

# **FLEXIBLE HOSE**

## **STAINLESS STEEL FLEXIBLE HOSE**



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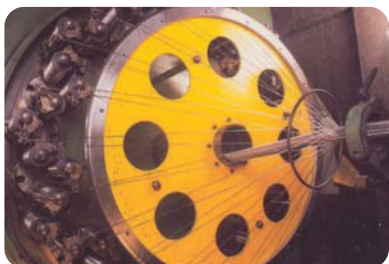
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## Selection Criteria for Flexible Hose

Type	Construction	Nominal Diameter (A)	Max. Working Pressure MPa {kgf/cm <sup>2</sup> }		Max. Working Temperature °C	Applicable Fluid	Features	Purpose of Application	Application
SF100		8~20	1.96 {20}	-	220	Oil, Water, Hot Water, Steam, Gas, Air	Both ends union female thread. Material FCMB. Easy piping work and low cost. Standard length: 300mm., 400mm., 500mm.	- Making pipe alignment. - Absorption of pipe thermal deformation. - Absorption of machine vibration. - Connection with machine and pipe.	- Connection for air-conditioning. - Connection for pump. - Connection for various machines.
		25~32	1.47 {15}						
		40~50	0.98 {10}						
SF300		15	1.96 {20}	3.52 {36}	250	Oil, Water, Hot Water, Steam, Gas, Air, Chemicals	Both ends union female thread and suitable for high pressure. Both union material can be selected depending on fluids. (Example: Material of SS400, S25C, SUS304) Standard length: 300mm., 400mm., 500mm.	Same as the above.	Same as the above.
		20		3.13 {32}					
		25~32	1.47 {15}	2.94 {30}					
		40~50	0.98 {10}	1.96 {20}					
SF6800		250~300	1.18 {12}	2.36 {24}	250	Oil, Water, Hot Water, Steam, Gas, Air, Chemicals	One end fixed and the other loose flange. One body construction, which ribbon braid is welded with ring and collar. Annular type tube and good in vibration isolation. Also applicable as underground use. Standard length: 500mm., 800mm., 1000mm.	- Prevention for damage of pipe and equipment by ground sinking, earthquake, etc. - Making pipe alignment. - Connection with machine and pipe.	- Connection of tank (oil, water, chemicals, etc.). - Connection of plant piping. - Connection of water piping.
		350	0.98 {10}	1.96 {20}					
		400	0.78 {8}	1.56 {16}					
SF7800		15~20	1.96 {20}	3.52 {36}	250	Oil, Water, Hot Water, Steam, Gas, Air, Chemicals	One end fixed and the other loose flange high pressure type for more than 0.98MPa (10kgf/cm <sup>2</sup> ). Besides, it can be matched to high pressure inserting steel ring to the waist of tube. Standard length: 300mm., 400mm., 500mm.	Same as the above.	Same as the above.
		25~40	1.47 {15}	2.94 {30}					
		50~200	0.98 {10}	1.96 {20}					
SF9800		250	0.78 {8}	1.37 {14}	300	Oil, Water, Hot Water, Steam, Gas, Air, Chemicals	One end fixed and the other loose flange. Construction of ribbon braid tightened with braid band. Large diameter and suitable for absorption of large movement. Standard length: 800mm., 1000mm., 1200mm.	- Prevention of damage of pipe and equipment by ground sinking, earthquake, etc. - Making pipe alignment. - Connection with machine and pipe.	- Connection of tank (oil, water, chemicals, etc.). - Connection of plant piping. - Connection of water piping.
		300		1.17 {12}					
		350~400	0.58 {6}						
Bendable Tube		15, 20	0.98 {10}		120	Water, Hot Water	Simple construction with both ends only swivel nuts and tube. Bendable freely and easy installation and low cost. Standard length: 200~500mm.	- Making pipe alignment. - Connection with machine and pipe.	- Connection of instantaneous water heater and hot water supply pipe. - Connection of kitchen unit. - Connection of water meter. - Connection of equipment bath.

# Classification of Stainless Steel Flexible Hose

SF					
<b>Type</b> 1 Union (Socket Welding) 3 Union (Butt Welding) 4 Screwed (Butt Welding) 5 Bevel (Butt Welding) 6 Flange (Socket) 7 Flange (Butt Welding) 9 Flange (Band)	<b>Material of Connection</b> 0 SS400, S25C, FCMB 1 SUS304 2 SUS304 (Wet Part) + SS400 (Dry Part) 3 SUS316 4 SUS316 (Wet Part) + SS400 (Dry Part)		<b>Standard of Connection</b> (none) Screwed 0 Others 1 JIS10K Flanges 2 JIS20K Flanges 3 ANSI150# Flanges 4 ANSI300# Flanges 5 BS4504 PN10 Flanges 6 BS4504 PN16 Flanges		<b>Material of Tube</b> (none) SUS304 316 SUS316 316L SUS316L 321 SUS321
					<b>SF450 and SF460 Series</b> (none) Female Swivel Hexagon Nut H Female Swivel Hydraulic P Female Swivel Pin Lug Nut

Combination	
0 Both Ends Female Union.....	
1 Both Ends Male Union (Swivel Nut+Male Nipple).....	
2 One End Male Nipple, One End Female Union.....	
3 One End Male Nipple, One End Male Union.....	
4 Both Ends Male Nipple.....	
5 Both Ends Female Swivel Nut.....	
6 One End Female Swivel Nut, One End Male Nipple.....	
7 Both Ends Loose Flange.....	
8 One End Fixed Flange, One End Loose Flange.....	
9 Both Ends Fixed Flange.....	

