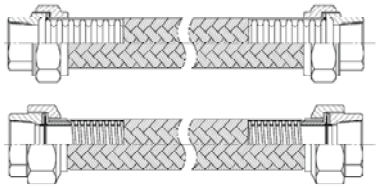
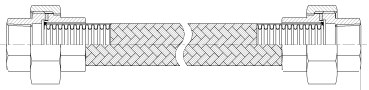
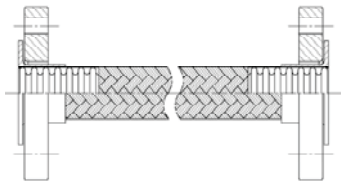
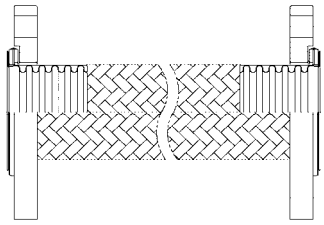
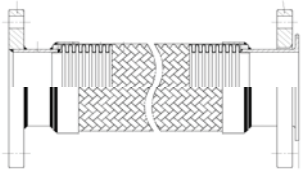
TOZEN

# FLEXIBLE HOSE

## STAINLESS STEEL FLEXIBLE HOSE

# Selection Criteria for Flexible Hose

| Type | Construction | Nominal Diameter (A) | Max. Working Temperature °C | Features |
|---|---|---|---|---|
| SF100 |  | 15-50 ( Welding Type)<br>15-50 (Non Welding Type) | 200 | Both ends union female thread. Material FCMB. Easy piping work and low cost. Standard length: 300mm., 400mm., 500mm. |
| SF101 |  | 15-50 (Welding Type) | 250 | Both end union screw end Material: SUS 304 Standard length:300 mm,400mm ,500mm |
| SF300 |  | 15-50 | 250 | 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. |
| SF6700 |  <br>  | 15-100 (Socket Welded Type)<br>65-300 (Non Welding Type | 250 | Both ends loose flange. All contacting fluid parts are stainless steel. Longer effective length enable higher lateral movement. |
| SF7800 |  | 25-400 | 250 | One end fixed and the other loose flange high pressure type for more than 0.98MPa {10kgf/cm$^2$}. Besides, it can be matched to high pressure inserting steel ring to the waist of tube. Standard length: 300mm., 400mm., 500mm. |
| SF9800 |  | 350-600 And above | 250 | 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. |

**Applicable Fluid:** **Oil, Water, Hot Water, Steam, Gas, Air**

**Purpose of Application:** **- Making pipe alignment. - Absorption of pipe thermal deformation**
**- Absorption of machine vibration - Connection with machine and pipe**
**- Prevention for damage of pipe & equipment by ground sinking, earthquake**

# Classification of Stainless Steel Flexible Hose

SF [ ] [ ] [ ] [ ] – [ ]

| Material of Tube | |
|---|---|
| ( none ) | SUS304 |
| 316L | SUS316L |

| Type | |
|---|---|
| 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) |

| Material of Connection | |
|---|---|
| 0 | Mild Steel |
| 1 | SUS304 |
| 2 | SUS304 (Wet Part) + SS400 (Dry Part) |
| 3 | SUS316 |
| 4 | SUS316 (Wet Part) + SS400 (Dry Part) |
| 5 | Carbon Steel |
| 6 | SUS304 (Dry Part) + SUS316 (Wet Part) |
| S | User defined |

| Standard of Flanges | |
|---|---|
| ( none ) | Screwed |
| 1 | JIS B 2220 10K |
| 2 | JIS B 2220 20K |
| 3 | ANSI B16.5 Class 150 |
| 4 | ANSI B16.5 Class 300 |
| 5 | BS EN1092 PN10 |
| 6 | BS EN1092 PN16 |
| 7 | BS EN1092 PN25 |
| 8 | ANSI B16.47 Series A |
| 9 | ANSI B16.47 Series B |
| S | Customer defined |

| Standard of screw fittings | |
|---|---|
| ( none ) | Female Swivel Hexagon Nut |
| F | Female Swivel Hexagon Nut (Flat Head) |
| H | Female Swivel Hydraulic |
| P | Female Swivel Pin Lug Nut |

**Combination of fitting & flange**

0 Both Ends Female Union or Both ends bevel (end pipe)

1 Both Ends Male Union (Swivel Nut+Male Adaptor)

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.

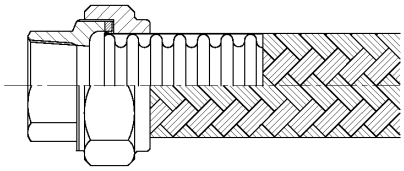
6 One End Female Swivel Nut, One End Male Nipple

7. Both Ends Loose Flange

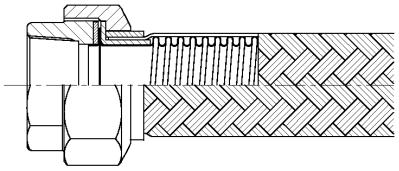
8. One End Fixed Flange, One End Loose Flange

9 Both Ends Fixed Flange

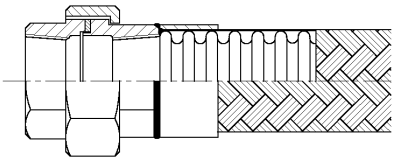
# Available Type of Connection



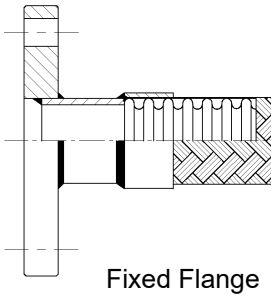
Female Union (Socket Welded)



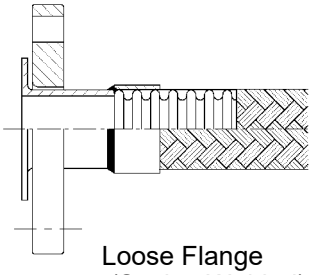
Union (Non Welding)



