swagelok.com

An Installer's Pocket Guide for Swagelok® Hoses

Swagelok

Table of Contents

Specification and Ordering

End Connections

Options

Appendix

The product technical and ordering information is up to date at the time of printing. Subsequent revisions will supersede the printed version and will be posted on swagelok.com and in the Swagelok electronic Desktop Technical Reference (eDTR™) tool.

Introduction

Properly selecting a hose for your fluid system is critical.

A properly selected and maintained hose keeps your process performing safely and cost effectively. Improper selection or maintenance could undermine your process, put personnel at risk, and compromise your bottom line – sometimes without you being aware of it.

This hose pocket guide is designed to help make your hose selection experience as seamless as possible. Throughout this hose guide, you will find a variety of information and tools including an overview of Swagelok® hoses, hose specifications, handling and installation, applications, and more.

For more information or assistance selecting the right hose for your fluid system, please contact your authorized Swagelok sales and service center or visit our website at www.swagelok.com.

About Swagelok Company

Swagelok Company is an approximately $2 billion privately held developer of fluid system products, assemblies, and services for the oil and gas, chemical and petrochemical, semiconductor, and transportation industries. Headquartered in Solon, Ohio, U.S.A., Swagelok serves customers through 200 sales and service centers in 70 countries, supported by the expertise of 5,500 corporate associates at 20 manufacturing facilities and five global technology centers.

For more information or assistance please contact your authorized Swagelok sales and service center or visit our website at www.swagelok.com.

A Closer Look: Why Choose Hose

Consider the design advantage, safety benefits of having fewer connections, and cost reduction gained from using flexible hose.

Rigid materials, such as piping and tubing, must be installed straight, perpendicular, or at angles cut perfectly to the exact lengths required. Compound directions require exact lengths and numerous connections. Because hose lends itself to convenient bending and routing, systems designers can eliminate many of the connectors required when using rigid materials.

What benefits come from having fewer connections?

- Lower cost of materials and labor
- Reduced risk of leakage
- Less chance of pressure drop
- Less chance for media entrapment

Additionally, unlike rigid materials, hose will compensate for slight dimensional mismatches between connection points. Hose can also be easily removed or replaced for periodic cleaning, and coiled hoses can fit inside sterilization equipment. In comparison, rigid materials of any significant length are often too long for the cleaning equipment tank.

Considerations For Selecting a Hose Assembly Solution

The four main components of a hose are:

1. Core tube material and construction, page 7
2. Reinforcement layers, page 10
3. Covers, page 11
4. End connections, page 11

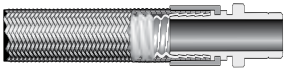
1. Core Tube Material and Construction

The core tube is the hose's innermost layer, the one that comes into contact with and carries the system media. The core is often referred to as the wetted surface. To determine the materials of construction best suited to your application demands, consider the following:

- Which core tube materials are chemically compatible with the system media?
- Will the core corrode or deteriorate over time?
- Can the core tolerate the temperature range of the system media?
- Will the material prevent or limit permeation and absorption? All materials, even metals, are subject to permeation and absorption, so this question is one of degree. Depending on your application, permeation and/or absorption may not be a significant concern.
- Will the core material stand up to the cleaning practices for your system in terms of temperature, pressure, and material compatibility with any solvents and cleaning agents employed?
- Will your application produce a static charge? (See Page 23 for information on Static Dissipation.)

Core Type	Features	Typical Temperature Range °F (°C)
Metal cores	• Commonly used in vacuum applications and medium pressure corrosive environments or where permeation is undesirable • Highly caustic or acidic media may require a special alloy, such as Hastelloy. • Not well suited for operations with repetitive movement when compared to a non-metallic core hose	-325 to 850 (-198 to 454)
Rubber	• Economical, general purpose hose • Commonly used as air lines • Durable • Limited pressure and temperature range; for low pressure uses only	-40 to 200 (-40 to 93)
Thermoplastic (nylon)	• Economical, general purpose hose • Commonly used in hydraulic applications	-40 to 200 (-40 to 93)

Core Type	Features	Typical Temperature Range °F (°C)

Fluoropolymer cores	• Can withstand repetitive steam cleaning
	• Commonly used in demanding applications where the core must be non-absorptive
	• Fluoropolymer hose that complies with one or more of these is available: FDA regulation 21CFR Part 177.1550, USP <88> Class VI , USP <88> Class VI (121°C), USP <87, 88> Class VI (121°C), or 3-A for contact with water, food, and beverage
	• Replacing silicone in many sanitary applications
	• Gas permeable; if your application cannot tolerate permeation, consider a less permeable core material, such as metal
	• The most chemically inert cores available
	• Non-aging, nonstick, and easy to clean
	• Available in smooth bore or convoluted core:
	  • Smooth-bore core (figure 1) is built with a smooth inner tube wall and is a good choice when precise flow control and drain-ability are priorities. The primary disadvantage is kinking, particularly in larger diameters. Reinforcement layers can help solve kinking.
	  • Convoluted core (figure 2) is formed in a pattern to increase the hose's flexibility. The pattern is usually helical, in fluoropolymer cores, or annular, in metal cores. This construction is chosen when flexibility is the priority.
	Figure 1
	 
	Figure 2
	 
		-65 to 450
		(-53 to 232)

2. Reinforcement Layers

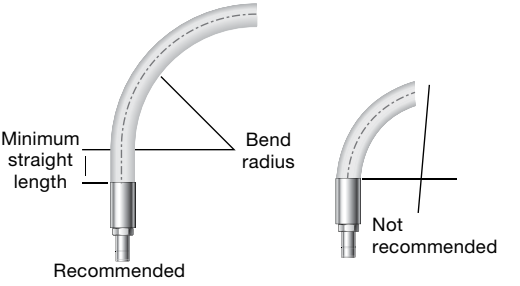
Hose reinforcement layers strengthen and support the hose core tube and can be made from a range of materials.

Proper reinforcement layers can improve hose performance in several areas including pressure containment, hoop strength and kink resistance, electrical continuity, torsion strength, volumetric expansion control, flexibility, and force to bend.

All hoses have a minimum bend radius, which measures how far a hose can bend before the core loses its round shape. Measurements for minimum bend radius are typically included in industrial hose literature.

Consider the force required to bend an unpressurized hose:

- Is the hose so stiff that an operator cannot bend it or has difficulty installing it?
- Will it slow down or break a machine in a dynamic operation?



3. Covers

The cover is an outer layer that protects underlying layers, personnel, and surrounding equipment. In most applications, the goal in cover selection is to achieve the smallest diameter with minimal decrease in the flexibility of the hose while providing ample protection of the hose.

Typical cover options include:

- Silicone
- Stainless steel braid

4. End Connections

The performance of a hose assembly depends largely on a hose manufacturer's ability to attach end connections. End connections differ widely in materials and pressure ratings and are where most leaks may occur. Partner with a trusted hose manufacturer that incorporates tried and tested methodology to permanently attach hose end connections, whether welded or crimped.

In Summary

Start with the main parts of a hose – core tube material and construction, reinforcement layers, covers, and end connections. You will find many options in each of these areas. Variables in applications include the pressure, temperature, flow, cleanliness, chemical compatibility, and the external environment. These will direct your decision making.

⚠ **Caution**
Nylon, PFA, polyethylene, PTFE, and rubber are permeable materials. Gases, vapors, and liquids may migrate through cores of these materials. The rate of permeation is affected by many application-specific and hose construction variables.

⚠ **Caution**
Non-perforated covers may blister in gas service.

⚠ **Caution**
Thermal cycling of any nonmetal hose may affect its ability to maintain a positive seal. Testing should be performed to verify suitability in actual operating conditions.

⚠ **Caution**
All equipment must be properly grounded to allow static dissipation and help to prevent static sparking.

⚠ **Caution**
Nonconductive hoses can be conduits for electricity if they contain conductive fluids. Verify the conductive properties of the system media prior to use.

How Swagelok can help with your hose applications.

You want a local resource with global capabilities.

How fast do you need it? Your authorized Swagelok sales and service center stocks a range of high-quality hose and tubing products that can be built and customized for all your fluid system needs.

Your hose is built to specification, this time and every time.

Everything we do is rooted in “One Swagelok,” and all of our global hose assembly locations are no different. Every Swagelok hose in every location is assembled using standardized equipment, the same tight tolerances, and the same high-quality standards and standard work practices.

You get innovations in end connections from the company that does them well.

For many PTFE and PFA core assemblies, Swagelok uses a proprietary crimp design technology to permanently attach end connections to hose. The new crimping technology works so well that nylon core assemblies have also been validated using the crimp process.

Our 360-degree radial crimping machines are computer controlled to ensure repeatable dimensions. Multiple dies compress the crimp collar to proprietary crimp specifications. These specifications factor in the manufacturing tolerances of the three components (hose, crimp collar, and end connections) to ensure complete and consistent assembly.

Swagelok provides all-metal hose assemblies as well. We weld end connections on bulk all-metal hose that is manufactured to Swagelok’s specifications. All end connections are welded in accordance with ASME Boiler and Pressure Vessel Code Section IX. Whether welded manually or with Swagelok's proprietary weld technology, each assembly is as consistent as the last.

Our push-on PB series hose can be assembled in the field, without the use of hose clamps due to the unique design of the hose barb and reinforcement within Swagelok PB series hose.

You can use identification to your advantage.

Customize your hoses with tags and text. Personnel can see the hose function at a glance, which helps safety and plant efficiency. Swagelok offers a variety of tag options.

We give your hose traceability.

Swagelok offers fully traceable products, and this feature is standard on many Swagelok hose assemblies.

We can lower your cost of ownership.

Make decisions based on the true cost of a hose, which is the purchase price plus the cost of owning and maintaining or replacing the assembly over time. All hoses wear out. Determine how often hose replacement will be necessary. Calculate the cost of replacement parts, labor, and downtime.

Applications

Aerospace

Application	Hoses Typically Used
Battery drain lines, fuel lines, hydraulic lines	T, B, X
Potable water lines	T, X, 7P
Vacuum lines	FN, FZ

Alternative Fuels (CNG/LNG)

Application	Hoses Typically Used
Fill stations	FX, FM, NG, T①
Natural gas delivery systems	FX, NG

① Carbon black-filled core is recommended.

- Containment under high pressure
- Performance in low temperatures
- Failures from permeation reduced
- System damage caused by an electric spark eliminated
- Specialty hoses available for use on CNG dispensers to fill and vent gas

Autoclave

Application	Hoses Typically Used
Alternating steam and vacuum lines	FJ, S, U

Biopharmaceutical

Application	Hoses Typically Used
Bacterial processing	S, U
Bioreactor/Fermentor feed lines	S, C, J, U
CIP/SIP systems	S, U
Cooling lines (glycol)	PB
Filling equipment	U
Hazardous waste	S, U
Load cells	S, U
Point of use in labs, ceiling drops	S
Steam lines	S, C, J, U
Transfer panel	U
USP water lines	X, S, U
Weigh scales	S, U

- Compliant with FDA standards
- Easy to clean the inside and outside of a line
- High flow rates for filling machines and injection applications

Chemical and Petrochemical

Application	Hoses Typically Used
Flare stack vent lines	FN, FZ
High chlorine media	AH
Instrumentation lines for laboratories and testing	FN, FZ, T, X
Transfer lines for most chemicals; corrosives and dyes	FM, FJ, FL, T, X
Water and polymer lines for cleaning heat exchanger piping	T, X

Environmental

Application	Hoses Typically Used
Environmental sampling	B, T, X

Essential Oil Extraction

Application	Hoses Typically Used
Collection chamber	X, S, C, U
Cryogenic column	X, S, C, U
Expansion filter	X, S, C, U
Heater	X, W, S
Material column	X, S, C, U
Recovery pump	X, S, C, U
Sampling in sea spray environment	AH
Solvent tank	X, S, C, U

Food and Beverage Processing

Application	Hoses Typically Used
Carbon dioxide purge	FM, FJ, FL
Cooling water lines for solder units	T, X
Feed lines to freezer plates	C
Filling machines and injection applications	T, X, S, 7P
Fish processing	T, PB
Hot adhesive lines for sealing processes	T, X
Hot oil and grease lines for fryers	S, U
Hot water lines for wash down	S, W, U, 7P, PB
Hydraulic lines in “clean” areas	S, 7R, 8R
Nitrous oxide lines for charging aerosol cans	FM
Steam lines for sealing glass containers	T, X, S, U
Supply lines for meat slurry to molds	T, S
Transfer lines for all foods	S, U, 7P
Whipped cream dispenser lines	C, J

- Compliant with FDA standards
- Easy to clean the inside and outside of a line

General Industrial Construction Applications

Application	Hoses Typically Used
Glass coating	FM, FJ, FL,T
High-pressure hydraulic lines	FX, 7R, 8R
Hydraulic lines for pile driving heads	7R, 8R
Solvent recovery	FJ, FL, AH, T, U,
Vacuum coating	FM, FJ, FL,T
Water cooling lines inside vacuum chamber	FJ, FL

Plating Applications

Application	Hoses Typically Used
Fluid transfer lines for acids and plating solutions	T, X, S
Steam lines to dryers	T, X, S

Robotic Applications

Application	Hoses Typically Used
Feed lines for conveyed materials to robot wrist	T, B, X
Hydraulic actuating lines	T, X, C, J, 7R, 8R

Research and Development

Application	Hoses Typically Used
Labs	FX, FM, FJ, FL, FN, FZ, T, B, X, C, J, 7R, 8R, PB
University research	FX, FM, FJ, FL, FN, FZ, T, B, X, C, J, 7R, 8R, PB

Rubber Applications

Application	Hoses Typically Used
Steam lines to calendaring machines	T, X, C, J
Steam/cold water lines for molds	T, X, S
Transfer lines for glue	T, X