**Precaution :** "The use of mild steel lap joint and pipe collar in water system may cause galvanic corrosion a severe corrosion on the base metal and cause leakage in very short period. The joint with all stainless steel wet parts is strongly recommended."

## Specification of Stainless Steel Tube

### Spiral Tube

- SUS304 (1 Braid)



Size (mm)	Dimension (mm)		Bending Radius (mm)	Working Pressure (Kgf/cm <sup>2</sup> )	Bursting Pressure (Kgf/cm <sup>2</sup> )
	I.D.	O.D.			
8	8.2	11.0	100	20	80
10	10.5	15.2	120	20	80
15	13.7	18.2	190	20	80
20	19.7	25.6	200	20	80
25	25.7	32.2	240	15	60
32	33.2	41.0	300	15	60
40	38.8	47.8	360	10	60
50	53.5	62.0	450	10	40
65	63.5	76.5	490	10	40
80	77.0	91.0	600	10	40

### Annular Tube

- SUS304 (1 Braid)

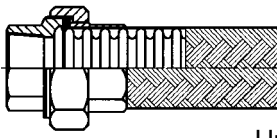


Size (mm)	Dimension (mm)		Bending Radius (mm)	Working Pressure (Kgf/cm <sup>2</sup> )	Bursting Pressure (Kgf/cm <sup>2</sup> )
	I.D.	O.D.			
100	102.5	127.0	800	10	40
125	128.0	156.5	1100	10	40
150	150.5	181.5	1600	10	40
200	201.5	234.5	1900	10	40

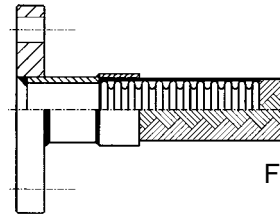
- SUS316, 316L, 321 (1 Braid)

Size (mm)	Dimension (mm)		Bending Radius (mm)	Working Pressure (Kgf/cm <sup>2</sup> )	Bursting Pressure (Kgf/cm <sup>2</sup> )
	I.D.	O.D.			
8	8.0	12.0	100	100	400
10	11.0	15.6	150	90	360
15	12.7	17.4	200	80	320
20	19.3	26.3	203	64	256
25	25.4	33.8	229	50	200
32	32.0	42.5	267	40	160
40	41.2	51.5	292	30	120
50	51.6	62.0	318	28	112
65	65.0	77.0	508	24	96
80	75.5	91.0	610	18	72
100	102.6	117.8	750	16	64
125	126.0	152.5	900	12	48
150	149.5	177.0	1050	10	40
200	196.0	227.7	1180	8	32

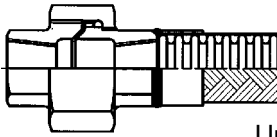
## Available Type of Connection



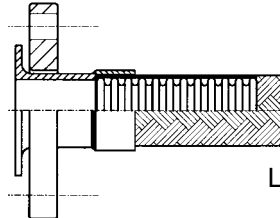
Union (Socket Welded)



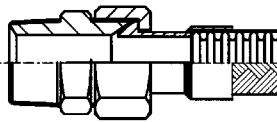
Fixed Flange



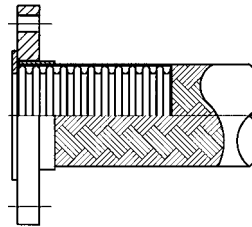
Union (Butt Welded)



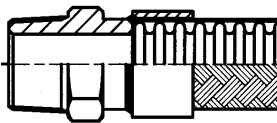
Loose Flange



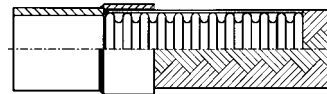
Male Union  
(Swivel Nut + Male Nipple)



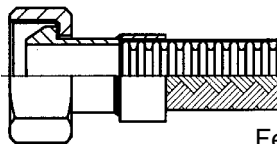
Loose Flange  
(Socket Welded)