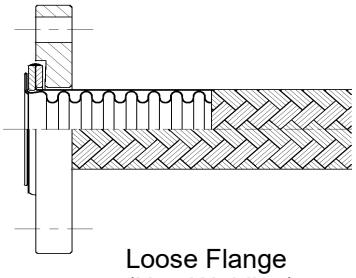
Union (Butt Welded)



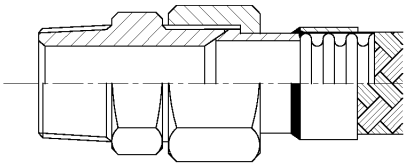
Fixed Flange



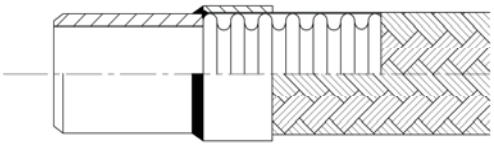
Loose Flange
(Socket Welded)



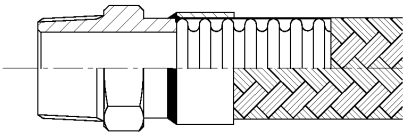
Loose Flange
(Non Welding)



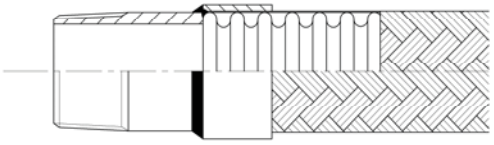
Male Union
(Swivel Nut + Male Adaptor)



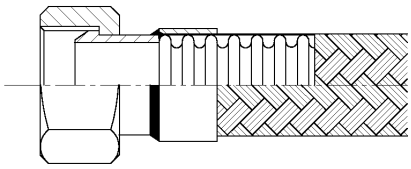
Bevelled End



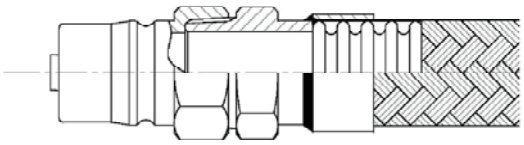
Male Nipple



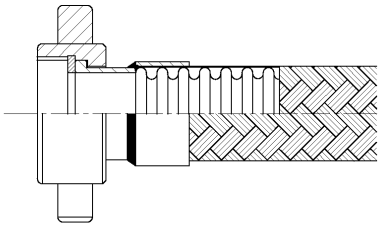
Thread End



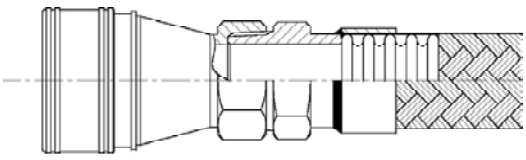
Female Swivel Nut



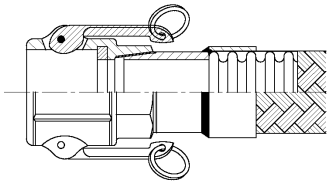
Male Nipple + -Quick Release Coupling–Male



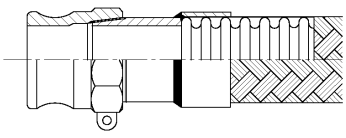
Pinlug Swivel Nut



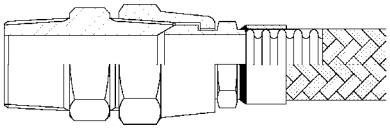
Male Nipple + Quick Release Coupling-Female



Thread End +
Camlock Part D



Thread End +
Camlock Part A



(Male Union)
Hydraulic Fitting

# Specification of Stainless Steel Tube

## Annular Tube (SUS304,SUS316L) with SUS 304 wire braid

- **Pressure rating 25 bars or up**

| Size A (Inch) | Type code | Type | ID (mm) | OD (mm) | Minimum Bending Radius (mm) | Max. W/P at room temp. ($kgf/cm^2$) |
|---|---|---|---|---|---|---|
| 10A(3/8") | ANR-010 | Annular-R | 10.8 | 15.2 | 150 | 75.8 |
| 12A(1/2") | ANR-012 | Annular-R | 13.4 | 17.6 | 165 | 50.7 |
| 20A(3/4") | ANR-020 | Annular-R | 19.1 | 25.2 | 225 | 33.1 |
| 25A(1") | ANR-025 | Annular-R | 25.2 | 32.7 | 260 | 25.1 |
| 32A (1-1/4") | ANR-032 | Annular-R | 32.9 | 40.6 | 300 | 26.6 |
| 40A (1-1/2") | ANR-040 | Annular-R | 39.3 | 47.6 | 340 | 31.3 |
| 50A (2") | ANR-050 | Annular-R | 50.8 | 61.0 | 390 | 25.7 |

- **Pressure rating 10 bars**

| Size A (Inch) | Type code | Type | ID (mm) | OD (mm) | Minimum Bending Radius (mm) | Max. W/P at room temp. ($kgf/cm^2$) |
|---|---|---|---|---|---|---|
| 65A (2-1/2") | AN-065 | Annular | 65 | 77 | 460 | 19.8 |
| 80A (3") | AN-080 | Annular | 79 | 94 | 660 | 11.4 |
| 100A (4") | AN-100 | Annular | 100 | 116 | 750 | 10.0 |
| 125A (5") | AN-125 | Annular | 125.2 | 146 | 1000 | 10.5 |
| 150A (6") | AN-150 | Annular | 150.2 | 173 | 1250 | 10.4 |
| 200A (8") | AN-200 | Annular | 200.1 | 229 | 1600 | 11.0 |
| 250A (10") | AN-250 | Annular | 250.3 | 281 | 2000 | 10.2 |
| 300A (12") | AN-300 | Annular | 300.4 | 331 | 2400 | 10.0 |
| 350A (14") | AN-350 | Annular | 350 | 385 | 2700 | 13.8 |
| 400A (16") | AN-400 | Annular | 400 | 440 | 3050 | 10.5 |

