



# Swagelok Hoses

Hose & Flexible Tubing

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## Metal Hose & Tubing



FX Series Metal Hose



FM Series Metal Hose



FJ Series Metal Hose



FL Series Metal Hose



CT Series Convoluted Metal Tubing

## Teflon Hose & Tubing



T Series PTFE Hose



B Series PTFE Hose



X Series PTFE Hose



C Series PTFE Hose



N Series PTFE Hose



W Series PTFE Hose



U Series PFA Hose



F Series PTFE Hose



S Series PTFE Hose



PFA Series PFA Tubing

## End Connections



Male Pipe Threads, NPT and ISO/BSP Tapered



Female Pipe Threads, NPT



Swagelok Tube Adapters



Swagelok Tube Fittings

## Thermoplastic Hose



7P Series Polyethylene Hose



7R and 8R Series Nylon Hose



7N and 8N Series Nylon Hose

## Other Hose & Tubing



NG Series Nylon Hose



LT Series Vinyl Tubing



PB Series Rubber Hose

## Quick Connects



QC Series



QF Series



QM Series



QTM Series

## Considerations for selection a hose assembly solution

### Temperature

Identify the minimum and maximum temperatures the hose assembly will be exposed to with regard to the system media and the environment.

### Pressure

Identify the minimum and maximum pressures (or vacuum) within and outside the hose assembly.

### Material

Identify the system media and the environment to which the hose assembly will be exposed. This will help determine the materials of construction best suited to the application demands and whether the hose requires a static dissipative core.

### Movement

Confirm whether the hose assembly will be installed in dynamic applications as this will require different considerations than a static application.

### Length

Determine the most likely route for installation of the hose, and use this to identify length requirements.

### Orientation

Clarify space constraint concerns. Hose assemblies with elbows and union ball joints may help resolve space constraint issues.

### Desired Flow

Consider desired flow. Hose connection size, core tube construction, and routed installation may impact flow.

### Drainability

Consider core construction as this will impact drainability.

### Test Reports

Identify the need for documentation in the form of test reports.

### Special Testing

Many applications may require testing to requirements different from the production tests listed. For example, metal hose assemblies undergo an inboard helium leak test to a maximum leak rate of  $1 \times 10^{-5}$  std cm<sup>3</sup>/s. If your application uses liquid at a positive pressure, you may request an additional hydrostatic proof test.

### Special Marking

Discuss special marking requirements; there are different options available to readily identify hose assemblies.

### Documentation and Regulatory Requirements

Identify the need for special regulatory approvals or documentation.

### Additional Protection and Covers

Identify whether covers are necessary for additional protection of the hose assemblies or surrounding systems.



### Cleanliness

Identify the need for cleanliness. Ease of cleaning the internal surfaces of the hose, as well as maintaining outside cleanliness may be of concern.

### End Connection

Identify the type of end connections which are most compatible with the system requirements. End connections differ with regard to materials of construction and pressure ratings.