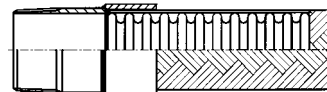
Male Nipple



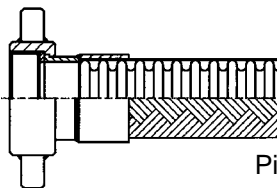
Pipe End



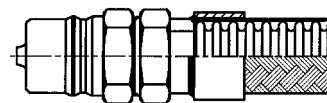
Female Swivel Nut



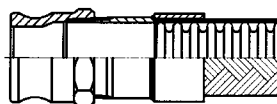
Thread End



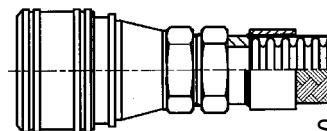
Pinlug Swivel Nut



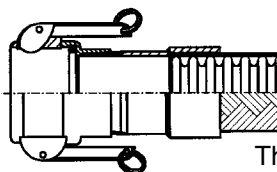
Plug-Quick Release Coupling



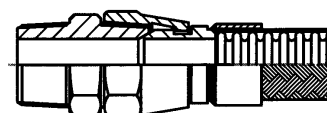
Thread End +  
Camlock Part A



Socket-Quick Release Coupling

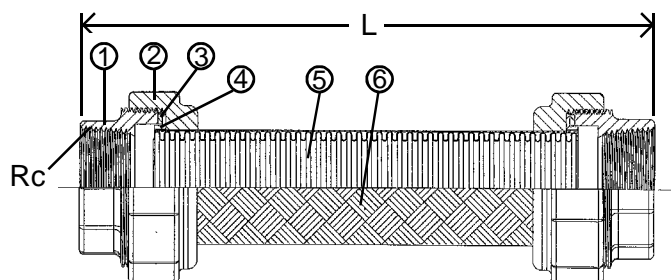


Thread End +  
Camlock Part D



Hydraulic Fitting

## SF100 Union Type Flexible Hose

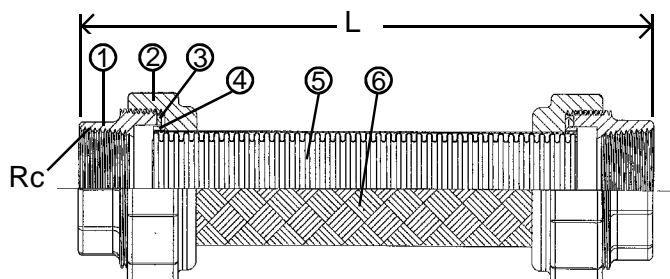


No.	Parts	Materials
1	Union End	FCD450
2	Union Nut	FCD450
3	Packing	Non Asbestos
4	Union Ring	SUS304
5	Flexible Tube	SUS304
6	Wire Braid	SUS304

Max Working Temperature : 220°C

Nominal Diameter A (B)	Thread Rc	Min. Bending Radius (mm)	Max. Working Pressure MPa {kgf/cm <sup>2</sup> }	Overall Length			Test Pressure MPa{kgf/cm <sup>2</sup> }	Bursting Pressure MPa {kgf/cm <sup>2</sup> }	Ineffective Length Ax2 (mm)
				300mm	400mm	500mm			
				Max Eccentric (mm)					
15 (1/2)	1/2	90	1.96 {20}	75	120	166	2.94 {30}	9.2 {94}	70
20 (3/4)	3/4	120	1.96 {20}	58	103	150	2.94 {30}	7.8 {80}	85
25 (1)	1	130	1.47 {15}	52	98	144	2.2 {22.5}	6.9 {70}	90
32 (1.1/4)	1.1/4	160	0.98 {10}	39	83	129	1.47 {15}	5.2 {53}	100
40 (1.1/2)	1.1/2	170	0.98 {10}	33	75	121	1.47 {15}	5.2 {53}	110
50 (2)	2	220	0.98 {10}	23	56	99	1.47 {15}	4.5 {46}	120

## SF100-316, SF100-316L, SF100-321 Union Type Flexible Hose



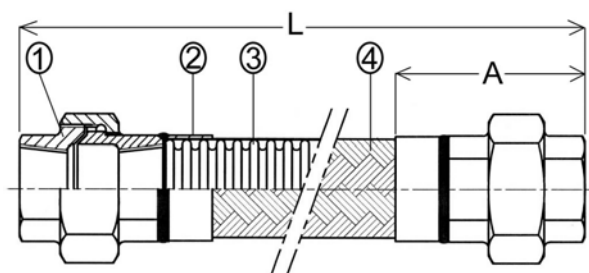
No.	Parts	Materials
1	Union End	FCD450
2	Union Nut	FCD450
3	Packing	Non Asbestos
4	Union Ring	SUS316
5	Flexible Tube	SUS316, SUS316L, SUS321
6	Wire Braid	SUS304

Max Working Temperature : 220°C

Nominal Diameter A (B)	Thread Rc	Min. Bending Radius (mm)	Max. Working Pressure MPa {kgf/cm <sup>2</sup> }	Overall Length			Test Pressure MPa{kgf/cm <sup>2</sup> }	Bursting Pressure MPa {kgf/cm <sup>2</sup> }	Ineffective Length Ax2 (mm)
				300mm	400mm	500mm			
				Max Eccentric (mm)					
15 (1/2)	1/2	200	1.96 {20}	64	128	199	2.94 {30}	9.2 {94}	70
20 (3/4)	3/4	203	1.96 {20}	55	116	186	2.94 {30}	7.8 {80}	85
25 (1)	1	229	1.47 {15}	47	100	169	2.2 {22.5}	6.9 {70}	90
32 (1.1/4)	1.1/4	267	0.98 {10}	37	82	142	1.47 {15}	5.2 {53}	100
40 (1.1/2)	1.1/2	292	0.98 {10}	30	70	125	1.47 {15}	5.2 {53}	110
50 (2)	2	318	0.98 {10}	25	60	110	1.47 {15}	4.5 {46}	120

**Applicable Fluid (for all models) : Oil, Water, Hot Water, Steam, Gas, Air, Chemicals, etc.**

## SF300 Union Type Flexible Hose

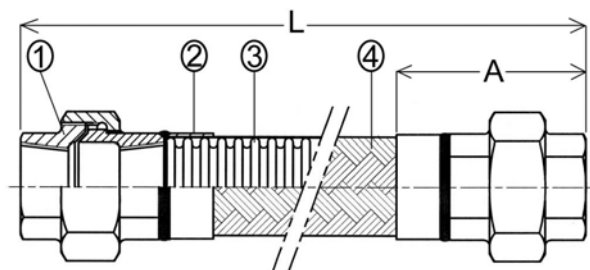


No.	Part	Material
1	Female Union	SS400, SUS304, S25C
2	Collar	SUS304
3	Flexible Tube	SUS304
4	Wire Braid	SUS304