***Hose specification will change without noticed***
***Bending Radius according to ISO 10380**

# Specification of Stainless Steel Tube

## Annular Tube (SUS304,SUS316L) with SUS 304 wire braid

- **Pressure rating 16 bars**

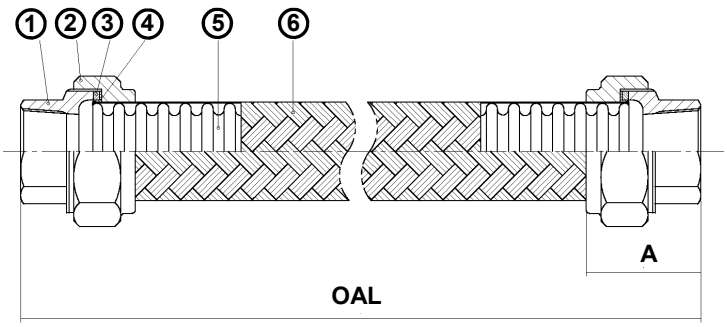
| Size A (Inch) | Type code | Type | ID (mm) | OD (mm) | Minimum Bending Radius (mm) | Max. W/P at room temp. ($kgf/cm^2$) |
|---|---|---|---|---|---|---|
| 65A(2-1/2") | AN-065 | Annular | 65 | 77 | 460 | 19.8 |
| 80A (3") | AN-080S | Annular-S | 79 | 94 | 660 | 20.7 |
| 100A (4") | AN-100S | Annular-S | 99.9 | 116.5 | 750 | 16.1 |
| 125A (5") | AN-125S | Annular-S | 124.8 | 149 | 1000 | 16.2 |
| 150A (6") | AN-150S | Annular-S | 150.0 | 173 | 1250 | 17.0 |
| 200A (8") | AN-200S | Annular-S | 199.8 | 228 | 1600 | 16.2 |
| 250A (10") | AN-250S | Annular-S | 250 | 282 | 2000 | 16.5 |
| 300A (12") | AN-300S | Annular-S | 300 | 333 | 2400 | 16.1 |
| 350A (14") | AN-350S | Annular-S | 349.6 | 385 | 2700 | 20.2 |
| 400A (16") | AN-400S | Annular-S | 399.8 | 440 | 3050 | 16.3 |

- **Pressure rating 25 bars**

| Size A (Inch) | Type code | Type | ID (mm) | OD (mm) | Minimum Bending Radius (mm) | Max. W/P at room temp. ($kgf/cm^2$) |
|---|---|---|---|---|---|---|
| 65A (2-1/2") | AN-065X | Annular-X | 64.9 | 77 | 460 | 25.1 |
| 80A (3") | AN-080X | Annular-X | 79 | 94 | 660 | 25.1 |
| 100A (4") | AN-100X | Annular-X | 99.7 | 116.5 | 750 | 25.3 |
| 125A (5") | AN-125X | Annular-X | 124.5 | 147 | 1000 | 27.2 |
| 150A (6") | AN-150X | Annular-X | 149.6 | 173 | 1250 | 30.4 |
| 200A (8") | AN-200X | Annular-X | 199.6 | 228.5 | 1600 | 25.7 |
| 250A (10") | AN-250X | Annular-X | 249.6 | 282 | 2000 | 25.8 |
| 300A (12") | AN-300X | Annular-X | 299.6 | 333 | 2400 | 25.1 |

***Hose specification will change without noticed***
***Bending Radius according to ISO 10380**

## SF100 Union Type Flexible Hose ( Welding Type)




| No. | Parts | Materials |
|---|---|---|
| 1 | Union End | FCMB |
| 2 | Union Nut | FCMB |
| 3 | Gasket | Non Asbestos |
| 4 | Union Ring | SUS304 |
| 5 | Flexible Tube | SUS304 |
| 6 | Wire Braid | SUS304 |

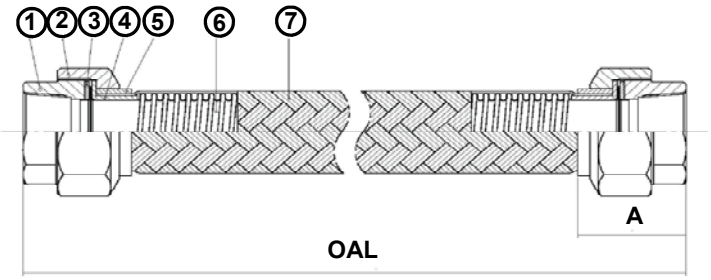
Max Working Temperature : 200°C
(For higher temperature, please consult us)

-SUS 304/SUS316L also available upon requested*
-Product size 15A design to use 12A hose
(ID Hose 13.4 mm)

Max Working Pressure : 25 bars

| Nominal Diameter A (Inch) | Thread Rc (Inch) | Min.Bending Radius (mm) | Overall Length | | | Ineffective Length Ax2 (mm) |
|---|---|---|---|---|---|---|
| | | | 300mm | 400mm | 500mm | |
| | | | Lateral Movement (mm) | | | |
| 15A (1/2”) | 1/2 | 165 | 51 | 100 | 161 | 70 |
| 20A (3/4”) | 3/4 | 225 | 33 | 70 | 117 | 85 |
| 25A (1”) | 1 | 260 | 28 | 59 | 101 | 90 |
| 32A (1.1/4”) | 1.1/4 | 300 | 22 | 49 | 85 | 100 |
| 40A (1.1/2”) | 1.1/2 | 340 | 18 | 40 | 72 | 110 |
| 50A (2”) | 2 | 390 | 14 | 33 | 60 | 120 |

## SF100 NW Union Type Flexible Hose (Non Welding )




| No. | Parts | Materials |
|---|---|---|
| 1 | Union End | FCMB |
| 2 | Union Nut | FCMB |
| 3 | Union Gasket | Non Asbestos |
| 4 | Lap Ring | SS400 |
| 5 | Collar | SS400 |
| 6 | Flexible Tube | SUS304,SUS316L |
| 7 | Wire Braid | SUS304 |

