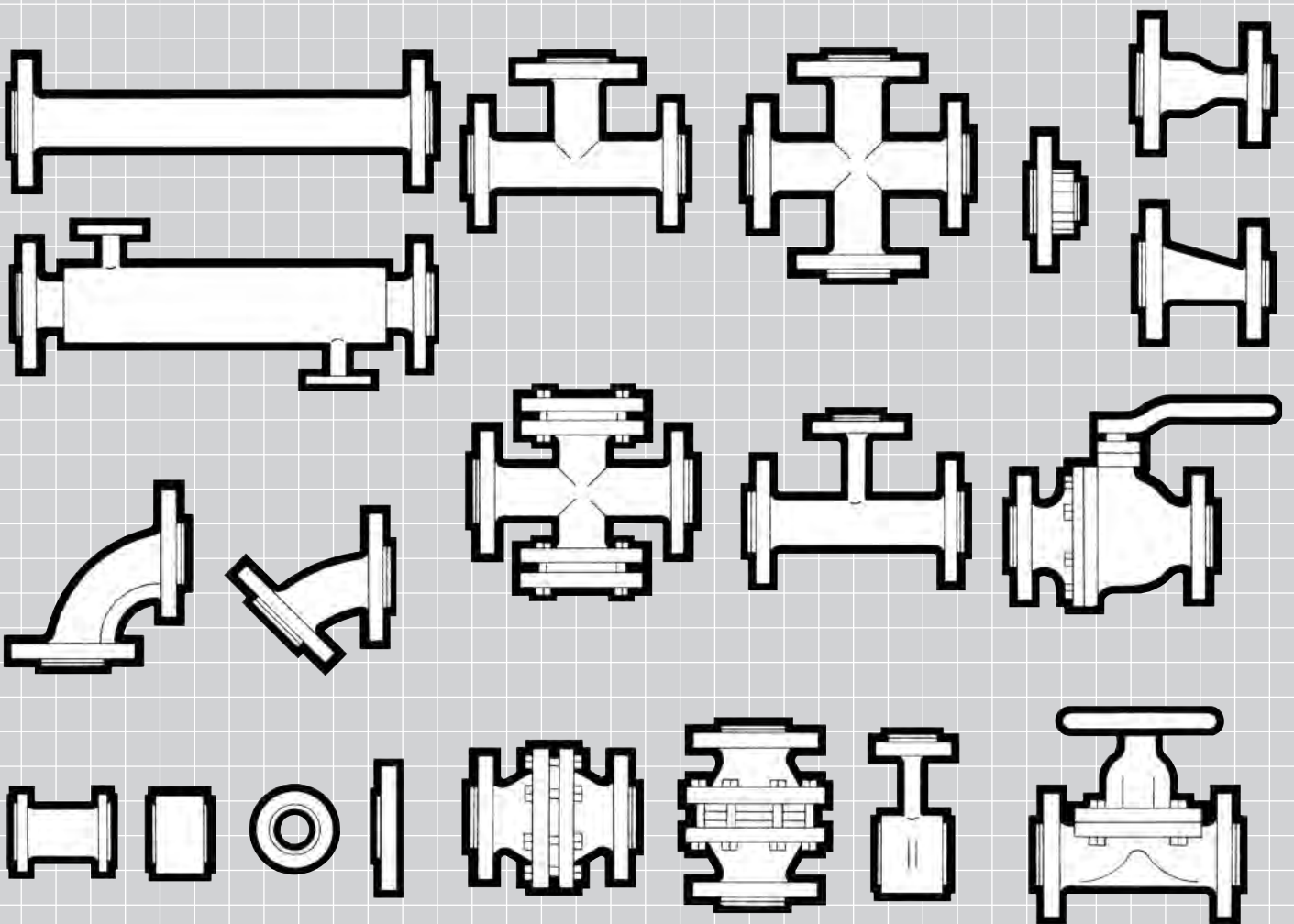


TOMBO™ BRAND

Fluoropolymer Anti-Corrosion lining



Fluoropolymer Anti-Corrosion lining Dimension Table



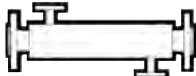


















Fluoroplastics have superior chemical and heat resistance compared to other general-purpose plastics. Corrosion-resistant lining is an application utilizing this feature. Thanks to the development of fluoroplastic processing and new technologies, we manufacture and sell various corrosion-resistant linings and PFA fluoropiping products using PFA fluoroplastic.

Note: This document contains a dimension table for our standard products.

For the dimensions of non-standard products (exterior piping material, face-to-face dimensions, etc.), please contact us.

Products marked with **K** may fall under the category of controlled goods as defined by the "Foreign Exchange and Foreign Trade Act." For such cases, export permission according to the above act is required.

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Lining

FLUOROPIPING™ · PFA

Perfluoroalkoxy Resin

This lining is made of fluoroplastic PFA, which can be fusion molded. Not only is the material highly corrosion resistant, but it is also mechanically durable at high temperatures; and can be used under the highest temperature among the fluoroplastics. The maximum service temperature of the piping material is 180°C.

Characteristic (Unit)	ASTM Test method	Anti-Corrosion lining material	Fluoropiping PFA Perfluoroalkoxy Resin
			$-\left(\begin{array}{c} \text{F} \\ \\ -\text{C}- \\ \\ \text{F} \end{array}\right)_n - \left(\begin{array}{c} \text{F} \\ \\ -\text{C}- \\ \\ \text{F} \\ \\ \text{Rf} \end{array}\right)_m -$
Melting Point	°C	—	310
Specific Gravity		D792	2.12~2.17
Tensile Strength	MPa	D638	25~35
Stretching	%	D638	300~350
Izod Impact Strength Test	J/m	D256A	No Destruction
Hardness	(Shore)	D2240	D62~66
Flexural Modulus	GPa	D790	0.54~0.64
Thermal Conductivity	W/(m·K)	C177	0.19
Coefficient of Linear Expansion	10 ⁻⁵ /k	D696	12
Continuous use ^{Note 1} Temperature	°C	—	— 29~180
Influence of Direct Sunlight		—	No Effect

* Since the maximum service temperature differs depending on the service conditions, please contact us for further information.

* The above values are representative values and not standard values.

* Source for characteristic values: Fluoroplastics Handbook (Japanese Fluoroplastics Industry Association)

Note 1: Continuous service temperature refers to that of the lining material. For selecting exterior piping material, see the applicable standard.

PFA Lining Materials and Features

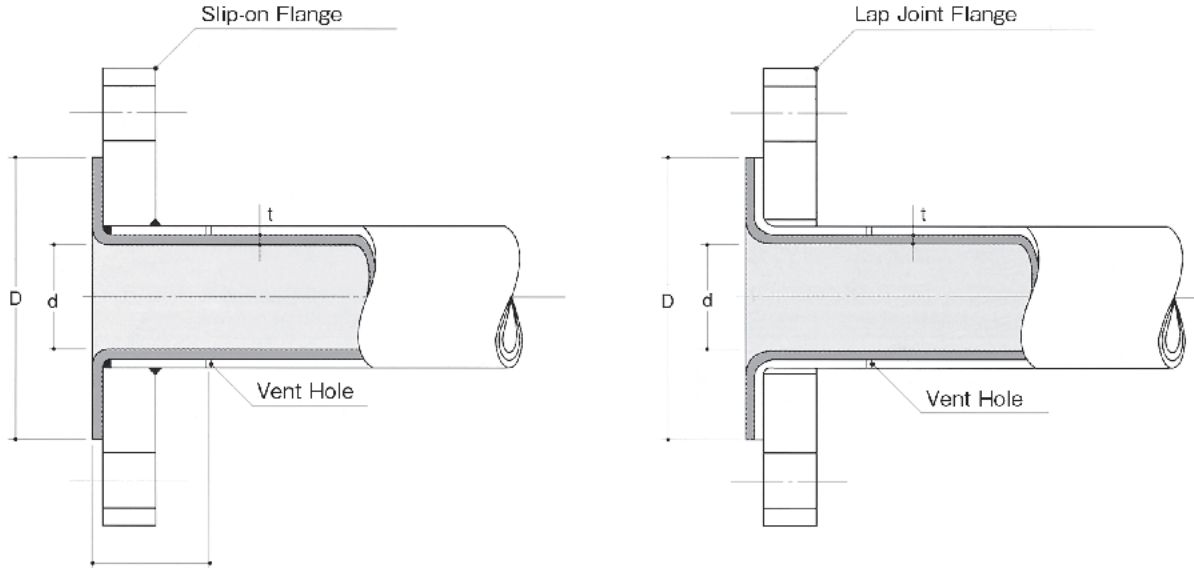
Lining material	Color	Features	Guideline for selection		
			Purity	Washability	Gas penetration resistance
FA	Brown	General-purpose grade lining material. The brown color is produced by adding a small amount of colorant to PFA. Physical properties, and heat and chemical resistance are the same as for PFA. Suitable for general chemical lines.	○	○	○
PFA	Translucent	The same heat and chemical resistance as PFA, with superior purity since it does not include additives such as filling material or elastomers. Suitable for high-purity chemical fluid lines or medical drug lines.	◎	○	○
PFA-HG	Translucent	Lining material with smooth surface using NEW PFA material with reduced fluorine ion elution. This material is characterized by reduced fluorine ion elution, less gas penetration and superior washability compared to PFA. Suitable for lines that require higher purity and washability such as high-purity chemical fluid lines for semiconductors or medical drug lines.	☆	◎	◎
PFA- HG-HW	Translucent	Lining material for thick straight piping using PFA-HG as a countermeasure against penetration. Physical properties, and heat and chemical resistance are the same as for PFA-HG. Suitable for lines in which the gas penetration rate is high such as lines for hydrochloric acid, nitric acid, or acetic acid.	☆	◎	☆
SP	Brown	Lining material for thick straight piping using PFA-HG as a countermeasure against penetration. Physical properties, and heat and chemical resistance are the same as for PFA-HG. Suitable for lines in which the gas penetration rate is high such as lines for hydrochloric acid, nitric acid, or acetic acid. NEW PFA grade lining material in which the brown color is produced by adding a small amount of colorant to PFA-HG-HW.	○	○	☆

* Compared to FA as the reference, ○: Standard, ◎: Excellent, ☆: Superior

TOMBO™ No.9930
TOMBO™ No.9940



STRAIGHT PIPE



For sizes 15A (1/2B) ~ 100A (4B) wrap joint flange is standard.

Unit: (mm)

Nominal Pipe size	d	D	t	Weight (kg)			Minimum tube length		
				Standard Liner Thk.	1st 200mm with 2 flanges		Each add 100mm	JIS 10K	
					JIS 10K	JPI 150LB		JIS 10K	JPI 150LB
15A (1/2B)	13 (14)	34	1.5	1.4	1.2	0.1	65	75	
20 (3/4)	18 (20)	43	1.5	1.9	1.6	0.2	67 (70)	75	
25 (1)	24 (25)	51	1.5	2.9	2.2	0.3	76 (75)	80	
40 (1 1/2)	38 (39)	73	1.75	4.1	3.6	0.5	80	85	
50 (2)	49 (50)	92	1.75	5.0	5.5	0.6	81 (85)	95	
65 (2 1/2)	62	105	1.9	7.3	8.5	1.0	83	105	
80 (3)	74	127	2.0	7.8	10.5	1.3	83	110	
100 (4)	97	155	2.6	9.9	14.0	1.8	88	110	
125 (5)	120	185	3.0	15.0	18.0	2.5	106	125	
150 (6)	145	216	3.0	19.0	22.0	3.2	106	130	
200 (8)	194	266	3.0	26.0	35.0	4.7	106	130	
Note 1 250 (10)	240	324	3.0	29.0	48.0	6.0	120	120	
Note 1 300 (12)	290	374	3.0	45.0	72.0	7.9	120	120	

Note 1: Different from those of size 200A or smaller, the maximum length is 3,000 mm. For use at high temperature, it may be better to change the maximum length. In addition, the lining for the flange portion is specified to be fixed with screws to prevent the material from lifting from the flange. Contact us for further information.

* Figures in () are the dimensions of the lining for external piping made of stainless steel (Sch10).

* The standard for the flange is JIS 10K and JPI 150LB.

* The maximum length is 5,400 mm for standard flanges, and 5,500 mm for slip-on flanges. In addition, all products of size 125A or larger use a slip-on flange. For use at high temperature, it may be better to change the maximum length. Contact us for further information. For lengths less than the shortest pipes, use a spacer or distance piece.

* The rough criteria for the shortest pipe in the table are the values for slip-on flanges, and the values in the table +100 mm are for lap joint flanges. If it is less than +100 mm, one side lap joint or one side slip-on becomes the standard.

* Vent holes are located at two positions at the center for products of size 25A or smaller and less than 300 mm.

Vent holes are located at two positions at the center for size 40A or larger and less than 600 mm.

Vent holes are located at four positions at 100 mm from the flange end for size 25A or smaller and 300 mm or more.

Vent holes are located at four positions at 150 mm from the flange end for size 40A or larger, and 600 mm or more.

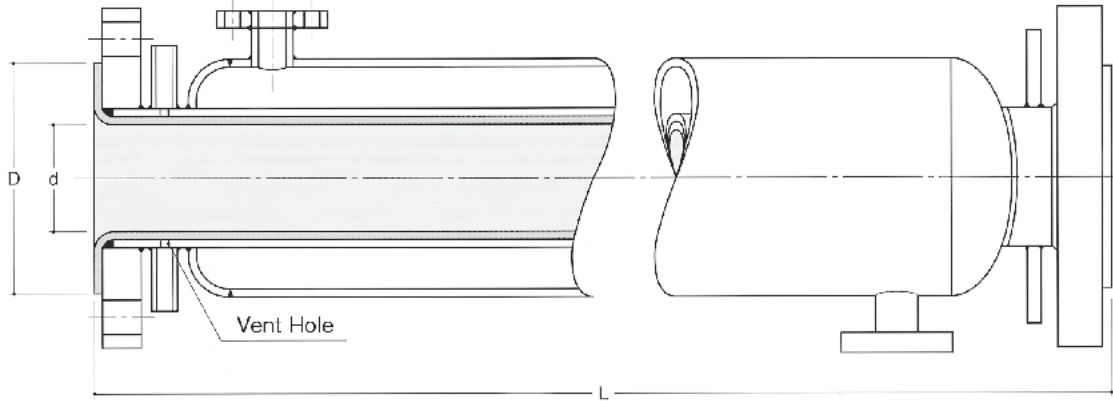
* The mass of steel and stainless-steel materials is approximately the same value.