## Extra information about selection of hoses

Series	Materials of Construction		
	Core	Reinforcement	Cover
<b>Metal Hose</b>			
FX	Convolute 316L SS	321 SS braid standard; 316L SS braid available	—
FM	Convolute 316L SS	316L SS braid	—
FJ	Convolute 316L SS	304 SS braid standard; 316L SS braid available	—
FL	Convolute 316L SS	321 SS braid	—
<b>Metal Flexible Tubing</b>			
CT	Convolute 321 SS	—	—
<b>Fluoropolymer Hose</b>			
T	Smooth-bore PTFE <sup>①</sup>	304 SS braid standard; 316L SS and alloy 400 braid available	—
B	Smooth-bore PTFE	304 SS braid	—
X	Smooth-bore PTFE <sup>①</sup>	Fiber braid with 304 SS braid	—
S	Smooth-bore PTFE <sup>①</sup>	Fiber braid with 304 SS braid	Silicone
C	Convolute PTFE <sup>①</sup>	300 series SS braid	No cover standard; silicone cover available
N	Convolute, carbon black-filled PTFE	Insulating wrap and aramid fiber braid	—
W	Smooth-bore, carbon black-filled PTFE	Fiber braid with insulating wrap and 304 SS braid	Silicone
F	Smooth-bore PTFE <sup>①</sup>	Fiber braid	—
U	Smooth-bore PFA <sup>②</sup>	302 SS braid	Silicone
<b>PFA Tubing</b>			
PFA	Smooth-bore PFA	—	—
<b>Vinyl Tubing</b>			
LT	Smooth-bore clear vinyl	—	—
<b>Nylon Hose</b>			
NG	Smooth-bore, static dissipative nylon	Fiber braid	Perforated black polyurethane with blue stripe
7R	Smooth-bore nylon	Fiber braid	Perforated black polyurethane
8R	Smooth-bore nylon	Fiber braid	Perforated black polyurethane
7N	Smooth-bore, nonconductive nylon	Fiber braid	Nonperforated orange polyurethane
8N	Smooth-bore, nonconductive nylon	Fiber braid	Nonperforated orange polyurethane
<b>Polyethylene Hose</b>			
7P	Smooth-bore polyethylene	Fiber braid	Nonperforated blue polyurethane
<b>Rubber Hose</b>			
PB	Smooth-bore Buna N	Synthetic fiber braid	Blue Buna N (other colors available)

<sup>①</sup> Carbon black-filled PTFE core is available for applications that require static dissipation.

<sup>②</sup> Carbon black-filled PFA core is available for applications that require static dissipation.

## Extra information about selection of hoses

Series	Nominal Hose Size, in.										Temperature Range °F (°C)
	Working Pressure at 70°F (20°C), psig (bar)										
	1/8	3/16	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	
<b>Metal Hose</b>											
FX	–	–	6000 (413)	–	4500 (310)	–	–	–	–	–	–325 to 1000 (–200 to 537)
FM	–	–	3100 (213)	2000 (137)	1800 (124)	1500 (103)	1200 (82.6)	950 (65.4)	900 (62.0)	500 (34.4)	–325 to 850 (–200 to 454)
FJ	–	–	1600 (110)	1470 (101)	1110 (76.4)	860 (59.2)	680 (46.8)	680 (46.8)	520 (35.8)	450 (31.0)	–325 to 800 (–200 to 426)
FL	–	–	1500 (103)	–	1200 (82.6)	–	–	–	–	–	–325 to 850 (–200 to 454)
<b>Metal Flexible Tubing</b>											
CT	–	–	100 (6.8)	25 (1.7)	25 (1.7)	25 (1.7)	25 (1.7)	–	25 (1.7)	–	70 to 1000 (20 to 537)
<b>Fluoropolymer Hose</b>											
T	–	–	3000 <sup>①</sup> (206)	2500 (172)	2000 (137)	1500 (103)	1000 (68.9)	–	–	–	–65 to 450 <sup>②</sup> (–53 to 230)
B	3000 (206)	–	–	–	–	–	–	–	–	–	
X	–	–	3500 (241)	3000 (206)	1800 (124)	1250 (86.1)	1000 (68.9)	–	–	–	
S	3000 (206)	–	3500 (241)	3000 (206)	1800 (124)	1250 (86.1)	1000 (68.9)	–	–	–	
C	–	–	–	–	1500 (103)	1100 (75.7)	750 (51.6)	–	700 (48.2)	525 (36.1)	
N	–	–	–	1250 (86.1)	750 (51.6)	375 (25.8)	–	–	–	–	
W	–	–	–	750 (51.6)	750 (51.6)	500 (34.4)	–	–	–	–	
F	–	–	800 (55.1)	650 (44.7)	450 (31.0)	325 (22.3)	–	–	–	–	
U	–	–	–	–	300 (20.6)	300 (20.6)	250 (17.2)	–	200 (13.7)	150 (10.3)	–65 to 400 (–53 to 204)
<b>PFA Tubing</b>											
PFA	275 (18.9)	–	275 (18.9)	180 (12.4)	125 (8.6)	83 (5.7)	61 (4.2)	–	–	–	70 to 400 (20 to 204)
<b>Vinyl Tubing</b>											
LT	40 (2.7)	30 (2.0)	25 (1.7)	15 (1.0)	10 (0.68)	–	–	–	–	–	–40 to 165 (–40 to 73)
<b>Nylon Hose</b>											
NG	–	–	5000 (344)	5000 (344)	–	–	–	–	–	–	–40 to 150 (–40 to 65)
7R	–	–	2750 (189)	2250 (155)	2000 (137)	–	–	–	–	–	–40 to 200 (–40 to 93)
8R	–	–	5000 (344)	4000 (275)	3500 (241)	2250 (155)	2000 (137)	–	–	–	–40 to 200 (–40 to 93)
7N	–	–	2750 (189)	2250 (155)	2000 (137)	–	–	–	–	–	–40 to 200 (–40 to 93)
8N	–	–	–	–	–	2250 (155)	–	–	–	–	–40 to 200 (–40 to 93)
<b>Polyethylene Hose</b>											
7P	–	–	2750 (189)	2250 (155)	2000 (137)	1500 (103)	1500 (103)	–	–	–	–10 to 150 (–23 to 65)
<b>Rubber Hose</b>											
PB	–	–	350 (24.1)	300 (20.6)	300 (20.6)	300 (20.6)	300 (20.6)	–	–	–	–40 to 200 <sup>③</sup> (–40 to 93)