Max Working Temperature : 250°C

Nominal Diameter A (B)	Min. Bending Radius Radius (mm)	Max. Working Pressure MPa {kgf/cm <sup>2</sup> }		Overall Length			Test Pressure MPa {kgf/cm <sup>2</sup> }	Bursting Pressure MPa {kgf/cm <sup>2</sup> }	Ineffective Length A x 2 (mm)
				300mm	400mm	500mm			
		1-Braid	2-Braid	Eccentric (mm)					
15 (1/2)	190	1.96 {20}	3.52 {36}	± 29	± 52	± 74	2.94 {30}	7.84 {80}	125
20 (3/4)	200	1.96 {20}	3.13 {32}	25	48	70	2.94 {30}	7.84 {80}	141
25 (1)	240	1.47 {15}	2.94 {30}	21	43	66	2.2 {22.5}	5.88 {60}	152
32 (1.1/4)	300	1.47 {15}	2.94 {30}	15	41	63	2.2 {22.5}	5.88 {60}	164
40 (1.1/2)	360	0.98 {10}	1.96 {20}	10	34	61	1.47 {15}	3.92 {40}	177
50 (2)	450	0.98 {10}	1.96 {20}	6	23	49	1.47 {15}	3.92 {40}	193

## SF300-316, SF300-316L, SF300-321 Union Type Flexible Hose



No.	Part	Material		
		SF300-316	SF300-316L	SF300-321
1	Female Union	SS400, SUS304, SUS316		
2	Collar	SUS304		
3	Flexible Tube	SUS316	SUS316L	SUS321
4	Wire Braid	SUS304		

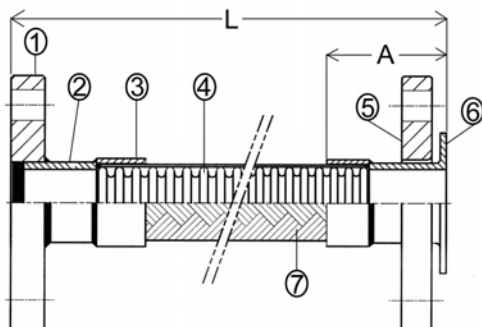
Max Working Temperature : 250°C

Nominal Diameter A (B)	Min. Bending Radius Radius (mm)	Max. Working Pressure MPa {kgf/cm <sup>2</sup> }	Overall Length			Test Pressure MPa {kgf/cm <sup>2</sup> }	Bursting Pressure MPa {kgf/cm <sup>2</sup> }	Ineffective Length A x 2 (mm)
			300mm	400mm	500mm			
			Eccentric (mm)					
15 (1/2)	200	7.84 {80}	± 29	± 52	± 74	11.76 {120}	31.36 {320}	114
20 (3/4)	203	6.27 {64}	25	48	70	9.41 {96}	25.08 {256}	140
25 (1)	229	4.90 {50}	21	43	66	7.35 {75}	19.60 {200}	160
32 (1.1/4)	267	3.92 {40}	15	41	63	5.88 {60}	15.68 {160}	184
40 (1.1/2)	292	2.94 {30}	10	34	61	4.41 {45}	11.76 {120}	212
50 (2)	318	2.74 {28}	6	23	49	4.11 {42}	10.96 {112}	230

**Applicable Fluid (for all models) : Oil, Water, Hot Water, Steam, Gas, Air, Chemicals, etc.**



# SF7800 Flange Type Flexible Hose (Wire Braid Type)

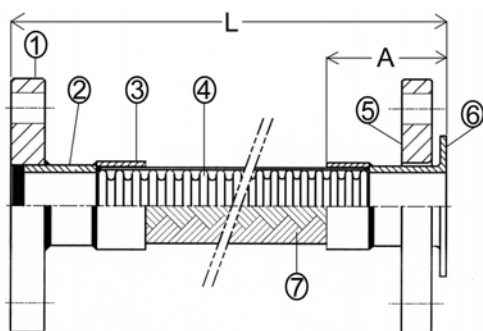


No.	Part	Material
1	Fixed Flange	SS400, SUS304
2	Short Pipe	SUS304, SGP
3	Collar	SUS304
4	Flexible Tube	SUS304
5	Loosed Flange	SS400, SUS304
6	Lap Joint	SUS304, SGP
7	Wire Braid	SUS304

Max Working Temperature : 250°C

Nominal Diameter A (B)	Min. Bending Radius Radius (mm)	Max. Working Pressure MPa {kgf/cm <sup>2</sup> }		Overall Length			Test Pressure MPa {kgf/cm <sup>2</sup> }	Bursting Pressure MPa {kgf/cm <sup>2</sup> }	Ineffective Length A x 2 (mm)
				300mm	400mm	500mm			
		1-Braid	2-Braid	Eccentric (mm)					
25 (1)	240	1.47 {15}	2.94 {30}	± 23	± 46	± 66	2.2 {22.5}	5.88 {60}	140
32 (1.1/4)	300	1.47 {15}	2.94 {30}	21	47	65	2.2 {22.5}	5.88 {60}	140
40 (1.1/2)	360	1.47 {15}	2.94 {30}	17	44	62	2.2 {22.5}	5.88 {60}	140
50 (2)	450	0.98 {10}	1.96 {20}	14	37	62	1.47 {15}	3.92 {40}	140
65 (2.1/2)	490	0.98 {10}	1.96 {20}	13	34	61	1.47 {15}	3.92 {40}	140
80 (3)	600	0.98 {10}	1.96 {20}	10	28	53	1.47 {15}	3.92 {40}	140
100 (4)	800	0.98 {10}	1.96 {20}	5	16	37	1.47 {15}	3.92 {40}	150
125 (5)	1100	0.98 {10}	1.96 {20}	-	12	26	1.47 {15}	3.92 {40}	150
150 (6)	1600	0.98 {10}	1.96 {20}	-	8	16	1.47 {15}	3.92 {40}	150
200 (8)	1900	0.98 {10}	1.96 {20}	-	3	14	1.47 {15}	3.92 {40}	170