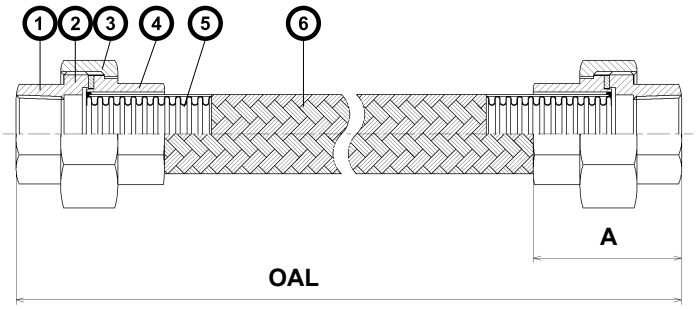
*Product size 15A design to use 12A hose (ID hose 13.4 mm)
*Max Working Temperature: 200 °C
(For higher temperature, plese consult us)

Max Working Pressure: 16 bars

| Nominal Diameter A (Inch) | Thread Rc (Inch) | Min.Bending Radius (mm) | Overall Length | | | Ineffective Length Ax2 (mm) |
|---|---|---|---|---|---|---|
| | | | 300mm | 400mm | 500mm | |
| | | | Lateral Movement (mm) | | | |
| 15A (1/2”) | 1/2 | 165 | 45 | 92 | 151 | 85 |
| 20A (3/4”) | 3/4 | 225 | 32 | 68 | 115 | 90 |
| 25A (1”) | 1 | 260 | 23 | 52 | 92 | 110 |
| 32A (1.1/4”) | 1.1/4 | 300 | 20 | 46 | 81 | 110 |
| 40A (1.1/2”) | 1.1/2 | 340 | 17 | 39 | 70 | 115 |
| 50A (2”) | 2 | 390 | 15 | 34 | 62 | 115 |

| | |
|---|---|
| **Applicable fluid** | **Oil, Water, Hot Water, Steam, Gas, Air** |
| **Working pressure** | **Please refer to spiral & annular tube and fitting.** |
| **Standard test pressure** | **1.5 Times of working pressure** |
| **Bursting pressure** | **4 Times of working pressure** |

## SF101 Union Type Flexible Hose (Welding Type)



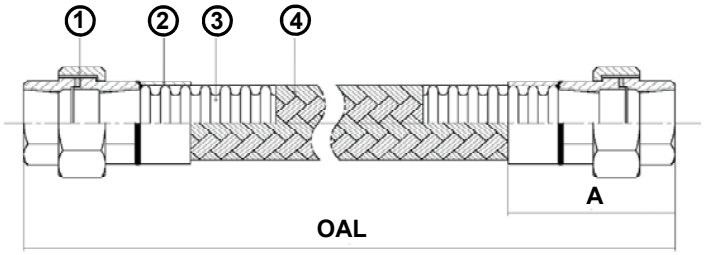

*Product size 15A design to use 12A hose (ID Hose 13.4 mm)

| No. | Parts | Materials |
|---|---|---|
| 1 | Union Screw End | SUS304 |
| 2 | Gasket | PTFE |
| 3 | Union Nut | SUS304 |
| 4 | Union Swivel End | SUS304 |
| 5 | Flexible Tube | SUS304 |
| 6 | Wire Braid | SUS304 |

*Max Working Temperature: 250 °C
*Max Working Pressure: 25 bars

| Nominal Diameter A (Inch) | Thread Rc (Inch) | Min.Bending Radius (mm) | Overall Length | | | Ineffective Length Ax2 (mm) |
|---|---|---|---|---|---|---|
| | | | 300mm | 400mm | 500mm | |
| | | | Lateral Movement (mm) | | | |
| 15A (1/2") | 1/2 | 165 | 46 | 93 | 153 | 82 |
| 20A (3/4") | 3/4 | 225 | 33 | 69 | 116 | 88 |
| 25A (1") | 1 | 260 | 26 | 57 | 98 | 97 |
| 32A (1.1/4") | 1.1/4 | 300 | 20 | 46 | 81 | 108 |
| 40A (1.1/2") | 1.1/2 | 340 | 18 | 41 | 73 | 108 |
| 50A (2") | 2 | 390 | 13 | 31 | 58 | 128 |

## SF300 Series Union Type Flexible Hose




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

*Product size 15A design to use 12A hose (ID Hose 13.4 mm)

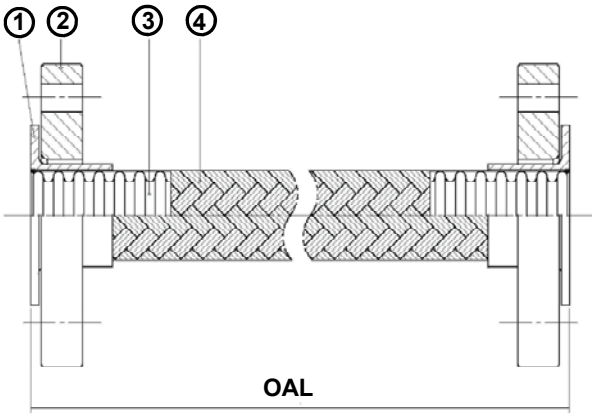
*Max Working Temperature : 250°C
*Max working pressure: 25 bars

| Nominal Diameter A (Inch) | Min. Bending Radius (mm) | Overall Length | | | Ineffective Length A x 2 (mm) |
|---|---|---|---|---|---|
| | | 300mm | 400mm | 500mm | |
| | | Eccentric (mm) | | | |
| 15A (1/2”) | 165 | 34 | 77 | 133 | 114 |
| 20A (3/4”) | 225 | 19 | 49 | 91 | 138 |
| 25A (1”) | 260 | 13 | 37 | 72 | 158 |
| 32A (1.1/4”) | 300 | 7 | 26 | 54 | 184 |
| 40A (1.1/2”) | 340 | 4 | 18 | 42 | 206 |
| 50A (2”) | 390 | 3 | 14 | 33 | 220 |