① T series hose with alloy 400 braid is rated to 1500 psig (103 bar).

② C series hose is rated from –20 to 340°F (–28 to 171°C) in the 1 1/2 and 2 in. nominal hose sizes.

③ PB series hose is rated from –20 to 200°F (–28 to 93°C) in the 1 in. nominal hose size.



## Extra information about selection of hoses

Series	Name	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1 1/2"	2"	Positioning
FM	<b>Flexible Metal</b>									Higher Pressure/Robust
FJ	<b>Flexible Japan</b>									Flexibility/Price
B	<b>Braided Teflon</b>									1/8" Availability
T	<b>Teflon Hose</b>					Kinking				Permeability Resistance
X	<b>X-Tra Braid</b>									Flexible Small Sizes
C	<b>Convolute Teflon</b>									Flexible Large Sizes
S	<b>Silicone Cover</b>									Silicone Cover - Flexible Small Sizes
U	<b>Ultra Flexible</b>				Expensive					Silicone Cover - Flexible Large Sizes
7R	SAE J517 100 <b>R7</b>									Lower Pressure Hydraulic - Outgassing
8R	SAE J517 100 <b>R8</b>									Higher Pressure Hydraulic - Outgassing
7N	<b>Non Conductive</b>									Non-conductive 7R Hydraulic - No Outgassing
8N	<b>Non Conductive</b>									Non-conductive 8R Hydraulic - No Outgassing
PB						Need Push-on Tool				General low pressure all-purpose