Standard			JIS 10K or JPI 150LB		
External piping material	Steel pipe	Piping	JIS G3454 STPG370E Sch40	JIS G3459 SUS304TPS Sch40	JIS G3459 SUS304TPS Sch10
		Flange	JIS G3101 SS400 (JIS 10K)	JIS G3202 SFVC-2A (JPI 150LB)	JIS G3214 SUS F304
Lining material	PFA		Available		
	FA		Available (25A and longer)		
	PFA-HG		Available		
	PFA-HG-HW		Available (20A~200A)		
	SP		Available		
Nominal Pipe size	15A	1/2B	○	○	○
	20	3/4	○	○	○
	25	1	○	○	○
	40	1 1/2	○	○	○
	50	2	○	○	○
	65	2 1/2	○	○	-
	80	3	○	○	-
	100	4	○	○	-
	125	5	○	○	-
	150	6	○	○	-
	200	8	○	○	-
	250	10	○	○	-
300	12	○	○	-	

TOMBO™ No.9930-SJ
TOMBO™ No.9940-SJ



JACKET PIPE



Unit: (mm)

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

* The standard for the flange is JIS 10K and JPI 150LB.

* Refer to straight pipe for maximum length and flange type.

* Please contact us for dimensions of 250A and longer.

* 15A to 100A are one sided slip-on flanges or one sided lap joint flanges, 125A or more are the sided slip-on flanges.

Standard			JIS 10K or JPI 150LB
External piping material	Steel pipe	Piping	JIS G3454 STPG370E Sch40
			JIS G3459 SUS304TPS Sch40 ^{Note 1}
		Jacket	JIS G3452 SGP
			JIS G3459 SUS304TP-A 3t
		Flange	JIS G3101 SS400 (JIS 10K)
			JIS G3202 SFVC-2A (JPI 150LB)
JIS G3214 SUS F304			
Lining material ^{Note 2}	PFA		Available
	FA		Available (25A and longer)
	PFA-HG		Available (25A and longer)
	SP		Available (15A and longer)
Nominal Pipe size	15A	1/2B	○
	20	3/4	○
	25	1	○
	40	1 1/2	○
	50	2	○
	65	2 1/2	○
	80	3	○
	100	4	○
	125	5	○
	150	6	○
200	8	○	

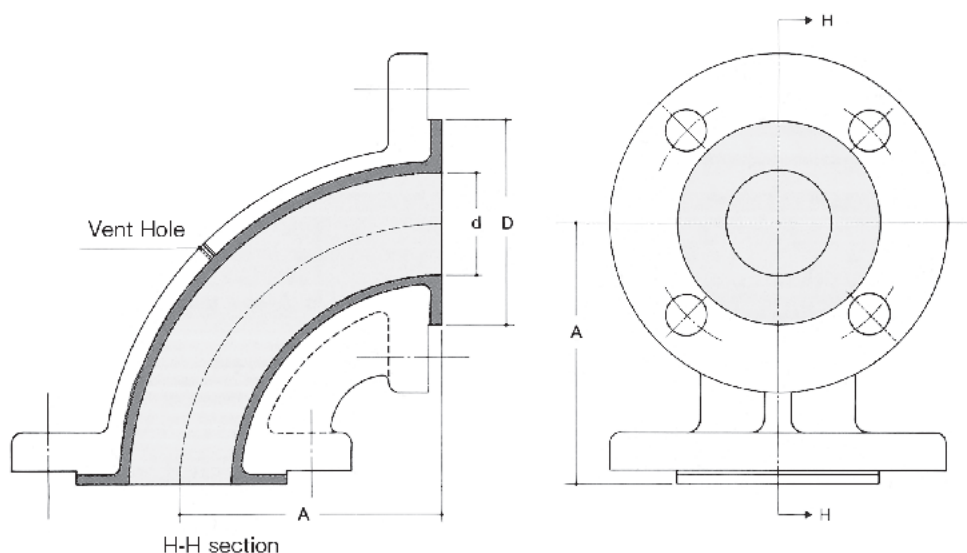
Note 1: If the piping is made of SUS material (JIS G3459 SUS304TPS Sch40), the jacket will also be SUS material (JIS G3459TPS Sch40).

Note 2: For PFA, FA and PFA-HG, there are thick-wall products with lining material of increased thickness for vacuum and gas permeation countermeasures, Please contact us. (However, PFA - HG will be from 20A to 200A.

TOMBO™ No.9931-90EL
TOMBO™ No.9941-90EL



90° ELBOW



Unit: (mm)

Nominal Pipe size	A	d		D		Weight (kg)	
		JIS 10K	JPI 150LB	JIS 10K	JPI 150LB	JIS 10K	JPI 150LB
15A (1/2B)	80	13	13	34	34	1.4	1.2
20 (3/4)	80	18	18	43	43	1.9	1.6
25 (1)	89	23	25	51	57	3.4	2.4
40 (1 1/2)	102	35	38	73	76	4.4	4.0
50 (2)	114	46	50	92	95	5.5	6.0
65 (2 1/2)	130	58	58	105	105	8.3	9.1
80 (3)	140	76	76	127	127	9.3	11.7
100 (4)	165	97	102	150	157	13.7	20.0
125 (5)	190	120	-	180	-	22.0	-
150 (6)	203	152	152	212	212	33.7	33.7
200 (8)	229	194	203	261	270	44.0	52.8
250 (10)	279	239	241	318	324	77.6	80.9
300	305	288	-	365	-	107.1	-

* Interfacial spacing dimensions conform to ANSI B16.5 150LB series.

* The standard for the flange is JIS 10K and JPI 150L.

* For PFA, tube draw-in products are the standard for JIS 10K 50A or smaller, and 150LB 3/4 B or smaller, and mold-forming products are the standard for others.

* The values in the above table are for standard products. Please contact us for information on products with non-standard dimensions.

* Lap joint flanges can also be manufactured for size 150A or smaller. Please contact us for further information.

* The mass of steel and stainless-steel materials is approximately the same value.

* For products of size 150A or smaller, 150°C, and vacuum resistant specifications, please contact us.

Standard	JIS 10K		
External piping material	Steel pipe		Castings JIS B2051 FCD-S
	Piping	JIS G3452 SGP	
		JIS G3459 SUS304TPS Sch40	
		JIS G4304 SUS304W Sch40	
	Flange	JIS G3101 SS400 (JIS 10K)	
JIS G3214 SUS F304			
Lining material	PFA	Available (15A~50A)	Available (40A~300A)
	FA	Available (25A~50A)	Available (40A~300A)
	PFA-HG	Available (15A~50A)	Available (40A~300A)
	PFA-HG-HW	Available (20A~50A)	Unavailable
	SP	Available (15A~50A)	Unavailable
Nominal Pipe size	15A	○	-
	20	○	-
	25	○	-
	40	○	○
	50	○	○
	65	-	○
	80	-	○
	100	-	○
	125	-	○
	150	-	○
	200	-	○
	250	-	○
	300	-	○

Standard	JPI 150LB		
External piping material	Steel pipe		Castings JIS B2051 FCD-S
	Piping	JIS G3452 SGP	
		JIS G3454 STPG370 Sch40	
		JIS G3459 SUS304TPS Sch40	
		JIS G4304 SUS304W Sch40	
Flange	JIS G3202 SFVC2A (JPI 150LB)		
	JIS G3214 SUS F304		
Lining material	PFA	Available ($\frac{1}{2}B, \frac{3}{4}B$)	Available (1B~10B)
	FA	Unavailable	Available (1B~10B)
	PFA-HG	Available ($\frac{1}{2}B, \frac{3}{4}B$)	Available (1B~10B)
	PFA-HG-HW	Available ($\frac{1}{2}B, \frac{3}{4}B$)	Unavailable
	SP	Available ($\frac{1}{2}B, \frac{3}{4}B$)	Unavailable
Nominal Pipe size	$\frac{1}{2}B$	○	-
	$\frac{3}{4}$	○	-
	1	○	○
	$1\frac{1}{2}$	○	○
	2	○	○
	$2\frac{1}{2}$	-	○
	3	-	○
	4	-	○
	5	-	-
	6	-	○
	8	-	○
	10	-	○
12	-	-	

90° ELBOW (One piece loose flange type)

Nominal Pipe size	A		d	D
	Steel pipe	SUS pipe	JIS 10K	JIS 10K
65A ($2\frac{1}{2}B$)	130	130	57	105
80 (3)	140	140	69	127
100 (4)	165	165	93	155
125 (5)	216	195	117	185
150 (6)	256	233	141	216

* Please contact us for sizes other than the above.

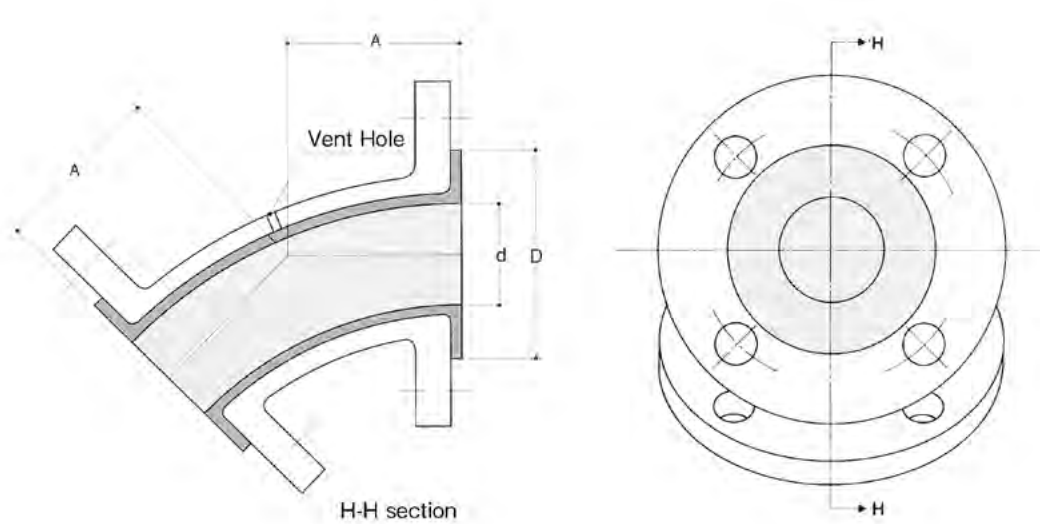
* For special 90° elbow products, JIS 10K is standard.

* One piece loose flange type is made by push extrusion method.

TOMBO™ No.9931-45EL
TOMBO™ No.9941-45EL



45° ELBOW



Unit: (mm)

Nominal Pipe size	A	d	D		Weight (kg)	
			JIS 10K	JPI 150LB	JIS 10K	JPI 150LB
15A (1/2B)	44.5	13	34	34	1.3	1.1
20 (3/4)	44.5	18	43	43	1.9	1.6
25 (1)	63.5	24	51	51	2.9	2.2
40 (1 1/2)	63.5	38	73	73	4.1	3.6
50 (2)	63.5	49	92	92	5.0	5.5
65 (2 1/2)	76.2	62	105	105	7.3	8.6
80 (3)	76.2	74	127	127	8.2	11.1
100 (4)	101.6	97	155	155	10.6	14.9
125 (5)	114.0	120	180	180	15.0	18.0
150 (6)	127.0	152	212	212	21.3	26.5
200 (8)	140.0	194	261	261	44.3	45.1
250 (10)	140.0	239	318	318	40.0	43.0

* The standard for the flange is JIS 10K and JPI 150LB.

* For sizes 100A or smaller, tube draw-in products are the standard. In this case, lap joint flanges can also be manufactured. Please contact us for further information.

* Vent hole: $\phi 3$ drilled hole for size 100A or smaller, and M5 tapped hole for 125A or larger.

* The mass of steel and stainless-steel materials is approximately the same value.

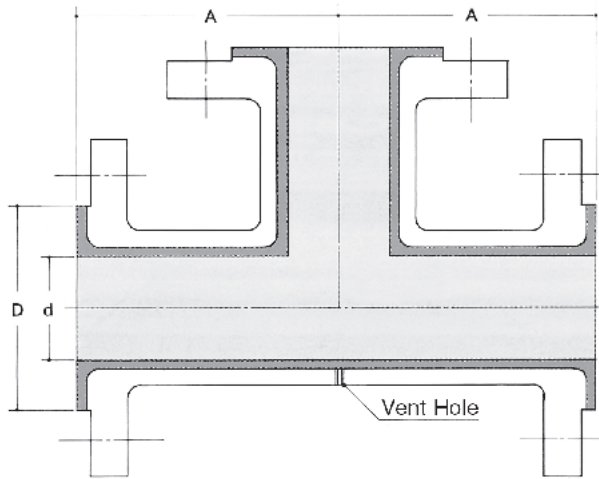
* For products of size 150A or smaller, 150°C, and vacuum resistant specifications, please contact us.