# SF 6700 Series Stainless Steel Flexible Hose (Contacting Fluid All Stainless Steel)

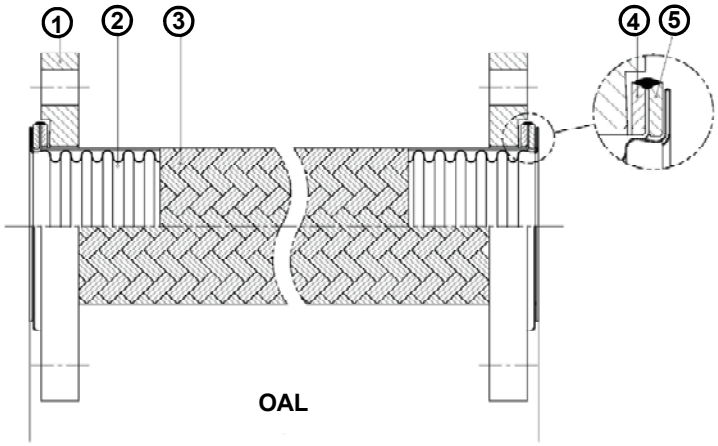
**SF67X1, FLANGE JIS10K**
**SF67X2, FLANGE JIS20K**
**SF67X3, FLANGE ANSI150**
**SF67X4, FLANGE ANSI 300**
**SF67X5, FLANGE PN10**
**SF67X6, FLANGE PN16**
**SF67X7, FLANGE PN25**

## For 15A-100A (SW Type)




| No. | Parts | Materials |
|---|---|---|
| 1 | Lap Ring | SUS304 |
| 2 | Loose Flange | SS400 (Zinc-plate) |
| 3 | Flexible Tube | SUS304, SUS316L |
| 4 | Wire Braid | SUS304 |

## For 65A-300A (NW Type)




| No. | Parts | Materials |
|---|---|---|
| 1 | Non Welding Flange | SS400 (Zinc-Plated) |
| 2 | Flexible tube | SUS304 or SUS316L |
| 3 | Wire braid | SUS 304 |
| 4 | Back rings | SUS 304 |
| 5 | Front rings | SUS 304 |

*Product size 15A design to use 12A hose (ID Hose 13.4 mm)

*Max Working Temperature : 250°C
*Max working pressure: 25 bars

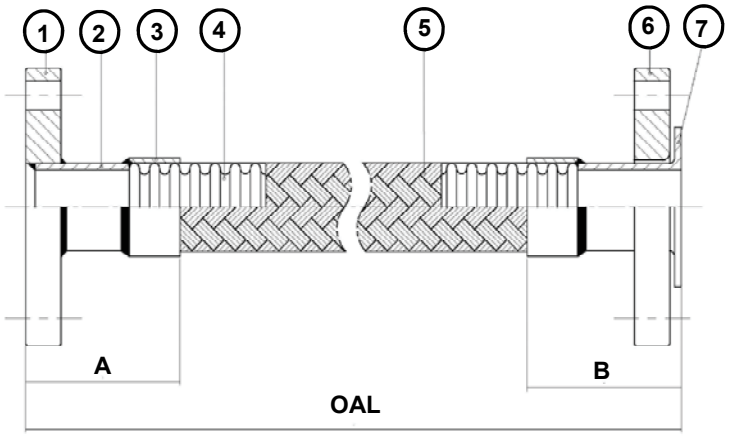
| Type | Nominal Diameter A (Inch) | Min bending radius (mm) | Max static Lateral Movement | | | Ineffective Length (mm) |
|---|---|---|---|---|---|---|
| | | | 300mm OAL | 400mm OAL | 500mm OAL | |
| SW | 15A(1/2”) | 165 | 66 | 119 | 183 | 36 |
| | 20A(3/4”) | 225 | 50 | 92 | 144 | 36 |
| | 25A(1”) | 260 | 43 | 81 | 128 | 36 |
| | 32A(1.1/4”) | 300 | 37 | 69 | 111 | 40 |
| | 40A(1.1/2”) | 340 | 32 | 61 | 98 | 43 |
| | 50A(2”) | 390 | 28 | 53 | 86 | 43 |
| SW/NW | 65A(2.1/2”) | 460 | 21 | 42 | 70 | 56 |
| | 80A(3”) | 660 | 15 | 29 | 49 | 59 |
| | 100A(4”) | 750 | 13 | 26 | 43 | 59 |
| NW | 125A(5”) | 1000 | 9 | 19 | 32 | 62 |
| | 150A(6”) | 1250 | 7 | 14 | 24 | 73 |
| | 200A(8”) | 1600 | 5 | 11 | 18 | 80 |
| | 250A(10”) | 2000 | 4 | 8 | 14 | 84 |
| | 300A(12”) | 2400 | 3 | 7 | 12 | 90 |

- **Protect Galvanic Corrosion of contacting fluid steel parts.**

| | |
|---|---|
| **Applicable fluid** | **Oil, Water,Hot Water,Steam, Gas,Air** |
| **Limited Working pressure** | **Limited of flange and hose rating** |
| **Standard test pressure** | **1.5 times of working pressure** |
| **Bursting pressure** | **4 times of working pressure** |

**Noted: SF6700 have more lateral movement than 7800 & 7700 for the same size and total length.**

# SF 7700 & 7800 Series Flange Type Flexible Hose (Wire Braid Type)




**SF77X1, SF78X1 FLANGE JIS10K**
**SF77X2, SF78X2 FLANGE JIS20K**
**SF77X3, SF78X3 FLANGE ANSI150**
**SF77X4, SF78X4 FLANGE ANSI 300**
**SF77X5, SF78X5 FLANGE PN10**
**SF77X6, SF78X6 FLANGE PN16**
**SF77X7, SF78X7 FLANGE PN25**

| No. | Part | Material |
|---|---|---|
| 1 | Fixed Flange | SS400, SUS304 |
| 2 | Short Pipe | SS400, SUS304 |
| 3 | Collar | SUS304 |
| 4 | Flexible Tube | SUS304 |
| 5 | Wire Braid | SUS304 |
| 6 | Loose Flange | SS400,SUS304 |
| 7 | Lap Joint / Stub End | CS,SUS304 |