# SF7800-316, SF7800-316L, SF7800-321 Flange Type Flexible Hose (Wire Braid Type)



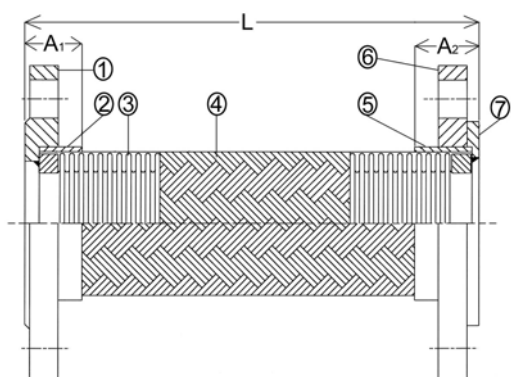
No.	Part	Material		
		SF7800-316	SF7800-316L	SF7800-321
1	Fixed Flange	SS400, SUS304, SUS316		
2	Short Pipe	SS400, SUS304, SUS316		
3	Collar	SUS304		
4	Flexible Tube	SUS316	SUS316L	SUS321
5	Loosed Flange	SS400, SUS304, SUS316		
6	Lap Joint	SS400, SUS304, SUS316		
7	Wire Braid	SUS304		

Max Working Temperature : 250°C

Nominal Diameter A (B)	Min. Bending Radius (mm)	Max. Working Pressure MPa {kgf/cm <sup>2</sup> }	Overall Length			Test Pressure MPa {kgf/cm <sup>2</sup> }	Bursting Pressure MPa {kgf/cm <sup>2</sup> }	Ineffective Length A x 2 (mm)
			300mm	400mm	500mm			
			Eccentric (mm)					
25 (1)	229	4.90 {50}	± 23	± 46	± 66	7.35 {75}	19.60 {200}	155
32 (1.1/4)	267	3.92 {40}	21	47	65	5.88 {60}	15.68 {160}	169
40 (1.1/2)	292	2.94 {30}	17	44	62	4.41 {45}	11.76 {120}	185
50 (2)	318	2.74 {28}	14	37	62	4.11 {42}	10.96 {112}	185
65 (2.1/2)	508	2.35 {24}	13	34	61	3.53 {36}	9.40 {96}	185
80 (3)	610	1.76 {18}	10	28	53	2.64 {27}	7.04 {72}	185
100 (4)	750	1.57 {16}	5	16	37	2.35 {24}	6.28 {64}	195
125 (5)	900	1.18 {12}	-	12	26	1.77 {18}	4.72 {48}	205
150 (6)	1050	0.98 {10}	-	8	16	1.47 {15}	3.92 {40}	205
200 (8)	1180	0.78 {8}	-	3	14	1.17 {12}	3.12 {32}	225

**Applicable Fluid (for all models) : Oil, Water, Hot Water, Steam, Gas, Air, Chemicals, etc.**

**SF6800, SF6800-316, SF6800-316L, SF6800-321** Flange Type Flexible Hose (Wire Braid Type)

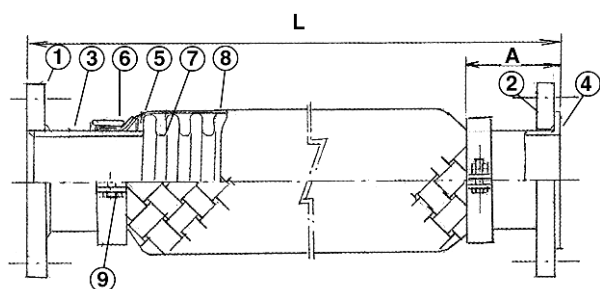


No.	Part	Material			
		SF6800	SF6800-316	SF6800-316L	SF6800-321
1	Fixed Flange	SS400, SUS304, SUS316			
2	Welding Ring	SS400, SUS304, SUS316			
3	Flexible Tube	SUS304	SUS316	SUS316L	SUS321
4	Wire Braid	SUS304			
5	Collar (Band)	SS400, SUS304			
6	Loosed Flange	SS400, SUS304, SUS316			
7	Ring	SS400, SUS304, SUS316			

Max Working Temperature : 250°C

Nominal Diameter A (B)	Min. Bending Radius (mm)	Max. Working Pressure {kgf/cm <sup>2</sup> }		Overall Length			Test Pressure {kgf/cm <sup>2</sup> }	Bursting Pressure in 1-Braid {kgf/cm <sup>2</sup> }	Ineffective Length A1 + A2 (mm)
				500mm	800mm	1000mm			
		1-Braid	2-Braid	Eccentric (mm)					
250 (10)	2000	12	24	± 9.6	± 34.0	± 58.5	19.5	36	160
300 (12)	2400	12	24	8.0	28.3	48.8	18	36	160
350 (14)	2700	10	20	7.1	25.2	43.4	15	30	160
400 (16)	3000	8	16	6.4	22.7	39.0	12	24	160

**SF9800** Flange Type Flexible Hose (Ribbon Braid Type)



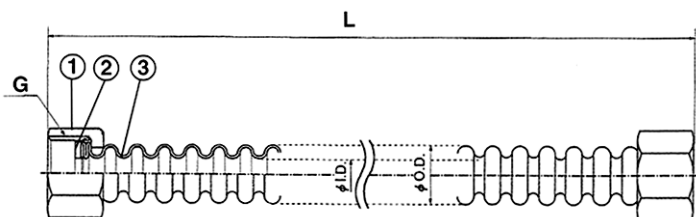
No.	Parts	Materials
1	Fixed Flanges	SS400, SUS304
2	Loose Flanges	SS400, SUS304
3	Pipe	SGP, SUS304
4	Lap Joint	SGP, SUS304
5	Ring	SS400
6	Braid Band	SS400
7	Bellows	SUS304
8	Braid	SUS304
9	Bolt & Nut	SS400

