VITON are available on request.)
Flange Rating	ANSI 150 LBS or JIS 10K

### ANSI 150LBS and JIS 10K

(ISO Dimension)

Nominal size	$\phi$ d	L	H	$\phi$ W	Lift	Max. Service Pressure (Mpa)	Max. CV value	Lining Material	
								ETFE	PFA
1/2B (15A)	15	114	90	65	5	1.1	3.0	●	●
3/4 (20)	20	123	101	65	8	1.1	4.5	●	●
1 (25)	25	133	108	80	10	1.1	10.0	●	●
1 1/2 (40)	40	165	152	120	18	0.9	24.5	●	●
2 (50)	50	196	176	140	24	0.9	40.5	●	●
2 1/2 (65)	65	222	222	165	30	0.7	67.5	●	●
3 (80)	80	260	240	180	35	0.7	99.0	●	●
4 (100)	100	311	297	220	45	0.7	179.0	●	●

(Special F-F Dimension)

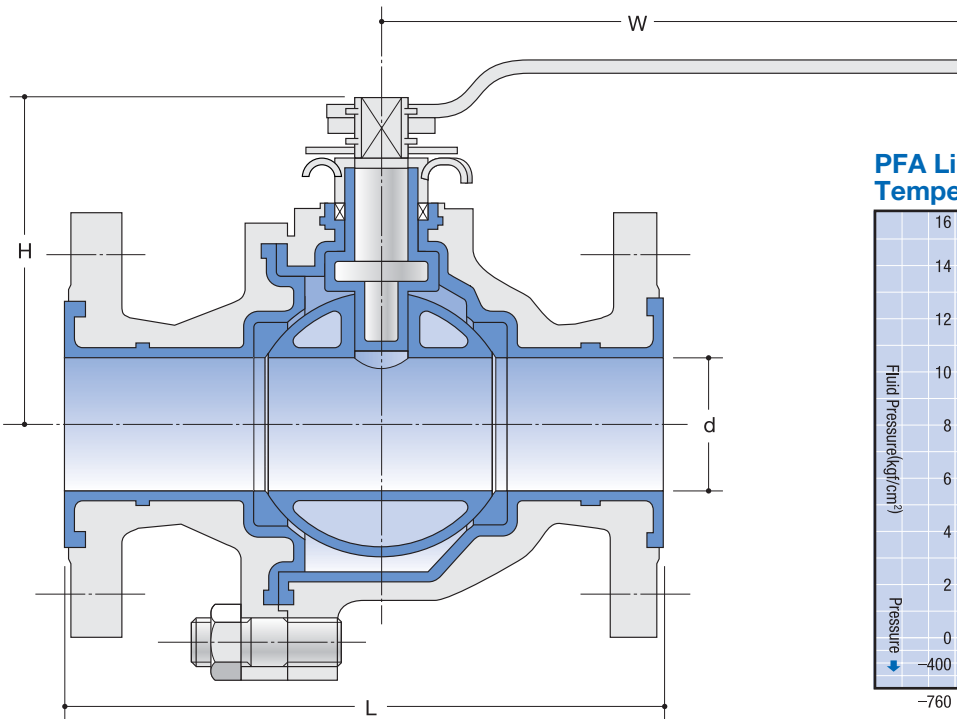
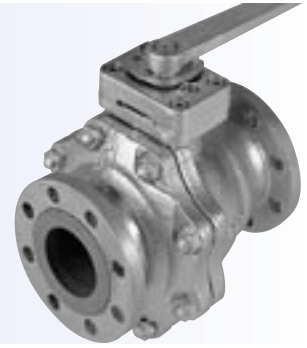
Nominal size	$\phi$ d	L	H	$\phi$ W	Lift	Max. Service Pressure (Mpa)	Lining Material	
							ETFE	PFA
1/2B (15A)	15	125	107	65	5	1.1	●	●
3/4 (20)	20	135	107	65	8	1.1	●	●
1 (25)	25	145	113	80	10	1.1	●	●
1 1/2 (40)	40	180	156	120	18	0.9	●	●
2 (50)	50	210	176	140	24	0.9	●	●
2 1/2 (65)	65	250	210	165	30	0.7	●	●
3 (80)	80	300	242	180	35	0.7	●	●
4 (100)	100	350	292	220	45	0.7	●	●

- Note: 1. Face to face dimensions both of ISO and special dimension are available.  
 2. Consult us for 5" and 6" of ISO dimension.  
 3. CV value of special dimensions is almost the same as those of ISO dimension.

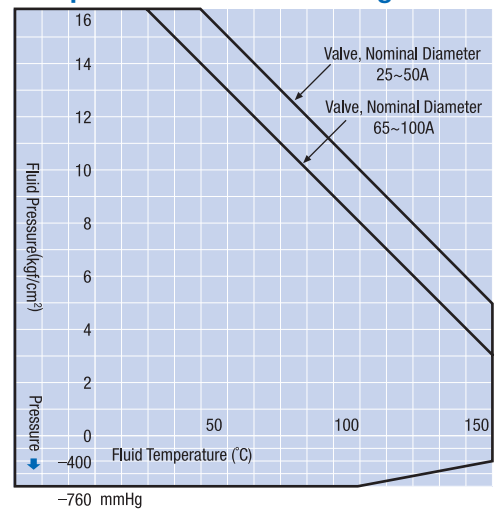


# BALL VALVE

## PFA



**PFA Lining Ball Valve Temperature-Pressure Rating**



### Standard Specification

Body Material	Cast Stainless Steel, JIS G 5121 SCS 13
Ball Core Material	Same as Body Material
Stem Material	Stainless Steel 304
Lining Material	PFA
Ball Seat	PTFE
Mechanical Packing	PTFE
Flange Rating	ANSI 150LBS or JIS 10K

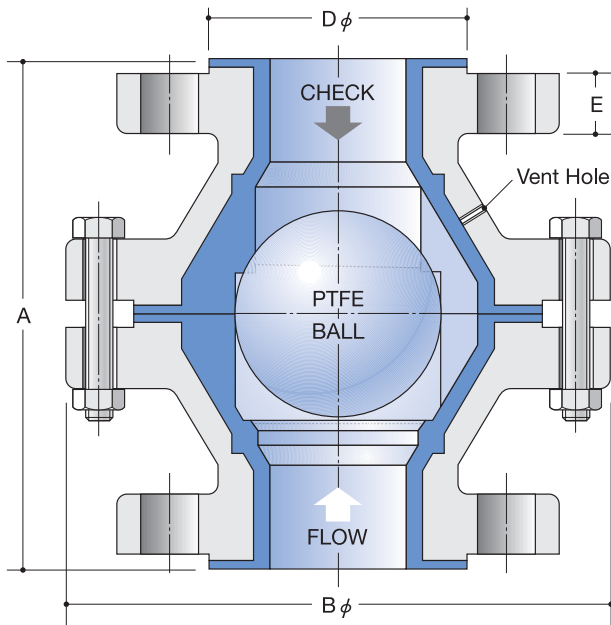
### ANSI 150LBS and JIS 10K

(Unit : mm)