Instrumentation

Application	Hoses Typically Used
High pressure analytical sampling	FX
High pressure bottle gas	FX
Instrumentation	FX, FM, FJ, FL, AH, T, X

- Increased flow through smaller sizes to control turbulence that can affect the finished product
- Longer life in service
- Reduced stress on delicate equipment
- Easy to connect and disconnect to the system

Marine

Application	Hoses Typically Used
Boiler hatches	X
Hydraulic lines for ramps, winches or weapons	7R, 8R
Hydraulic lines for steering systems	T, X, 7R, 8R

Medical

Application	Hoses Typically Used
Airless spray tablet coating lines	T, X, S, U
Coolant lines for hydraulics on C.T. scanners	S, U
Transfer lines for drug manufacturing	T, X, S, U
Washer carts	U

Oil and Gas

Application	Hoses Typically Used
Air supply	T, B, X, PB
Engine lines for portable generators, pumps, and compressors	T, X, S
Fuel or gas lines or instrument air	PB, X, F, S, W
Gas transfer lines for oxygen, argon, air, nitrogen, and nitrous oxide (pigtails)	FX, FM, FJ, FL, AH, T, X,
Hydraulic lines	T, X, 7R, 8R
Transfer lines for well gases	FX, FM, FJ, FL, AH

Power

Application	Hoses Typically Used
Accumulators	X
Boiler	FM
Boiler feed water lube oil system	X, 7R, 8R
Calibration	B, X
Combustors for drain line	X
Compressed air	7R, 8R, PB
Exhaust lines	FX
GT turbines	X
Hydraulics	X
Instrumentation	B, FM, X
Pistons	PB
Shop air	PB
Turbine lube oil systems	X, 7R, 8R

Generator and Generator Auxiliaries

Application	Hoses Typically Used
Gland seal oil system	FM, FJ
Hydrogen system (Cooling)	FM, FJ

Coal Handling

Application	Hoses Typically Used
Pulverizer lubrication skid	FM, FJ

Make Up Water Demineralization

Application	Hoses Typically Used
Ash handling	FM, FJ
Caustic pumps	T
Weak and strong acid pumps	T

Power Plant Applications

Application	Hoses Typically Used
Burner injector hose – fossil fuel plants	FM, AH
Engine lines for portable generators, pumps, and compressors	FM, FJ, FL
Fire suppression cabinets for turbine assembly	T
Fuel oil, air, water, and coolant lines for turbine generators	FM, FJ, FL
Scrubber lines	FM, T
Water lines for boiler feed	T, X

Pulp and Paper

Application	Hoses Typically Used
Black liquor lines	T
Chlorine transfer, bleaching①	AH, T, X, S
Fluid lines for coatings and hot wax	FM, FJ
Hydraulics	7R, 8R
Platen presses for plywood, furniture	FM, FJ, T, X
Shop air to actuated valves	PB
Steam lines for calendaring equipment	FV, FM, FJ, T, X
Steam lines for dryer cans (at rotary joint)	FM, FJ, T, X
Steam lines for platen presses	FV, FM, FJ, T, X
Transfer lines for solvents, pigments, and bleaching	T

① Non 316SS end connections should be used in chlorine applications.

Semiconductor

Application	Hoses Typically Used
Allow for multiple dispersement to “shower heads”	FM, FJ, FL
Chiller transfer lines	FJ, FV
Clean room point of use	T
Dielectric media used for heat exchanger thermal concerns①	FM, FJ, FL,T, X, S, C, N, W, F, U
Eliminate system damage caused by an electric charge①	T, X, S, C, W, F, U
Heat exchanger/chiller & heating/cooling applications	X, N, W
Vacuum lines	FN, FZ
Water or water/glycol applications	PB

① Carbon black-filled core is recommended for PTFE and PFA core hoses.

Ultrahigh-Purity

Application	Hoses Typically Used
General facility use	T, X, PB
Vacuum and gas lines	FM, FJ, FL, FN, FZ

Cryogenics

Application	Hoses Typically Used
Transfer lines	FV

Non-Industry Specific Factors

Static Dissipation and Conductivity

Static dissipation is defined as the ability of a material to conduct an electrical charge to ground. Select Swagelok hoses constructed with nylon, PTFE, or PFA core material are available with an optional carbon black-filling for applications requiring static dissipation.

A static dissipative hose is designed to alleviate any static charge that may be built up as different fluids flow through the hose. Examples of media that have the potential to generate static charge are steam, dielectric media, high-velocity gases and hydraulic oil. Equipment must be properly grounded for static dissipative hoses to function as intended.

Conductivity is defined as the ability of a material to transmit or conduct an electrical charge. Typically these are all-metal hoses.

Based on the construction of the hose and the connection method of the end connections, conductive hose can be broken down into four categories:

1. All-metal hoses (FM, FJ, FL, FX, AH, FN, FZ, Convoluted Tube) – Due to their all-metal construction and with the ends welded on, all-metal hose should be considered conductive.
2. Fluoropolymer (PTFE) crimped hoses (T) – After crimping, there is intimate contact between the metal braid, collar, and end connection due to the design of the collar/insert interface. Should be considered conductive.
3. Fluoropolymer (PTFE) crimped hoses (B, X, S, C, J, W) – After crimping, the metal braids are in intimate contact with the collar; however, the collar may not be in contact with the end connection due to the design of the collar/insert interface. Should be considered to have the potential to be conductive.
4. Fluoropolymer (PFA) crimped hoses (U) – After crimping, the teeth of the collar bites down into metal braids, making contact between the two; however, the collar may not be in contact with the end connection due to the design of the collar/insert interface. Should be considered to have the potential to be conductive.

Static Dissipation and Conductivity

The table below summarizes the electrical properties of each hose series core, reinforcement layer(s), and total assembly end-to-end. Hoses are identified with a letter notation as follows:

- Non-conductive (N)
- Conductive (C)
- Static dissipative (D)
- Unspecified (U)
- Not Applicable (N/A)

Hose Series	Core	Reinforcement	End Connection to End Connection
FM	C	C	C
FJ	C	C	C
FL	C	C	C
FX	C	C	C
AH	C	C	C
FV	C	C	C
FN	C	N/A	C
FZ	C	N/A	C
Convoluted Tube	C	N/A	C
TH	N	C	C
TC	D	C	C
TL	N	C	C
BT	N	U	U
XT	N	U	U
XC	D	U	D
ST	N	U	U
SC	D	U	D
CT	N	U	U
CC	D	U	D
JT	N	U	U
NC	D	U	D
WC	D	U	D
FT	N	U	U
FC	D	U	D
UT	N	U	U
UC	D	U	D
NG	D	U	D
7R	N	U	U
8R	N	U	U
7N	N	N	N
7P	N	U	U
PB	N	U	U

Swagelok Hose Specification and Ordering

Make sure your hoses are STAMPED.

When you get ready to select the right hose, use the STAMPED method to make sure you are getting what you need.

S IZE; I.D., O.D., and length

T EMPERATURE of the material conveyed and the environment

A PPLICATION, the conditions of use

M ATERIAL being conveyed, type and concentration

P RESSURE to which the assembly will be exposed

E NDS; style, type, orientation, attachment methods, etc.

D ELIVERY; testing, quality, packaging, and delivery requirements

Swagelok Hose Selection Guide

See individual hose series sections for additional technical information.

	Materials of Construction		
	Core	Reinforcement	Cover
Metal Hose			
FX	Convoluted 316L SS	321 SS standard; 316L SS braid available	—
FM	Convoluted 316L SS	316L SS braid	—
FJ	Convoluted 316L SS	304 SS braid standard; 316L SS braid available	—
FL	Convoluted 316L SS	321 SS braid (1/4 and 1/2 in.); 316L SS braid (all other sizes)	—
AH	Convoluted C-276	304L SS braid	—
FV	Convoluted 316L SS	304L SS braid	Convoluted 316L SS
Metal Flexible Tubing			
FN	Convoluted 316L SS, annealed	—	—
FZ	Convoluted 316L SS	—	—
Convoluted Tube	Convoluted 316L SS, annealed	—	—
Fluoropolymer Hose			
T	Smooth-bore PTFE①	304 SS braid standard; 316L SS and alloy 400 braid available	—
B	Smooth-bore PTFE	304 SS braid	—
X	Smooth-bore PTFE①	Fiber braid with 304 SS braid	—
S	Smooth-bore PTFE①	Fiber braid with 304 SS braid	Silicone
C	Convoluted PTFE①	304 SS braid	—
J	Convoluted PTFE	304 SS braid	Silicone
N	Convoluted, 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 PTFE①	Fiber braid	—
U	Smooth-bore PFA②	302 SS braid	Silicone

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

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

Swagelok Hose Selection Guide

See individual hose series sections for additional technical information.

	Materials of Construction		
	Core	**Reinforcement**	**Cover**
Nylon Hose			
NG	Smooth-bore, static dissipative nylon	Fiber braid	Perforated black polyurethane
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
Polyethylene Hose			
7P	Smooth-bore polyethylene	Fiber braid	Nonperforated blue polyurethane
Rubber Hose			
PB	Smooth-bore Buna N	Synthetic fiber braid	Blue Buna N (other colors available)

Swagelok Hose Selection Guide

See individual hose series sections for additional technical information.

Series	Nominal Hose Size, in. — Working Pressure at 70°F (20°C), psig (bar)④ 1/8	1/4	3/8	1/2	3/4	1
Metal Hose						
FX	—	6000 (413)	5000 (344)	4500 (310)	3600 (248)	3000 (206)
FM	—	3100 (213)	2000 (137)	1800 (124)	1500 (103)	1200 (82.6)
FJ	—	1600 (110)	1470 (101)	1110 (76.4)	860 (59.2)	680 (46.8)
FL	—	1500 (103)	1470 (101)	1200 (82.6)	860 (59.2)	680 (46.8)
AH	—	—	—	1110 (76.4)	860 (59.2)	680 (46.8)
FV	—	—	—	600 (41.3)	490 (33.7)	400 (27.5)
Metal Flexible Tubing						
FN	—	135 (9.3)	65 (4.4)	60 (4.1)	—	—
FZ	—	250 (17.2)	105 (7.2)	95 (6.5)	—	—
Convoluted Tube	—	100 (6.8)	25 (1.7)	25 (1.7)	25 (1.7)	25 (1.7)
Fluoropolymer Hose						
T	—	3000① (206)	2500 (172)	2000 (137)	1500 (103)	1000 (68.9)
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)
J	—	—	—	1500 (103)	1100 (75.7)	750 (51.6)
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)

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.
④ Pressure-temperature ratings may be limited by end connections.
⑤ X series hose is rated from -65 to 450°F (-53 to 230°C) in the 1/4 and 3/8 in. nominal sizes

Swagelok Hose Selection Guide

See individual hose series sections for additional technical information.

Series	Nominal Hose Size, in. Working Pressure at 70°F (20°C), psig (bar)④ 1 1/4	1 1/2	2	Temperature Range④ °F (°C)	Page
Metal Hose					
FX	2600 (179)	2200 (151)	1675 (115)	–325 to 1000 (–200 to 537)	34
FM	950 (65.4)	900 (62.0)	500 (34.4)	–325 to 850 (–200 to 454)	38
FJ	680 (46.8)	520 (35.8)	450 (31.0)	–325 to 800 (–200 to 426)	42
FL	645 (44.4)	520 (35.8)	380 (26.1)	–325 to 850 (–200 to 454)	46
AH	—	520 (35.8)	450 (31.0)	–325 to 800 (–200 to 426)	50
FV	—	—	—	–425 to 1000 (–253 to 537)	54
Metal Flexible Tubing					
FN	—	—	—	–325 to 1000 (–200 to 537)	58
FZ	—	—	—	–325 to 1000 (–200 to 537)	62
Convoluted Tube	—	25 (1.7)	—	–70 to 1000 (20 to 537)	66
Fluoropolymer Hose					
T	—	—	—	–65 to 450 (–53 to 230)	70
B	—	—	—		74
X	—	—	—	–100 to 450⑤ (–73 to 230)	78
S	—	—	—	–65 to 400 (–53 to 204)	82
C	—	700 (48.2)	525 (36.1)	–65 to 450② (–53 to 230)	86
J		—	—	–65 to 400 (–53 to 204)	90
N	—	—	—	–65 to 400 (–53 to 204)	94
W	—	—	—	–65 to 400 (–53 to 204)	98
F	—	—	—	–65 to 450 (–53 to 230)	102
U	—	200 (13.7)	150 (10.3)	–65 to 400 (–53 to 204)	106

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.
④ Pressure-temperature ratings may be limited by end connections.
⑤ X series hose is rated from -65 to 450°F (-53 to 230°C) in the 1/4 and 3/8 in. nominal sizes

Swagelok Hose Selection Guide

See individual hose series sections for additional technical information.

Series	Nominal Hose Size, in.					
	Working Pressure at 70°F (20°C), psig (bar)④					
	1/8	1/4	3/8	1/2	3/4	1
Nylon Hose						
NG	—	5000 (344)	5000 (344)	5000 (344)	—	—
7R	—	2750 (189)	2250 (155)	2000 (137)	—	—
8R	—	5000 (344)	4000 (275)	3500 (241)	2250 (155)	2000 (137)
7N	—	2750 (189)	2250 (155)	2000 (137)	—	—
Polyethylene Hose						
7P	—	2750 (189)	2250 (155)	2000 (137)	1500 (103)	1500 (103)
Rubber Hose						
PB	—	350 (24.1)	300 (20.6)	300 (20.6)	300 (20.6)	300 (20.6)

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.
④ Pressure-temperature ratings may be limited by end connections.
⑤ X series hose is rated from -65 to 450°F (-53 to 230°C) in the 1/4 and 3/8 in. nominal sizes

Swagelok Hose Selection Guide

See individual hose series sections for additional technical information.