 Available  Use Caution

Industry	Value Proposition	Series	Key Feature(s)	Patented	Pressure Range PSI (BAR)	Size	Inner-core	Cover
General Industrial	The flexibility of the X series product is far better than other competitive smoothbore PTFE stainless steel braided designs	X	Flexibility	Yes	1000 - 3500 (68.9 - 241)	1/4 - 1 inch	Smoothbore Teflon	Stainless
	FJ/FM are flexible solutions for gas applications where permeability and/or temperature is a concern	FJ/FM	Permeation Resistance/Temp	No	450 - 3100 (31.0 - 213)	1/4" - 2 inch	Convolute Metal	Stainless
Chemical	The convolute inner core design offers extreme flexibility with the benefits of Teflon's compatibility. Larger sizes hoses are often required in chemical; > 3/4 inch	C	Flexibility	No	525 - 1500 (36.1 - 103)	1/2 - 2 inch	Convolute Teflon	Stainless
Pharm/Biotech	Smoothbore Teflon is required because of purity requirements, but Teflon is typically not flexible. The U & S series hoses offer superb flexibility and come with smooth silicone covers for external cleanability. S series is good in 1/8 thru 3/4 inch sizes. U series is recommended in 1 thru 2 inch sizes. Ideal for load cell / weigh scale applications and steam lines where exterior insulating protection may be required	S	Flexibility/smooth silicone cover/cleanable	Yes	1000 - 3000 (68.9 - 206)	1/8 - 1 inch	Smoothbore Teflon	Silicone
		U			150 - 300 (10.3 - 20.6)	1/2 - 2 inch		
Laboratory	The availability of these products in 1/8 inch size makes them ideal for laboratory lines. Benefits of Teflon with extreme flexibility	B	Available in 1/8 inch size	No	3,000 (206)	1/8 inch	Smoothbore Teflon	Stainless
		S		Yes	1000 - 3000 (68.9 - 206)	1/8 - 1 inch	Smoothbore Teflon	Silicone
Semiconductor	Heat exchanger/Chiller applications requiring hose products that offer insulation to prevent "frosting" typically caused with the temperature extremes of internal versus room temperatures. Heat exchanger fluids are glycol, galden, or flourinert which prefer a Teflon wetted surface. The W series hose is designed for these application requirements and illustrate flexibility in combination of insulation.	W	Insulating design	Yes	1000 (68.9)	3/8 - 3/4 inch	Smoothbore Teflon - Static Dissipative	Silicone (Blue/White/Red/Black)
Food & Beverage	Rubber inner core hose is often used in food, beverage, and dairy applications because they meet the approvals of the industry. However, Teflon would be the ideal material choice if the products could offer the flex characteristics of rubber since Teflon is more pure - does not impart taste nor odor. The U series offers these flex characteristics and available in the larger sizes needed to service these applications.	U	Flexibility/imparts no taste nor odor/cleanable	Yes	150 - 300 (10.3 - 20.6)	1/2 - 2 inch	Smoothbore Teflon	Silicone

## Installation topics to extend the life of your hoses

### Inspection

Establish an inspection schedule based on system application and replacement history.

### Electrostatic Discharge

Static electricity can be generated by fluid passing through the hose. Select hose with sufficient conductivity to ground the static electric charge and allow static dissipation. If static electricity generation is possible within an application, choose static dissipative hose and properly ground to earth.

### Vibration

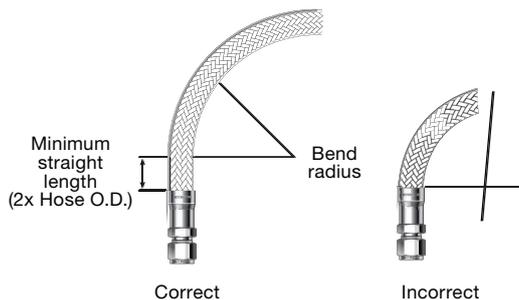
Evaluate amount of system vibration when selecting hose. Metal hose may not be appropriate for systems with constant or severe vibration.

### Length

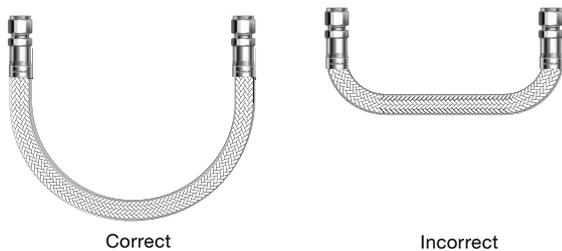
Take into consideration hose movement, system pressurization, and thermal expansion when determining hose length. Installing hose that does not have sufficient length to accommodate these factors may reduce hose life.