Nominal size	d	L	H	W	Test Pressure (Mpa)	Weight(kg)
<b>1B (25A)</b>	25	165	78	160	1.4	8.0
<b>1½ (40)</b>	38	191	103	230	1.4	10.3
<b>2 (50)</b>	51	216	113	230	1.4	13.5
<b>2½ (65)</b>	64	241	139	400	1.4	24.0
<b>3 (80)</b>	76	283	149	400	1.4	32.0
<b>4 (100)</b>	102	305	178	700	1.4	48.0

# BALL CHECK VALVE

## PFA



### Standard Specification

Size	3/4"-6" NPS(20A-150A)
Body Material	Cast Ductile Iron, JIS B 8243 FCD-S
Lining Material	PFA
Ball Material	PTFE
Flange Rating	ANSI 150LBS or JIS 10K

### ANSI 150LBS and JIS 10K

(Unit : mm)

Nominal size	A	B	D	E	CV Value	Weight(kg)
<b>3/4B (20A)</b>	152	137	57	19	30	5.4
<b>1 (25)</b>	152	137	57	19	30	5.5
<b>1 1/2 (40)</b>	178	169	76	21	75	8.8
<b>2 (50)</b>	178	188	95	22	150	13.3
<b>3 (80)</b>	203	232	127	23	250	27.3
<b>4 (100)</b>	267	296	150	25	400	43.4
<b>6 (150)</b>	395	438	216	29	550	96.7

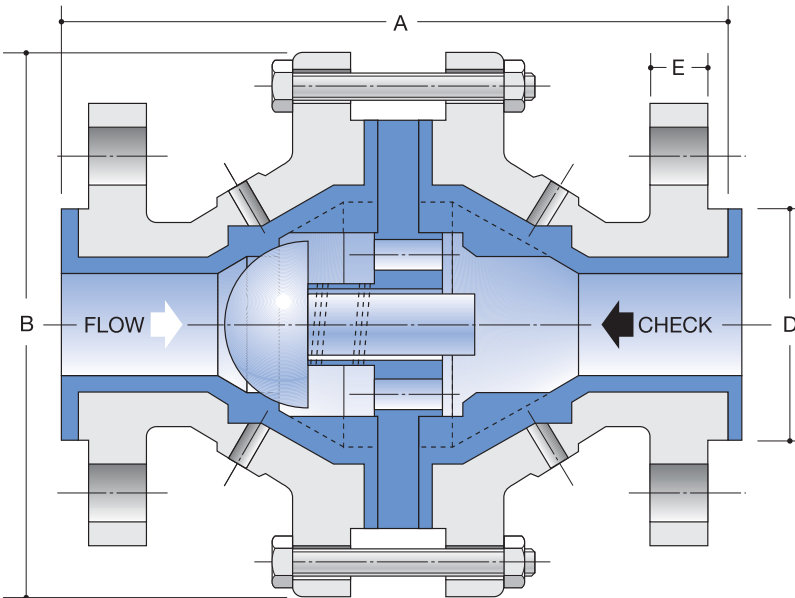
Note : 1. PFA ball check valve is recommended when the ball trembles due to the continuous given vibration.

CV Value UNIT : US GALLON / min

2. Line check valve is recommended for better sealability in low pressure and long time operation.
3. Use vertically. Line check valve is recommended for horizontal use.
4. Do not use for gas sealing.

# LINE CHECK VALVE

## PFA



### Standard Specification

Size	3/4"-3" NPS(20A-80A)
Body Material	Cast Ductile Iron, JIS B 8243 FCD-S
Lining Material	PFA
Ball Material	PTFE
Flange Rating	ANSI 150LBS or JIS 10K
Spring	Stainless Steel + PFA

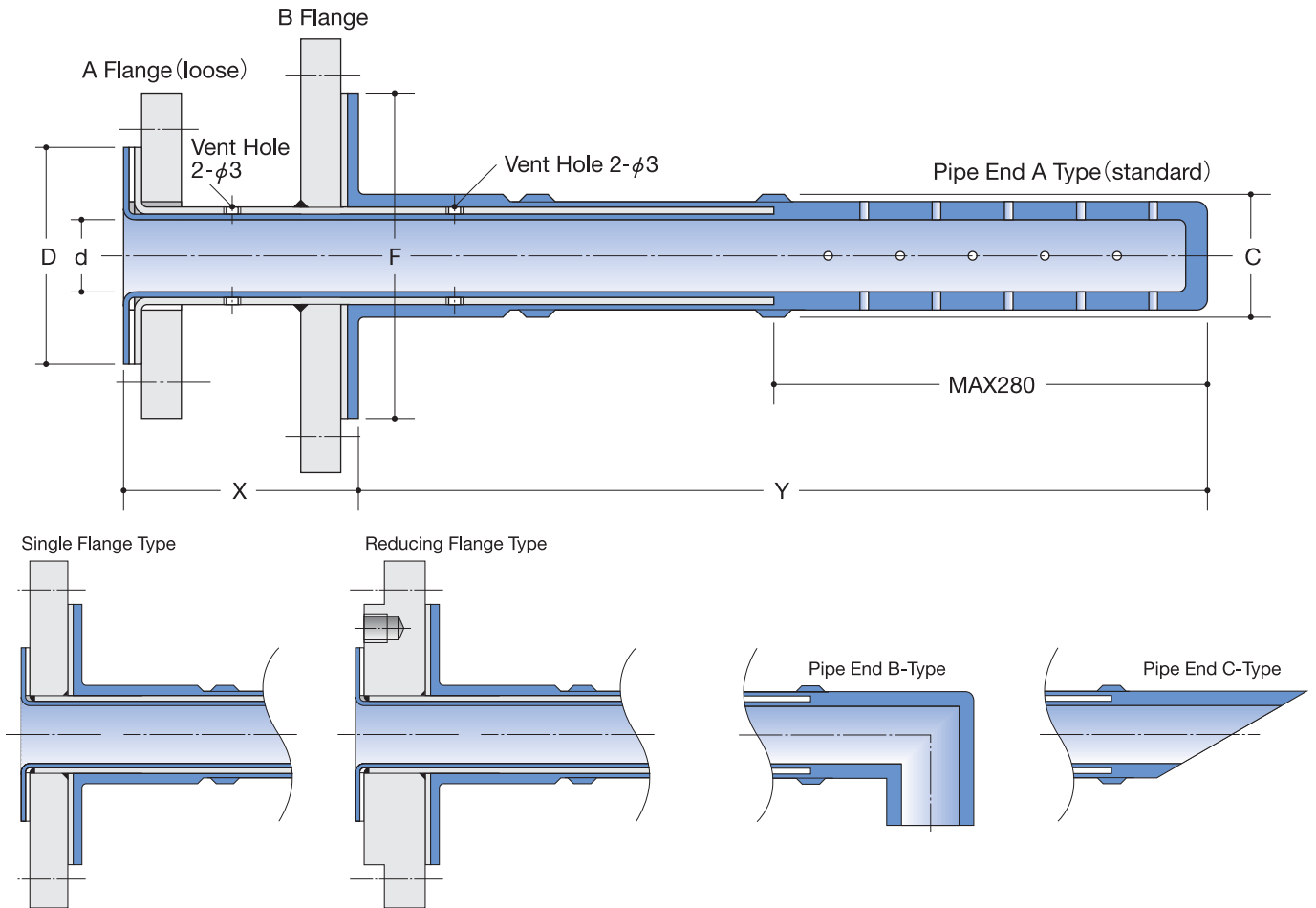
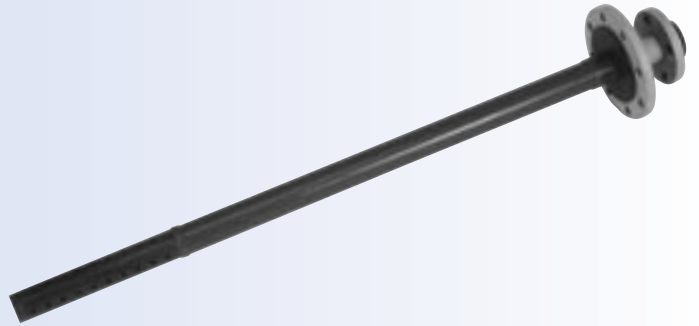
### Dimension ANSI 150LBS and JIS 10K