Standard	JIS 10K or JPI 150LB			
External piping material	Piping		Steel pipe	Castings
			JIS G3454 STPG370 Sch40	
			JIS G3452 SGP	
	Flange		JIS G3459 SUS304TPS Sch40	
			JIS G3101 SS400 (JIS 10K)	
			JIS G3202 SFVC2A (JPI 150LB)	
		JIS G3214 SUS F304	JIS B2051 FCD-S	
Lining material	PFA		Available (15A~125A, 250A)	Available (150A, 200A)
	FA		Available (25A~125A, 250A)	Available (150A, 200A)
	PFA-HG		Available	Available (150A, 200A)
	PFA-HG-HW		Available (15A~100A)	Unavailable
	SP		Available (15A~100A)	Unavailable
Nominal Pipe size	15A	1/2B	○	-
	20	3/4	○	-
	25	1	○	-
	40	1 1/2	○	-
	50	2	○	-
	65	2 1/2	○	-
	80	3	○	-
	100	4	○	-
	125	5	○	-
	150	6	-	○
	200	8	-	○
	250	10	○	-
	300	12	-	-

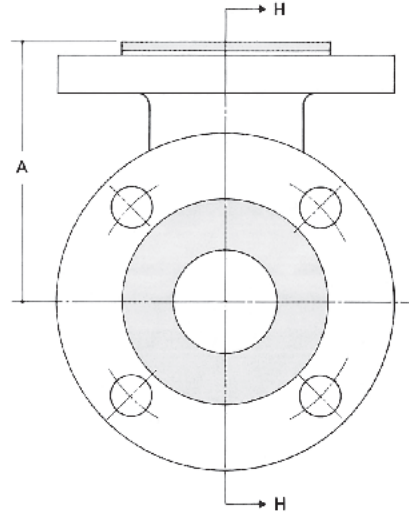
TOMBO™ No.9931-TE
TOMBO™ No.9941-TE



TEE



H-H section



Unit: (mm)

Nominal Pipe size	A	d		D		Weight (kg)	
		JIS 10K	JPI 150LB	JIS 10K	JPI 150LB	JIS 10K	JPI 150LB
15A (1/2B)	80	15	10	50	40	3.7	3.7
20 (3/4)	80	20	20	50	50	3.7	3.7
25 (1)	89	25	25	57	57	4.9	3.9
40 (1 1/2)	102	38	38	76	76	6.9	7.0
50 (2)	114	50	50	95	95	8.5	9.2
65 (2 1/2)	130	58	58	105	105	12.8	14.2
80 (3)	140	76	76	127	127	14.0	15.7
100 (4)	165	97	102	150	157	23.0	29.5
125 (5)	190	116	116	180	180	32.0	34.0
150 (6)	203	152	152	212	212	48.3	48.3
200 (8)	229	194	190	261	261	56.4	78.3
250 (10)	279	236	236	318	318	133.7	141.0
300 (12)	305	288	284	365	381	154.4	194.8

* Interfacial spacing dimensions conform to ANSI B16.5 150LB series.

* The standard for the flange is JIS 10K and JPI 150L.

* Lap joint flanges can also be manufactured. Please contact us for further information.

* The mass of steel and stainless-steel materials is approximately the same value.

* The figures in the above table are for cases where the exterior tube is a cast. For steel pipes, please refer to the dimensional table of R.TEE.

* For products of size 150A or smaller, 150°C, and vacuum resistant specifications, please contact us.

Standard	JIS 10K			
External piping material	Steel pipe		Castings JIS B2051 FCD-S	
	Piping	JIS G3454 STPG370 Sch40		
		JIS G3459 SUS304TP Sch40		
Flange	JIS G3101 SS400 (JIS 10K)			
	JIS G3214 SUS F304			
Lining material	PFA	Available	Available	
	FA	Available	Available	
	PFA-HG	Available	Available	
	SP	Unavailable	Unavailable	
Nominal Pipe size	15A	-	○	
	20	-	○	
	25	-	○	
	40	-	○	
	50	-	○	
	65	-	○	
	80	-	○	
	100	-	○	
	125	○	-	
	150	-	○	
	200	-	○	
	250	-	○	
300	-	○		

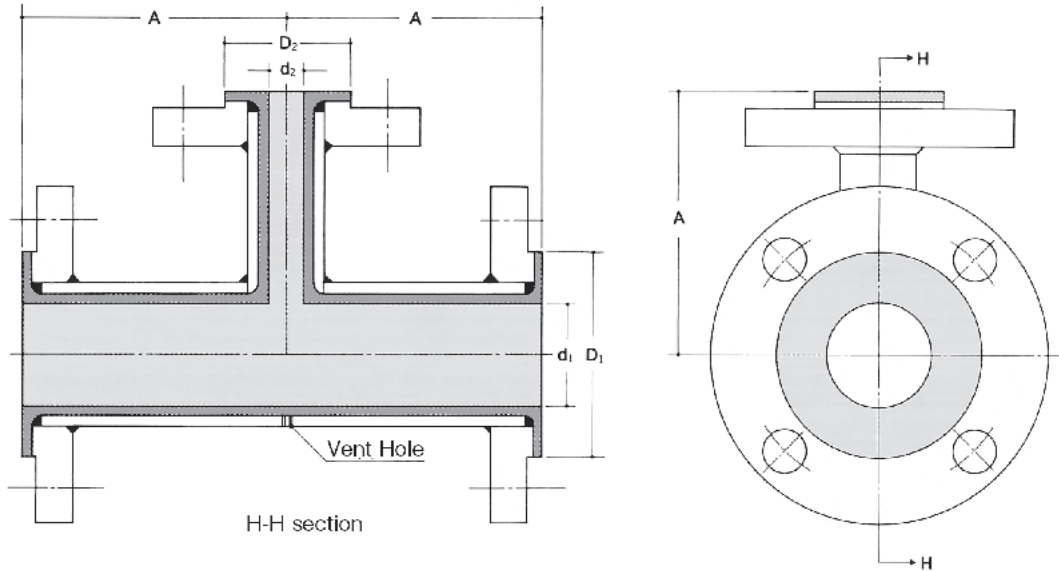
Standard	JPI 150LB			
External piping material	Steel pipe		Castings JIS B2051 FCD-S	
	Piping	JIS G3454 STPG370 Sch40		
		JIS G3459 SUS304TP Sch40		
Flange	JIS G3202 SFVC2A (JPI 150LB)			
	JIS G3214 SUS F304			
Lining material	PFA	Available	Available	
	FA	Available	Available	
	PFA-HG	Available	Available	
	SP	Unavailable	Unavailable	
Nominal Pipe size	1/2B	○	-	
	3/4	-	○	
	1	-	○	
	1 1/2	-	○	
	2	-	○	
	2 1/2	-	○	
	3	-	○	
	4	-	○	
	5	○	-	
	6	-	○	
	8	○	-	
	10	○	-	
12	○	-		

* Stainless steel tube type can be produced up to 150A.

TOMBO™ No.9931-RT
TOMBO™ No.9941-RT



REDUCING TEE



Unit: (mm)

Nominal Pipe size	A	d ₁ or d ₂	D ₁ or D ₂		Weight (kg)	
			JIS	JPI	JIS	JPI
15A (1/2)	-	10	40	40	-	-
20 (3/4)	80	20 [15]	50	50	2.7	2.2
25 (1)	89	25 [21]	57	57	3.7	3.2
40 (1 1/2)	102	33	76	76	5.5	5.1
50 (2)	114	44	95	95	7.1	7.9
65 (2 1/2)	130	56	105	105	10.4	12.0
80 (3)	140	70	127	127	12.4	16.5
100 (4)	165	93	150	150	16.5	23.8
125 (5)	190	116	180	180	30.0	32.0
150 (6)	203	138	212	212	31.9	37.0
200 (8)	229	189	261	261	52.4	60.0
250 (10)	279	236	318	318	74.3	86.4
300 (12)	305	278	365	381	95.0	107.1

- * Interfacial spacing dimensions conform to ANSI B16.5 150LB series.
- * The standard for the flange is JIS 10K and JPI 150L.
- * Interfacial spacing or Lap joint flanges can also be manufactured. Please contact us for further information.
- * 20A, 25A The dimensions in brackets [] are the diameter of the branch.
- * The 15A inner diameter of 20A × 15A is $\phi 20$.
- * The mass of steel and stainless-steel materials is approximately the same value.
- * For products of size 150A or smaller, 150°C, and vacuum resistant specifications, please contact us.

Standard	JIS 10K or JPI 150LB														
External piping material	Steel pipe										Castings				
	Piping	JIS G3454 STPG370 Sch40										JIS B2051 FCD-S			
		JIS G3459 SUS304TP Sch40 (Can be manufactured up to150A)													
	Flange	JIS G3101 SS400 (JIS 10K)													
		JIS G3202 SFVC2A (JPI 150LB)													
JIS G3214 SUS F304 (Can be manufactured up to150A)															
Lining material	PFA	Available													
	FA	Available													
	PFA-HG	Available													
	SP	Unavailable													
Branch pipe	A	15	20	25	40	50	65	80	100	125	150	200	250		
Main pipe	B	1/2	3/4	1	1 1/2	2	2 1/2	3	4	5	6	8	10		
Nominal Pipe size	20	3/4	○	-	-	-	-	-	-	-	-	-	-		
	25	1	○	○	-	-	-	-	-	-	-	-	-		
	40	1 1/2	○	○	○	-	-	-	-	-	-	-	-		
	50	2	○	○	○	○	-	-	-	-	-	-	-		
	65	2 1/2	○	○	○	○	○	-	-	-	-	-	-		
	80	3	○	○	○	○	○	○	-	-	-	-	-		
	100	4	-	○	○	○	○	○	○	-	-	-	-		
	125	5	-	-	○	○	○	-	○	○	-	-	-		
	150	6	-	-	○	○	○	○	○	○	○	-	-		
	200	8	-	-	-	○	○	○	○	○	○	○	-		
	250	10	-	-	-	-	○	-	○	○	○	○	○		
300	12	-	-	-	-	-	-	○	○	-	○	○			

○ Steel pipe products only

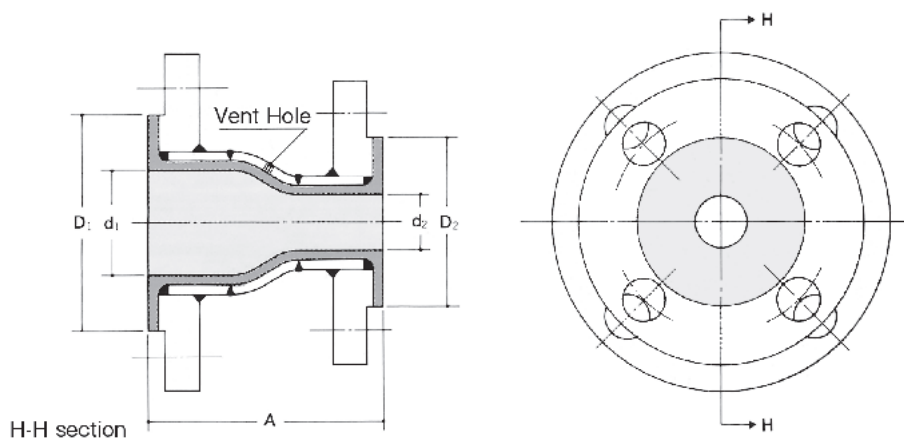
◎ Both steel pipe and castings can be manufactured (however, castings are standard)

The table symbols are that of JIS 10K.

TOMBO™ No.9931-CR
TOMBO™ No.9941-CR



CONCENTRIC REDUCER



Unit: (mm)

Nominal Pipe size	A	D ₁	d ₁	D ₂	d ₂	Nominal Pipe size	A	D ₁	d ₁	D ₂	d ₂
25A×15A (¾B×½B)	102	50	19	40	13	100×40 (4×1½)	178	150	95	76	35
25×15 (1×½)	102	57	25	40	13	100×50 (4×2)	178	150	95	95	45
25×20 (1×¾)	102	57	25	50	19	100×65 (4×2½)	178	150	95	105	57
40×20 (1½×¾)	114	76	33	50	19	100×80 (4×3)	178	150	95	127	71
40×25 (1½×1)	114	76	33	57	21	125×50 (5×2)	203	180	116	95	45
50×20 (2×¾)	127	95	45	50	19	125×80 (5×3)	203	180	116	127	71
50×25 (2×1)	127	95	45	57	21	125×100 (5×4)	203	180	116	150	92
50×40 (2×1½)	127	95	45	76	35	150×80 (6×3)	229	212	141	127	71
65×40 (2½×1½)	127	105	57	76	35	150×100 (6×4)	229	212	141	150	92
65×50 (2½×2)	127	105	57	95	46	150×125 (6×5)	200	212	141	180	116
80×20 (3×¾)	152	127	71	50	19	200×100 (8×4)	279	261	190	150	92
80×25 (3×1)	152	127	71	57	21	200×150 (8×6)	279	261	190	212	141
80×40 (3×1½)	152	127	71	76	35	250×150 (10×6)	305	324	239	212	141
80×50 (3×2)	152	127	71	95	46	250×200 (10×8)	305	324	239	261	190
80×65 (3×2½)	152	127	71	105	57						

* Interfacial spacing dimensions conform to ANSI B16.5 150LB series.

* The standard for the flange is JIS 10K and JPI 150L.

* Please consult about combination other than the standard.

* Lap joint flanges can also be manufactured.

* [] within the dimensions are the case of JPI 150LB.

* Stainless steel pipe can be manufactured up to 150A.