Series	Nominal Hose Size, in. Working Pressure at 70°F (20°C), psig (bar)④ 1 1/4	1 1/2	2	Temperature Range④ °F (°C)	Page
Nylon Hose					
NG	—	—	—	–40 to 150 (–40 to 65)	110
7R	—	—	—	–40 to 200 (–40 to 93)	114
8R	—	—	—	–40 to 200 (–40 to 93)	114
7N	—	—	—	–40 to 200 (–40 to 93)	118
Polyethylene Hose					
7P	—	—	—	–10 to 150 (–23 to 65)	122
Rubber Hose					
PB	—	—	—	–40 to 200③ (–40 to 93)	126

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.
④ Pressure-temperature ratings may be limited by end connections.
⑤ X series hose is rated from -65 to 450°F (-53 to 230°C) in the 1/4 and 3/8 in. nominal sizes

Metal Hose

FX Series Metal Hose

Features

- High-pressure, corrosion resistant, all-metal hose, for high-temperature vacuum and high-pressure corrosive environments or where permeation is undesirable
- 316L stainless steel annular convoluted core
- Size range of 1/4 through 2 in. and working pressures from vacuum to 6000 psig (413 bar)
- Double braid layers of 321 stainless steel promotes hose pressure containment
- End connections welded in accordance with ASME Boiler and Pressure Vessel Code Section IX
- Commonly used in high-temperature vacuum and high-pressure corrosive environments or where permeation is undesirable
- Custom assemblies available
- Options include hose covers, hose tags, additional cleaning, and additional helium leak testing. See page 180 for details
- For electrical properties, see page 23 for details

⚠ Caution
Do not subject flexible metal hose to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.

Ordering Information | FX Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1		2	3	4		4		5	6			5	6
SS	-	FX	4	TA	4	PM	4	-	28	-	F	or	71CM	-	F
									in.				cm		

1 Material

End Connections

SS = 316 stainless steel

2 Hose

FX = FX series high-pressure metal hose

3 Nominal Hose Size, in.

4 = 1/4	**16** = 1
6 = 3/8	**20** = 11/4
8 = 1/2	**24** = 11/2
12 = 3/4	**32** = 2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
F1 = Thermosleeve
G = CGA 4.1 cleaning on hose wetted surfaces
H7 = Helium leak test (1×10^{-7} std cm^3/s)
N3 = Nitrogen pressure test
Z = 316L SS collar and braid materiall

Mat Tags

MA = Gray	**MO** = Orange
MB = Blue	**MP** = Purple
MC = Brown	**MR** = Red
MG = Green	**MW** = White
MK = Black	**MY** = Yellow
MN = Pink	

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: MA**2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags
T5 = Clamp tag

*Specify text for tags. See **Hose Tag Text** table, page 184.*
See page 180 for detailed descriptions of options.

Technical Data | FX Series Metal Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Center Line Bend Radius in. (cm)		Temperature Range °F (°C)	Working Pressure at –325 to 300°F (–200 to 148°C) Vacuum to ... psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic				
1/4 (6.4)	0.25 (6.4)	0.71 (18.0)	1.5 (3.81)	5.5 (14.0)	–325 to 1000 (–200 to 537)	6000 (413)	24 000 (1653)	0.49 (0.73)
3/8 (9.7)	0.38 (9.5)	0.94 (23.9)	2.5 (6.40)	7.0 (17.8)		5000 (344)	20 000 (1378)	0.77 (1.15)
1/2 (12.7)	0.51 (13.0)	1.01 (25.7)	3.0 (7.62)	8.0 (20.3)		4500 (310)	18 000 (1240)	0.85 (1.26)
3/4 (19.0)	0.75 (19.0)	1.44 (36.4)	4.0 (10.2)	10.0 (25.4)		3600 (248)	14 400 (992)	1.58 (2.35)
1 (25.4)	1.00 (25.4)	1.73 (43.9)	5.0 (12.7)	11.0 (27.9)		3000 (206)	12 000 (826)	2.32 (3.45)
1 1/4 (31.8)	1.25 (31.8)	2.03 (51.6)	6.5 (16.5)	12.5 (31.8)		2600 (179)	10 400 (716)	2.88 (4.29)
1 1/2 (38.1)	1.50 (38.1)	2.40 (60.9)	7.5 (19.1)	13.0 (33.0)		2200 (151)	8 800 (606)	3.57 (5.31)
2 (50.8)	2.00 (50.8)	2.85 (72.4)	9.0 (22.9)	14.0 (35.6)		1675 (115)	6 700 (461)	4.45 (6.62)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | FX Series Metal Hose

Ratings are based on ASME Code for Pressure Piping, B31.1 Power Piping.

Nominal Hose Size, in.	**1/4**	**3/8**	**1/2**	**3/4**	**1**	**1 1/4**	**1 1/2**	**2**
Temperature, °F (°C)	**Working Pressure, vacuum to ...** psig (bar)							
–325 (–200) to 300 (148)	6000 (413)	5000 (344)	4500 (310)	3600 (248)	3000 (206)	2600 (179)	2200 (151)	1675 (115)
400 (204)	5640 (388)	4700 (323)	4230 (291)	3384 (233)	2820 (194)	2444 (168)	2068 (142)	1574 (108)
500 (260)	5317 (366)	4431 (305)	3988 (274)	3190 (219)	2658 (183)	2304 (158)	1949 (134)	1484 (102)
600 (315)	5029 (346)	4191 (288)	3772 (259)	3017 (207)	2514 (193)	2179 (150)	1844 (127)	1404 (96.7)
700 (371)	4850 (334)	4041 (278)	3637 (250)	2910 (200)	2425 (167)	2101 (144)	1778 (122)	1354 (93.2)
800 (426)	4634 (319)	3862 (266)	3476 (239)	2780 (191)	2317 (159)	2008 (138)	1699 (117)	1293 (89.0)
850 (454)	4562 (314)	3802 (261)	3422 (235)	2737 (188)	2281 (157)	1977 (136)	1673 (115)	1273 (87.7)
900 (482)	4455 (306)	3712 (255)	3341 (230)	2673 (184)	2227 (153)	1930 (132)	1633 (112)	1243 (85.6)
950 (510)	4347 (299)	3622 (249)	3260 (224)	2608 (179)	2173 (149)	1883 (129)	1594 (109)	1213 (83.5)
1000 (537)	4239 (292)	3532 (243)	3179 (219)	2543 (175)	2119 (145)	1837 (126)	1554 (107)	1183 (81.5)

⚠ **Caution: Do not subject flexible metal hose to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.**

FM Series Metal Hose

Features

- All-metal hose promotes corrosion resistance
- 316L stainless steel annular convoluted core
- Size range of 1/4 through 2 in. and working pressures from vacuum to 3100 psig (213 bar)
- Single braid layer of 316L stainless steel promotes hose pressure containment and exhibits strong performance in dynamic cycling applications
- End connections welded in accordance with ASME Boiler and Pressure Vessel Code Section IX
- Commonly used in high-temperature vacuum applications and medium-pressure corrosive environments, or where permeation is undesirable
- Standard and custom assemblies available
- Options include hose covers, hose tags, and additional helium leak testing. See page 180 for details
- For electrical properties, see page 23 for details

⚠ **Caution**
Do not subject flexible metal hose to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.

Ordering Information | FM Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4	4		5	6		5	6
SS	-	FM	4	TA4	PM4	-	28	- F	or	71CM	- F
							in.			cm	

1 Material End Connections

SS = 316 stainless steel

2 Hose

FM = FM series metal hose

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2
12 = 3/4
16 = 1
20 = 11/4
24 = 11/2
32 = 2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
F1 = Thermosleeve
H7 = Helium leak test (1×10^{-7} std cm^3/s)
N3 = Nitrogen pressure test
S = 302 SS spring guard, hose-length (1/4, 3/8, and 1/2 in. sizes only)
W = Hydrostatic test

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags
T5 = Clamp tag

*Specify text for tags. See **Hose Tag Text** table, page 184.*
See page 180 for detailed descriptions of options.

Technical Data | FM Series Metal Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Center Line Bend Radius in. (cm)		Temperature Range °F (°C)	Working Pressure at –325 to 100°F (–200 to 37°C) Vacuum to ... psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic				
1/4 (6.4)	0.28 (7.1)	0.53 (13.5)	2.25 (5.72)	10.0 (25.4)	–325 to 850 (–200 to 454)	3100 (213)	12 400 (854)	0.29 (0.43)
3/8 (9.7)	0.42 (10.6)	0.69 (17.5)	3.00 (7.62)	12.0 (30.5)		2000 (137)	8 000 (551)	0.33 (0.49)
1/2 (12.7)	0.53 (13.5)	0.85 (21.6)	4.50 (11.4)	16.0 (40.6)		1800 (124)	7 200 (496)	0.45 (0.67)
3/4 (19.0)	0.80 (20.3)	1.15 (29.1)	6.00 (15.2)	17.0 (43.2)		1500 (103)	6 000 (413)	0.62 (0.92)
1 (25.4)	1.03 (26.0)	1.45 (36.9)	6.75 (17.1)	20.0 (50.8)		1200 (82.6)	4 800 (330)	0.77 (1.15)
1 1/4 (31.8)	1.30 (33.0)	1.77 (45.0)	4.50 (11.4)	23.0 (58.4)		950 (65.4)	3 800 (261)	1.05 (1.56)
1 1/2 (38.1)	1.53 (38.9)	2.02 (51.3)	5.25 (13.3)	26.0 (66.0)		900 (62.0)	3 600 (248)	1.18 (1.76)
2 (50.8)	2.05 (52.1)	2.57 (65.3)	6.75 (17.1)	32.0 (81.3)		500 (34.4)	2 000 (137)	1.66 (2.47)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | FM Series Metal Hose

Ratings are based on ASME Code for Pressure Piping, B31.1 Power Piping, and ASME Boiler and Pressure Vessel Code.

Nominal Hose Size, in.	**1/4**	**3/8**	**1/2**	**3/4**	**1**	**1 1/4**	**1 1/2**	**2**
Temperature, °F (°C)	**Working Pressure, vacuum to ...** psig (bar)							
–325 (–200) to 100 (37)	3100 (213)	2000 (137)	1800 (124)	1500 (103)	1200 (82.6)	950 (65.4)	900 (62.0)	500 (34.4)
200 (93)	2604 (179)	1680 (115)	1512 (104)	1260 (86.8)	1008 (69.4)	798 (54.9)	756 (52.0)	420 (28.9)
300 (148)	2356 (162)	1520 (104)	1368 (94.2)	1140 (78.5)	912 (62.8)	722 (49.7)	684 (47.1)	380 (26.1)
400 (204)	2170 (149)	1400 (96.4)	1260 (86.8)	1050 (72.3)	840 (57.8)	665 (45.8)	630 (43.4)	350 (24.1)
500 (260)	2015 (138)	1300 (89.5)	1170 (80.6)	975 (67.1)	780 (53.7)	618 (42.5)	585 (40.3)	325 (22.3)
600 (315)	1922 (132)	1240 (85.4)	1116 (76.8)	930 (64.0)	744 (51.2)	589 (40.5)	558 (38.4)	310 (21.3)
700 (371)	1829 (126)	1180 (81.3)	1062 (73.1)	885 (60.9)	708 (48.7)	561 (38.6)	531 (36.5)	295 (20.3)
800 (426)	1767 (121)	1140 (78.5)	1026 (70.6)	855 (58.9)	684 (47.1)	542 (37.3)	513 (35.3)	285 (19.6)
850 (454)	1736 (119)	1120 (77.1)	1008 (69.4)	840 (57.8)	672 (46.3)	532 (36.6)	504 (34.7)	280 (19.2)

⚠ **Caution: Do not subject flexible metal hose to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.**

FJ Series Metal Hose

Features

- General purpose all-metal hose
- 316L stainless steel annular convoluted core
- Size range of 1/4 through 2 in. and working pressures from vacuum to 1600 psig (110 bar)
- Single braid layer of 304 stainless steel promotes hose pressure containment
- End connections welded in accordance with ASME Boiler and Pressure Vessel Code Section IX
- Optional 316L stainless steel braid available to provide greater corrosion resistance
- Commonly used in high-temperature vacuum or general purpose applications where permeation is undesirable
- Custom assemblies available
- Options include hose covers, hose tags, additional cleaning, and additional helium leak testing. See page 180 for details
- For electrical properties, see page 23 for details

⚠ Caution
Do not subject flexible metal hose to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.

Ordering Information | FJ Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4	4		5	6			5	6
SS	-	FJ	**4**	**TA4**	**PM4**	-	**28**	**-F**	or	**71C**	**M-F**
							in.			cm	

1 Material End Connections

SS = 316 stainless steel

2 Hose

FJ = FJ series metal hose

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2
12 = 3/4
16 = 1
20 = 11/4
24 = 11/2
32 = 2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
F1 = Thermosleeve
G = CGA 4.1 cleaning on hose wetted surfaces
H7 = Helium leak test (1×10^{-7} std cm^3/s)
N3 = Nitrogen pressure test
W = Hydrostatic test
Z = 316L SS braid material
093 = ECE R110 approval, only on select end connections. See page 187 for additional information.