(Unit : mm)

Nominal size	A	B	D	E	Weight(kg)
<b>3/4B (20A)</b>	162	137	57	19	4.3
<b>1 (25)</b>	162	137	57	19	5.5
<b>1 1/2 (40)</b>	188	169	76	21	8.8
<b>2 (50)</b>	188	188	95	22	13.3
<b>3 (80)</b>	213	232	127	23	27.3

- Note : 1. Minimum Working Pressure: 0.03MPa/cm<sup>2</sup> ΔP  
 2. When high permeable and corrosive chemicals run, springs should be replaced periodically  
 3. Do not use for gas sealing.

# SPARGER



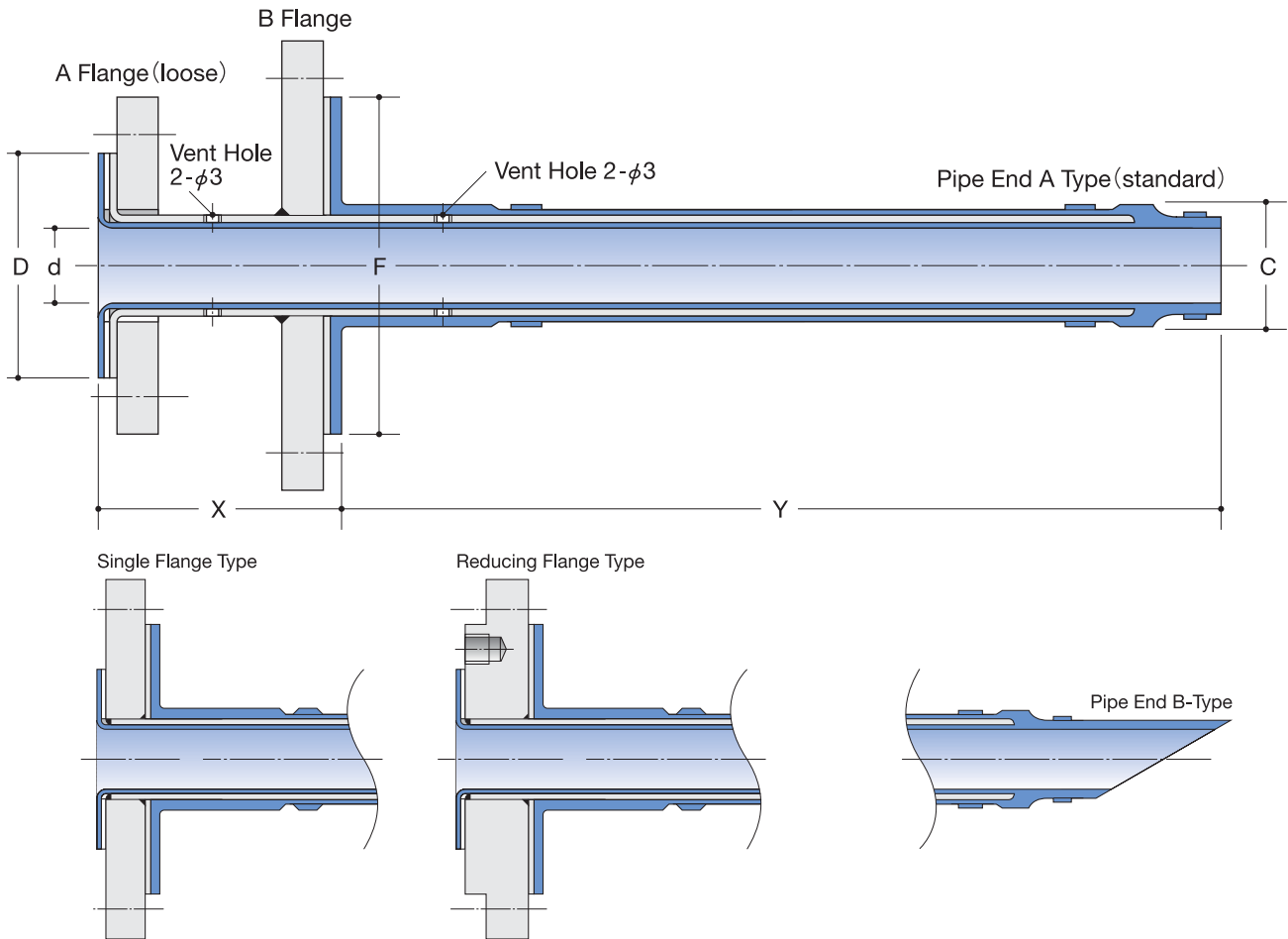
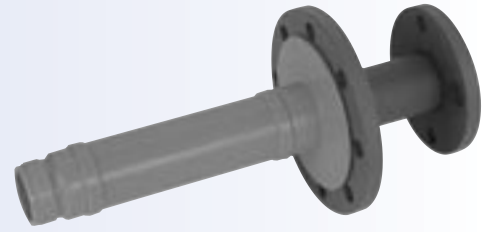
(Unit : mm)

Dimension Nominal size	d	D	C	F	Weight(kg)	
					Flanges	Without Flange (kg/300mm)
<b>3/4B (20A)</b>	18.4	43	35.0	43	0.7	0.3
<b>1 (25)</b>	24.2	51	41.8	51	1.1	0.4
<b>1 1/2 (40)</b>	37.7	73	56.0	73	1.6	0.5
<b>2 (50)</b>	49.2	92	68.5	92	1.9	0.7
<b>2 1/2 (65)</b>	62.4	105	84.3	105	2.6	1.1
<b>3 (80)</b>	74.1	127	97.9	127	2.6	1.4
<b>4 (100)</b>	97.1	155	123.1	155	3.1	2.0
<b>6 (150)</b>	145.0	216	173.8	216	6.3	3.4
<b>8 (200)</b>	—	266	—	266	7.5	—
<b>10 (250)</b>	—	324	—	324	12.7	—
<b>12 (300)</b>	—	374	—	374	13.8	—

- Note: 1. Liner Availability : PFA (brown or transparent)  
 2. Please specify A-flange, B-flange and X, Y dimensions on ordering.  
 3. Standard Flange Rating : Equal to ANSI B16.5, 150LBS and JIS 10K.  
 4. For lined vessels, check ID of the nozzle (C dimension) on ordering.  
 5. Standard Pipe End : A-type.  
     B and C type available on request.  
 6. Please specify number, size and pitch of holes for A-type pipe end.  
 7. Single flange type and reducing flange type are available on request.  
 8. When using in a mixer. please consult us.