Standard	JIS 10K or JPI 150LB												
External piping material	Steel pipe									Castings			
	Piping	JIS G3454 STPG370 Sch40											
		JIS G3452 SGP (Reducer part)											
		JIS G3459 SUS304TP Sch40											
		JIS G4304 SUS304W Sch20 (Reducer part)											
	Flange	JIS G3101 SS400 (JIS 10K)											
JIS G3202 SFVC2A (JPI 150LB)													
JIS G3214 SUS F304													
JIS B2051 FCD-S													
Lining material	PFA	Available											
	FA	Available											
	PFA-HG	Available											
	SP	Unavailable											
Small caliber	A	15	20	25	40	50	65	80	100	125	150	200	
Large caliber	B	1/2	3/4	1	1 1/2	2	2 1/2	3	4	5	6	8	
Nominal Pipe size	20	3/4	○	-	-	-	-	-	-	-	-	-	
	25	1	○	○	-	-	-	-	-	-	-	-	
	40	1 1/2	only SUS	○	○	-	-	-	-	-	-	-	
	50	2	-	○	○	○	-	-	-	-	-	-	
	65	2 1/2	-	○	○	○	○	-	-	-	-	-	
	80	3	-	△	△	○	○	○	-	-	-	-	
	100	4	-	-	-	○	○	○	○	-	-	-	
	125	5	-	-	-	-	○	-	○	○	-	-	
	150	6	-	-	-	-	-	-	○	○	○	-	
	200	8	-	-	-	-	-	-	-	○	-	○	
	250	10	-	-	-	-	-	-	-	-	-	○	

○ Steel pipe products

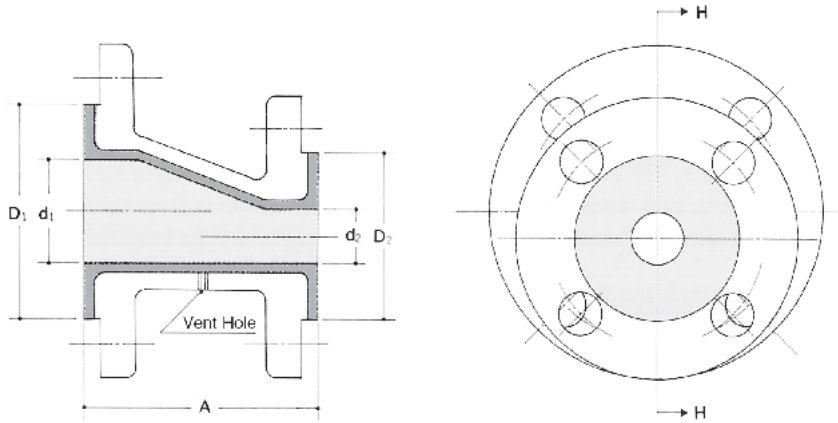
◎ Both steel pipe and castings can be manufactured (however, castings are standard)

△ Casting, stainless steel

TOMBO™ No.9931-ER
TOMBO™ No.9941-ER



ECCENTRIC REDUCER



Unit: (mm)

Nominal Pipe size	A	D ₁	d ₁ ^{Note 2}	D ₂ ^{Note 2}	d ₂ ^{Note 2}
20A × 15A (¾B × ½B)	102	50	15	40	10
25A × 15A (1B × ½B)	102	57	21	50	15
25A × 20A (1B × ¾B)	102	57	21	50	15
40 × 20 (1½ × ¾)	114	76	34	50	21
40 × 25 (1½ × 1)	114	76	34	57	21
50 × 20 (2 × ¾) ^{Note 1}	127	95	51 [45]	57 [50]	25 [21]
50 × 25 (2 × 1) ^{Note 1}	127	95	51 [45]	57	25 [21]
50 × 40 (2 × 1½) ^{Note 1}	127	95	51 [45]	76	37 [34]
80 × 40 (3 × 1½) ^{Note 1}	152	127	76 [70]	76	37 [30]
80 × 50 (3 × 2) ^{Note 1}	152	127	76 [69]	95	50 [45]
100 × 50 (4 × 2)	178	150	94	95	45
100 × 80 (4 × 3) ^{Note 1}	178	150	97 [94]	127	76 [68]
150 × 80 (6 × 3) ^{Note 1}	229	212	155 [140]	127	75 [64]
150 × 100 (6 × 4)	229	212	140	150	90
200 × 150 (8 × 6)	279	261	203	212	152

Note 1: It is possible to manufacture both castings and steel pipes.

Note 2: [] of d₁, D₂, d₂ is the dimension of steel tube type.

* Interfacial spacing dimensions conform to ANSI B16.5 150LB series.

* The standard for the flange is JIS 10K and JPI 150LB.

* Stainless steel pipe can be manufactured up to 150A.

Standard	JIS 10K or JPI 150LB											
External piping material	Steel pipe							Castings				
	Piping	JIS G3454 STPG370 Sch40										
		JIS G3452 SGP (Reducer part)										
		JIS G3459 SUS304TP Sch40										
		JIS G4304 SUS304W Sch20										
	Flange	JIS G3101 SS400 (JIS 10K)										
		JIS G3202 SFVC2A (JPI 150LB)										
JIS G3214 SUS F304												
Lining material	PFA	Available										
	FA	Available										
	PFA-HG	Available										
	SP	Unavailable										
Small caliber	A	15	20	25	40	50	65	80	100	125	150	
Large caliber	B	1/2	3/4	1	1 1/2	2	2 1/2	3	4	5	6	
Nominal Pipe size	20	3/4	○	-	-	-	-	-	-	-	-	
	25	1	○	○	-	-	-	-	-	-	-	
	40	1 1/2	-	○	○	-	-	-	-	-	-	
	50	2	-	◎	◎	◎	-	-	-	-	-	
	80	3	-	-	-	◎	◎	-	-	-	-	
	100	4	-	-	-	-	○	-	◎	-	-	
	150	6	-	-	-	-	-	-	◎	○	-	
	200	8	-	-	-	-	-	-	-	-	-	△

○ Steel pipe products

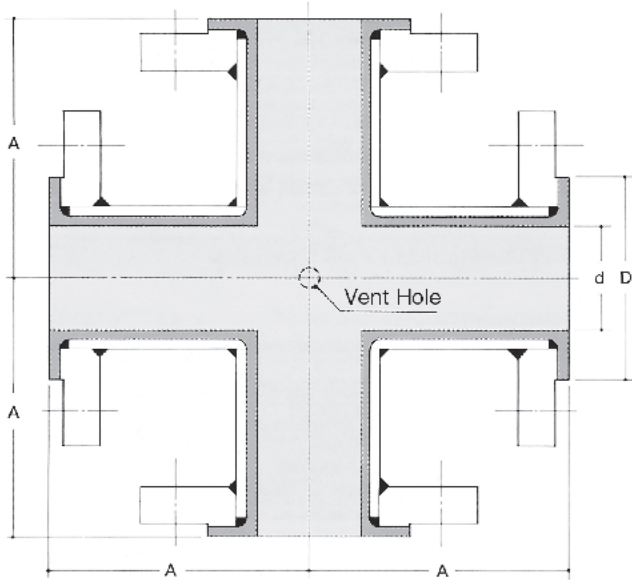
◎ Both steel pipe and castings can be manufactured (however, castings are standard)

△ Casting only

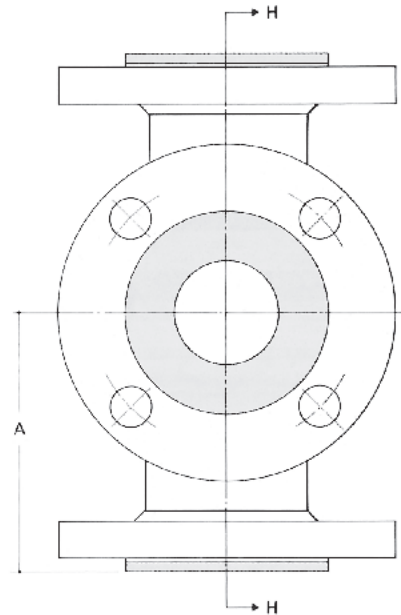
TOMBO™ No.9931-X
TOMBO™ No.9941-X



CROSS



H-H section



Unit: (mm)

Nominal Pipe size	A	d	D		Weight (kg)	
			JIS 10K	JPI 150LB	JIS 10K	JPI 150LB
15A (1/2B)	80	10	40	40	2.7	2.3
20 (3/4)	80	15	50	50	3.6	3.0
25 (1)	89	25	57	57	5.7	4.5
40 (1 1/2)	102	33	76	76	8.0	6.8
50 (2)	114	44	95	95	10.0	10.8
65 (2 1/2)	130	56	105	105	15.1	17.5
80 (3)	140	70	127	127	16.5	23.0
100 (4)	165	93	150	150	23.2	32.0
150 (6)	203	138	212	212	47.0	52.6

* Interfacial spacing dimensions conform to ANSI B16.5 150LB series.

* The standard for the flange is JIS 10K and JPI 150LB.

* Lap joint flanges can also be manufactured.

* The mass of steel and stainless-steel materials is approximately the same value.

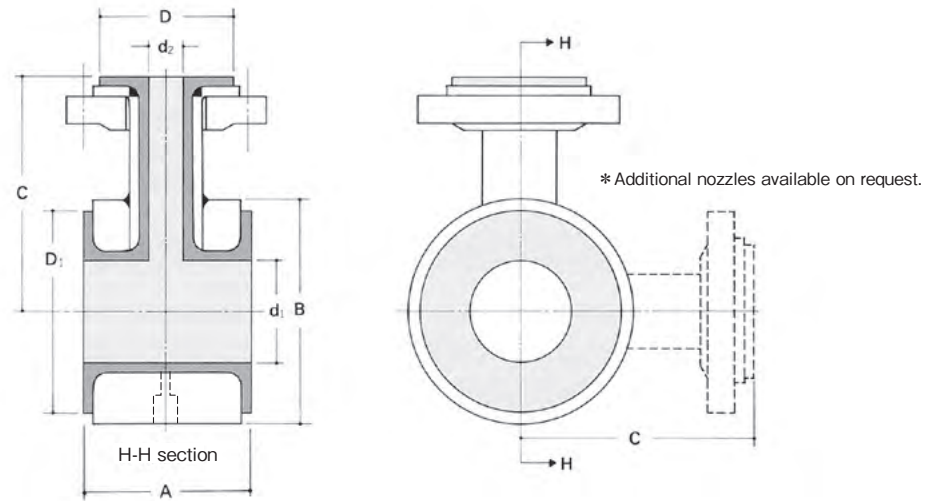
* For products of size 150A or smaller, 150°C, and vacuum resistant specifications, please contact us.

Standard	JIS 10K or JPI 150LB		
External piping material	Steel pipe		
	Piping	JIS G3454 STPG370 Sch40	
		JIS G3459 SUS304TP Sch40	
		JIS G3459 SUS304TP Sch10	
	Flange	JIS G3101 SS400 (JIS 10K)	
		JIS G3202 SFVC-2A (JPI 150LB)	
JIS G3214 SUS F304			
Lining material	PFA		Available
	FA		Available
	PFA-HG		Available
	SP		Unavailable
Nominal Pipe size	15A	1/2B	○
	20	3/4	○
	25	1	○
	40	1 1/2	○
	50	2	○
	65	2 1/2	○
	80	3	○
	100	4	○
	150	6	○

TOMBO™ No.9931-IC
TOMBO™ No.9941-IC



INSTRUMENTATION CONNECTION



Unit: (mm)

Nominal Pipe size	A	B		C		D ₁		d ₁		Nozzle Size	
		JIS	JPI	JIS	JPI	JIS	JPI	JIS	JPI	JIS	JPI
25A (1B)	75	74	66	142.0	141.5	57	57	25	25	15A~25A	1/2B~1B
40 (1 1/2)	75	89	86	148.5	148.5	76	76	38	38	15~25	1/2~1
50 (2)	75	104	104	155.0	155.0	95	95	51	51	15~40	1/2~1 1/2
65 (2 1/2)	75	122	122	158.5	158.5	105	105	58	58	15~50	1/2~2
80 (3)	100	134	137	167.5	167.5	127	127	76	76	15~25	1/2~2
100 (4)	100	159	175	178.0	178.0	150	157	97	97	15~40	1/2~1 1/2
150 (6)	100	220	220	204.5	206.0	212	212	150	150	15~50	1/2~2
200 (8)	150	270	279	226.5	231.0	261	270	194	203	15~40	1/2~2
250 (10)	150	333	340	250.0	250.0	322	324	241	239	15~50	1/2~2
300 (12)	150	378	410	273.5	276.0	365	381	288	288	15~40	1/2~2

Nozzle Size

Nominal Nozzle size	d ₂	D ₂	
		JIS	JPI
15A (1/2B)	10	49	40
20 (3/4)	15	52	47
25 (1)	20	57	57
40 (1 1/2)	35	76	76
50 (2)	45	95	95

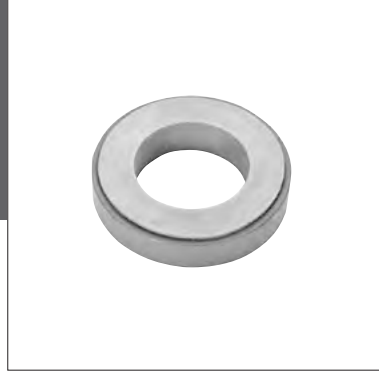
* The standard for the flange is JIS 10K and JPI 150LB.

Standard	JIS 10K or JPI 150LB						
External piping material	Steel pipe						
	Substance	JIS G3101 SS400					
		JIS G3459 SUS304TP Sch40					
	Piping	JIS G3454 STPG370 Sch40					
		JIS G3459 SUS304TP Sch40					
	Flange	JIS G3101 SS400 (JIS 10K)					
		JIS G3202 SFVC2A (JPI 150LB)					
JIS G3214 SUS F304							
Lining material	PFA	Available					
	FA	Available					
	PFA-HG	Available					
	SP	Unavailable					
Small caliber	A	15	20	25	40	50	
Large caliber	B	1/2	3/4	1	1 1/2	2	
Nominal Pipe size	25	1	○	○	○	-	-
	40	1 1/2	○	○	○	-	-
	50	2	○	○	○	○	-
	65	2 1/2	○	○	○	○	○
	80	3	○	○	○	○ Note 1	○ Note 1
	100	4	○	○	○	○	-
	150	6	○	○	○	○	○
	200	8	○	○	○	○	○ Note 1
	250	10	○	○	○	○	○
	300	12	○	○	○	○	○ Note 1

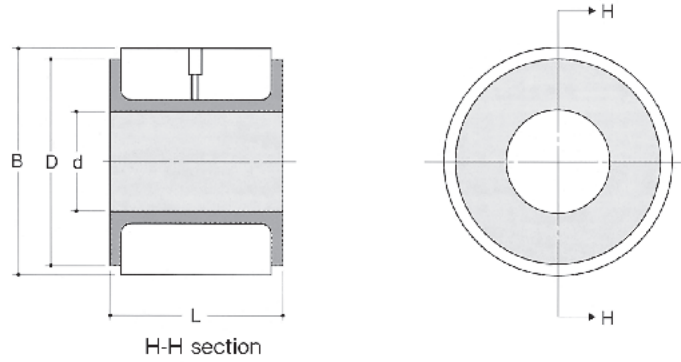
Note 1: Only for JPI

* Stainless steel pipe can be manufactured up to 150A.