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **MA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags
T5 = Clamp tag

*Specify text for tags. See **Hose Tag Text** table, page 184. See page 180 for detailed descriptions of options.*

Technical Data | FJ Series Metal Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Center Line Bend Radius in. (cm)		Temperature Range °F (°C)	Working Pressure at –325 to 300°F (–200 to 148°C) Vacuum to ... psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic				
1/4 (6.4)	0.25 (6.4)	0.48 (12.2)	1.00 (2.54)	4.33 (11.0)	–325 to 800 (–200 to 426)	1600 (110)	6400 (440)	0.11 (0.16)
3/8 (9.7)	0.38 (9.5)	0.69 (17.5)	1.20 (3.05)	5.91 (15.0)		1470 (101)	5880 (405)	0.20 (0.30)
1/2 (12.7)	0.50 (12.7)	0.82 (20.8)	1.50 (3.81)	6.50 (16.5)		1110 (76.4)	4500 (310)	0.22 (0.33)
3/4 (19.0)	0.75 (19.0)	1.21 (30.7)	2.10 (5.33)	8.86 (22.5)		860 (59.2)	3440 (237)	0.37 (0.55)
1 (25.4)	1.00 (25.4)	1.51 (38.4)	2.70 (6.86)	10.2 (25.9)		680 (46.8)	2720 (187)	0.50 (0.74)
1 1/4 (31.8)	1.25 (31.8)	1.82 (46.2)	3.10 (7.87)	11.8 (30.0)		680 (46.8)	2720 (187)	0.61 (0.91)
1 1/2 (38.1)	1.50 (38.1)	2.14 (54.4)	3.90 (9.91)	13.4 (34.0)		520 (35.8)	2080 (143)	0.85 (1.26)
2 (50.8)	2.00 (50.8)	2.69 (68.3)	5.10 (13.0)	15.4 (39.1)		450 (31.0)	1800 (124)	1.10 (1.65)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | FJ Series Metal Hose

Ratings are based on ASME Code for Pressure Piping, B31.1 Power Piping, and ASME Boiler and Pressure Vessel Code.

Nominal Hose Size, in.	**1/4**	**3/8**	**1/2**	**3/4**	**1**	**1 1/4**	**1 1/2**	**2**
Temperature °F (°C)	**Working Pressure, vacuum to ...** psig (bar)							
–325 (–200) to 300 (148)	1600 (110)	1470 (101)	1110 (76.4)	860 (59.2)	680 (46.8)	680 (46.8)	520 (35.8)	450 (31.0)
400 (204)	1488 (102)	1367 (94.1)	1032 (71.1)	800 (55.1)	632 (43.5)	632 (43.5)	484 (33.3)	419 (28.8)
500 (260)	1376 (94.8)	1264 (87.0)	955 (65.7)	740 (50.9)	585 (40.3)	585 (40.3)	447 (30.7)	387 (26.6)
600 (315)	1296 (89.2)	1191 (82.0)	899 (61.9)	697 (48.0)	551 (37.9)	551 (37.9)	421 (29.0)	365 (25.1)
700 (371)	1232 (84.8)	1132 (77.9)	855 (58.9)	662 (45.6)	524 (36.1)	524 (36.1)	400 (27.5)	347 (23.9)
750 (398)	1200 (82.6)	1103 (75.9)	833 (57.3)	645 (44.4)	510 (35.1)	510 (35.1)	390 (26.8)	338 (23.2)
800 (426)	1184 (81.5)	1088 (74.9)	821 (56.5)	636 (43.8)	503 (34.6)	503 (34.6)	385 (26.5)	333 (22.9)

⚠ **Caution: Do not subject flexible metal hose to pressure surges, shock or pulsations with a peak pressure greater than 50% of the working pressure rating.**

FL Series Metal Hose

Features

- Highly flexible all-metal hose
- 316L stainless steel annular convoluted core
- Size range of 1/4 through 2 in. sizes and working pressures from vacuum to 1500 psig (103 bar)
- Single braid layer of 321 stainless steel for sizes 1/4 and 1/2 in. and 316L stainless steel for all other sizes ensures hose pressure containment
- End connections welded in accordance with ASME Boiler and Pressure Vessel Code Section IX
- Exhibits strong performance in dynamic cycling applications
- Commonly used in high-temperature vacuum and general purpose dynamic-cycling applications
- Standard and custom assemblies available
- Options include hose covers, hose tags, additional cleaning, and additional helium leak testing. See page 180 for details
- For electrical properties, see page 23 for details

⚠ Caution
Do not subject flexible metal hose to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.

Ordering Information | FL Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6			5	6
SS	-	FL	**4**	**TA**	**4**	**PM**	**4**	-	**28**	**-F**	or	**71CM**	**-F**
									in.			cm	

1 Material End Connections

SS = 316 stainless steel

2 Hose

FL = FL series metal hose

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2
12 = 3/4
16 = 1
20 = 1 1/4
24 = 1 1/2
32 = 2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator. Insert a dash as shown prior to the first option designator.

F = Fire jacket
F1 = Thermosleeve
C = ASTM G93 Level C cleaning on hose wetted surfaces
G = CGA 4.1 cleaning on hose wetted surfaces (available for all hose sizes except 1/4 and 1/2 in.)
H7 = Helium leak test (1×10^{-7} std cm^3/s)
N3 = Nitrogen pressure test
W = Hydrostatic test

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags

*Specify text for tags. See **Hose Tag Text** table, page 184.*
See page 180 for detailed descriptions of options.

Technical Data | FL Series Metal Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Center Line Bend Radius in. (cm)		Temperature Range °F (°C)	Working Pressure at –325 to 300°F (–200 to 148°C) Vacuum to ... psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic				
1/4 (6.4)	0.25 (6.4)	0.45 (11.4)	1.00 (2.54)	5.50 (14.0)	–325 to 850 (–200 to 454)	1500 (103)	6000 (413)	0.12 (0.18)
3/8 (9.5)	0.38 (9.5)	0.70 (17.8)	1.00 (2.54)	4.00 (10.2)		1470 (101)	5880 (405)	0.21 (0.31)
1/2 (12.7)	0.50 (12.7)	0.81 (20.6)	1.75 (4.45)	7.00 (17.8)		1200 (82.6)	4800 (330)	0.24 (0.36)
3/4 (19.0)	0.75 (19.0)	1.22 (31.0)	1.70 (4.32)	6.40 (16.3)		860 (59.3)	3440 (237)	0.47 (0.70)
1 (25.4)	1.00 (25.4)	1.54 (39.1)	2.10 (5.33)	7.10 (18.0)		680 (46.8)	2720 (187)	0.64 (0.96)
1 1/4 (31.8)	1.25 (31.8)	1.84 (46.7)	2.50 (6.35)	7.90 (20.1)		645 (44.4)	2580 (178)	0.99 (1.48)
1 1/2 (38.1)	1.50 (38.1)	2.16 (54.9)	3.10 (7.87)	11.0 (27.9)		520 (35.8)	2080 (143)	1.16 (1.74)
2 (50.8)	2.00 (50.8)	2.69 (68.3)	4.00 (10.2)	13.0 (33.0)		380 (26.2)	1520 (105)	1.48 (2.22)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | FL Series Metal Hose

Ratings are based on ASME Code for Pressure Piping, B31.1 Power Piping, and ASME Boiler and Pressure Vessel Code.

Nominal Hose Size, in.	**1/4**	**3/8**	**1/2**	**3/4**	**1**	**1 1/4**	**1 1/2**	**2**
Temperature, °F (°C)	**Working Pressure, vacuum to ...** psig (bar)							
–325 (–200) to 100 (37)	1500 (103)	1470 (101)	1200 (82.7)	860 (59.2)	680 (46.8)	645 (44.4)	520 (35.8)	380 (26.1)
200 (93)	1260 (86.8)	1235 (85.0)	1008 (69.4)	722 (49.7)	571 (39.3)	542 (37.3)	437 (30.1)	319 (21.9)
300 (148)	1140 (78.5)	1117 (76.9)	912 (62.8)	654 (45.0)	517 (35.6)	490 (33.7)	395 (27.2)	289 (19.9)
400 (204)	1050 (72.3)	1029 (70.8)	840 (57.9)	602 (41.4)	476 (32.7)	451 (31.0)	364 (25.0)	266 (18.3)
500 (260)	975 (67.2)	955 (65.7)	780 (53.7)	559 (38.5)	442 (30.4)	419 (28.8)	338 (23.2)	247 (17.0)
600 (315)	930 (64.1)	911 (62.7)	744 (51.2)	533 (36.7)	422 (29.0)	400 (27.5)	322 (22.1)	236 (16.2)
700 (371)	885 (61.0)	867 (59.7)	708 (48.8)	507 (34.9)	401 (27.6)	381 (26.2)	307 (21.1)	224 (15.4)
750 (398)	870 (59.9)	853 (58.7)	696 (47.9)	499 (34.3)	394 (27.1)	374 (25.7)	302 (20.8)	220 (15.1)
800 (426)	855 (58.9)	838 (57.7)	684 (47.1)	490 (33.7)	388 (26.7)	368 (25.3)	296 (20.3)	216 (14.8)
850 (454)	840 (57.9)	823 (56.7)	672 (46.3)	482 (33.2)	381 (26.2)	361 (24.8)	291 (20.0)	213 (14.6)

⚠ **Caution: Do not subject flexible metal hose to pressure surges, shock or pulsations with a peak pressure greater than 50% of the working pressure rating.**

AH Series Metal Hose

Features

- Corrosion resistant all-metal hose
- Alloy C-276 annular convoluted core
- Size range of 1/2 through 2 in. and working pressures from vacuum to 1110 psig (76.4 bar)
- Single braid layer of 316L stainless steel promotes hose pressure containment
- End connections welded in accordance with ASME Boiler and Pressure Vessel Code Section IX
- Commonly used in high-temperature vacuum or corrosion resistant applications where permeation is undesirable
- Custom assemblies available
- Options include hose covers, hose tags, additional cleaning, and additional helium leak testing. See page 180 for details
- Alloy C-276 braid and end connections available upon request

⚠ Caution
Do not subject flexible metal hose to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.

Ordering Information | AH Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4	4		5	6			5	6
SS	-	AH	8	TA8	PM8	-	28	-	F	or	71CM	-	F
							in.				cm		

1 Material End Connections

SS = 316 stainless steel

2 Hose

AH = AH series metal hose

3 Nominal Hose Size, in.

8 = 1/2
12 = 3/4
16 = 1
24 = 11/2
32 = 2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
F = Fire jacket
F1 = Thermosleeve
C = ASTM G93 Level C cleaning on hose wetted surfaces
G = CGA 4.1 cleaning on hose wetted surfaces
H = Helium leak test (1×10^{-9} std cm^3/s)
H7 = Helium leak test (1×10^{-7} std cm^3/s)
N3 = Nitrogen pressure test
W = Hydrostatic test

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags
T5 = Clamp tag

*Specify text for tags. See **Hose Tag Text** table, page 184.*
See page 180 for detailed descriptions of options.

Technical Data | AH Series Metal Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Center Line Bend Radius in. (cm)		Temperature Range °F (°C)	Working Pressure at –325 to 300°F (–200 to 148°C) Vacuum to ... psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic				
1/2 (12.7)	0.50 (12.7)	0.82 (20.8)	1.50 (3.81)	6.50 (16.5)	–325 to 800 (–200 to 426)	1110 (76.4)	4440 (306)	0.22 (0.33)
3/4 (19.0)	0.75 (19.0)	1.21 (30.7)	2.10 (5.33)	8.86 (22.5)		860 (59.2)	3440 (237)	0.37 (0.55)
1 (25.4)	1.00 (25.4)	1.51 (38.4)	2.70 (6.86)	10.2 (25.9)		680 (46.8)	2720 (187)	0.50 (0.74)
1 1/2 (38.1)	1.50 (38.1)	2.12 (53.8)	3.90 (9.91)	13.4 (34.0)		520 (35.8)	2080 (143)	0.85 (1.26)
2 (50.8)	2.00 (50.8)	2.67 (67.8)	5.10 (13.0)	15.4 (39.1)		450 (31.0)	1800 (124)	1.10 (1.65)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | AH Series Metal Hose

Ratings are based on ASME Code for Pressure Piping, B31.1 Power Piping, and ASME Boiler and Pressure Vessel Code.

Nominal Hose Size, in.	**1/2**	**3/4**	**1**	**1 1/2**	**2**
Temperature, °F (°C)					
–325 (–200) to 300 (148)	1110 (76.4)	860 (59.2)	680 (46.8)	520 (35.8)	450 (31.0)
400 (204)	1032 (71.1)	800 (55.1)	632 (43.5)	484 (33.3)	419 (28.8)
500 (260)	955 (65.7)	740 (50.9)	585 (40.2)	447 (30.8)	387 (26.6)
600 (315)	899 (61.9)	697 (47.9)	551 (37.9)	421 (29.0)	365 (25.1)
700 (371)	855 (58.8)	662 (45.6)	524 (36.0)	400 (27.5)	347 (23.8)
750 (398)	833 (57.3)	645 (44.4)	510 (35.1)	390 (26.8)	338 (23.2)
800 (426)	821 (56.5)	636 (43.8)	503 (34.6)	385 (26.5)	333 (22.9)

⚠ **Caution: Do not subject flexible metal hose to pressure surges, shock or pulsations with a peak pressure greater than 50% of the working pressure rating.**

FV Series Vacuum-Insulated Metal Hose

Features

- Vacuum layer provides excellent insulation to extreme media temperatures.
- Proprietary design provides two levels of insulating performance in a compact package.
- Vacuum-only insulation can be augmented with multi-layer insulation to also address radiant heat transfer.
- Proprietary manufacturing process does not require the vacuum port, eliminating the primary source of vacuum degradation.
- Fully annealed condition eases hose routing through form-fit-and-stay capability.
- Available in sizes 1/2, 3/4, and 1 in.
- Custom lengths available to meet specific needs.
- 316L stainless steel wetted surfaces are suitable for liquids and gaseous media.
- Wetted braze material meets AMS 4777 (Nickel alloy).
- Colored polyolefin sleeves allow for color-coding process lines.

⚠ Caution

Do not subject flexible metal hose to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.