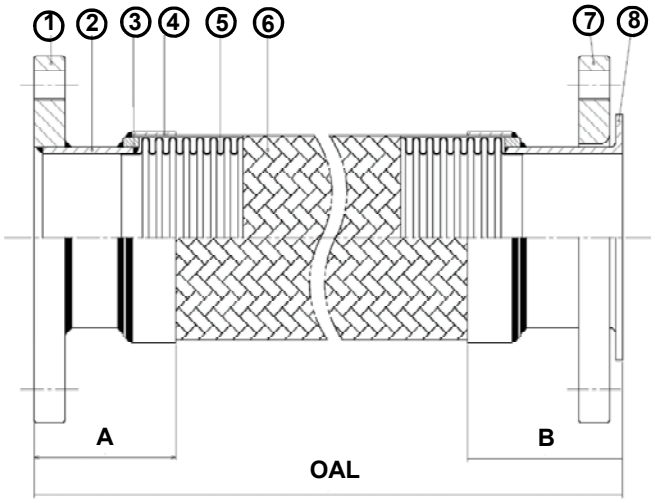
Max Working Temperature : 250°C
Max working pressure: 25 bars
(16 bar for size 350A-400A)

| Nominal Diameter A (Inch) | Min. Bending Radius (mm) | Overall Length | | | Ineffective Length A + B (mm) |
|---|---|---|---|---|---|
| | | 300mm | 400mm | 500mm | |
| | | Eccentric (mm) | | | |
| 25A (1”) | 260 | 14 | 39 | 75 | 150 |
| 32A (1.1/4”) | 300 | 10 | 30 | 60 | 165 |
| 40A (1.1/2”) | 340 | 7 | 23 | 49 | 180 |
| 50A (2”) | 390 | 6 | 21 | 43 | 180 |
| 65A (2.1/2”) | 460 | 5 | 17 | 37 | 180 |
| 80A (3”) | 660 | 3 | 10 | 23 | 200 |
| 100A (4”) | 750 | 2 | 9 | 20 | 200 |
| 125A (5”) | 1000 | 2 | 7 | 15 | 200 |
| 150A (6”) | 1250 | 1 | 5 | 12 | 200 |
| 200A (8”) | 1600 | 1 | 3 | 8 | 230 |
| 250A (10”) | 2000 | - | 2 | 6 | 230 |
| 300A (12”) | 2400 | - | 2 | 5 | 230 |

**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.”

## SF 9800 Series Flange Type Flexible Hose (Ribbon Braid Type)

**SF98X1- FLANGE JIS10K**
**SF98X3- FLANGE ANSI150**




| No. | Parts | Materials |
|---|---|---|
| 1 | Fixed Flanges | SS400, SUS304 |
| 2 | Short pipe | SS400, SUS304 |
| 3 | Band | SS400,SUS304 |
| 4 | Collar | SUS304 |
| 5 | Flexible Tube | SUS304 |
| 6 | Ribbon Braid | SUS304 |
| 7 | Loose Flange | SS400,SUS304 |
| 8 | Lap Joint / Stub End | SS400.SUS304 |

Max. Working Temperature : 250°C
Max working pressure: 150 PSI (10 bars)
* Please consult us for bigger size

| Nominal Diameter A (Inch) | Min.Bending Radius (mm) | Overall Length | | | Ineffective Length A + B (mm) |
|---|---|---|---|---|---|
| | | 800mm | 1000mm | 1200mm | |
| | | Eccentric (mm) | | | |
| 350A(14”) | 2700 | 16 | 31 | 51 | 290 |
| 400A(16”) | 3050 | 14 | 28 | 45 | 290 |
| 450A(18”) | 3200 | 10 | 21 | 36 | 370 |
| 500A(20”) | 3550 | 9 | 19 | 32 | 370 |
| 600A(24”) | 3850 | 8 | 17 | 30 | 370 |

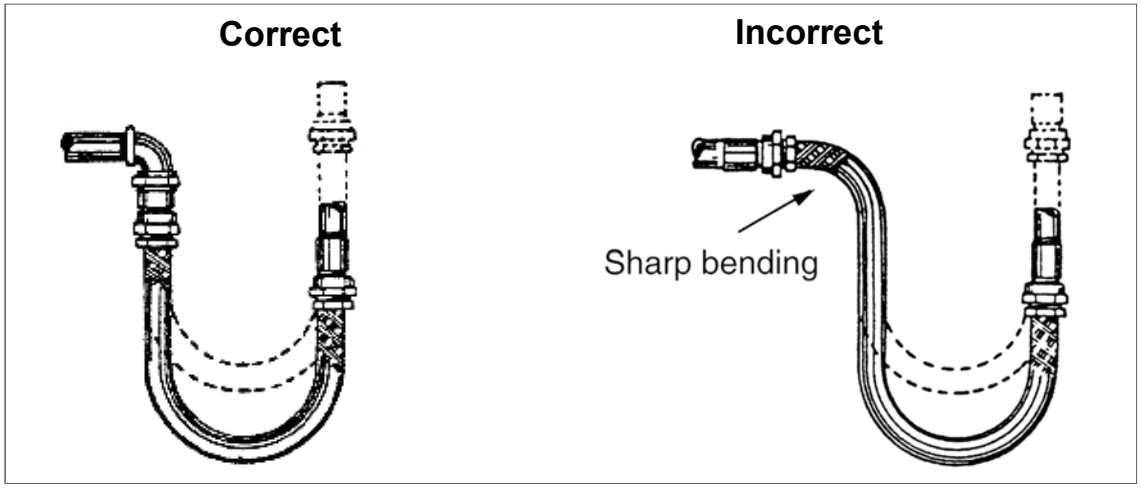
| | |
|---|---|
| **Applicable Fluid** | **Oil, Water,Hot Water,Steam, Gas,Air** |
| **Limited Working pressure** | **Limited of flange and hose rating** |
| **Standard test pressure** | **1.5 Times of working pressure** |
| **Bursting pressure** | **4 Times of working pressure** |