Max. Working Temperature : 300°C

Nominal Diameter A (B)	Min. Bending Radius (mm)	Max. Working Pressure MPa {kgf/cm <sup>2</sup> }		Overall Length			Test Pressure MPa {kgf/cm <sup>2</sup> }	Bursting Pressure in 1-Braid MPa {kgf/cm <sup>2</sup> }	Ineffective Length A x 2 (mm)
				800mm	1000mm	1200mm			
		1-Braid	2-Braid	Eccentric (mm)					
250 (10)	2100	0.78 {8}	1.37 {14}	± 32	± 61	± 92	1.17 {12}	3.13 {32}	280
300 (12)	2600	0.78 {8}	1.17 {12}	25	49	77	1.17 {12}	3.13 {32}	280
350 (14)	2700	0.58 {6}	1.17 {12}	24	47	72	0.87 {9}	2.35 {24}	280
400 (16)	3300	0.58 {6}	1.17 {12}	20	39	60	0.87 {9}	2.35 {24}	280

**Applicable Fluid (for all models) : Oil, Water, Hot Water, Steam, Gas, Air, Chemicals, etc.**

## Bendable Tube Flexible Joint for low pressure piping



No.	Parts	Materials
1	Swivel Nut	BsBM (Chrome Plated)
2	Packing	Neoprene
3	Bendable Tube	SUS304

L (mm)	I.D. (Ø)	O.D. (Ø)	G	Bending Radius (mm)	Max. Working Pressure {kgf/cm <sup>2</sup> }	Bursting Pressure {kgf/cm <sup>2</sup> }
200~500	12.7	16.5	1/2	270	10	120
200~500	16.0	21.0	3/4	290	10	110

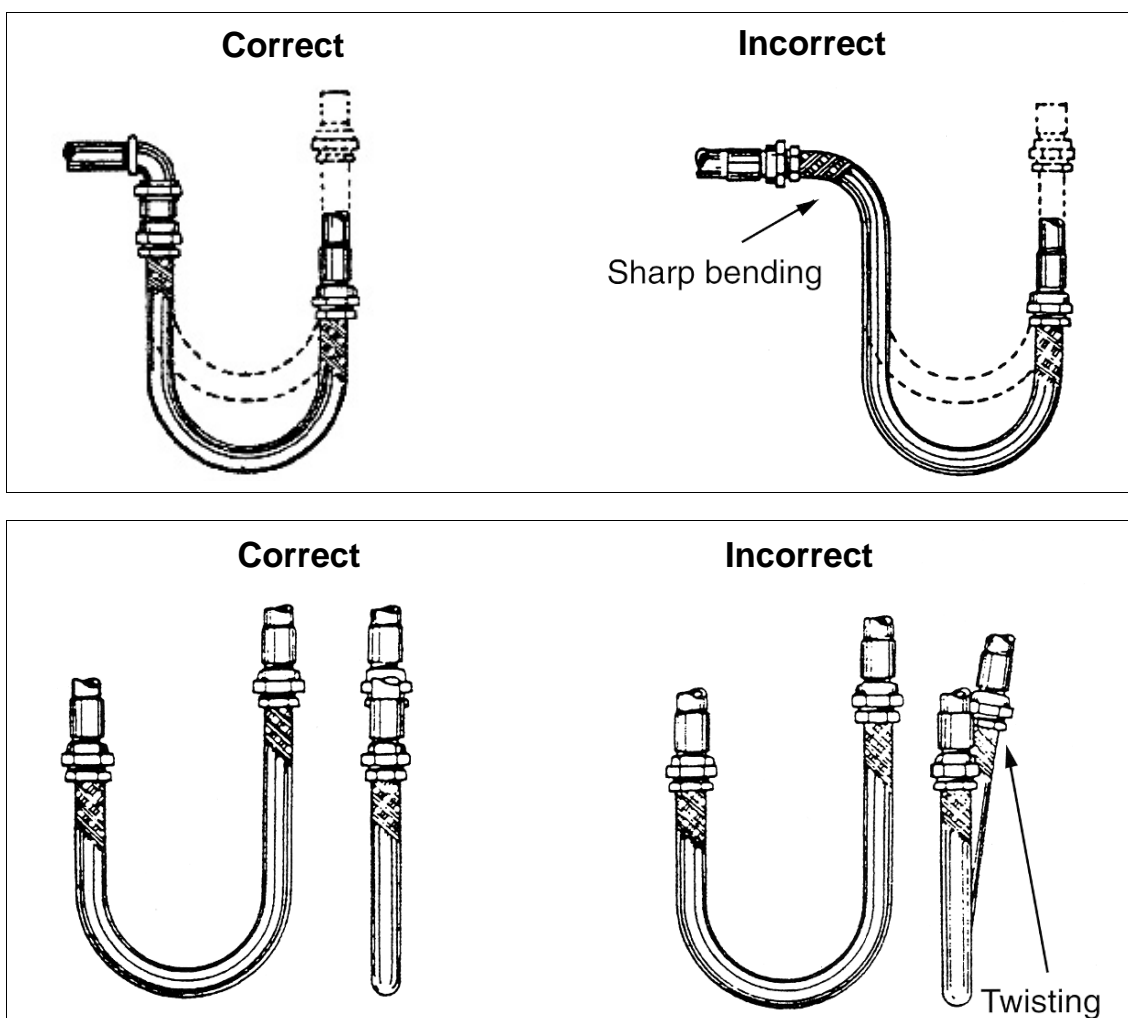
Note : Bendable tubes with nipple and various valve sets are available.