Ordering Information | FV Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4	4	5	6	7	8	5	6	7	8
SS	-	FV	**8**	**TN8**	**TN8**	-	**36**	-	**QB1**	-	**T** or	**90CM**	-	**QB1**	-	**T**
							in.					cm				

1 Material End Connections

SS = 316L stainless steel

2 Hose

FV = FV series metal hose

3 Nominal Hose Size, in.

8 = 1/2
12 = 3/4
16 = 1

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

Inches or centimeters, in whole numbers. Include CM as shown for centimeter lengths.

Minimum length is 18 in. (46 cm).
Maximum length is 720 in. (1820 cm).

Hoses 50 in. and less have a tolerance of ±1.5 in. Hoses longer than 50 in. have a tolerance of ±3%.

Ordered length is unpressurized. When pressurized, hose can stretch up to approximately 5%.

6 Sleeve Color

Standard

QB = Blue
QR = Red

Optional

QK = Black
QW = White

7 Insulation Level

1 = Vacuum
2 = Vacuum & Radiant barrier

8 Options

T = Lanyard Tag
T2 = Two lanyard Tags

Technical Data | FV Series Vacuum-Insulated Metal Hose

Nominal Hose Size in. (mm)	Insulation Level	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Center Line Bend Radius in. (cm)		Temperature Range °F (°C)	Working Pressure 10^{-9} torr to ... psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
				Static	Dynamic①				
1/2 (12.7)	Vacuum	0.47 (11.9)	1.27 (32.3)	5.00 (12.7)	—	–425 to 1000 (–253 to 537)	600 (41.3)	2400 (165)	0.45 (0.67)
	Vacuum & Radiant barrier		1.62 (41.2)	6.15 (15.6)	—				0.66 (0.98)
3/4 (19.0)	Vacuum	0.79 (20.1)	1.62 (41.2)	6.15 (15.6)	—		490 (33.7)	1960 (135)	0.80 (1.19)
	Vacuum & Radiant barrier		2.38 (60.5)	9.41 (23.9)	—				1.13 (1.68)
1 (25.4)	Vacuum	0.98 (25.0)	1.95 (49.5)	7.62 (19.4)	—		400 (27.5)	1600 (110)	1.02 (1.52)
	Vacuum & Radiant barrier		2.38 (60.5)	9.41 (23.9)	—				1.25 (1.86)

① Annealed product is not rated for highly dynamic applications.

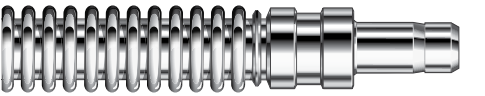
Pressure-Temperature Ratings | FV Series Vacuum-Insulated Metal Hose

Ratings are based on ASME Code for Pressure Piping, B31.3 Process Piping.

Nominal Hose Size, in.	**1/2**	**3/4**	**1**
Temperature °F (°C)	**Working Pressure** Vacuum to ... psig (bar)		
–425 (-253) to 300 (148)	600 (41.3)	490 (33.7)	400 (27.5)
400 (204)	567 (39.0)	463 (31.9)	378 (26.0)
500 (260)	531 (36.5)	434 (29.9)	354 (24.3)
600 (315)	502 (34.5)	410 (28.2)	335 (23.0)
700 (371)	484 (33.3)	395 (27.2)	323 (22.2)
800 (426)	466 (32.1)	381 (26.2)	311 (21.4)
900 (482)	427 (29.4)	348 (23.9)	284 (19.5)
1000 (537)	280 (19.2)	228 (15.7)	186 (12.8)

Flexible Metal Tubing

FN Series Metal Tubing



Features

- 316L stainless steel annular convoluted core
- Size range of 1/4 through 1/2 in. and working pressures up to 135 psig (9.3 bar)
- Form-fit-and-stay capability of tubing assemblies can compensate for misalignment and system reroutes between static connections in vacuum or low-pressure static applications
- Commonly used in high-temperature vacuum or low-pressure applications where permeation is undesirable
- Custom assemblies available
- Options include tubing tags, additional cleaning, and additional helium leak testing. See page 180 for details
- For electrical properties, see page 23 for details

⚠ Caution
Do not subject flexible metal tube to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.

Ordering Information | FN Series

Build a tube assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4	4		5	6		5	6
SS	- FN	**4**	**TA4**	**RF4**	-	**36**	**-H**	or	**90CM**	**-H**
						in.			cm	

1 Material End Connections

SS = 316 stainless steel

2 Hose

FN = FN series annealed metal tube

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*
Maximum length is 96 in (244 cm). For longer lengths, please contact your authorized Swagelok sales and service center.

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

C = ASTM G93 Level C cleaning on tube wetted surfaces
G = CGA 4.1 cleaning on tube wetted surfaces
H = Helium leak test (1×10^{-9} std cm^3/s)
T = Lanyard tag
T2 = Two lanyard tags

Technical Data | FN Series Metal Tube

Nominal Tubing Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Center Line Bend Radius in. (cm)		Temperature Range °F (°C)	Working Pressure at –325 to 300°F (–200 to 148°C) 10-9 torr to ... psig (bar)	Nominal Tubing Wall Thickness in. (mm)	Tubing Weight lb/ft (kg/m)
			Static	Dynamic①				
1/4 (6.4)	0.27 (6.9)	0.41 (10.4)	1.00 (2.54)	—	–325 to 1000 (–200 to 537)	135 (9.3)	0.006 (0.15)	0.04 (0.06)
3/8 (9.7)	0.38 (9.7)	0.54 (13.7)	1.20 (3.05)	—		65 (4.4)	0.006 (0.09)	0.06 (0.09)
1/2 (12.7)	0.53 (13.5)	0.75 (19.1)	1.50 (3.81)	—		60 (4.1)	0.008 (0.20)	0.11 (0.16)

① Annealed product is not rated for highly dynamic applications.

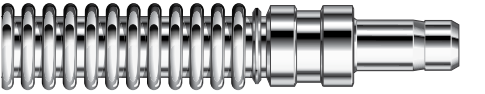
Pressure-Temperature Ratings | FN Series Metal Tube

Ratings are based on ASME Code for Pressure Piping, B31.1 Power Piping, and ASME Boiler and Pressure Vessel Code.

Nominal Hose Size, in.	**1/4**	**3/8**	**1/2**
Temperature, °F (°C)	**Working Pressure, vacuum to ...** psig (bar)		
–325 (–200) to 300 (148)	135 (9.3)	65 (4.4)	60 (4.1)
400 (204)	127 (8.7)	61 (4.2)	56 (3.8)
500 (260)	120 (8.2)	58 (3.9)	53 (3.6)
600 (315)	113 (7.8)	55 (3.7)	50 (3.4)
700 (371)	1922 (132)	53 (3.6)	49 (3.3)
800 (426)	1829 (126)	50 (3.4)	46 (3.1)
900 (482)	1767 (121)	48 (3.3)	44 (3.0)
1000 (537)	1736 (119)	46 (3.1)	43 (2.9)

⚠ **Caution: Do not subject flexible metal tube to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.**

FZ Series Metal Tubing



Features

- 316L stainless steel annular convoluted core
- Size range of 1/4 through 1/2 in. and working pressures up to 250 psig (17.2 bar)
- Non-annealed all-metal tubing can be used in dynamic applications
- Commonly used in high-temperature vacuum or low-pressure applications where permeation is undesirable
- Custom assemblies available
- Options include tubing tags, additional cleaning, and additional helium leak testing. See page 180 for details
- For electrical properties, see page 23 for details

⚠ **Caution**
Do not subject flexible metal tube to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.

Ordering Information | FZ Series

Build a tube assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4	4		5	6		5	6
SS	- FZ	**4**	**TA4**	**RF4**	-	**36**	**-H**	or	**90C**	**M-H**
						in.			cm	

1 Material End Connections

SS = 316 stainless steel

2 Hose

FZ = FZ series annealed metal tube

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*
Maximum length is 480 in (1219 cm).

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

C = ASTM G93 Level C cleaning on tube wetted surfaces
G = CGA 4.1 cleaning on tube wetted surfaces
H = Helium leak test (1×10^{-9} std cm^3/s)
T = Lanyard tag
T2 = Two lanyard tags

Technical Data | FZ Series Metal Tube

Nominal Tubing Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Center Line Bend Radius in. (cm)		Temperature Range °F (°C)	Working Pressure at –325 to 300°F (–200 to 148°C) 10-9 torr to ... psig (bar)	Nominal Tubing Wall Thickness in. (mm)	Tubing Weight lb/ft (kg/m)
			Static	Dynamic				
1/4 (6.4)	0.27 (6.9)	0.41 (10.4)	1.00 (2.54)	4.50 (11.4)	–325 to 1000 (–200 to 537)	250 (17.2)	0.006 (0.15)	0.04 (0.06)
3/8 (9.7)	0.38 (9.7)	0.54 (13.7)	1.20 (3.05)	5.00 (12.7)		105 (7.2)	0.006 (0.09)	0.06 (0.09)
1/2 (12.7)	0.53 (13.5)	0.75 (19.1)	1.50 (3.81)	5.50 (13.9)		95 (6.5)	0.008 (0.20)	0.11 (0.16)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | FZ Series Metal Tube

Ratings are based on ASME Code for Pressure Piping, B31.1 Power Piping, and ASME Boiler and Pressure Vessel Code.

Nominal Hose Size, in.	**1/4**	**3/8**	**1/2**
Temperature, °F (°C)	**Working Pressure, vacuum to ...** psig (bar)		
–325 (–200) to 300 (148)	250 (17.2)	105 (7.2)	95 (6.5)
400 (204)	235 (16.1)	99 (6.8)	89 (6.1)
500 (260)	223 (15.3)	93 (6.4)	85 (5.8)
600 (315)	210 (14.4)	88 (6.0)	80 (5.4)
700 (371)	203 (13.9)	85 (5.8)	77 (5.3)
800 (426)	193 (13.2)	81 (5.5)	73 (5.0)
900 (482)	185 (12.7)	78 (5.3)	70 (4.8)
1000 (537)	178 (12.2)	75 (5.1)	67 (4.6)

⚠ **Caution: Do not subject flexible metal tube to pressure surges, shock, or pulsations, where the peak pressure is greater than 50% of the working pressure rating.**

Convoluted Metal Tubing

Features

- Form-fit-and-stay, flexible, all-metal tubing
- 316L stainless steel annular convoluted core
- Size range of 1/4 through 1/2 in. and working pressures up to 100 psig (6.8 bar)
- Annealed material enables tubing to be compressed by at least 15% and extended up to 50% of manufactured length
- Form-fit-and-stay capability of convoluted tubing can compensate for misalignment and system reroutes between static connections in vacuum or low-pressure static applications
- Commonly used in high-temperature vacuum or lowpressure static applications
- Standard and custom tubing lengths, custom tubing assemblies, and adapters for field assembly are available
- Options include tubing tags, additional cleaning, and additional helium leak testing. See page 180 for details
- For electrical properties, see page 23 for details

⚠ **Not suitable for dynamic flexing applications.**

Ordering Information | Convoluted

Build a tube assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4	5	6
321	- **4**	- X	- **36**	**FMR**	- **HLT**

1 Material

Tubing

321 = 321 stainless steel

2 Tube OD, in.

4 = 1/4 **12** = 3/4
6 = 3/8 **16** = 1
8 = 1/2 **24** = 1 1/2

3 Tubing

X = Convoluted metal tubing

4 Manufactured Live Length

Insert length in inches, in whole numbers.

1/4 in. tubing size: available in select lengths up to 120 in.
All other tubing sizes: available in select lengths up to 96 in.

Manufactured lengths over 48 in. but less than 96 in. are spliced from two pieces; manufactured lengths over 96 in. but less than 120 in. are spliced from three pieces.

To calculate the overall length of the custom tubing assembly, add the manufactured live length (L) and two times the cuff length (A) for the appropriate sized hose.

5 End Connections

For tubing assemblies

First End Connection	Second End Connection	Designator
XBA adapter	None	-B1
	XBA adapter	-B2
	Female VCR	FRB
	Male VCR	MRB
	Female VCO	FOB
Female VCR	None	FR
	Female VCR	DFR
	Male VCR	FMR
	Male VCO	FRMO
Male VCR	None	MR
	Male VCR	DMR
Female VCO	None	FO
	Female VCO	DFO
	Male VCR	FOMR
	Male VCO	FMO
Male VCO	None	MO
	Male VCO	DMO

6 Options

For tubing assemblies

HLT = Inboard helium leak test with certification (1 × 10–9 std cm3/s maximum leak rate)

Technical Data | Convoluted Metal Tubing

Nominal Tubing Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Temperature Range °F (°C)	Working Pressure at –325 to 300°F (–200 to 148°C) 10-9 torr to ... psig (bar)	Nominal Tubing Wall Thickness in. (mm)	Tubing Weight lb/ft (kg/m)
1/4 (6.4)	0.25 (6.4)	0.38 (9.5)	70 to 1000 (20 to 537)	100 (6.8)	0.006 (0.15)	0.04 (0.06)
3/8 (9.7)	0.38 (9.5)	0.58 (14.7)		25 (1.7)		0.07 (0.10)
1/2 (12.7)	0.50 (12.7)	0.71 (17.9)				0.09 (0.13)
3/4 (19.0)	0.75 (19.0)	1.08 (27.4)				0.19 (0.28)
1 (25.4)	1.00 (25.4)	1.36 (34.5)				0.23 (0.34)
1 1/2 (38.1)	1.50 (38.1)	1.92 (48.7)				0.34 (0.51)

Pressure-temperature ratings may be limited by the end connections.