# DIP PIPE



(Unit : mm)

Dimension Nominal size	d	D	C	F	Weight(kg)	
					Flanges	Without Flange (kg/300mm)
<b>3/4B (20A)</b>	18.4	43	35.0	43		
<b>1 (25)</b>	24.2	51	41.8	51	1.1	0.3
<b>1 1/2 (40)</b>	37.7	73	56.0	73	1.6	0.4
<b>2 (50)</b>	49.2	92	68.5	92	1.9	0.5
<b>2 1/2 (65)</b>	62.4	105	84.3	105	2.6	0.7
<b>3 (80)</b>	74.1	127	97.9	127	2.6	1.1
<b>4 (100)</b>	97.1	155	123.1	155	3.1	1.4
<b>6 (150)</b>	145.0	216	173.8	216	6.3	2.0
<b>8 (200)</b>	—	266	—	266	7.5	3.4
<b>10 (250)</b>	—	324	—	324	12.7	—
<b>12 (300)</b>	—	374	—	374	13.8	—

- Note: 1. Liner Availability : PFA (brown or transparent)  
 2. Please specify A-flange, B-flange and X, Y dimensions on ordering.  
 3. Standard Flange Rating : Equal to ANSI B16.5, 150LBS and JIS 10K.  
 4. For lined vessels, check ID of the nozzle (C dimension) on ordering.  
 5. Standard Pipe End : A-type.  
 B and C type available on request.  
 6. Please specify number, size and pitch of holes for A-type pipe end.  
 7. When using in a mixer, please consult us.

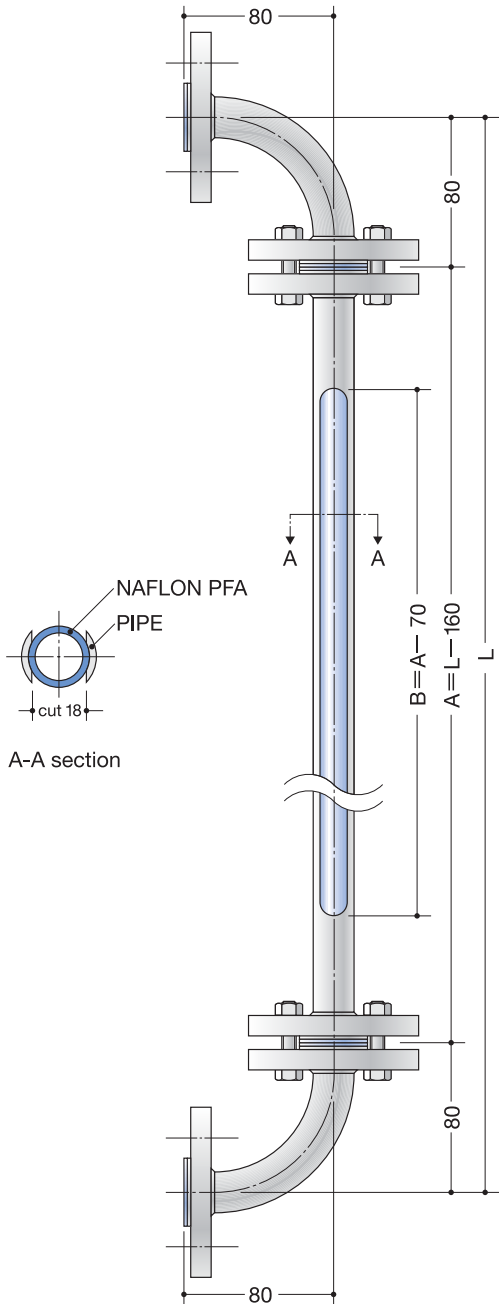
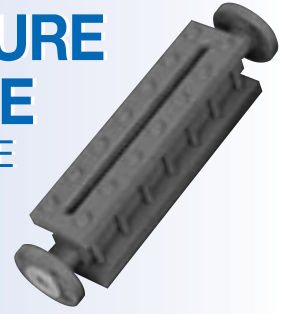
# LOW PRESSURE LEVEL GAUGE

LIQUID LEVEL GAUGE



# HIGH PRESSURE LEVEL GAUGE

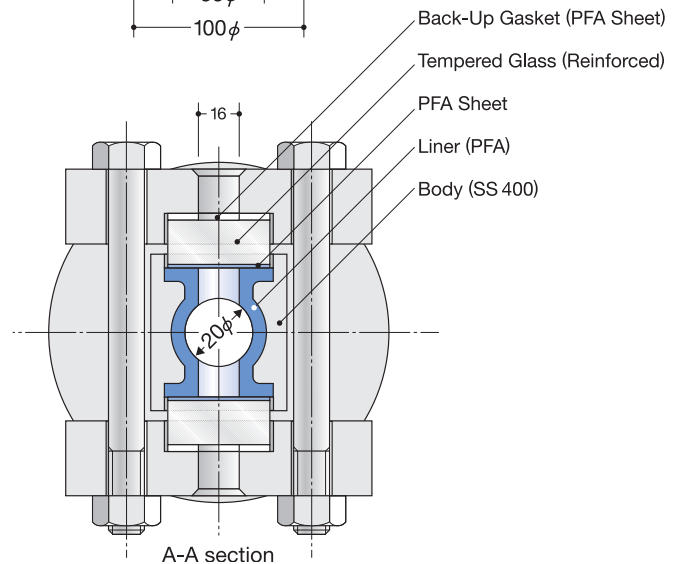
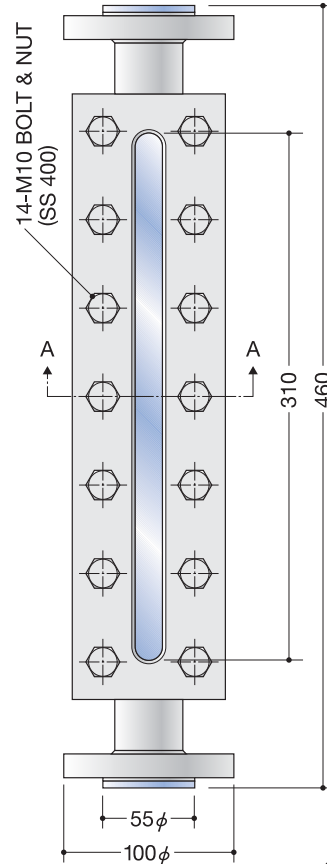
LIQUID LEVEL GAUGE



### Service Pressure Rating

Temperature(°C)	Pressure(MPa)
20	0.49
60	0.39
100	0.20

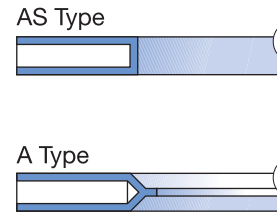
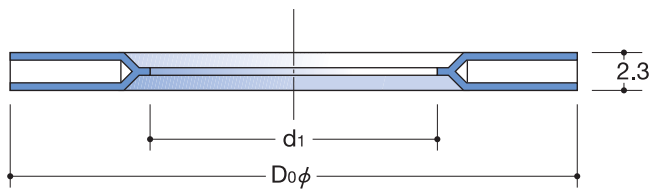
- Liner material : 1.5mm transparent PFA
- Pipe Material : JIS G 3454, STPG 370E, Sch, 40, 20A
- Flange : Material - JIS G 3101, SS 400  
Rating - ANSI 150LBS, 3/4" or JIS 10K 20A.
- Glass Opening : 680mm max.  
Both flanges on a Level Gauge are lap joint flanges.  
For over 680mm opening, openings are separated with 10mm pitch.