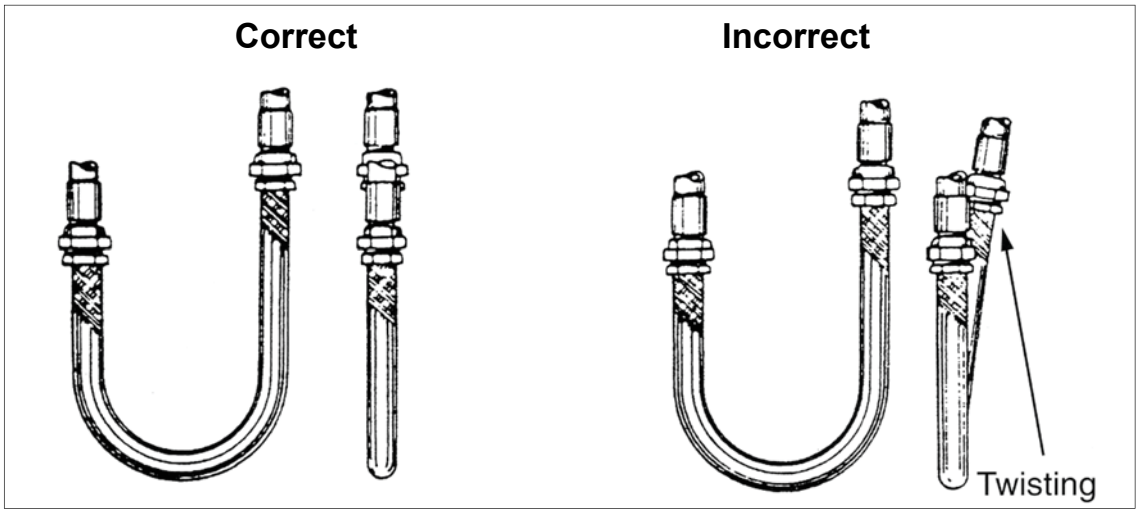
# Precaution in Piping Method

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

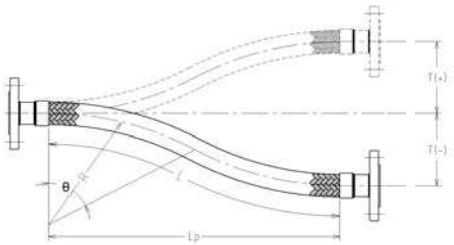
- Metal flexible hoses should not be bent to a radius smaller than recommended in their specifications, otherwise fatigue and premature failure will occur.
- Avoid twisting of metal flexible hoses.
- Always install metal flexible hoses so that movement originates in the same plane as the centerline.

## 1 Proper Flexible Hose Installation



# 2 Calculation for Hose Length (L) with Movement

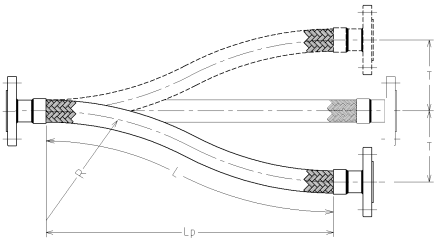


## 1.Lateral offset Movement

### 1.1. Theoretical displacement by geometric calculation

**Max. offset distance by geometric calculation**

**Bend Angle $\theta = 28.65\ L/R$**
**$L = 0.035R \times COS^{-1}\ (1-T/2R)$**
**$Lp = 2R\ SIN\ (COS^{-1}\ (1-T/2R))$**

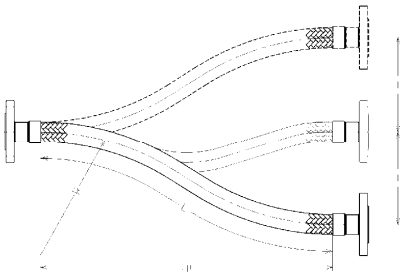


### 1.2. Practical application with a free retractable end

**Recommended Length (L) for offset movement (Static with one end free)**

$$L = \sqrt{6(RT) + T^2}$$

$$Lp = \sqrt{L^2 - T^2}$$



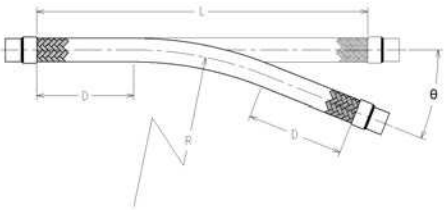
### 1.3 Practical application with both fixed ends

**Recommend Length (L) for offset movement (Static with both end fixed)**

$$L = \sqrt{20(RT)}$$

$$Lp = \sqrt{L^2 - T^2}$$

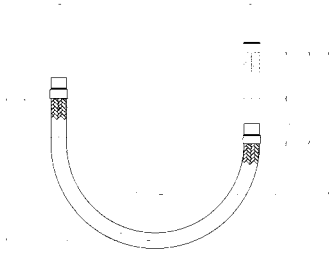
**( For repeatedly or dynamic movement "T" should not exceed 25% of "R")**