TOMBO™ No.9931-SPA
TOMBO™ No.9941-SPA



SPACER



Unit: (mm)

Nominal Pipe size	B		D		d	L Standard Length
	JIS 10K	JPI 150LB	JIS 10K	JPI 150LB		
15A (1/2B)	55	47	40	40	15	10
20 (3/4)	62	57	43	43	20	
25 (1)	74	67	57	57	25	20
40 (1 1/2)	89	86	76	76	38	30
50 (2)	104	105	95	95	51	
65 (2 1/2)	124	124	105	105	64	40
80 (3)	134	137	127	127	76	
100 (4)	159	175	150	157	97	50
125 (5)	190	-	180	-	122	
150 (6)	220	220	212	212	152	20, 30, 40, 50
200 (8)	270	279	261	270	196	
250 (10)	333	340	322	324	245	
300 (12)	378	410	365	381	292	

* For L dimensions, please also consult other faces other than the standard size from 10 to 50mm.

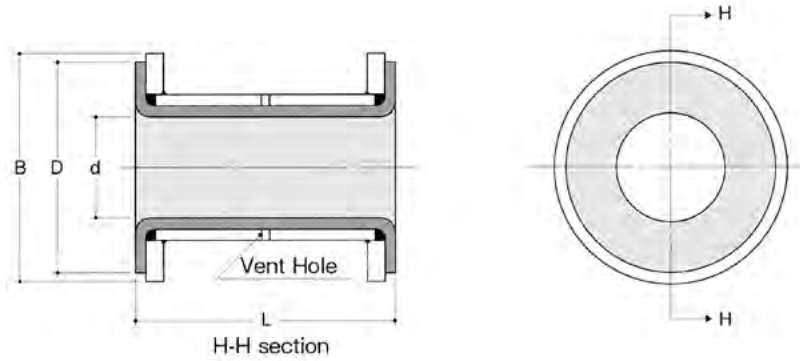
* 20L or more comes with a vent hole.

Standard			JIS 10K	JPI 150LB
External piping material			JIS G3101 SS400	
			JIS G4303 SUS304	
Lining material	PFA		Available	
	FA		Available	
	PFA-HG		Available	
	SP		Unavailable	
Nominal Pipe size	15A	1/2B	○	○
	20	3/4	○	○
	25	1	○	○
	40	1 1/2	○	○
	50	2	○	○
	65	2 1/2	○	○
	80	3	○	○
	100	4	○	○
	125	5	○	-
	150	6	○	○
	200	8	○	○
	250	10	○	○
	300	12	○	○

TOMBO™ No.9930-DIS
TOMBO™ No.9940-DIS



DISTANCE PIECE



Unit: (mm)

Nominal Pipe size	B		D		d	L Standard Length
	JIS 10K	JPI 150LB	JIS 10K	JPI 150LB		
15A (1/2B)	55	47	34	34	13	60
20 (3/4)	62	57	43	43	18	60
25 (1)	74	67	51	51	24	60, 70
40 (1 1/2)	89	86	73	73	38	60, 70
50 (2)	104	105	92	92	49	60, 70, 80
65 (2 1/2)	124	124	105	105	62	60, 70, 80
80 (3)	134	137	127	127	74	60, 70, 80, 90
100 (4)	159	175	155	155	97	60, 70, 80, 90
125 (5)	190	-	185	-	120	60, 70, 80, 90, 100
150 (6)	220	222	216	216	145	60, 70, 80, 90, 100
200 (8)	270	279	266	266	194	60, 70, 80, 90, 100

* For anything other than the standard length, please contact us.

* PFA only for 20A or smaller. Both FA and PFA are available for others.

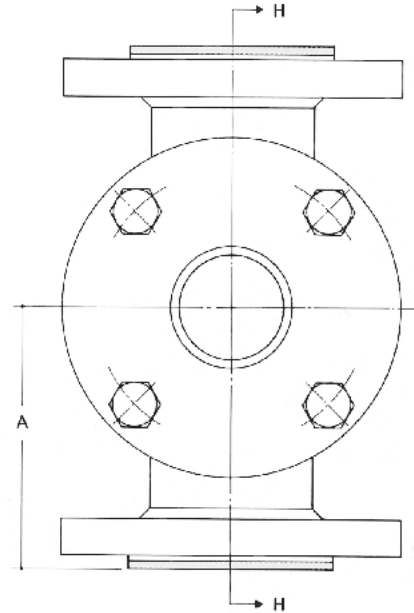
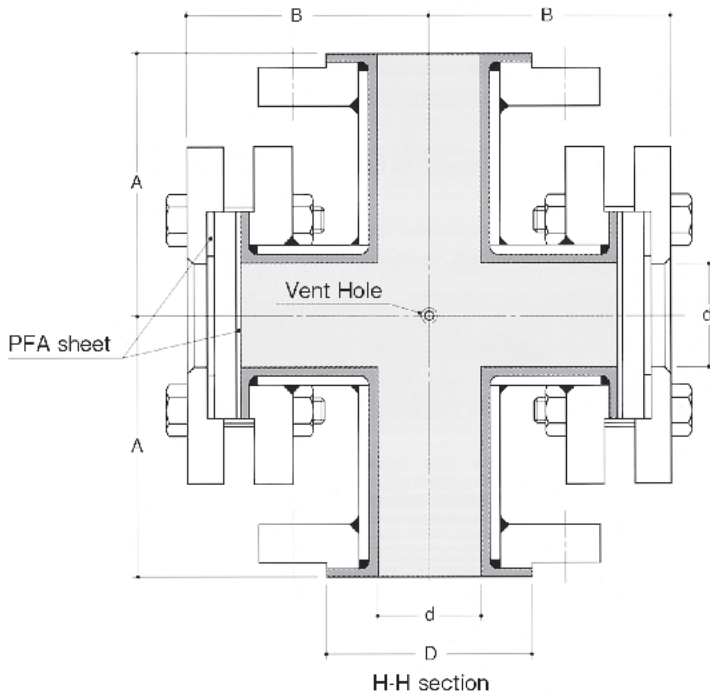
Standard	JIS 10K or JPI 150LB		
External piping material	Steel pipe		
	Piping	JIS G3454 STPG370E Sch40	
		JIS G3459 SUS304TPS Sch40	
	Stub end	JIS G3101 SS400	
		JIS G3214 SUS F304	
Lining material	PFA		Available
	FA		Available
	PFA-HG		Available
	SP		Available
Nominal Pipe size	15A	1/2B	○
	20	3/4	○
	25	1	○
	40	1 1/2	○
	50	2	○
	65	2 1/2	○
	80	3	○
	100	4	○
	125	5	○
	150	6	○
	200	8	○

Note 1: For PFA-HG, please consult us for thick-wall products with increased thickness of lining material for vacuum and gas permeation countermeasures. (PFA - HG is from 20A to 200A.)

TOMBO™ No.9931-SG
TOMBO™ No.9941-SG



SIGHT FLOW INDICATOR



Unit: (mm)

Nominal Pipe size	A	B	d	D	Weight (kg)	
					JIS 10K	JPI 150LB
15A (1/2B)	80	73	10	40	4.0	3.3
20 (3/4)	80	75	15	50	5.1	4.2
25 (1)	89	80	25	57	8.0	4.6
40 (1 1/2)	102	89	34	76	11.1	9.4
50 (2)	114	94	44	95	13.8	15.0
65 (2 1/2)	130	108	58	115	20.3	23.9
80 (3)	140	115	70	127	21.7	30.8
100 (4)	165	130	93	150	29.5	42.6
150 (6)	203	173	138	212	59.7	68.0

* The standard for the flange is JIS 10K and JPI 150LB.

* Bolt nut material: JIS G3101 SS400

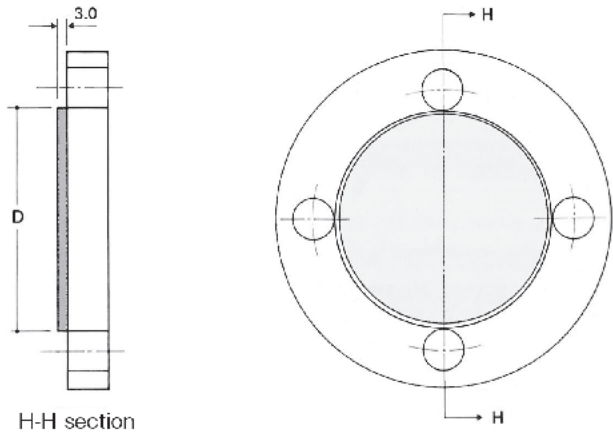
* The mass of steel and stainless-steel materials is approximately the same value.

* Do not disassemble or assemble the product as it may cause damage to the glass.

Standard	JIS 10K or JPI 150LB		
External piping material	Steel pipe		
	Piping	JIS G3454 STPG370 Sch40	
		JIS G3459 SUS304TP Sch40	
		JIS G3459 SUS304TP Sch10	
	Flange	JIS G3101 SS400 (JIS 10K)	
		JIS G3202 SFVC2A (JPI 150LB)	
JIS G3214 SUS F304			
Lining material	PFA		Available
	FA		Available
	PFA-HG		Available
	SP		Unavailable
Nominal Pipe size	15A	1/2B	○
	20	3/4	○
	25	1	○
	40	1 1/2	○
	50	2	○
	65	2 1/2	○
	80	3	○
	100	4	○
	125	5	-
	150	6	○
	200	8	-



BLIND FLANGE



Unit: (mm)

Nominal Pipe size	D		Weight (kg)	
	JIS 10K	JPI 150LB	JIS 10K	JPI 150LB
15A (1/2B)	55	35	0.8	0.6
20 (3/4)	60	43	0.9	1.0
25 (1)	71	51	1.4	1.1
40 (1 1/2)	86	73	2.1	2.1
50 (2)	101	92	2.5	2.6
65 (2 1/2)	121	105	3.5	3.5
80 (3)	131	127	3.8	4.4
100 (4)	156	157	5.0	8.2
125 (5)	187	186	7.3	9.3
150 (6)	217	216	10.8	12.5
200 (8)	267	270	14.8	21.1
250 (10)	330	324	23.6	32.8
300 (12)	375	381	28.8	50.9

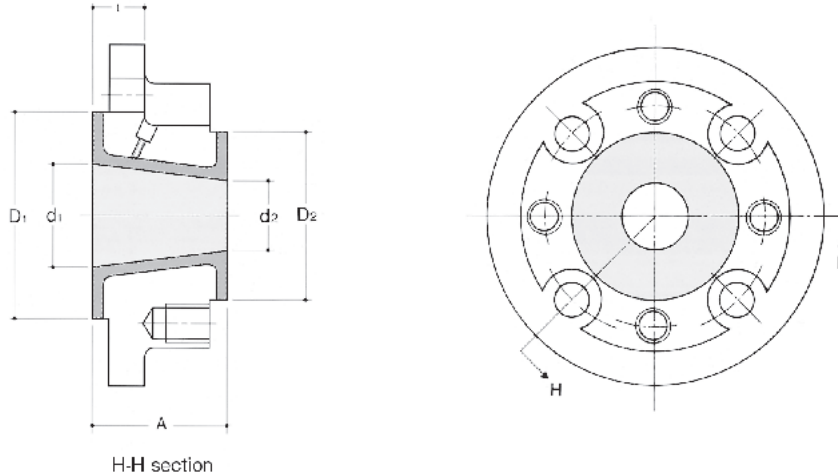
* The mass shows almost the same value for iron and stainless steel material.

Standard	JIS 10K or JPI 150LB		
External piping material	Flange		JIS G3101 SS400 (JIS 10K)
			JIS G3202 SFVC2A (JPI 150LB)
			JIS G3214 SUS F304
Lining material	PFA		Available
	FA		Unavailable
	PFA-HG		Available
	SP		Unavailable
Nominal Pipe size	15A	1/2B	○
	20	3/4	○
	25	1	○
	40	1 1/2	○
	50	2	○
	65	2 1/2	○
	80	3	○
	100	4	○
	125	5	○
	150	6	○
	200	8	○
	250	10	○
300	12	○	

TOMBO™ No.9931-RF
TOMBO™ No.9941-RF



REDUCING FLANGE



	Nominal Pipe size	d ₁ and d ₂	D ₁ and D ₂	Bolt holes (piece)	Bolt center diameter	Bolt holes diameter	Tap	
							Nominal	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
	65	58	105	4	140	19	M16	20
	80	76	127	8	150	19	M16	20
	100	97	150	8	175	19	M16	20
	125	125	180	8	210	23	M20	28
	150	152	212	8	240	23	M20	28
	200	194	261	12	290	23	M20	28
	250	241	318	12	355	25	M22	25
	300	288	365	16	400	25	M22	25

	Nominal Pipe size	d ₁ and d ₂	D ₁ and D ₂	Bolt holes (piece)	Bolt center diameter	Bolt holes diameter	Tap	
							Nominal	Depth
JPI 150LB	1/2B	10	40	4	60.3	16	U 1/2	16
	3/4	15	47	4	69.9	16	U 1/2	16
	1	25	57	4	79.4	16	U 1/2	16
	1 1/2	38	76	4	98.4	16	U 1/2	16
	2	51	95	4	120.6	20	U 5/8	20
	2 1/2	58	105	4	139.7	20	U 5/8	20
	3	76	127	4	152.4	20	U 5/8	20
	4	97	157	8	190.5	20	U 5/8	20
	5	125	180	8	215.9	23	U 3/4	28
	6	152	212	8	241.3	23	U 3/4	28
	8	194	270	8	298.4	23	U 3/4	28
	10	241	324	12	361.9	26	U 7/8	33
	12	288	381	12	431.8	26	U 7/8	-