Maximum Service Pressure : 0.98 MPa max.

- Liner Material : PFA
- Body Material : JIS G 3101 Class 2.
- Flange : Material - JIS G 3101, Class 2, SS 400  
Rating - ANSI 150LBS, 3/4" or JIS 10K, 20A.
- Class : Heat Resistant Glass

# TOMBO NO.9010-FG, NAFLON® CUSHION GASKET



(Unit : mm)

Type	ANSI 150LBS			JIS 10K		
	Nominal size	d1	d0	Nominal size	d1	d0
AS	1½B	16	47	(15A)	16	58
	¾	22	56	(20)	22	63
	1	28	66	(25)	27	74
A	1½	45	85	(40)	45	89
	2	58	104	(50)	58	104
	2½	75	123	(65)	76	124
	3	85	135	(80)	85	134
	4	110	173	(100)	104	159
	6	160	221	(150)	153	220
	8	214	277	(200)	202	270
	10	266	338	(250)	251	333
	12	328	408	(300)	300	378

(1) Regarding gaskets used in TOMBO Fluoropolymer Anti-Corrosion Lined Piping and Fittings, the standard type is the T/# 9010-FG Naflon cushion gasket which has an asbestos joint sheet as a cushion core material. If an asbestos-free product is required, the T/# 9007 PTFE solid gasket is recommended. Dimension both outside and inside diameter of the gasket, are in accordance with the above table.

(2) The applicable flanges are JIS10K and ANSI (JPI) Class150, 15A(1/2B)-300A(12B)

## ■ Installation of T/# 9010-FG NAFLON® CUSHION GASKET.

To avoid the over-torquing, tighten the flange bolts with torque wrench. The recommended bolt torque values are shown on the following table.

### Appropriate Bolt Torque For Fluoropiping

Nominal size	ANSI 150LBS		Nominal size	JIS 10K	
	Min.(N·m)	Max.(N·m)		Min.(N·m)	Max.(N·m)
1½B	6.9	9.8	15A	4.9	6.9
¾	8.8	12.7	20	6.9	9.8
1	11.8	17.7	25	11.8	17.7
1½	18.6	27.5	40	20.6	30.4
2	34.3	52.0	50	31.4	47.1
2½	36.6	54.9	65	36.9	55.3
3	54.9	81.4	80	27.5	41.2
4	38.2	57.9	100	43.1	63.7
6	77.5	115.7	150	90.2	134.4
8	99.0	149.1	200	82.4	123.6
10	98.1	146.1	250	118.7	178.5
12	106.9	160.8	300	116.7	175.5

# NAFLON® BELLOWS

NAFLON Bellows are used to absorb thermal expansion and contraction, vibration and noise of pipe lines. NAFLON Bellows will give easy solution for expansion and contraction of pipe lines to be generated by heat, axial and lateral movement between vessels and pipes in operation, vibration and noise from pumps. Having excellent chemical resistance, high heat resistance and long service life and other high performance, NAFLON Bellows are versatile expansion joints manufactured with fluoropolymer.



## Pressure Resistance NAFLON® EXPANSION JOINTS

PRODUCT	AVAILABLE SIZE	PRESSURE RESISTANCE (room temp)MPa	CONSTRUCTION
<b>Tombo 9060 Machined Type PTFE</b>	<b>3/4"-16"</b> <b>3 &amp; 7 conv.</b> For larger sizes, please consult us.	<b>3 conv.</b> 3/4" - 0.59 8" - 0.27 <b>7 conv.</b> 3/4" - 0.39 10" - 0.18	
<b>Tombo 9064 Tube Forming Type PFA</b>	<b>3/4"-12"</b> <b>2.3 &amp; 5 conv.</b>	<b>2 conv.</b> 3/4" - 1.44 12" - 0.72 <b>3 conv.</b> 3/4" - 1.09 12" - 0.57 <b>5 conv.</b> 3/4" - 0.69 12" - 0.34	
<b>Tombo 9062-S 9062-L Stainless Steel Covered PTFE</b>	<b>2"-14"</b> <b>3 thru 10 conv.</b> <b>16"-24"</b> <b>2 thru 5 conv.</b> S : short F-F dimension L : long F-F dimension Vacuum use is available on request	<b>3 thru 10 conv.</b> 2" - 0.98 24" - 0.20	
<b>Tombo 9063-S 9063-L Special Forming Type PTFE</b>	<b>2"-12"</b> <b>3 thru 5 conv.</b> <b>14"-24"</b> <b>3 thru 5 conv.</b> Vacuum use is available on request	<b>3 conv.</b> 2" - 0.98 24" - 0.29 <b>4 &amp; 5 conv.</b> 2" - 0.98 24" - 0.20	
<b>Tombo 9061-S Tube Forming Type PTFE</b>	<b>3/4"-24"</b> <b>3 thru 5 conv.</b> Vacuum use is available on request	<b>3 conv.</b> 1" - 0.98 24" - 0.23 <b>5 conv.</b> 1" - 0.49 24" - 0.12	

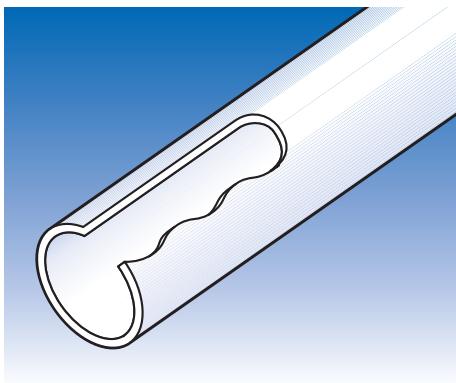
For vacuum application, please consult us in advance.

# NAFLON<sup>®</sup> HOSE

NAFLON Hoses are manufactured from fluoropolymer tubing which has excellent chemical resistance and high heat resistance. NAFLON Hoses are braided over with stainless steel wire, fitted with nipples or flared for joints with flanges. NAFLON Hoses are safely used for steam, oil, gases, chemicals and foods.