Fluoropolymer Hose

T Series PTFE Hose

Features

- PTFE hose with permeation-resistant features
- Smooth-bore PTFE core
- Size range of 1/4 through 1 in. and working pressures up to 3000 psig (206 bar)
- Single braid layer of 304 stainless steel (316L SS and alloy 400 available) ensures hose pressure containment and protects the core from abrasion
- PTFE material complies with FDA regulation 21CFR Part 177.1550
- Optional carbon black-filled PTFE core is available for applications that require static dissipation
- Select static dissipative hose assemblies are approved to ECE R110; see page 187 for more information
- Commonly used where chemical compatibility and permeation resistance is desired.
- Standard and custom assemblies available.
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | T Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6			5	6
SS	-	TH	4		TA4		SL4	-	28	-Z	or	71CM	-Z
									in.			cm	

1 Material End Connections

SS = 316 stainless steel
M = Alloy 400
HC = Alloy C-276
TI = Titanium, grade 4

Only wetted components will be made of the requested material, with the exception of Alloy 400 on TL hoses. Contact your authorized Swagelok sales and service representative with component material questions.

2 Hose

TH = T series PTFE hose with 304 SS braid
TC = T series carbon black-filled PTFE hose with 304 SS braid
TL = T series PTFE hose with alloy 400 braid (1/4 in. hose size only)

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2
12 = 3/4
16 = 1

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator. Insert a dash as shown prior to the first option designator.

C = ASTM G93 Level C cleaning on tube wetted surfaces
F = Fire jacket
F1 = Thermosleeve
N3 = Nitrogen pressure test
S = 302 SS spring guard, hoselength
W = Hydrostatic test
Z = 316 SS braid material (1/4 and 3/8 in. TH series hoses only)
093 = ECE R110 approval, only on select end connections for TC hose. *See page 187 for additional information.*

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags
T5 = Clamp tag

*Specify text for tags. See **Hose Tag Text** table, page 184.*

See page 180 for detailed descriptions of options.

Technical Data | T Series PTFE Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Vacuum (28.5 in.Hg [96.5 kPa]) Rated to ... °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic					
304 SS Braid (TH and TC)									
1/4 (6.4)	0.19 (4.8)	0.31 (7.9)	1.50 (3.81)	2.00 (5.08)	–65 to 450 (–53 to 230)	450 (230)	3000 (206)	12 000 (826)	0.08 (0.12)
3/8 (9.5)	0.31 (7.9)	0.44 (11.1)	3.50 (8.89)	5.00 (12.7)		450 (230)	2500 (172)	10 000 (689)	0.12 (0.17)
1/2 (12.7)	0.41 (10.3)	0.56 (14.3)	4.50 (11.4)	6.00 (15.2)		450 (230)	2000 (137)	8 000 (551)	0.15 (0.22)
3/4 (19.0)	0.63 (15.9)	0.81 (20.6)	6.00 (15.2)	7.50 (19.0)		450 (230)	1500 (103)	6 000 (413)	0.28 (0.41)
1 (25.4)	0.88 (22.2)	1.03 (26.2)	9.00 (22.9)	11.3 (28.7)		400 (204)	1000 (68.9)	4 000 (275)	0.39 (0.58)
Alloy 400 Braid (TL4)									
1/4 (6.4)	0.19 (4.8)	0.31 (7.9)	1.50 (3.81)	2.00 (5.08)	–65 to 450 (–53 to 230)	450 (230)	1500 (103)	6 000 (413)	0.08 (0.12)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | T Series PTFE Hose

Ratings are based on ASME Code for Pressure Piping, B31.1 Power Piping, and ASME Boiler and Pressure Vessel Code.

Braid Material	**304 SS (TH and TC)**					**Alloy 400 (TL4)**
Nominal Hose Size in.	**1/4**	**3/8**	**1/2**	**3/4**	**1**	**1/4**
Temperature °F (°C)	**Working Pressure,** psig (bar)					
–65 (–53) 0 (–17) to 100 (37) 200 (93)	2250 (155) 3000 (206) 2250 (155)	2250 (155) 2500 (172) 1875 (129)	2000 (137) 2000 (137) 1500 (103)	1500 (103) 1500 (103) 1125 (77.6)	1000 (68.9) 1000 (68.9) 750 (51.7)	1500 (103) 1500 (103) 1500 (103
300 (148) to 450 (230)	2250 (155)	1875 (129)	1500 (103)	1125 (77.6)	750 (51.7)	1215 (83.7)

B Series PTFE Hose

Features

- General purpose PTFE hose
- Smooth-bore PTFE core
- 1/8 in. size and working pressure of 3000 psig (206 bar)
- 304 stainless steel braid ensures hose pressure containment and protects the core from abrasion
- PTFE material complies with FDA regulation 21CFR Part 177.1550 and USP <88> Class VI, and is free of TSE, BSE, and ADI as defined in EMEA/410/01
- Commonly used where chemical compatibility is desired.
- Custom hose lengths and end connections available
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | B Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6			5	6
SS	-	BT	2		**TA2**		**PM2**	-	**28**	- **F**	or	**71CM** - **F**
									in.			cm

1 Material End Connections

SS = 316 stainless steel
HC = Alloy C-276

2 Hose

BT = B series PTFE hose

3 Nominal Hose Size, in.

2 = 1/8

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

Typical maximum one-piece hose length is 900 in. or 2286 cm. Longer assemblies may be spliced; specify splices under Options. See page 200 for more information about splices.

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
W = Hydrostatic test

Splices

SP1 = 1 splice
SP2 = 2 splices

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **MA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags
T5 = Clamp tag

*Specify text for tags. See **Hose Tag Text** table, page 184.*
See page 180 for detailed descriptions of options.

Technical Data | B Series PTFE Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Vacuum (28.5 in.Hg [96.5 kPa]) Rated to ... °F (°C)	Working Pressure at –65 to 450°F (–53 to 230°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic					
1/8 (3.2)	0.125 (3.2)	0.25 (6.4)	1.50 (3.81)	3.75 (9.52)	–65 to 450 (–53 to 230)	450 (230)	3000 (206)	12 000 (826)	0.05 (0.07)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | B Series PTFE Hose

Temperature °F (°C)	Working Pressure psig (bar)
–65 (–53) to 450 (230)	3000 (206)

X Series PTFE Hose

Features

- Highly flexible PTFE hose
- Smooth-bore PTFE core
- Size range of 1/4 through 1 in. and working pressures up to 3500 psig (241 bar)
- Fiber braid bonded to the core with a patent-pending process supports core to resist kinking
- 304 stainless steel braid protects the core from abrasion and enhances hose pressure rating
- PTFE material complies with FDA regulation 21CFR Part 177.1550 and USP <88> Class VI, and is free of TSE, BSE, and ADI as defined in EMEA/410/01
- Optional carbon black-filled PTFE core is available for applications that require static dissipation
- Commonly used where flexibility and chemical compatibility are desired
- Custom hose lengths and end connections available
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | X Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1 2 3 4 4 5 6 5 6 7

SS - **XT 8 TA8 KC16** - **28** - **MB** or **71CM** - **MB**

in. cm

1 Material End Connections

SS = 316 stainless steel
B = Brass (only on 1/4 in. PM, PF, and 1/4 in. hose size)
HC = Alloy C-276

2 Hose

XT = X series PTFE hose
XC = X series carbon black-filled PFTE hose

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2
12 = 3/4
16 = 1

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
G6 = Spiral guard, black
G7 = Spiral guard, blue
G8 = Spiral guard, yellow
W = Hydrostatic test

Splices

SP1 = 1 splice
SP2 = 2 splices

Other Tags

T = Lanyard tag
T2 = Two lanyard tags
T5 = Clamp tag

*Specify text for tags. See **Hose Tag Text** table, page 184.*
See page 180 for detailed descriptions of options.

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **MA2***

7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 160 for values and further information.

Technical Data | X Series PTFE Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Vacuum (28.5 in.Hg [96.5 kPa]) Rated to ... °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic					
1/4 (6.4)	0.25 (6.4)	0.46 (11.7)	1.25 (3.18)	4.20 (10.7)	–65 to 450 (–53 to 230)	450 (230)	3500 (241)	14 000 (964)	0.13 (0.19)
3/8 (9.6)	0.38 (9.6)	0.57 (14.5)	1.75 (4.44)	4.40 (11.2)		450 (230)	3000 (206)	12 000 (826)	0.17 (0.25)
1/2 (12.7)	0.50 (12.7)	0.76 (19.3)	2.50 (6.35)	4.55 (11.6)	–100 to 450 (–73 to 230)	450 (230)	1800 (124)	7 200 (496)	0.24 (0.36)
3/4 (19.0)	0.75 (19.0)	1.00 (25.4)	3.50 (8.89)	6.3 (16.2)		200 (93)	1250 (86.1)	5 000 (344)	0.36 (0.54)
1 (25.4)①	1.00 (25.4)	1.32 (33.5)	5.50 (14.0)	7.15 (18.2)		150 (65)	1000 (68.9)	4 000 (275)	1.1 (1.6)

Pressure-temperature ratings may be limited by the end connections.

① Constructed with two stainless steel braids and no fiber braid reinforcement.

Pressure-Temperature Ratings | X Series PTFE Hose

Nominal Hose Size, in.	1/4	3/8	1/2	3/4	1
Temperature, °F (°C)	**Working Pressure,** psig (bar)				
–100 (–73) to -65 (-53)	—	—	150 (10.3)	150 (10.3)	150 (10.3)
–65 (–53) to 100 (37)	3500 (241)	3000 (206)	1800 (124)	1250 (86.1)	1000 (68.9)
200 (93)	3500 (241)	2345 (161)	1800 (124)	1135 (78.2)	1000 (68.9)
300 (148)	3460 (238)	1965 (135)	1790 (123)	1010 (69.5)	895 (61.6)
400 (204)	3265 (224)	1810 (124)	1665 (114)	900 (62.0)	895 (61.6)
450 (230)	3205 (220)	1675 (115)	1665 (114)	900 (62.0)	895 (61.6)

S Series PTFE Hose

Features

- Highly flexible, silicone-covered PTFE hose
- Smooth-bore PTFE core
- Size range of 1/8 through 1 in. and working pressures up to 3500 psig (241 bar)
- Fiber braid bonded to the core with a patent-pending process supports core to resist kinking
- 304 stainless steel braid protects the core from abrasion and enhances hose pressure rating
- Silicone cover provides smooth, noncontaminating, easy-to-clean surface and insulation from internal system fluid temperature extremes
- PTFE material complies with FDA regulation 21CFR Part 177.1550, USP <88> Class VI (121°C), 3-A (for hose sizes 3/4 and 1 in.), and is free of TSE, BSE, and ADI as defined in EMEA/410/01
- Optional carbon black-filled PTFE core is available for applications that require static dissipation
- Commonly used where flexibility and chemical compatibility are desired
- Custom hose lengths and end connections available
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | S Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6		5		6	7
S	S	-	**ST**	**8**	**TA8**	**KC16**	-	**28**	-	**PB**	or	**71CM**	-	**PB**
								in.				cm		

1 Material End Connections

SS = 316 stainless steel
B = Brass (only on 1/4 in. PM, PF, and 1/4 in. hose size)
HC = Alloy C-276

2 Hose

ST = S series PTFE hose with silicone-cover
SC = S series carbon black-filled PFTE hose with silicone cover (not avail-able in 1/8 in. hose size)

3 Nominal Hose Size, in.

2 = 1/8 (ST series only)
4 = 1/4
6 = 3/8
8 = 1/2
12 = 3/4
16 = 1

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

Typical maximum one-piece hose length:

- *900 in. or 2286 cm for 1/4 through 1/2 in. hose*
- *600 in. or 1524 cm for 3/4 and 1 in. hose*

*Longer assemblies may be spliced; specify splices under **Options**. See page 200 for more information about splices.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
G6 = Spiral guard, black*
G7 = Spiral guard, blue*
G8 = Spiral guard, yellow*
W = Hydrostatic test

** (not available in 1/8 in. ST hose size)*

Splices

SP1 = 1 splice
SP2 = 2 splices

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **MA2***

Perma Tags

(not available in 1/8 in. hose size)

PA = Gray
PB = Blue
PC = Brown
PG = Green
PK = Black
PN = Pink
PO = Orange
PP = Purple
PR = Red
PW = White
PY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **PA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags

*Specify text for tags. See **Hose Tag Text** table, page 184..See page 180 for detailed descriptions of options.*

7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 160 for values and further information.

Technical Data | S Series PTFE Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Vacuum (28.5 in.Hg [96.5 kPa]) Rated to ... °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic					
1/8 (3.2)①	0.125 (3.2)	0.42 (10.7)	1.50 (3.81)	3.75 (9.52)	–65 to 400 (–53 to 204)	400 (204)	3000 (206)	12 000 (826)	0.09 (0.13)
1/4 (6.4)	0.25 (6.4)	0.55 (14.0)	1.25 (3.18)	4.20 (10.7)		400 (204)	3500 (241)	14 000 (964)	0.19 (0.28)
3/8 (9.6)	0.38 (9.6)	0.71 (18.0)	1.75 (4.44)	4.40 (11.2)		400 (204)	3000 (206)	12 000 (826)	0.25 (0.37)
1/2 (12.7)	0.50 (12.7)	0.86 (21.8)	2.50 (6.35)	4.55 (11.6)		400 (204)	1800 (124)	7 200 (496)	0.34 (0.51)
3/4 (19.0)	0.75 (19.0)	1.12 (28.4)	3.50 (8.89)	6.38 (16.2)		200 (93)	1250 (86.1)	5 000 (344)	0.47 (0.70)
1 (25.4)②	1.00 (25.4)	1.55 (39.4)	5.50 (14.0)	7.15 (18.2)		150 (65)	1000 (68.9)	4 000 (275)	1.8 (2.7)

Pressure-temperature ratings may be limited by the end connections.