JIS 10K				JPI 150LB			
Designation	A	t	Weight (kg)	Designation	A	t	Weight (kg)
20A — 15 ^{Note 1}	51	19	2.0	$\frac{3}{4}$ B — $\frac{1}{2}$ B ^{Note 1}	51	18	1.8
25 — 15 ^{Note 1}	51	19	2.4	1 — $\frac{1}{2}$ ^{Note 1}	51	20	2.1
25 — 20 ^{Note 1}	51	19	2.7	1 — $\frac{3}{4}$ ^{Note 1}	51	20	2.4
40 — 15 ^{Note 1}	51	21	3.0	$1\frac{1}{2}$ — $\frac{1}{2}$ ^{Note 1}	51	23	2.7
40 — 20 ^{Note 1}	51	21	3.0	$1\frac{1}{2}$ — $\frac{3}{4}$ ^{Note 1}	51	23	2.7
40 — 25 ^{Note 1}	51	21	2.9	$1\frac{1}{2}$ — 1 ^{Note 1}	51	23	2.6
50 — 15 ^{Note 1}	51	21	3.2	2 — $\frac{1}{2}$ ^{Note 1}	51	25	3.4
50 — 20 ^{Note 1}	51	21	3.2	2 — $\frac{3}{4}$ ^{Note 1}	51	25	3.4
50 — 25 ^{Note 1}	51	21	3.2	2 — 1 ^{Note 1}	51	25	3.4
50 — 40 ^{Note 1}	51	21	3.0	2 — $1\frac{1}{2}$ ^{Note 1}	51	25	3.2
65 — 20	51	23	4.8	$2\frac{1}{2}$ — $\frac{3}{4}$	51	28	5.1
65 — 25 ^{Note 1}	51	23	4.9	$2\frac{1}{2}$ — 1	51	28	5.3
65 — 40 ^{Note 1}	51	23	5.0	$2\frac{1}{2}$ — $1\frac{1}{2}$ ^{Note 1}	51	28	5.5
65 — 50 ^{Note 1}	51	23	5.3	$2\frac{1}{2}$ — 2 ^{Note 1}	51	28	5.8
80 — 20	52	23	4.6	3 — $\frac{3}{4}$	52	29	5.9
80 — 25	52	23	4.6	3 — 1	52	29	5.9
80 — 40	52	23	4.3	3 — $1\frac{1}{2}$ ^{Note 1}	52	29	5.6
80 — 50	52	23	4.2	3 — 2 ^{Note 1}	52	29	5.4
80 — 65	52	23	5.2	3 — $2\frac{1}{2}$	52	29	5.4
100 — 25	55	23	5.0	4 — 1	55	29	7.2
100 — 40	55	23	4.6	4 — $1\frac{1}{2}$	55	29	6.8
100 — 50	55	23	4.3	4 — 2	55	29	6.5
100 — 65	55	23	4.1	4 — $2\frac{1}{2}$	55	29	6.3
100 — 80 ^{Note 1}	55	23	4.1	4 — 3	55	29	6.3
125 — 50	55	25	8.0	5 — 2	55	29	9.4
125 — 80 ^{Note 1}	55	25	8.5	5 — 3	55	29	9.5
125 — 100 ^{Note 1}	55	25	8.2	5 — 4	55	29	9.5
150 — 25	60	27	11.9	6 — 1	60	31	13.3
150 — 40	60	27	11.2	6 — $1\frac{1}{2}$	60	31	12.6
150 — 50	60	27	10.5	6 — 2	60	31	11.9
150 — 65	60	27	12.9	6 — $2\frac{1}{2}$	60	31	13.5
150 — 80	60	27	10.1	6 — 3	60	31	11.5
150 — 100 ^{Note 1}	60	27	9.6	6 — 4 ^{Note 1}	60	31	11.0
150 — 125 ^{Note 1}	60	27	10.5	6 — 5 ^{Note 1}	60	31	11.9
200 — 50	60	27	15.9	8 — 2	60	34	20.3
200 — 80	60	27	15.4	8 — 3	60	34	20.0
200 — 100	60	27	15.2	8 — 4	60	34	19.6
200 — 150	60	27	13.9	8 — 6 ^{Note 1}	60	34	17.3
250 — 80	60	29	24.9	10 — 3	60	36	29.7
250 — 100	60	29	24.0	10 — 4	60	36	28.8
250 — 150	60	29	22.2	10 — 6	60	36	27.0
250 — 200 ^{Note 1}	60	29	20.4	10 — 8	60	36	25.2
300 — 80	62	29	29.6	12 — 3	62	37	43.2
300 — 100	62	29	27.8	12 — 4	62	37	41.4
300 — 150	62	29	25.6	12 — 6	62	37	39.2
300 — 200	62	29	24.2	12 — 8	62	37	37.8
300 — 250	62	—	—	12 — 10 ^{Note 1}	62	37	35.6

Note 1: Since the positions of tapped holes and drilled holes do not align, provide a loose flange on one side of the straight pipes to be connected (see page 29). For others, tapped holes and drilled holes will align.

* The standard for the flange is JIS 10K and JPI 150LB.

* D_1 and D_2 for JIS 10K \times 20A \times 15A are the same as for 150LB $\frac{3}{4}$ B \times $\frac{1}{2}$ B.

* Tapped holes are provided on both sides of the flanges of JIS 10K 300-250. For the shape, please contact us.

* Since the smaller diameter side of the reducing flange is provided with tapped holes, it is impossible to connect to a spacer or distance piece.

* The mass of steel and stainless-steel materials is approximately the same value.

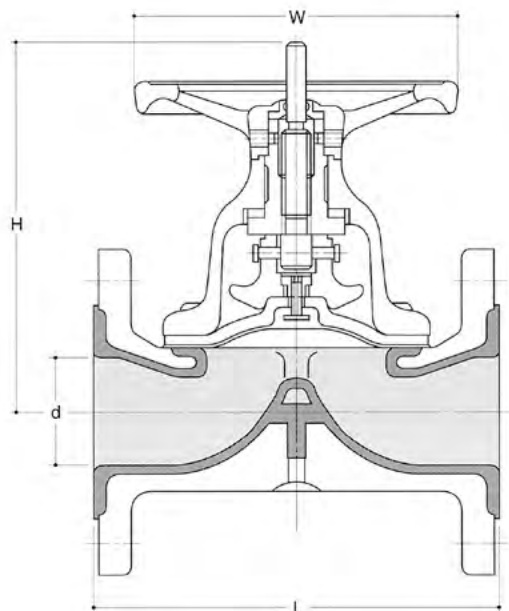
Standard	JIS 10K or JPI 150LB													
External piping material	Flange	JIS G3101 SS400												
		JIS G4303 SUS F304												
Lining material	PFA	Available												
	FA	Available												
	PFA-HG	Available												
	SP	Unavailable												
Small caliber	A	15	20	25	40	50	65	80	100	125	150	200	250	
Large caliber	B	1/2	3/4	1	1 1/2	2	2 1/2	3	4	5	6	8	10	
Nominal Pipe size	20	3/4	○	-	-	-	-	-	-	-	-	-	-	
	25	1	○	○	-	-	-	-	-	-	-	-	-	
	40	1 1/2	○	○	○	-	-	-	-	-	-	-	-	
	50	2	○	○	○	○	-	-	-	-	-	-	-	
	65	2 1/2	-	△	○	○	○	-	-	-	-	-	-	
	80	3	-	△	△	●	●	●	-	-	-	-	-	
	100	4	-	-	△	△	△	△	○	-	-	-	-	
	125	5	-	-	-	-	△	-	○	○	-	-	-	
	150	6	-	-	△	△	△	△	△	○	○	-	-	
	200	8	-	-	-	-	△	-	△	△	-	●	-	
	250	10	-	-	-	-	-	-	△	△	-	△	○	
	300	12	-	-	-	-	-	-	△	△	-	△	△	●

- Only in case of JIS 10K, the connection flange is loose.
- For JPI 150LB only, the connection flange is loose.
- ◎ For both JIS 10K and JPI 150LB, the connection flange is loose.
- △ The bolt hole position is not swinging.

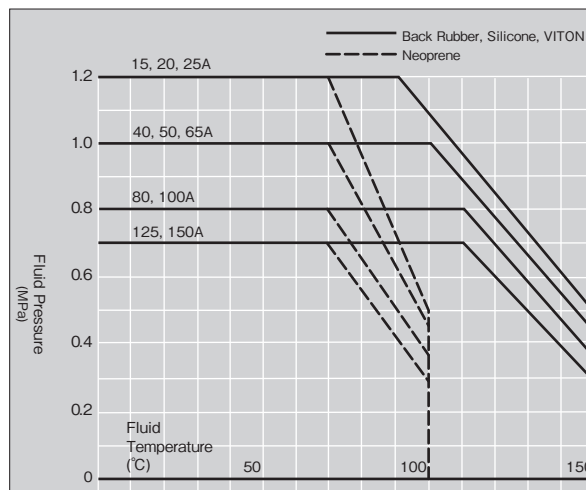
TOMBO™ No.9943-DV
TOMBO™ No.9963-DV



DIAPHRAGM VALVE ETFE·PFA



Diaphragm Valve, Temperature-Pressure Rating



Standard Specification

Available Size	15A ~ 150A
Body Material	Cast Ductile Iron, JIS B2051 FCD-S
Lining Material	ETFE or PFA
Diaphragm Material	PTFE

Backer Material	Neoprene, Silicone, VITON
Flange Rating	JIS 10K, JPI 150LB

150LB 10K Standard Size

(ISO Dimension)

Nominal size	φ d	L	H	φ W	Lift	Max.Service Pressure MPa	Max.CV value	Lining Material	
								ETFE	PFA
15A (1/2B)	15	114	90	65	6	1.2	3.6	●	●
20 (3/4)	20	123	101	65	10	1.2	5.6	●	●
25 (1)	25	133	108	80	12	1.2	12.0	●	●
40 (1 1/2)	40	165	152	120	20	1.0	36.0	●	●
50 (2)	50	196	176	140	28	1.0	58.0	●	●
65 (2 1/2)	65	222	222	165	30	1.0	80.0	●	●
80 (3)	80	260	240	180	35	0.8	129.0	●	●
100 (4)	100	311	297	220	45	0.8	230.0	●	●

(Special F-F Dimension)

Nominal size	φ d	L	H	φ W	Lift	Max.Service Pressure MPa	Lining Material	
							ETFE	PFA
15A (1/2B)	15	125	90	65	6	1.2	●	●
20 (3/4)	20	135	101	65	10	1.2	●	●
25 (1)	25	145	108	80	12	1.2	●	●
40 (1 1/2)	40	180	152	120	20	1.0	●	●
50 (2)	50	210	176	140	28	1.0	●	●
65 (2 1/2)	65	250	210	165	30	1.0	●	●
80 (3)	80	300	242	180	35	0.8	●	-
100 (4)	100	350	292	220	45	0.8	●	-

* Negative pressure can not be used.

* There are two types of mirror profiles in the ISO Interfacial spacing and the special interfacial spacing.

* CV values between special interfacial spacing are almost the same as those between ISO interfacial spacing.

* This product is made by Emerson Bubble and Control Japan.

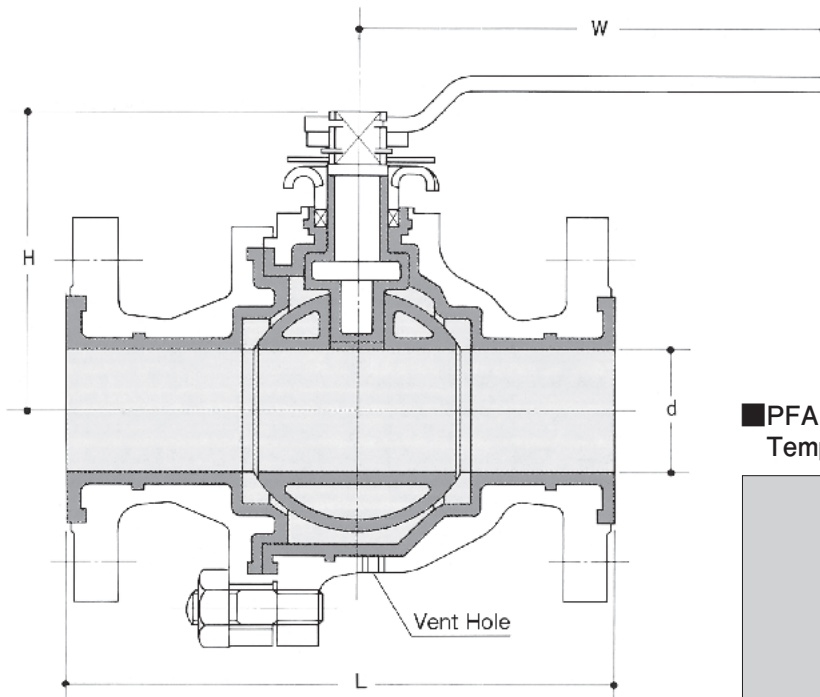
* CV value unit: US gallons/min.

* TOMBO No.9943-DV (PFA) is not a special interfacial spacing product.

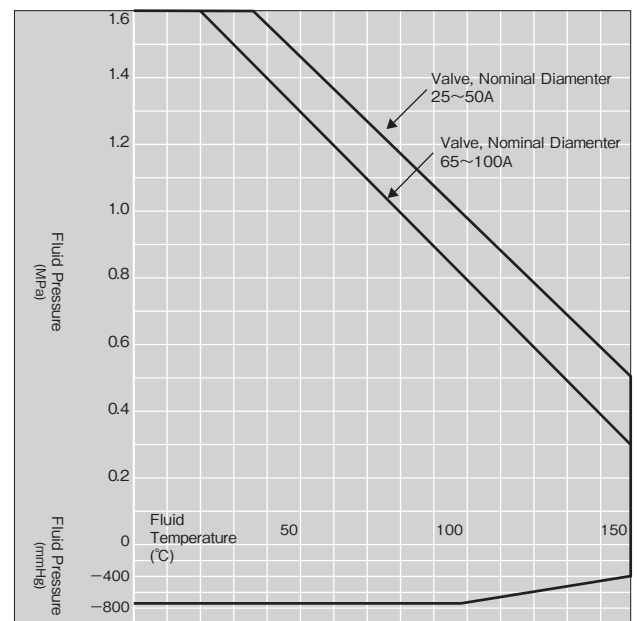
TOMBO™ No.9943-BV



BALL VALVE PFA



■ PFA Lining Ball Valve
Temperature-Pressure Rating



■ Standard Specification

Body Material	Cast Stainless Steel, JIS G5121 SCS13
Ball Core Material	Same as Body Material
Stem Material	SUS 304
Lining Material	PFA
Ball Sheet	PTFE
Mechanical Packing	PTFE
Flange Rating	JIS 10K ASME 150LB

■ 150LB 10K Standard Size

Unit: (mm)

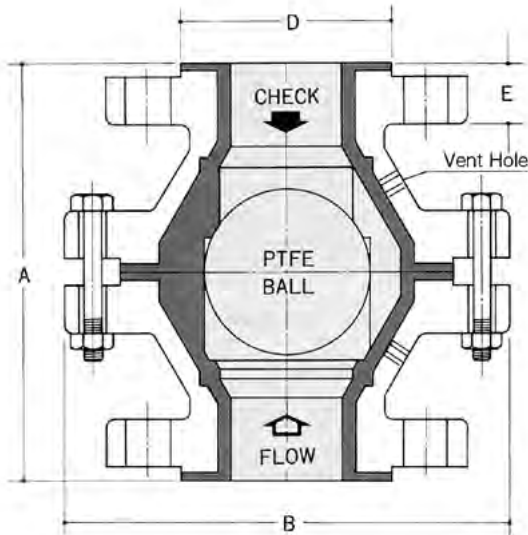
Nominal size	d	L	H	W	Weight (kg)
15A (1/2)	19	152	56	130	2.7
20 (3/4)	19	152	56	130	3.1
25 (1)	25	165	78	160	4.0
40 (1 1/2)	38	191	103	230	9.0
50 (2)	51	216	113	230	12.5
65 (2 1/2)	64	241	139	400	19.0
80 (3)	76	283	149	400	23.0
100 (4)	102	305	178	700	35.5

* This product is made by Emerson Bubble and Control Japan.