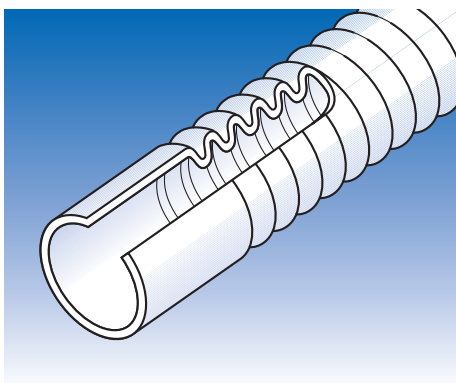


## NAFLON Hose products

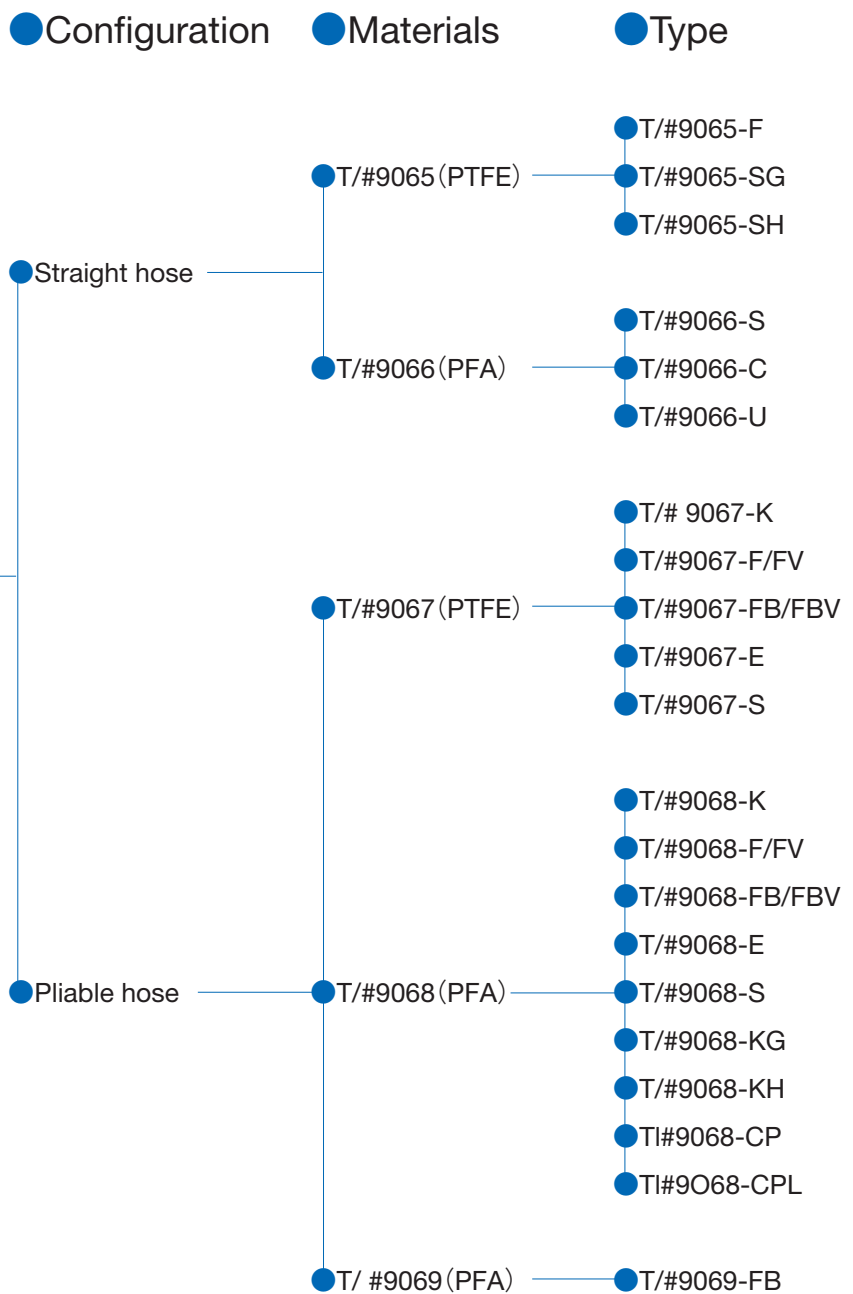


▲ Straight hose (cut view)

### NAFLON Hose




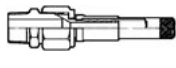



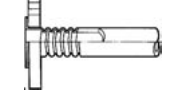
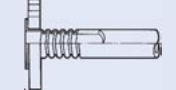

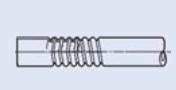
▲ Pliable hose (cut view)





## Joins and working pressure of NAFLON® HOSE

STRAIGHT TYPE						
PRODUCT	JOINT	CONTACTING SURFACE	WORKING PRESSURE MPa	SIZE	TUBE MATERIAL	CONSTRUCTION
9065-F Flange Type	Flange 10K (SS400, AISI 304)	PTFE	0.98	1/2"- 4"	PTFE	
9065-SG Sanitary Hose	Union Nut (AISI 304)	AISI 304	0.98	1/2"- 4"	PTFE	
9065-SH Sanitary Hose	Ferrule (AISI 304)	AISI 304	0.98	1/2"- 4"	PTFE	
9066-S, 9066-C High Pressure Hose	REFER TO PAGE NO 15 & 16	AISI 304 Bronze	1/4"- 19.6 1" -10.3 Bronze is 1/2 of that of AISI	1/4"- 1"	PFA	
9066-U Ultra High Pressure Hose	REFER TO PAGE NO 15 & 16	AISI 304	1/4"- 41.2 1" - 20.6	1/4"- 1"	PFA	

PLIABLE TYPE						
PRODUCT	JOINT	CONTACTING SURFACE	WORKING PRESSURE MPa	SIZE	TUBE MATERIAL	CONSTRUCTION
9067-K, 9068-K Nipple Type	REFER TO PAGE NO 27. 28	AISI 304	1/2"- 1.96 2" - 0.98	1/2"- 2"	PTFE PFA	
9067-F Flange Type	Flange 10K (SS400, AISI 304)	PTFE	1/2"- 0.29 2" - 0.098	1/2"- 4"	PTFE	
9068-F Flange Type	Flange 10K (SS400, AISI 304)	PFA	1/2"- 0.29 3" - 0.098	1/2"- 3"	PFA	
9067-FB Flange Type	Flange 10K (SS400, AISI 304)	PTFE	1/2"- 0.98 4" - 0.98	1/2"- 4"	PTFE	
9068-FB Flange Type	Flange 10K (SS400, AISI 304)	PFA	1/2"- 0.98 3" - 0.98	1/2"- 3"	PFA	
9068-KG Sanitary Hose	Union Nut (AISI 304)	AISI 304	1"- 1.96 4"- 0.98	1"- 4"	PFA (Partially PTFE)	
9068-KH Sanitary Hose	Ferrule (AISI 304)	AISI 304	1"- 1.96 4"- 0.98	1"- 4"	PFA (Partially PTFE)	
9068-CP 9068-CPL	Flange 20K (AISI 304)	AISI 316	1"- 1.96	1"-1-1/2"	PFA	
9069-FB	Flange 10K (AISI 304)	PFA	0.98	1/2"-3"	PFA	
9067-E 9067-S	—	PTFE	max. 0.2	3/8"-8"	PTFE	
9068-E 9068-S	—	PFA	max. 0.2	3/8"-8"	PFA	

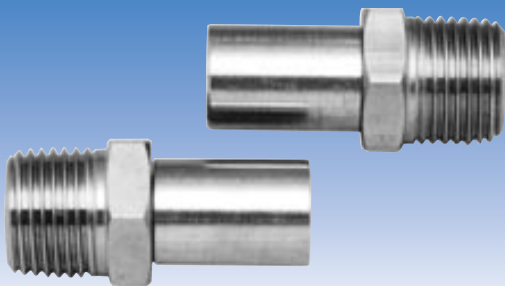
For detailed working pressure, please check with NAFLON HOSE catalog.