### Minimum Bend Radius

Follow minimum bend radius requirements for your hose. Installing hose with smaller bends may kink hose and reduce hose life.



Hose rupture or leakage may result from bending too close to the hose/fitting connection.



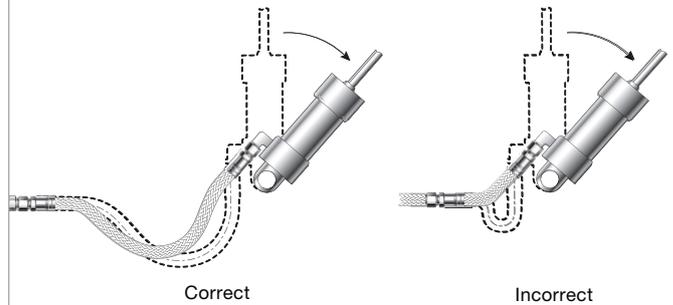
### Hose Strain

Elbows and adapters can be used to relieve hose strain.



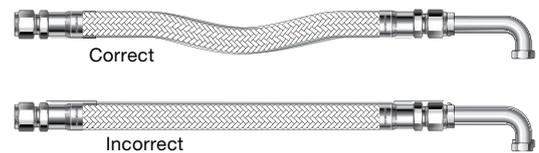
### Motion Absorption

Distribute movement and prevent bends smaller than the hose's minimum bend radius by providing sufficient hose length.



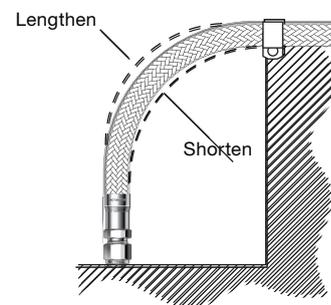
### Machine Tolerance

Allow for changes in length resulting from machine motion and tolerances.



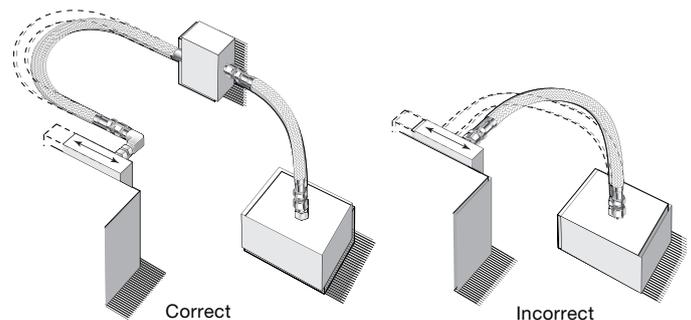
### System Pressure Changes

Allow sufficient hose length to accommodate changing system pressures. Do not connect high- and low pressure hoses.

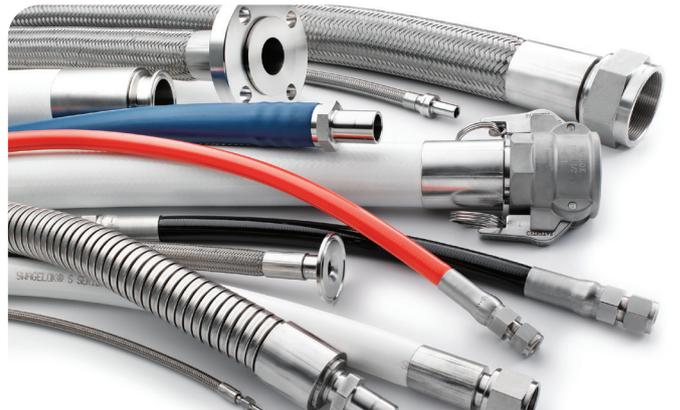


### Bending in One Plane

Avoid twisting the hose by bending it in one plane only. For a compound bend, use multiple hose pieces or other isolation methods.



# ENGINEERED TO PERFORM UNDER PRESSURE



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