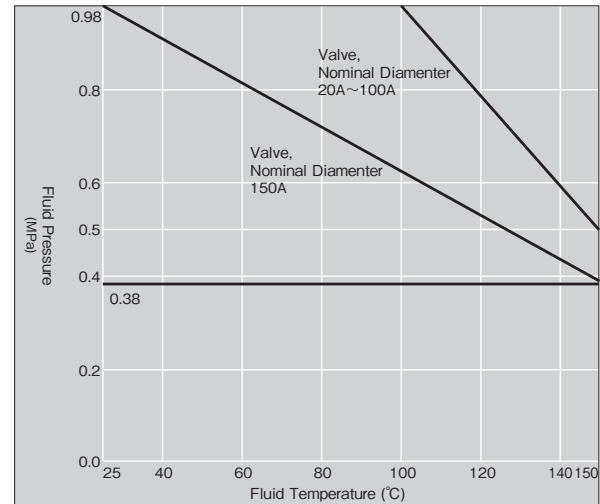
TOMBO™ No.9933-BCV
TOMBO™ No.9943-BCV



BALL CHECK VALVE PFA



■ TOMBO No.9933,9943-BCV BALL CHECK VALVE PFA, Temperature-Pressure-Rating



Source: Evaluation Data of NICHIAS Corporation

■ Standard Specification

Size	20A ~ 150A
Body Material	Cast Ductile Iron, JIS B2051 FCD-S
Lining Material	PFA
Ball Material	PTFE
Flange Rating	JIS 10K JPI 150LB

- * This was prepared based on service experience, and the results of steam and heat cycle tests (cold water ⇔ steam at each temperature × 100 times).
- * For each size, there is no deformation of the lining up to 150°C under vacuum conditions.
- * When used under frequent heat cycles, the ball may deform, resulting in an abnormal leakage amount. In addition, when used under conditions that can easily cause the ball to rattle (abnormal noise, abnormal vibration) such as strong pulsation flow nearest to the pump, or a high flow rate of fluid (2 m/s or more), this may cause abrasion of the valve seat, reduced sealing ability, or breakage. Therefore, avoid using under such conditions.

■ 150LB 10K Standard Size

Nominal size	A	B	D	E	CV Value (-)	Weight (kg)	Min. Operating Pressure (kPa)
20A (¾B)	152	137	57	19	30	5.3	2.9
25 (1)	152	137	57	19	30	5.5	2.9
40 (1½)	178	169	76	21	75	10	2.9
50 (2)	178	188	95	22	150	14	2.9
80 (3)	203	232	127	23	250	23	4.9
100 (4)	267	296	150 (157)	25	400	40	7.8
150 (6)	395	438	212	29	550	90	14.7

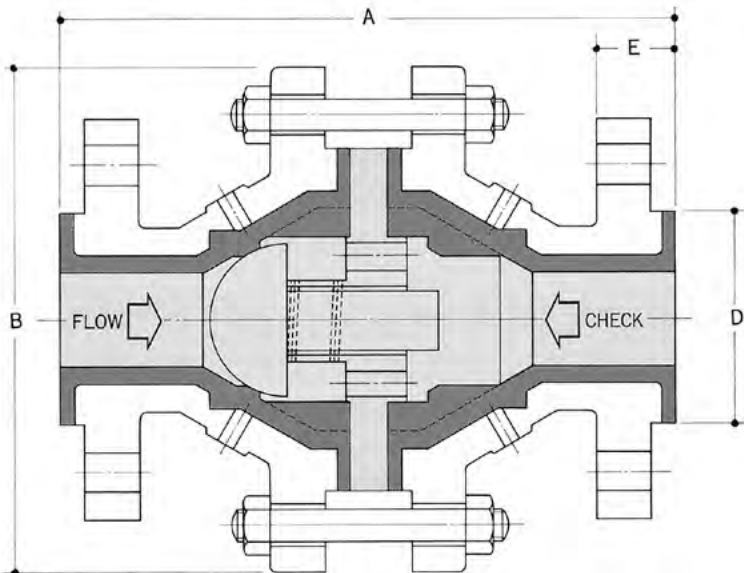
Unit: (mm)
CV Value UNIT: US GALLON/min (1 psig dropp)

- * Since there is a slight amount of leakage (several mm³/s), avoid using for applications that require perfect sealing.
- * Arrange the piping in the vertical direction. For horizontal piping, use a line check valve.
- * Gas sealing is not possible.
- * Dimensions shown in () are for PI 150LB.
- * If used under conditions that can easily cause the ball to rattle (abnormal noise, abnormal vibration) such as strong pulsation flow nearest to the pump, or a high flow rate (2 m/s or more) of fluid, this may cause abrasion of the valve seat, reduced sealing ability, or breakage. Therefore, avoid using under such conditions.
- * Contact us for information on the service temperature/pressure range.
- * Do not disassemble the product as there is a risk of leakage due to assembling error or damage to the lining surface.

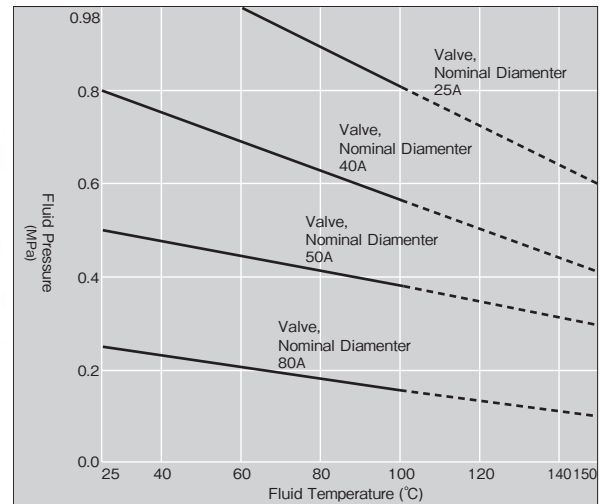
TOMBO™ No.9933-LCV
TOMBO™ No.9943-LCV



LINE CHECK VALVE PFA



■ TOMBO No.9933, 43-LCV LINE CHECK VALVE PFA, Temperature·Pressure-Rating



* NICHIAS Standard

■ Standard Specification

Size	20A ~ 80A
Body Material	Cast Ductile Iron, JIS B2051 FCD-S
Lining Material	PFA
Ball Material	PTFE
Flange Rating	JIS 10K JPI 150LB
Spring	SUS + PFA

* Long-term use may cause fracture of the spring, resulting in the ball material plugging the flow path of the ball guide component. In such a case, the fluid pressure acts directly on the ball guide, and therefore, the service range is specified taking into consideration the safety margin.

■ 150LB 10K Standard Size

Unit: (mm)

Nominal size	A	B	D	E	Weight (kg)
20A (¾B)	162	137	57	19	5.3
25 (1)	162	137	57	19	5.5
40 (1½)	188	169	76	21	10
50 (2)	188	188	95	22	14
80 (3)	213	232	127	23	23

* The minimum operational pressure is 29 kPa ΔP.

* When used for fluid with a high penetration rate or highly corrosive fluid, it is necessary to replace the spring periodically.

* Gas sealing is not possible.

* If used under conditions that can easily cause the ball to abnormal noise, abnormal vibration such as strong pulsation flow nearest to the pump, or a high flow rate (2 m/s or more) of fluid, this may cause abrasion of the valve seat, reduced sealing ability, or breakage. Therefore, avoid using under such conditions.

* Contact us for information on the service temperature/pressure range.

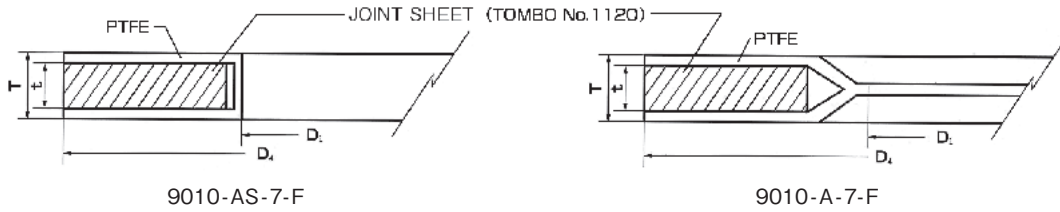
* Do not disassemble the product as there is a risk of leakage due to assembling error or damage to the lining surface.

* Arrange the piping in the horizontal direction. Use a ball check valve for piping in the vertical direction.

TOMBO™ No.9007
 TOMBO™ No.9007-LC
 TOMBO™ No.9010



NAFLON™ PTFE Cut Gasket
 NAFLON™ PTFE Low Creep Cut Gasket
 NAFLON™ Envelope Gasket



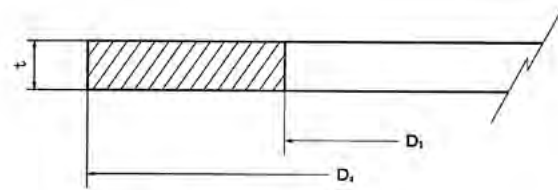
Unit: (mm)

Flange Nominal size		For JIS 10K				For ANSI (JPI) Class150				TOMBO No.
A	B	D ₁	D ₄	t	T	D ₁	D ₄	t	T	
15	1/2	16	58	1.5	2.3	16	47	1.5	2.3	9010-AS-7-F
20	3/4	22	63			22	56			
25	1	27	74			28	66			
40	1 1/2	45	89			45	85			
50	2	58	104			58	104			9010-A-7-F
65	2 1/2	71	124			71	123			
80	3	85	134			85	135			
100	4	104	159			110	173			
125	5	128	189	128	196	266	338			
150	6	153	220	160	221					
200	8	202	270	214	277					
250	10	251	333	266	338	328	408			
300	12	300	378	328	408					

* Applicable standards are JIS 10K and ANSI (JPI) class 150 15A (1/2B) ~ 300A (12B).

When solid gasket products are required, use TOMBO No. 9007 NAFLON PTFE cut gasket or TOMBO No. 9007-LC NAFLON PTFE low creep gasket as shown in the figure on the right.

D₁, D₄ and t are the same as in the above table.



NAFLON PTFE cut gasket (TOMBO No.9007)

Piping work

See the attached technical document "Piping work procedure for fluoropiping" for details of the piping work. In addition, since a small diameter (50A or smaller) flange can easily be overtightened, use a torque wrench, and carefully tighten the flange so as not to exceed the maximum value shown on page 37 "Adequate bolt tightening torque for piping of fluoropiping." Avoid using gaskets other than those shown above for connecting fluoropiping and other material (metal, ceramic, glass, carbon, reinforced plastic) and for connecting fluoropiping sections.

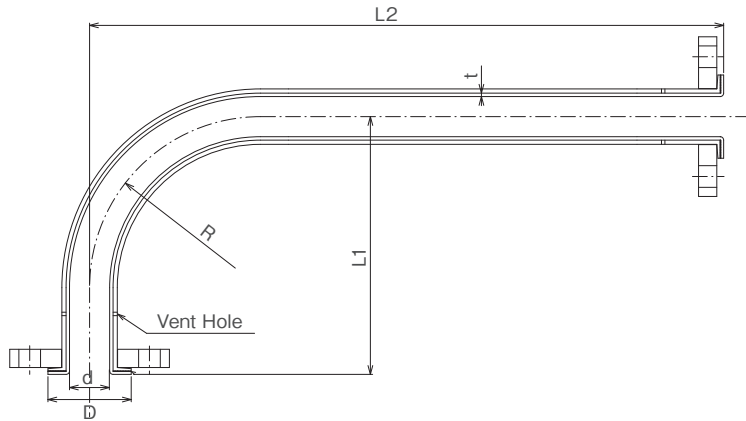
Minimum Tightening Torque and Allowable Tightening Torque of Fluoropiping Pipe Table