# PLIABLE HOSE



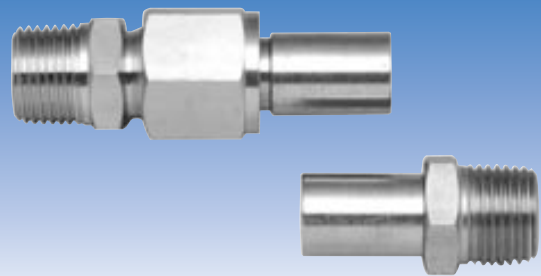
## JOINT TYPES

### MALE FIXED + MALE FIXED



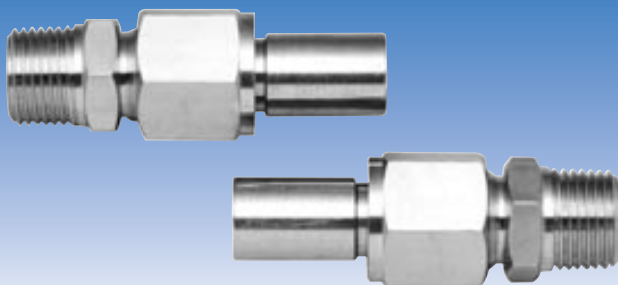
For taper female screw fittings on both pipe sides and one side (or both sides) must be a union type.

### MALE UNION + MALE FIXED



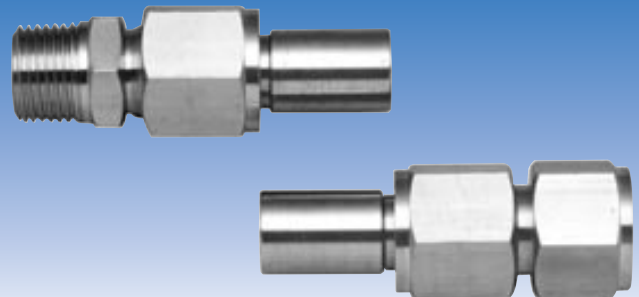
For taper female screw fittings on both pipe sides and both sides are fixed type joints (union type also OK).

### MALE UNION + MALE UNION



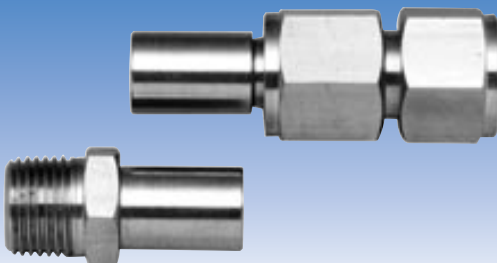
For taper female screw fittings on both pipe sides and both sides are fixed type joints (union type also OK).

### MALE UNION + FEMALE UNION



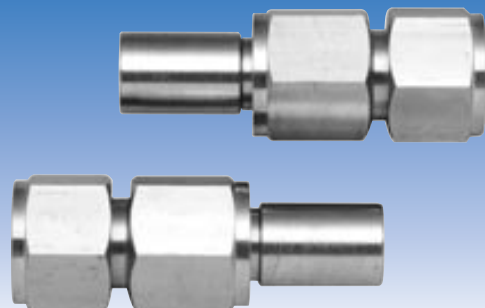
For taper female screw fitting on one pipe side and taper male screw fitting on other side and both fixed type joints (union type also OK).

### FEMALE UNION + MALE FIXED



For taper female screw fitting on one pipe side and taper male screw fitting on other side and both fixed type joints (union type also OK).

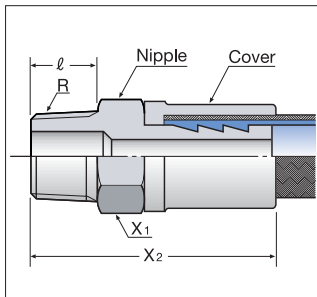
### FEMALE UNION + FEMALE UNION



For taper male screw fittings on both pipe sides and both sides are fixed type joints (union type also OK).

# JOINT DIMENSIONS

## MALE FIXED



● T/#9066-C

Nominal dimensions	Piping connection joint					
A	B	R	ℓ	X <sub>1</sub>	X <sub>2</sub>	
6	1/4	1/4	12	14	37	
10	1/4	3/8	13	18	44	
15	1/2	1/2	16	22	48	
20	3/4	3/4	19	29	56	
25	1	1	22	35	65	

● T/#9066-S

Nominal dimensions	Piping connection joint					
A	B	R	ℓ	X <sub>1</sub>	X <sub>2</sub>	
6	1/4	1/4	12	14	37	
10	3/8	3/8	13	19	44	
15	1/2	1/2	16	23	48	
20	3/4	3/4	19	29	56	
25	1	1	22	35	65	

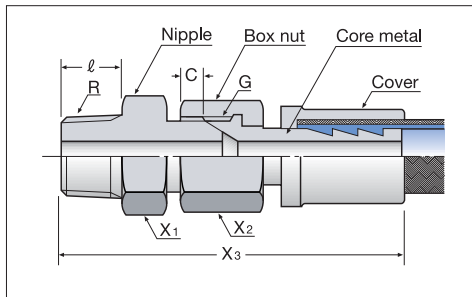
● T/#9066-U

Nominal dimensions	Piping connection joint					
A	B	R	ℓ	X <sub>1</sub>	X <sub>2</sub>	
6	1/4	1/4	12	14	47	
10	3/8	3/8	13	19	55	
15	1/2	1/2	16	23	59	
20	3/4	3/4	19	29	69	
25	1	1	22	35	79	

● T/#9067·T/#9068-K

Nominal dimensions	Piping connection joint					
A	B	R	ℓ	X <sub>1</sub>	X <sub>2</sub>	
15	1/2	1/2	16	26	53	
20	3/4	3/4	19	29	57	
25	1	1	22	35	67	
32	1 1/4	1 1/4	25	46	72	
40	1 1/2	1 1/2	25	50	77	
50	2	2	26	62	85	

## MALE UNION



● T/#9066-C

Nominal dimensions	Piping connection joint								
A	B	R	ℓ	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	G	C	
6	1/4	1/4	12	14	17	54	1/4	6	
10	3/8	3/8	13	17	20	63	3/8	7	
15	1/2	1/2	16	21	25	74	1/2	10	
20	3/4	3/4	19	27	32	82	3/4	10	
25	1	1	22	35	41	93	1	12	

● T/#9066-S

Nominal dimensions	Piping connection joint								
A	B	R	ℓ	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	G	C	
6	1/4	1/4	12	14	17	59	1/4	8	
10	3/8	3/8	13	19	21	70	3/8	9	
15	1/2	1/2	16	23	26	78	1/2	12	
20	3/4	3/4	19	29	32	89	3/4	14	
25	1	1	22	35	41	100	1	15	