## 2. Angular Movement

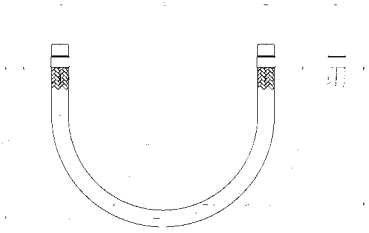
**$L = 2D + (\theta/57.3)R$**

## 3. U-Loop arrangement



### 3.1 Traveling Loop "A"

**$L = 4R + 0.5T$**
**$K = 1.43R + 0.5T$**

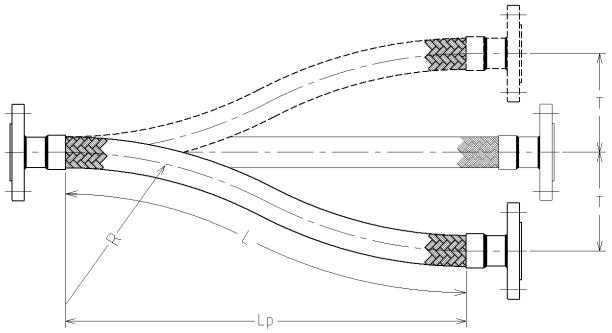


### 3.2 Travelling Loop "B"

**$L = 4R + 1.57T$**
**$K1 = 1.43R + 0.785T$**
**$K2 = 1.43R + 0.5T$**

# Recommend Effective Length for Lateral offset Movement

## Static application 1: with one end free or allowed to pull in

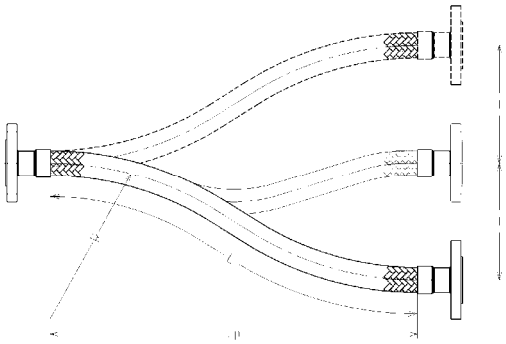



| Nominal Diameter A (B) | Minimum Bending Radius (mm) | Lateral Movement in mm (T) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 25 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 |
| 10A(3/8") | 150 | 153 | 218 | 271 | 317 | 397 | 470 | **546** | **656** | **874** | **1092** |
| 12A(1/2") | 165 | 160 | 229 | 283 | 331 | 414 | 488 | **546** | **656** | **874** | **1092** |
| 20A(3/4") | 225 | 186 | 265 | 327 | 381 | 475 | 557 | 633 | 704 | **874** | **1092** |
| 25A(1") | 260 | 200 | 284 | 351 | 408 | 507 | 594 | 673 | 747 | 886 | **1092** |
| 32A(1-1/4") | 300 | 214 | 305 | 375 | 436 | 541 | 633 | 716 | 794 | 939 | **1092** |
| 40A(1-1/2") | 340 | 228 | 324 | 399 | 463 | 574 | 670 | 757 | 838 | 988 | 1127 |
| 50A(2") | 390 | 244 | 346 | 426 | 494 | 612 | 713 | 805 | 890 | 1047 | 1192 |
| 65A(2-1/2") | 460 | 264 | 375 | 462 | 535 | 661 | 770 | 868 | 959 | 1125 | 1277 |
| 80A(3") | 660 | 316 | 448 | 551 | 638 | 786 | 913 | 1026 | 1131 | 1321 | 1494 |
| 100A(4") | 750 | 337 | 477 | 586 | 679 | 836 | 970 | 1090 | 1200 | 1400 | 1582 |
| 125A(5") | 1000 | 389 | 550 | 675 | 782 | 961 | 1114 | 1250 | 1375 | 1600 | 1803 |
| 150A(6") | 1250 | 434 | 615 | 754 | 872 | 1072 | 1241 | 1392 | 1530 | 1778 | 2000 |
| 200A(8") | 1600 | 491 | 695 | 852 | 985 | 1210 | 1400 | 1570 | 1724 | 2000 | 2248 |
| 250A(10") | 2000 | 549 | 777 | 952 | 1100 | 1350 | 1563 | 1750 | 1921 | 2228 | 2500 |
| 300A(12") | 2400 | 601 | 850 | 1042 | 1205 | 1478 | 1709 | 1914 | 2100 | 2434 | 2730 |

- **Figures in blue color cells are limited for static movement**
- **Figures in bold fonts are adjusted with length retraction below 10%**

# Recommend Effective Length for Lateral offset Movement

## Static application 2: Crowded position with both end fixed and not allowed to move in



| Nominal Diameter A (B) | Minimum Bending Radius (mm) | Lateral Movement in mm (T) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 25 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 500 |
| 10A(3/8") | 150 | 274 | 388 | 475 | 548 | 671 | **815** | **1016** | **1220** | **1630** | **2035** |
| 12A(1/2") | 165 | 288 | 407 | 498 | 575 | 704 | **815** | **1016** | **1220** | **1630** | **2035** |
| 20A(3/4") | 225 | 336 | 475 | 581 | 671 | 822 | 949 | 1061 | **1220** | **1630** | **2035** |
| 25A(1") | 260 | 361 | 510 | 625 | 722 | 884 | 1020 | 1141 | 1249 | **1630** | **2035** |
| 32A(1-1/4") | 300 | 388 | 548 | 671 | 775 | 949 | 1096 | 1225 | 1342 | **1630** | **2035** |
| 40A(1-1/2") | 340 | 413 | 584 | 715 | 825 | 1010 | 1167 | 1304 | 1429 | 1650 | **2035** |
| 50A(2") | 390 | 442 | 625 | 765 | 884 | 1082 | 1249 | 1397 | 1530 | 1767 | **2035** |
| 65A(2-1/2") | 460 | 480 | 679 | 831 | 960 | 1175 | 1357 | 1517 | 1662 | 1919 | 2145 |
| 80A(3") | 660 | 575 | 813 | 995 | 1149 | 1408 | 1625 | 1817 | 1990 | 2298 | 2570 |
| 100A(4") | 750 | 613 | 867 | 1061 | 1225 | 1500 | 1733 | 1937 | 2122 | 2450 | 2739 |
| 125A(5") | 1000 | 708 | 1000 | 1225 | 1415 | 1733 | 2000 | 2237 | 2450 | 2829 | 3163 |
| 150A(6") | 1250 | 791 | 1119 | 1370 | 1582 | 1937 | 2237 | 2500 | 2739 | 3163 | 3536 |
| 200A(8") | 1600 | 895 | 1265 | 1550 | 1789 | 2191 | 2530 | 2829 | 3099 | 3578 | 4000 |
| 250A(10") | 2000 | 1000 | 1415 | 1733 | 2000 | 2450 | 2829 | 3163 | 3465 | 4000 | 4473 |
| 300A(12") | 2400 | 1096 | 1550 | 1898 | 2191 | 2684 | 3099 | 3465 | 3795 | 4382 | 4899 |

- **Figures in blue color cells are limited for static movement**
- **Figures in bold fonts are adjusted with length elongation below 3%**


A joint reliance

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