JIS 10K									JPI 150LB												
Nominal size	Gasket Type		TOMBO No.9007		TOMBO No.9007-LC		TOMBO No.9010		TOMBO No.1133		Nominal size	Gasket Type		TOMBO No.9007		TOMBO No.9007-LC		TOMBO No.9010		TOMBO No.1133	
	Minimum Tightening Torque	Allowable Tightening Torque	Minimum Tightening Torque	Allowable Tightening Torque	Minimum Tightening Torque	Allowable Tightening Torque	Minimum Tightening Torque	Allowable Tightening Torque	Minimum Tightening Torque	Allowable Tightening Torque		Minimum Tightening Torque	Allowable Tightening Torque	Minimum Tightening Torque	Allowable Tightening Torque	Minimum Tightening Torque	Allowable Tightening Torque	Minimum Tightening Torque	Allowable Tightening Torque	Minimum Tightening Torque	Allowable Tightening Torque
15A	4	15	6	19	4	12	6	21	1/2B	4	16	6	20	4	12	7	22				
20A	7	24	9	29	6	18	9	32	3/4B	7	25	10	31	6	19	10	34				
25A	11	42	16	54	11	33	17	59	1B	9	33	12	43	9	26	13	45				
40A	22	80	30	78	16	47	31	104	1-1/2B	17	63	24	62	13	37	24	82				
50A	34	125	47	126	26	76	47	160	2B	34	124	47	100	20	60	37	127				
65A	40	144	54	147	31	88	55	188	2-1/2B	40	142	53	146	31	88	55	187				
80A	30	109	41	115	23	69	41	140	3B	60	217	81	228	46	137	82	278				
100A	41	149	56	177	35	106	61	207	4B	40	146	55	175	35	105	55	186				
125A	68	240	90	303	61	182	103	350	5B	72	262	98	288	58	173	98	334				
150A	89	319	120	399	80	239	134	456	6B	85	309	116	380	76	228	116	394				
200A	85	275	103	342	68	205	115	392	8B	119	366	137	489	98	293	137	467				
250A	132	405	152	535	107	321	178	604	10B	132	390	146	540	108	324	146	498				
300A	127	361	136	476	97	286	158	539	12B	164	368	175	642	130	385	138	470				

- * The tightening torque shown in the table is the torque per bolt.
- * During the piping work, be careful not to exceed the allowable tightening torque shown in the above table and provide a safety margin of 1.3-1.5. Especially for flanges of size 50A or smaller, use a torque wrench so as not to exceed the allowable tightening torque.
- * The values shown in the table are for the flange sizes shown in the table on page 36. The dimensions of TOMBO No.1133 are the same as those of TOMBO No.9007.
- * When tightened with the minimum torque shown in the table, the surface pressure applied on the gasket is TOMBO No.9007: 10.8 N/mm², TOMBO No.9007-LC: 14.7 N/mm², TOMBO No.9010-NA-FG7: 9.8 N/mm², TOMBO No.1133: 14.7 N/mm².
- * When tightened with the allowable torque shown in the table, the surface pressure applied on the gasket is TOMBO No.9007: 39.2 N/mm², TOMBO No.9007-LC: 49.0 N/mm², TOMBO No.9010-NA-FG7: 29.4 N/mm², TOMBO No.1133: 50.0 N/mm².
- * The value shown in the table is for the case in which water type or oil type fluid is used.

TOMBO™ No.9900-BL,BU
 TOMBO™ No.9940-BL,BU
 TOMBO™ No.9940-HG-HBL,HBU

BENT PIPE



L-Bent Pipe

Unit: (mm)

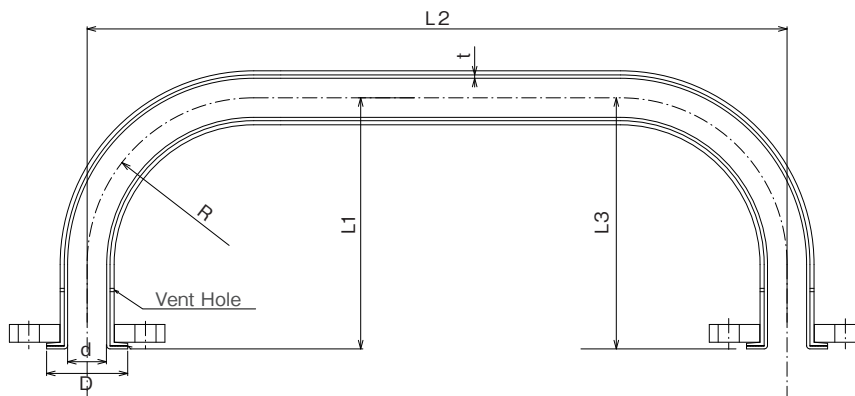
Nominal size		d	D	t	L			Max.	R
A	B				L ₁		L ₂		
					Length to square	Minimum length			
15	1/2	13	34	1.5	81.5 (82)	142	342 ≦	Overall Length 3000	60
20	3/4	17	43	2.0	102.5 (103)	155	348 ≦		65
25	1	22	51	2.5	118 (119)	195	333 ≦		80
40	1 1/2	35	73	3.0	241.5 (244) ≦		475 ≦		150
50	2	46	92	3.3	299 (296) ≦		510 ≦		200

* () dimension is when the pipe material is SUS304.

* The vent hole is 4 locations irrespective of the bore size and length, the size of 25 A or less is near the flange, 40A / 50A is located 50 mm from the flange face.

* All products are lap joint flange specifications.

* The dimensions of L₁ and L₂ are fixed for 15 ~ 25A.



U-Bent Pipe

Unit: (mm)

Nominal size		d	D	t	L			Max.	R	
A	B				L ₁	L ₂	L ₃			
										15
20	3/4	17	43	2.0	102.5 (103)	280 ≦	102.5 (103)	65		
25	1	22	51	2.5	118 (119)	250 ≦	118 (119)	80		
40	1 1/2	35	73	3.0	241.5 (244) ≦		595 ≦	241.5 (244) ≦	150	
50	2	46	92	3.3	299 (296) ≦		600 ≦	299 (296) ≦	200	

* () dimension is when the pipe material is SUS304.

* The vent hole is 4 locations irrespective of the bore size and length, the size of 25 A or less is near the flange, 40A / 50A is located 50 mm from the flange face.

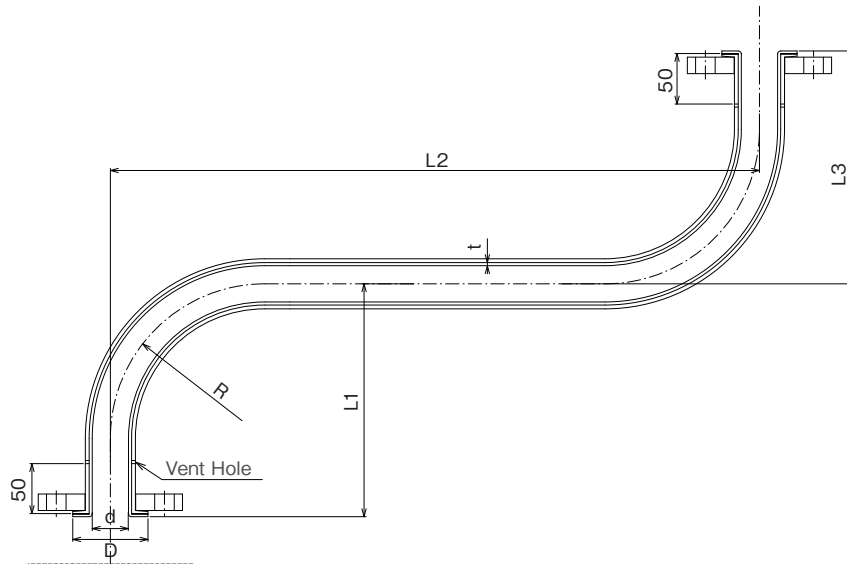
* All products are lap joint flange specifications.

* The dimensions of L₁ and L₂ are fixed for 15 ~ 25A.

TOMBO™ No.9900-BS
 TOMBO™ No.9940-BS
 TOMBO™ No.9940-HG-HBS



BENT PIPE



■ S-Bent Pipe

Unit: (mm)

Nominal size		d	D	t	L			Max.	R
A	B				L ₁	L ₂	L ₃		
15	1/2	13	34	1.5	81.5 (82)	370 ≦	81.5 (82)	Overall Length 3000	60
20	3/4	17	43	2.0	102.5(103)	370 ≦	102.5(103)		65
25	1	22	51	2.5	118 (119)	360 ≦	118 (119)		80
40	1 1/2	35	73	3.0	241.5(244) ≦	595 ≦	241.5(244) ≦		150
50	2	46	92	3.3	299 (296) ≦	650 ≦	299 (296) ≦		200

* () dimension is when the pipe material is SUS304.

* The vent hole is 4 locations irrespective of the bore size and length, the size of 25 A or less is near the flange, 40A / 50A is located 50 mm from the flange face.

* All products are lap joint flange specifications.

* The dimensions of L₁ and L₃ are fixed for 15 ~ 25A.

Cautions when using fluoropiping material

Carry out handling and inspection of our fluoropiping material as described below.

1. Transportation, installation, storage

1) Protective plate

When the products are shipped from our company, a protective plate (plywood or resin sheet) is mounted on the flange flare surface where the liner is directly exposed so as to prevent damage to the liner or lifting of the liner. Do not remove the protective plate until just before the piping work.

When a product is removed after piping for inspection etc., promptly remount the protective plate.

2) Impact

The application of excessive impact force may cause breakage. Hence, carefully handle the product during transportation or installation.

3) Welding, flame

Avoid welding the metal portion of the piping lining material or keep it far away from the flame as there is a risk of breakage or leakage.

4) Vent hole

Normally, a vent hole (to discharge gas that penetrates the lining material or to check for nonconformity) is provided on the piping component; avoid plugging the hole when painting or applying thermal insulation material. In addition, due to rainwater entering from the vent hole, gas that has penetrated the lining material liquefies, which may cause drop corrosion on external piping. To avoid corrosion, assemble the horizontal piping so that the position of the vent hole is as horizontal as possible.

In the case of a significant difference between the inside and outside temperature, which may cause liquefaction of the gas, the thermal insulation specification is recommended. For ordering the thermal insulation specification, please contact us.

5) Storage

Store the product indoors as much as possible. If it must be stored outdoors, cover it with plastic sheets, etc., to prevent rainwater from entering through the vent hole or from the backside of the flare.

In addition, exposure to direct sunshine may warm the piping lining, which may cause extrusion of lining material due to the thermal expansion difference.

2. Operation

1) Negative pressure

Be careful not to generate more than the designed negative pressure as there is a risk of the liner buckling.

Examples where negative pressure is generated:

- (1) In a piping system with a height difference, the fluid flows backwards when the ground pump stops.
- (2) In a case where steam in the piping system is cooled under tightly sealed conditions.
- (3) When fluid is discharged from a piping system with a height difference, pressure loss occurs due to the inlet being closed or having a very small diameter.

* See "Vacuum resistance technical data" in the catalogue for the negative pressure performance of the piping lining.

2) Dielectric breakdown due to static electricity

When electrostatic charge on the PFA lining material

caused by friction with the fluid exceeds the breakdown voltage, this may cause dielectric breakdown. Hence, avoid feeding fluid at a high flow rate (Guideline: flow rate of 2 m/s or more).

In addition, when a gas-liquid mixture is flowing, electrostatic charge (dielectric breakdown) may easily occur. Handle such fluid carefully. Also, when a high insulation chemical liquid such as organic solvent is flowing, the electrostatic charge may become higher, requiring extra caution.

3) Additional tightening

Inspect the bolt tightening torque before operation, 24-30 hours after starting operation and after changing the operating temperature/pressure. In the case of a decrease in tightening torque, tighten it again.

4) Gasket

Use gaskets of our specified size (TOMBO No.9010, TOMBO No.9007, TOMBO No.9007-LC, or TOMBO No.1133). When used in a piping system for highly penetrating fluid, early replacement of gaskets is recommended.

5) Erosion

Since slurry fluid may abrade the liner, avoid feeding such fluid at a high flow rate.

6) Corrosion on external piping

During long-time service, fluid with high permeability such as halide acid (hydrofluoric acid, hydrochloric acid) may penetrate the liner and corrode the external piping material. In addition, corrosion around the vent hole may plug the vent hole, resulting in inward deformation of the liner due to expansion pressure of the corrosion on the external pipe. It is recommended that a socket be provided at the vent hole and an elbow be mounted on it to prevent the entry of rainwater.

7) Inner diameter

After starting operation, the lining dimensions may change due to the release of residual deformation during forming, resulting in a decrease of the inner diameter by several millimeters. If a washing nozzle, etc., is to be inserted, order a product with slightly larger dimensions.

8) Removal

If the piping lining is removed under high temperature conditions, the rising flare portion or the removal of lining from the dovetail groove may make remounting impossible. Hence, remove the piping lining after it has cooled down to room temperature.

3. Inspection

1) Regular inspection

Carry out the necessary regular inspection depending on the service conditions and confirm that there are no harmful defects for use. As part of the regular inspection of the liner, check for leakage of the contents from the vent hole.

2) Air tightness tests

When checking for leakage from the vent hole using soapy water, air in the gap between the external pipe and the liner may **initially** come through the vent hole and generate bubbles, which does not affect the performance.

Prohibitions

1. Never allow the product to come into contact with a person's skin or body fluid.
2. Never apply the product to a person (including accidental ingestion).

Note

For maintaining the original functions of this product and ensuring safe use, strictly observe the following points.

1. Do not use the product for any application or purpose other than that described in the catalogue.
2. Use the product within the temperature range described in the catalogue.
3. When the product is being processed and exceeds the maximum service temperature (reference), since it generates cracked gas, sufficient ventilation must be provided and measures taken against inhaling the cracked gas.
4. Avoid proximity to a flame or welding since there is a risk of breakage of product or leakage.
5. Read the safety data sheet before handling this product.
6. For disposal of the product, follow the "Waste Disposal and Public Cleaning Law."

Notes on handling the products

Keep the following points in mind so that the original functions of the product are not reduced.

1. All technical data (representing product capability) provided in the catalogue are measured values or representative values and are not a guarantee of performance. It is recommended that the products are used after thoroughly studying the data pertaining to the intended application.
2. A thorough study is especially required for applications involving the use of acidic, alkaline or highly toxic fluid. For more information, please contact our technical personnel.
3. Due to the material's characteristics, repeated load, concentrated load, or bending load may affect the durability. Before use, be sure to check for compatibility with the service environment.
4. Due to their characteristics, fluoroplastics exhibit self-lubricity; however, abrasion will progress. Regular replacement is recommended for the portion where repeated abrasion occurs.
5. Due to their characteristics, fluoroplastics may become hardened, change in dimensions, or be penetrated or permeated by fluids, and there are cases in which general specifications cannot be applied. Before use, be sure to check for compatibility with the service environment.

If you require clarification of any of the above points, please contact our sales personnel or technical personnel.

Others

In a case where this product is used as a component of a heat exchanger, and is to be exported, it may be in violation of the Security Export Control laws. Please contact us for more information.



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