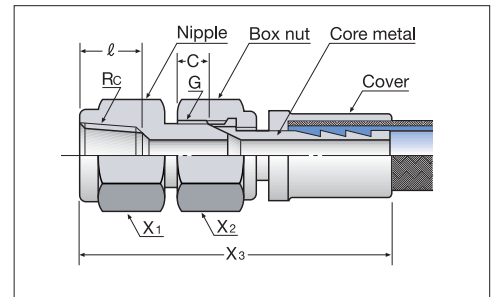
● T/#9066-U

Nominal dimensions	Piping connection joint								
A	B	R	ℓ	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	G	C	
6	1/4	1/4	12	14	17	59	1/4	8	
10	3/8	3/8	13	19	21	80	3/8	9	
15	1/2	1/2	16	23	26	88	1/2	12	
20	3/4	3/4	19	29	32	101	3/4	14	
25	1	1	22	35	41	113	1	15	

● T/#9067·T/#9068-K

Nominal dimensions	Piping connection joint								
A	B	R	ℓ	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	G	C	
15	1/2	1/2	16	23	26	86	1/2	12	
20	3/4	3/4	19	29	32	93	3/4	14	
25	1	1	22	35	41	105	1	15	
32	1 1/4	1 1/4	25	46	50	113	1 1/4	17	
40	1 1/2	1 1/2	25	50	60	118	1 1/2	17	
50	2	2	26	62	70	132	2	20	

## FEMALE UNION



● T/#9066-C

Nominal dimensions	Piping connection joint								
A	B	R <sub>c</sub>	ℓ	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	G	C	
6	1/4	1/4	12	16	17	52	1/4	6	
10	3/8	3/8	13	20	20	60	3/8	7	
15	1/2	1/2	16	25	25	71	1/2	10	
20	3/4	3/4	19	32	32	78	3/4	10	
25	1	1	22	38	41	88	1	12	

● T/#9066-S

Nominal dimensions	Piping connection joint								
A	B	R <sub>c</sub>	ℓ	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	G	C	
6	1/4	1/4	12	17	17	58	1/4	8	
10	3/8	3/8	13	21	21	68	3/8	9	
15	1/2	1/2	16	26	26	75	1/2	12	
20	3/4	3/4	19	32	32	86	3/4	14	
25	1	1	22	41	41	95	1	15	

● T/#9066-U

Nominal dimensions	Piping connection joint								
A	B	R <sub>c</sub>	ℓ	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	G	C	
6	1/4	1/4	12	17	17	58	1/4	8	
10	3/8	3/8	13	21	21	78	3/8	9	
15	1/2	1/2	16	26	26	85	1/2	12	
20	3/4	3/4	19	32	32	98	3/4	14	
25	1	1	22	41	41	108	1	15	

● T/#9067·T/#9068-K

Nominal dimensions	Piping connection joint								
A	B	R <sub>c</sub>	ℓ	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	G	C	
15	1/2	1/2	16	26	26	83	1/2	12	
20	3/4	3/4	19	32	32	90	3/4	14	
25	1	1	22	41	41	100	1	15	
32	1 1/4	1 1/4	25	50	50	107	1 1/4	17	
40	1 1/2	1 1/2	25	60	60	112	1 1/2	17	
50	2	2	26	70	70	125	2	20	

# LINED VESSEL

Fluoropolymer finds its application with chemical resistance lining for tanks, vessels, reactors and towers. NICHIAS Corporation gives you a wide material selection of PFA, PTFE, ETFE and VF2 and several selection in lining methods from loose lining, adhesion lining and coating for service conditions such as temperature, positive and negative pressure and corrosive chemicals. NICHIAS fluoropolymer lining are in service for long time under different severe conditions at many chemical and petrochemical plants, semiconductor plants, pulp plants, metal treatment plants.



## Materials and lining methods

<b>PFA</b>	<b>Tombo No.9932-L</b> (Color:Brown) <b>Tombo No.9942-L</b> (Color:Transparent) <b>PFA Loose Lining</b>	Sheet lining with 2mm thick PFA sheet. High temperature resistance of PFA offers higher service temperature than FEP. Maximum continuous service temperature is 150°C.
	<b>Tombo No.9932-GB</b> (Color:Brown) <b>Tombo No.9942-GB</b> (Color:Transparent) <b>PFA (GB Sheet) Adhesion Lining</b>	Knitted or plain woven fiber glass fabric is heat bonded to PFA sheet. This PFA-GB (fiber glass backed) is bonded to casing with heat resistant adhesive. Overall thickness of PFA-GB is 2.3mm thickness. Maximum continuous service temperature is 150°C.
	<b>Tombo No.9942-CCB</b> <b>PFA (CCB Sheet) Adhesion Lining</b>	Carbon fiber fabric is heat bonded to PFA sheet. This PFA-CCB (carbon fiber backed) is bonded to casing with adhesive. This lining has excellent performance for fluoric acid application. Maximum service temperature is 120°C.
	<b>Tombo No.9035-PFA</b> <b>PFA Coating</b>	Thicker wall coating by process of PFA powder electrostatic painting. Showing superior vacuum resistance and flexibility in application to special shapes.
<b>PTFE</b>	<b>Tombo No.9972-GB</b> <b>PTFE (GB Sheet) Adhesion Lining</b>	Knitted or plain woven fiber glass fabric is heat bonded to 2mm thick PTFE sheet. This PTFE-GB (glass fiber backed) is bonded to casing with heat resistant adhesive. All joints are entirely welded with fluoropolymer rods. Excellent chemical resistance. Maximum continuous service temperature is 120°C.
<b>ETFE</b>	<b>Tombo No.9966-L</b> <b>ETFE Lote Lining</b>	Roto mold lining of ETFE powder. This lining can be applied to special shapes and to vacuum services. Maximum continuous service temperature is 100°C.
<b>VF2</b>	<b>Tombo No.9952-PB</b> <b>VF2 Adhesion Lining</b>	Polyester fabric is heat bonded to 1.5mm thick VF2 sheet. This VF2-PB (polyester fabric backed) is bonded to casing with adhesive. Overall thickness of VF2-PB is 2mm thick. Maximum service temperature is 80°C.

## Characteristics by Lining Methods

	PFA			PTFE	ETFE	VF2	
Lining Method	loose	adhesion		coating	adhesion	baking	adhesion
Service Temp.	150°C	150°C	120°C	100°C	120°C	100°C	80°C
Sheet Backing Material	—	glass fabric	carbon fabric	—	glass fabric	—	polyester fabric
Adhesive	—	rubber or epoxy based		—	rubber or epoxy based	—	rubber or epoxy based
Acid Resistance	excell	excell	excell	excell	excell	excell	excell
Alkali Resistance	excell	excell	excell	excell	excell	excell	good
Solvent Resistance	excell	excell	excell	excell	excell	excell	good
Adaptability to dishes and one piece tanks	none	fair	fair	fair	fair	fair	fair

# MEMO

A series of horizontal dotted lines for writing.





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