## Precaution in Piping Method

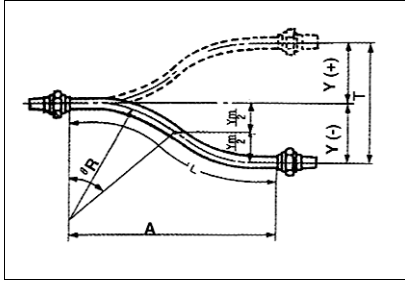
To make flexible hoses function properly and last longer, the followings are guides to correct installation.

- Metal flexible hoses should not be bent to a radius smaller than recommended in their specifications, otherwise fatigue and premature failure will occur.
- Avoid twisting of metal flexible hoses.
- Always install metal flexible hoses so that movement originates in the same plane as the centerline.

### 1 Proper Flexible Hose Installation



## 2 Calculation for Hose Length (L) with Movement



### 1. Offset Movement (in case of non-alignment)

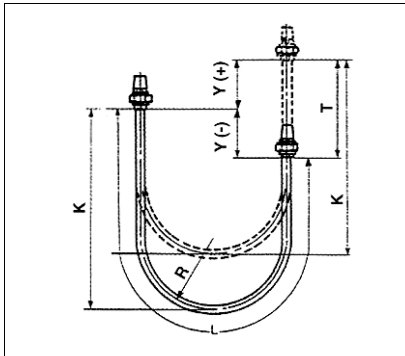
$$Y_m = 2 \cdot R (1 - \cos \theta) \dots\dots\dots (1)$$

$$Y_L = 2 \cdot R (1 - \cos \theta) + (L - \frac{\theta \cdot R}{90}) \cdot \sin \theta \dots\dots\dots (2)$$

$$A_m = 2 \cdot R \cdot \sin \theta \dots\dots\dots (3)$$

$$A_L = 2 \cdot R \cdot \sin \theta + (L - \frac{\theta \cdot R}{90}) \cdot \cos \theta \dots\dots\dots (4)$$

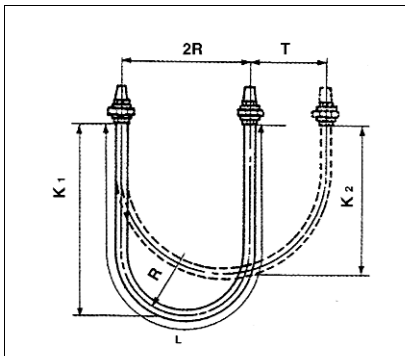
$$R = \frac{D_m \cdot Q}{2 \cdot e} \dots\dots\dots (5)$$



### 2. Vertical Movement

$$L = 4R + \frac{T}{2} \dots\dots\dots (6)$$

$$K = 1.43R + \frac{T}{2} \dots\dots\dots (7)$$



### 3. Horizontal Movement

$$L = 4R + 1.57T \dots\dots\dots (8)$$

$$K_1 = 1.43R + 0.785T \dots\dots\dots (9)$$

$$K_2 = 1.43R + \frac{T}{2} \dots\dots\dots (10)$$

### Symbols :

T	: Total value of displacement (Movement)	mm
L	: Length of the hose	mm
Lm	: Min. effective length of the hose	mm
Y	: Movement from the centre	
	Ym : The value of min. effective length of the hose	mm
	YL : The value by the effective length of the hose > Lm	mm
A	: Face-to-face Dimension	
	Am : The value by Lm of the effective length of the hose	mm
	AL : The value by the effective length of the hose > Lm	mm
R	: Allowable bending radius	mm
Dm	: Effective Diameter	mm
Q	: Hose Pitch	mm
e	: Elongation and Compression per Bellows	mm
θ	: Bend Angle	degree
K	: Loop Length	mm



The required effective length of flexible hose to absorb lateral movement of the piping alignment is shown in the following table:

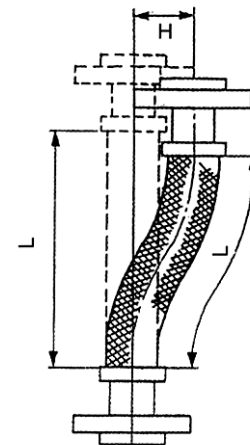
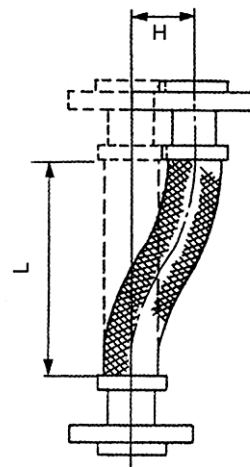
# Spiral Tube