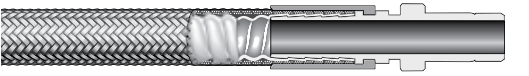
① Constructed with no fiber braid reinforcement.

② Constructed with two stainless steel braids and no fiber braid reinforcement.

Pressure-Temperature Ratings | S Series PTFE Hose

Nominal Hose Size, in.	**1/8**	**1/4**	**3/8**	**1/2**	**3/4**	**1**
Temperature, °F (°C)	**Working Pressure,** psig (bar)					
–65 (–53) to 100 (37)	3000 (206)	3500 (241)	3000 (206)	1800 (124)	1250 (86.1)	1000 (68.9)
200 (93)	3000 (206)	3500 (241)	2650 (182)	1800 (124)	1250 (86.1)	1000 (68.9)
300 (148)	2610 (179)	3435 (236)	2510 (172)	1800 (124)	1250 (86.1)	1000 (68.9)
400 (204)	2550 (175)	3320 (228)	2495 (171)	1800 (124)	1250 (86.1)	1000 (68.9)

C Series PTFE Hose



Features

- Low-weight, highly flexible PTFE hose
- Helical convoluted bore PTFE core
- Size range of 1/2 through 2 in. and working pressures up to 1500 psig (103 bar)
- 300 series stainless steel braid ensures hose pressure containment and protects the core from abrasion
- PTFE material complies with FDA regulation 21CFR Part 177.1550 and USP <88> Class VI, and is free of TSE, BSE, and ADI as defined in EMEA/410/01
- Optional carbon black-filled PTFE core is available for applications that require static dissipation
- Commonly used where high flexibility and chemical compatibility are desired
- Custom hose lengths and end connections available
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | C Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6		5		6	7
S	S	-	**CT**	**8**	**TA8**	**KC16**	-	**28**	-	**M**	**B**	or	**71CM** - **M B**
								in.					cm

1 Material End Connections

SS = 316 stainless steel
HC = Alloy C-276

2 Hose

CT = C series helical convoluted PTFE hose
CC = C series convoluted, carbon black-filled PTFE hose

3 Nominal Hose Size, in.

8 = 1/2
12 = 3/4
16 = 1
24 = 1 1/2
32 = 2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

Typical maximum one-piece hose length:

- *900 in. or 2286 cm for 1/2 in. hose*
- *600 in. or 1524 cm for 3/4 and 1 in. hose*
- *300 in. or 762 cm for 1 1/2 and 2 in. hose*

*Longer assemblies may be spliced; specify splices under **Options**. See page 200 for more information about splices.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
G6 = Spiral guard, black
G7 = Spiral guard, blue
G8 = Spiral guard, yellow
W = Hydrostatic test

Splices

SP1 = 1 splice
SP2 = 2 splices

Other Tags

T = Lanyard tag
T2 = Two lanyard tags
T5 = Clamp tag

*Specify text for tags. See **Hose Tag Text** table, page 184.*
See page 180 for detailed descriptions of options.

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 160 for values and further information.

Technical Data | C Series PTFE Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Vacuum (28.5 in.Hg [96.5 kPa]) Rated to ... °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic					
1/2 (12.7)	0.50 (12.7)	0.76 (19.3)	2.50 (6.35)	3.75 (9.52)	–65 to 450 (–53 to 230)	450 (230)	1500 (103)	6000 (413)	0.20 (0.30)
3/4 (19.0)	0.75 (19.0)	1.00 (25.4)	3.00 (7.62)	3.90 (9.91)		450 (230)	1100 (75.7)	4400 (303)	0.28 (0.42)
1 (25.4)	1.00 (25.4)	1.32 (33.5)	5.50 (14.0)	7.15 (18.2)		200 (93)	750 (51.6)	3000 (206)	0.47 (0.70)
1 1/2 (38.1)	1.50 (38.1)	2.03 (51.6)	6.00 (15.2)	7.80 (19.8)	–20 to 340 (–28 to 171)	150 (65)	700 (48.2)	2800 (192)	0.83 (1.2)
2 (50.8)	2.00 (50.8)	2.54 (64.5)	7.50 (19.0)	9.75 (24.8)		—	525 (36.1)	2100 (144)	1.02 (1.5)

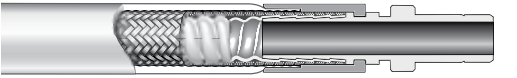
Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | C Series PTFE Hose

Nominal Hose Size, in.	1/2①	3/4①	1①	1 1/2①	2①
Temperature, °F (°C)	**Working Pressure,** psig (bar)				
–65 (–53)	1500 (103)	1100 (75.7)	750 (51.6)	—	—
–20 (–28)	1500 (103)	1100 (75.7)	750 (51.6)	675 (46.5)	525 (36.1)
0 (–17) to 100 (37)	1500 (103)	1100 (75.7)	750 (51.6)	700 (48.2)	525 (36.1)
200 (93)	1500 (103)	1100 (75.7)	700 (48.2)	435 (29.9)	525 (36.1)
300 (148)	1500 (103)	1100 (75.7)	620 (42.7)	405 (27.9)	495 (34.1)
340 (171)	1500 (103)	1030 (70.9)	600 (41.3)	330 (22.7)	485 (33.4)
400 (204)	1500 (103)	960 (66.1)	565 (38.9)	—	—
450 (230)	1500 (103)	900 (62.0)	490 (33.7)	—	—

① Hose with carbon black-filled PTFE core (CC series) is limited to 340°F (171°C).

J Series PTFE Hose



Features

- Low-weight, highly flexible PTFE hose
- Helical convoluted bore PTFE core
- Size range of 1/2 through 1 in. and working pressures up to 1500 psig (103 bar)
- 300 series stainless steel braid ensures hose pressure containment and protects the core from abrasion
- Silicone cover provides smooth, noncontaminating, easy-to-clean surface and insulation from internal system fluid temperature extremes
- PTFE material complies with FDA regulation 21CFR Part 177.1550, USP <88> Class VI, 3-A (for hose sizes 3/4 and 1 in.), and is free of TSE, BSE, and ADI as defined in EMEA/410/01
- Commonly used where high flexibility and chemical compatibility are desired
- Custom hose lengths and end connections available
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | J Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6			5	6	7
S	S	-	**J**	**T**	**8**	**T**	**A**	**8**	**KC16**	-	**28**	-	**MB**	or	**71**	**CM**	-	**MB**
											in.					cm		

1 Material End Connections

SS = 316 stainless steel
HC = Alloy C-276

2 Hose

JT = J series helical convoluted PTFE hose with silicone cover

3 Nominal Hose Size, in.

8 = 1/2
12 = 3/4
16 = 1

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

Typical maximum one-piece hose length:

- *900 in. or 2286 cm for 1/2 in. hose*
- *600 in. or 1524 cm for 3/4 and 1 in. hose*

*Longer assemblies may be spliced; specify splices under **Options**. See page 200 for more information about splices.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
G6 = Spiral guard, black
G7 = Spiral guard, blue
G8 = Spiral guard, yellow
W = Hydrostatic test

Splices

SP1 = 1 splice
SP2 = 2 splices

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **MA2***

Perma Tags

(not available in 1/8 in. hose size)

PA = Gray
PB = Blue
PC = Brown
PG = Green
PK = Black
PN = Pink
PO = Orange
PP = Purple
PR = Red
PW = White
PY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **PA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags

*Specify text for tags. See **Hose Tag Text** table, page 184..*
See page 180 for detailed descriptions of options.

7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 160 for values and further information.

Technical Data | J Series PTFE Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Vacuum (28.5 in.Hg [96.5 kPa]) Rated to ... °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic					
1/2 (12.7)	0.50 (12.7)	0.88 (22.4)	2.50 (6.35)	3.75 (9.52)	–65 to 400 (–53 to 204)	400 (204)	1500 (103)	6000 (413)	0.28 (0.42)
3/4 (19.0)	0.75 (19.0)	1.12 (28.4)	3.00 (7.62)	3.90 (9.91)		400 (204)	1100 (75.7)	4400 (303)	0.40 (0.60)
1 (25.4)	1.00 (25.4)	1.47 (37.3)	5.50 (14.0)	7.15 (18.2)		200 (93)	750 (51.6)	3000 (206)	0.72 (1.1)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | J Series PTFE Hose

Nominal Hose Size, in.	1/2	3/4	1
Temperature, °F (°C)	**Working Pressure,** psig (bar)		
–65 (–53)	1500 (103)	1100 (75.7)	750 (51.6)
–20 (–28)	1500 (103)	1100 (75.7)	750 (51.6)
0 (–17) to 100 (37)	1500 (103)	1100 (75.7)	750 (51.6)
200 (93)	1500 (103)	1100 (75.7)	750 (51.6)
300 (148)	1500 (103)	1095 (75.4)	620 (42.7)
340 (171)	1500 (103)	1075 (74.0)	595 (40.9)
400 (204)	1500 (103)	1050 (72.3)	555 (38.2)
450 (230)	—	—	—

N Series PTFE Hose

Features

- Nonmetallic PTFE hose
- Helical convoluted bore, carbon black-filled PTFE core for applications that require static dissipation
- 3/8, 1/2, and 3/4 in. sizes and working pressures up to 1250 psig (86.1 bar)
- Internal insulating wrap eliminates need for external insulation in many applications
- Aramid fiber braid aids pressure containment and maintains flexibility while reducing weight
- PTFE material complies with FDA regulation 21CFR Part 177.1550, USP <88> Class VI, and is free of TSE, BSE, and ADI as defined in EMEA/410/01
- Commonly used where flexibility, chemical compatibility, and a nonconductive braid are desired
- Custom hose lengths and end connections available
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | N Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6			5		6	7
SS	-	NC	**8**	**TA**	**8**	**KC**	**16**	-	**28**	-	**MB**	or	**71CM**	-	**MB**
									in.				cm		

1 Material End Connections

SS = 316 stainless steel
HC = Alloy C-276

2 Hose

NC = N series helical convoluted-bore, carbon black-filled PTFE hose with ceramic wrap

3 Nominal Hose Size, in.

6 = 3/8
8 = 1/2
12 = 3/4

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

Typical maximum one-piece hose length:

- *900 in. or 2286 cm for 3/8 in. and 1/2 in. hose*
- *600 in. or 1524 cm for 3/4 hose*

*Longer assemblies may be spliced; specify splices under **Options**. See page 200 for more information about splices.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
G6 = Spiral guard, black
G7 = Spiral guard, blue
G8 = Spiral guard, yellow
W = Hydrostatic test

Splices

SP1 = 1 splice
SP2 = 2 splices

Other Tags

T = Lanyard tag
T2 = Two lanyard tags

*Specify text for tags. See **Hose Tag Text** table, page 184.. See page 180 for detailed descriptions of options.*

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **MA2***

7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 160 for values and further information.

Technical Data | N Series PTFE Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Vacuum (28.5 in. Hg [96.5 kPa]) Rated to ... °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic					
3/8 (9.6)	0.37 (9.4)	0.70 (17.8)	2.50 (6.35)	4.00 (10.2)	–65 to 450 (–53 to 230)	450 (230)	1250 (86.1)	5000 (344)	0.12 (0.18)
1/2 (12.7)	0.51 (13.0)	0.86 (21.8)	3.50 (8.89)	5.25 (13.3)		400 (204)	750 (51.6)	3000 (206)	0.15 (0.22)
3/4 (19.0)	0.75 (19.0)	1.12 (28.4)	4.50 (11.4)	5.85 (14.9)		—	375 (25.8)	1500 (103)	0.19 (0.28)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | N Series PTFE Hose

Nominal Hose Size, in.	3/8	1/2	3/4
Temperature, °F (°C)	**Working Pressure,** psig (bar)		
–65 (–53)	1250 (86.1)	720 (49.6)	375 (25.8)
0 (–17) to 100 (37)	1250 (86.1)	750 (51.6)	375 (25.8)
200 (93)	500 (34.4)	340 (23.4)	275 (18.9)
300 (148)	365 (25.1)	235 (16.1)	165 (11.3)
400 (204)	165 (11.3)	160 (11.0)	85.0 (5.8)
450 (230)	140 (9.6)	130 (8.9)	80.0 (5.5)

W Series PTFE Hose

Features

- Silicone covered PTFE hose
- Smooth-bore, carbon black-filled PTFE core for applications that require static dissipation
- 3/8, 1/2, and 3/4 in. sizes and working pressures up to 750 psig (51.6 bar)
- Fiber braid bonded to the core with a patent-pending process supports core to reduce kinking
- 304 stainless steel braid ensures hose pressure containment and protects the core from abrasion
- Silicone cover provides smooth, noncontaminating, easy-to-clean surface and insulation from internal system fluid temperature extremes; cover is available in black, blue, red, and white
- PTFE material complies with FDA regulation 21CFR Part 177.1550, USP <88> Class VI, 3-A (for hose size 3/4 in.), and is free of TSE, BSE, and ADI as defined in EMEA/410/01
- Commonly used where flexibility, chemical compatibility, and exterior insulating (hot/cold) cover are desired
- Custom hose lengths and end connections available
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | W Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4	4	5	6	7		5		6	7	8
SS	-	WC	8	TA8	KC16	-	28	-	BL	-	PG	or	71CM	-	BL	PG
							in.						cm			

1 Material End Connections

SS = 316 stainless steel
HC = Alloy C-276

2 Hose

WC = W series carbon black-filled PTFE hose with silicone-cover and ceramic wrap

3 Nominal Hose Size, in.

6 = 3/8
8 = 1/2
12 = 3/4

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

*Typical maximum one-piece hose length is 300 in. or 762 cm. Longer assemblies may be spliced; specify splices under **Options**. See page 200 for more information about splices.*

6 Silicone Cover Color

BK = Black
BL = Blue
RD = Red
WD = White

3/4 in. available with blue and red only.