Nominal Diameter A (B)	Lateral Movement (mm)																													
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
8	64	100	143	168	193	226	258	291	323	355	388	420	453	485	517	549	582	614	647	679	711	744	776	808	841	873	905	938	970	1002
	64	106	149	183	210	246	282	321	356	391	429	466	501	536	572	611	646	681	721	756	791	826	863	901	936	976	1011	1046	1114	1154
10	71	106	136	168	200	232	265	297	330	362	394	427	459	491	524	556	588	621	653	686	718	756	783	815	847	880	912	944	977	1009
	71	109	138	173	203	241	276	311	346	377	414	472	507	543	580	617	652	687	723	790	797	832	871	905	942	977	1015	1052	1087	1125
15	88	129	171	213	253	295	336	378	419	460	501	543	584	625	667	708	750	791	832	874	915	956	997	1039	1080	1121	1163	1204	1246	1287
	90	132	176	221	266	311	356	401	446	491	534	576	621	666	711	756	801	846	891	936	980	1021	1066	1111	1156	1201	1246	1291	1336	1881
20	90	132	173	215	256	297	339	380	421	463	504	545	587	628	669	711	752	793	835	876	917	959	1000	1041	1083	1124	1165	1207	1248	1289
	91	136	181	226	271	316	359	401	446	491	536	581	626	671	716	759	801	846	891	936	981	1026	1071	1116	1161	1204	1246	1291	1336	1881
25	98	140	179	218	256	295	334	372	411	449	488	527	565	604	643	681	720	759	797	836	874	913	952	990	1029	1068	1106	1145	1184	1222
	101	145	186	228	268	308	351	393	433	473	516	558	598	638	688	723	763	806	848	888	928	971	1011	1053	1093	1136	1178	1218	1258	1803
32	110	158	202	247	292	336	380	425	469	513	558	602	647	691	736	780	825	869	914	958	1002	1047	1091	1136	1180	1225	1269	1314	1358	1403
	110	161	211	256	306	354	401	451	496	546	596	641	691	740	786	836	881	931	879	1026	1076	1121	1171	1221	1266	1316	1366	1411	1461	1506
40	121	171	212	253	295	336	377	419	460	501	543	584	625	667	708	749	791	832	873	915	956	997	1039	1080	1121	1163	1204	1246	1287	1328
	126	174	219	264	307	349	394	439	484	529	574	619	664	707	749	794	839	884	929	974	1019	1064	1109	1149	1194	1239	1284	1329	1374	1419
50	135	191	236	281	325	370	414	459	503	547	592	636	681	725	770	814	858	903	947	992	1036	1081	1125	1170	1214	1259	1303	1347	1392	1436
	142	198	239	289	336	384	434	479	529	579	624	674	722	772	818	867	914	964	1009	1059	1109	1154	1204	1249	1299	1349	1394	1444	1489	1589
65	141	200	245	289	334	378	423	467	512	556	601	645	690	734	778	823	867	912	956	1001	1045	1090	1134	1179	1223	1267	1312	1356	1401	1445
	146	202	261	296	346	396	441	489	536	584	636	681	731	779	826	876	921	971	1019	1069	1116	1161	1211	1261	1306	1356	1404	1451	1501	1546
80	156	220	270	314	359	403	448	492	537	581	626	670	714	759	803	848	892	937	981	1026	1070	1115	1159	1203	1248	1292	1337	1381	1429	1470
	168	230	276	322	367	417	467	515	562	607	657	705	755	802	850	897	947	992	1042	1092	1137	1187	1232	1282	1332	1377	1427	1477	1522	1572

Nominal Diameter A (B)	Lateral Movement (mm)																													
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
100	180	254	256	360	404	449	493	538	582	627	671	715	760	804	849	893	938	982	1027	1071	1116	1160	1204	1249	1293	1338	1382	1427	1471	1516
(4)	196	280	313	364	411	459	506	556	601	651	699	746	796	841	891	941	986	1036	1086	1131	1181	1226	1276	1326	1371	1421	1471	1516	1566	1611
125	212	300	370	423	472	517	562	606	651	695	740	784	829	873	917	962	1006	1051	1095	1140	1184	1229	1273	1318	1362	1406	1451	1495	1540	1584
(5)	231	308	370	425	479	522	572	617	667	712	762	812	860	905	955	1005	1052	1100	1148	1195	1242	1292	1336	1385	1435	1482	1532	1582	1630	1677
150	255	360	443	509	569	626	673	721	769	817	865	913	961	1009	1057	1105	1154	1202	1250	1298	1346	1394	1442	1490	1538	1586	1635	1683	1731	1779
(6)	260	392	448	509	570	626	676	731	781	836	886	939	991	1046	1096	1149	1199	1251	1304	1356	1411	1461	1514	1566	1621	1671	1724	1776	1829	1881
200	291	396	488	555	620	678	733	787	838	877	921	966	1010	1055	1099	1144	1188	1232	1277	1321	1366	1410	1455	1499	1544	1588	1633	1677	1721	1766
(8)	276	399	481	557	624	683	736	787	833	883	928	978	1026	1073	1123	1171	1218	1268	1313	1363	1411	1461	1508	1553	1603	1651	1698	1748	1796	1846
250	292	434	508	582	654	715	779	843	907	971	1035	1099	1117	1174	1232	1289	1347	1404	1462	1520	1577	1635	1692	1750	1807	1865	1923	1980	2038	2095
(10)	294	441	515	588	662	717	782	845	912	975	1037	1102	1167	1227	1292	1357	1422	1487	1552	1617	1682	1747	1807	1872	1932	1997	2052	2127	2192	2252
300	328	457	561	647	725	796	861	921	986	1049	1113	1177	1241	1305	1369	1433	1497	1561	1625	1689	1753	1817	1880	1944	2008	2072	2136	2200	2264	2328
(12)	364	465	566	652	728	798	868	943	1013	1088	1158	1226	1303	1373	1449	1518	1588	1658	1733	1808	1878	1951	2018	2091	2163	2233	2306	2376	2448	2523
350	334	468	571	661	738	810	882	954	1026	1098	1169	1241	1313	1384	1456	1528	1600	1672	1744	1816	1888	1960	2032	2103	2175	2247	2319	2391	2463	2535
(14)	378	473	577	662	742	830	912	992	1072	1152	1237	1317	1400	1482	1567	1652	1732	1812	1892	1982	2062	2142	2222	2302	2387	2467	2647	2717	2797	
400	365	518	634	730	816	898	980	1038	1110	1182	1253	1325	1397	1469	1541	1613	1685	1756	1828	1900	1972	2044	2114	2188	2259	2331	2403	2475	2547	2619
(16)	462	578	638	738	819	899	984	1069	1144	1229	1309	1394	1474	1554	1688	1724	1804	1889	1969	2054	2134	2214	2299	2379	2464	2544	2624	2709	2789	2869

: without axial movement by lateral movement

(upper row) : with axial movement by lateral movement





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