7 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
G6 = Spiral guard, black
G7 = Spiral guard, blue
G8 = Spiral guard, yellow
W = Hydrostatic test

Splices

SP1 = 1 splice
SP2 = 2 splices

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

Perma Tags

(not available in 1/8 in. hose size)

PA = Gray
PB = Blue
PC = Brown
PG = Green
PK = Black
PN = Pink
PO = Orange
PP = Purple
PR = Red
PW = White
PY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **PA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags

*Specify text for tags. See **Hose Tag Text** table, page 184.. See page 180 for detailed descriptions of options.*

8 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 160 for values and further information.

Technical Data | W Series PTFE Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Vacuum (28.5 in.Hg [96.5 kPa]) Rated to ... °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic					
3/8 (9.6)	0.35 (8.9)	0.75 (19.0)	2.75 (6.98)	4.40 (11.2)	–65 to 400 (–53 to 204)	450 (230)	750 (51.6)	3000 (206)	0.29 (0.43)
1/2 (12.7)	0.50 (12.7)	0.92 (23.4)	4.25 (10.8)	6.38 (16.2)		200 (93)	750 (51.6)	3000 (206)	0.35 (0.52)
3/4 (19.0)	0.75 (19.0)	1.19 (30.2)	6.75 (17.1)	8.00 (20.3)		—	500 (34.4)	2000 (137)	0.50 (0.74)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | W Series PTFE Hose

Nominal Hose Size, in.	**3/8, 1/2**	**3/4**
Temperature, °F (°C)	**Working Pressure,** psig (bar)	
–65 (–53) to 400 (204)	750 (51.6)	500 (34.4)

F Series PTFE Hose

Features

- Nonmetallic PTFE hose
- Smooth-bore PTFE core
- Size range of 1/4 through 3/4 in. and working pressures up to 800 psig (55.1 bar)
- Fiber braid bonded to the core with a patent-pending process supports core to resist kinking
- PTFE material complies with FDA regulation 21CFR Part 177.1550, USP <88> Class VI, and is free of TSE, BSE, and ADI as defined in EMEA/410/01
- Optional carbon black-filled PTFE core is available for applications that require static dissipation
- Commonly used where flexibility, chemical compatibility, and a nonconductive braid are desired
- Custom hose lengths and end connections available
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | F Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6			5		6	7
SS	-	FT	8	TA8	KC16	-	28	-	MB	or	71CM	-	MB	
							in.				cm			

1 Material End Connections

SS = 316 stainless steel
HC = Alloy C-276

2 Hose

FT = F series PTFE hose
FC = F series carbon black-filled PTFE hose

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2
12 = 3/4

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

Typical maximum one-piece hose length:

- *900 in. or 2286 cm for 1/4 in. through 1/2 in. hose*
- *600 in. or 1524 cm for 3/4 hose*

*Longer assemblies may be spliced; specify splices under **Options**. See page 200 for more information about splices.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
G6 = Spiral guard, black
G7 = Spiral guard, blue
G8 = Spiral guard, yellow
W = Hydrostatic test

Splices

SP1 = 1 splice
SP2 = 2 splices

Other Tags

T = Lanyard tag
T2 = Two lanyard tags

*Specify text for tags. See **Hose Tag Text** table, page 184.. See page 180 for detailed descriptions of options.*

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **MA2***

7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 160 for values and further information.

Technical Data | F Series PTFE Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic				
1/4 (6.4)	0.25 (6.4)	0.41 (10.4)	2.75 (6.99)	5.50 (14.0)	–65 to 450 (–53 to 230)	800 (55.1)	3200 (220)	0.06 (0.09)
3/8 (9.6)	0.38 (9.6)	0.55 (14.0)	3.25 (8.26)	5.20 (13.2)		650 (44.7)	2600 (179)	0.09 (0.13)
1/2 (12.7)	0.50 (12.7)	0.70 (17.8)	5.25 (13.3)	7.88 (20.0)		450 (31.0)	1800 (124)	0.13 (0.19)
3/4 (19.0)	0.75 (19.0)	0.94 (23.9)	6.50 (16.5)	8.45 (21.5)		325 (22.3)	1300 (89.5)	0.18 (0.27)

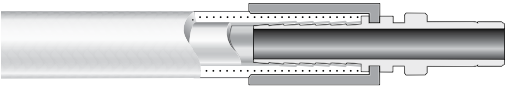
Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | F Series PTFE Hose

Nominal Hose Size, in.	1/4	3/8	1/2	3/4
Temperature, °F (°C)	**Working Pressure,** psig (bar)			
–65 (–53)	455 (31.3)	480 (33.0)	450 (31.0)	325 (22.3)
0 (–17) to 100 (37)	800 (55.1)	650 (44.7)	450 (31.0)	325 (22.3)
200 (93)	700 (48.2)	490 (33.7)	450 (31.0)	185 (12.7)
300 (148)	330 (22.7)	490 (33.7)	315 (21.7)	175 (12.0)
400 (204)	160 (11.0)	170 (11.7)	310 (21.3)	175 (12.0)
450 (230)	160 (11.0)	170 (11.7)	295 (20.3)	160 (11.0)

U Series PFA Hose

Features



- Highly flexible PFA hose
- Smooth-bore PFA core
- Size range of 1/2 through 2 in. and working pressures up to 300 psig (20.6 bar)
- 302 stainless steel reinforcement ensures hose pressure containment and supports core to resist kinking
- Silicone cover provides a smooth, noncontaminating, easy-to-clean surface and reduces internal system fluid temperature transfer
- Hose layers are encapsulated together without adhesives or cements with a patent-pending process, providing high flexibility and outstanding kink resistance
- PFA material complies with FDA regulation 21CFR Part 177.1550, USP <87, 88> Class VI (121°C), 3-A (for hose sizes 3/4 through 2 in.), and is free of TSE, BSE, and ADI as defined in EMEA/410/01
- Optional carbon black-filled PFA core is available for applications that require static dissipation
- Commonly used where high flexibility, chemical compatibility, and a smooth exterior cover are desired
- Custom hose lengths and end connections available
- Options include hose covers, hose tags, and additional cleaning. See page 180 for details.
- For electrical properties, see page 23 for details

Ordering Information | U Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6			5	6	7
SS-	UT	8	TA	8	KC	16	-	28	-	PB	or	71	CM-PB
								in.				cm	

1 Material End Connections

SS = 316 stainless steel
HC = Alloy C-276

2 Hose

UT = U series PFA hose with silicone cover

UC = U series carbon black-filled PFA hose with silicone cover

3 Nominal Hose Size, in.

8 = 1/2
12 = 3/4
16 = 1
24 = 1 1/2
32 = 2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

Typical maximum one-piece hose length:

- *900 in. or 2286 cm for 1/2 in. hose*
- *600 in. or 1524 cm for 3/4 and 1 in. hose*
- *300 in. or 762 cm for 1 1/2 and 2 in. hose*

*Longer assemblies may be spliced; specify splices under **Options**. See page 200 for more information about splices.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

A = Armor guard
C = ASTM G93 Level C cleaning on hose wetted surfaces
F = Fire jacket
G6 = Spiral guard, black
G7 = Spiral guard, blue
G8 = Spiral guard, yellow
W = Hydrostatic test

Splices

SP1 = 1 splice
SP2 = 2 splices

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **MA2***

Perma Tags

(not available in 1/8 in. hose size)

PA = Gray
PB = Blue
PC = Brown
PG = Green
PK = Black
PN = Pink
PO = Orange
PP = Purple
PR = Red
PW = White
PY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **PA2***

Other Tags

T = Lanyard tag
T2 = Two lanyard tags

*Specify text for tags. See **Hose Tag Text** table, page 184.. See page 180 for detailed descriptions of options.*

7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 160 for values and further information.

Technical Data | U Series PFA Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)		Temperature Range °F (°C)	Vacuum (28.5 in.Hg [96.5 kPa]) Rated to ... °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
			Static	Dynamic					
1/2 (12.7)	0.50 (12.7)	0.81 (20.6)	1.50 (3.81)	4.50 (11.4)	–65 to 400 (–53 to 204)	400 (204)	300 (20.6)	1200 (82.6)	0.20 (0.30)
3/4 (19.0)	0.75 (19.0)	1.13 (28.7)	2.50 (6.35)	5.20 (13.2)		400 (204)	300 (20.6)	1200 (82.6)	0.38 (0.57)
1 (25.4)	1.00 (25.4)	1.48 (37.6)	4.00 (10.2)	6.50 (16.5)		250 (121)	250 (17.2)	1000 (68.9)	0.63 (0.94)
1 1/2 (38.1)	1.50 (38.1)	2.00 (50.8)	7.00 (17.8)	9.10 (23.1)		250 (121)	200 (13.7)	800 (55.1)	0.88 (1.3)
2 (50.8)	v2.00(50.8)	2.50 (63.5)	7.00 (17.8)	9.10 (23.1)		150 (65)	150 (10.3)	600 (41.3)	1.3 (1.9)

Pressure-temperature ratings may be limited by the end connections.

Pressure-Temperature Ratings | U Series PFA Hose

Nominal Hose Size, in.	1/2	3/4	1	1 1/2	2
Temperature, °F (°C)	Working Pressure, psig (bar)				
–65 (–53)	200 (13.7)	115 (7.9)	250 (17.2)	200 (13.7)	150 (10.3)
0 (–17) to 100 (37)	300 (20.6)	300 (20.6)	250 (17.2)	200 (13.7)	150 (10.3)
200 (93)	280 (19.2)	300 (20.6)	250 (17.2)	200 (13.7)	150 (10.3)
300 (148)	210 (14.4)	270 (18.6)	230 (15.8)	200 (13.7)	150 (10.3)
400 (204)	160 (11.0)	195 (13.4)	175 (12.0)	200 (13.7)	150 (10.3)

Nylon Hose

NG Series Hose

Features

- Designed for use with natural gas where static dissipation is required
- Static dissipative, smooth-bore nylon core
- Size range of 1/4, 3/8 and 1/2 in. and working pressures up to 5000 psig (344 bar)
- Internal fiber reinforcement enhances hose pressure rating
- Perforated polyurethane cover resists abrasion.
- Single, twin bonded, and vent bonded hoses are available in custom assemblies
- Most popular configurations are available with NGV3.1-2014 Class B and NGV4.2-2014 Class A certification
- For electrical properties, see page 23 for details

Single hose

Twin hose (high-pressure vent)

Vent hose (low-pressure vent)

⚠ **Warning**
All equipment must be properly grounded to allow static dissipation and to help prevent static sparking.

⚠ **Warning**
Periodic inspection of hose assembly is recommended. End-to-end electrical resistance of the hose assembly must not exceed 1 MΩ per meter when tested at 500 VDC.

Ordering Information | NG Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1		2	3		4	4		5	6
SS	-	NGS	4	-	T6	S4	-	40	- F

1 Material

End Connections

SS = 316 stainless steel

2 Hose

NGS = NG series single nylon hose

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*
*For fitting dimensions, see **End Connection** tableson pages 132 to 174.*

5 Overall Length (Fill)

Insert length in inches.

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

F = Fire jacket
F1 = Thermosleeve
N3 = Nitrogen pressure test
NGV = NGV 3.1 and 4.2 certified
W = Hydrostatic test
X = No spring guards①

① *5 in. spring guards at each end are standard. The **X** option should only be used in static bend applications or to accommodate short length assemblies.*

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags. Example: **MA2***

See page 180 for detailed descriptions of options.

Technical Data | NG Series Nylon Hose

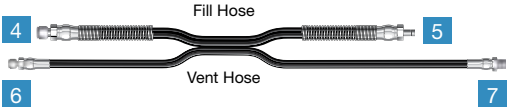
Hose Style (Series)	Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)	Temperature Range °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
Single (NGS)	1/4 (6.4)	0.26 (6.6)	0.63 (16.0)	2.00 (5.08)	–40 to 150 (–40 to 65)	5000 (344)	20 000 (1378)	0.12 (0.17)
	3/8 (9.6)	0.38 (9.6)	0.77 (19.6)	4.00 (10.2)				0.15 (0.22)
	1/2 (12.7)	0.52 (13.2)	0.89 (22.6)	5.50 (14.0)				0.21 (0.32)
Twin (NGT)	1/4 (6.4)	0.26 (6.6)	0.63 (16.0)	2.00 (5.08)		Fill and vent 5000 (344)	Fill and vent 20 000 (1378)	0.25 (0.37)
	3/8 (9.6)	0.38 (9.6)	0.77 (19.6)	4.00 (10.2)				0.30 (0.44)
Vent① (NGV)	1/4 (6.4)	Fill 0.26 (6.6) Vent 0.26 (6.6)	Fill 0.63 (16.0) Vent 0.63 (16.0)	2.00 (5.08)		Fill 5000 (344) Vent 1500 (103)	Fill 20 000 (1378) Vent 6 000 (413)	0.15 (0.22)
	3/8 (9.6)	Fill 0.38 (9.6) Vent 0.26 (6.6)	Fill 0.38 (9.6) Vent 0.63 (16.0)	4.00 (10.2)				0.25 (0.37)

Pressure-temperature ratings may be limited by the end connections.

① Low-pressure vent line does not have static dissipative core.

Ordering Information | NG Twin & Vent Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.



Typical Ordering Number

1	2	3	4	5	6	7	8	9	10	11
SS-	**NGV**	**6** -	**S6**	**T6**	**S4**	**P6** -	**48** -	**1**	**3**	- X

1 Material End Connections

SS = 316 stainless steel

2 Hose

NGT = NG series twin nylon hose

NGV = NG series vent nylon hose

3 Nominal Hose Size, in.

4 = 1/4

6 = 3/8

4 Fill Hose Nozzle End Connection

5 Fill Hose Dispenser End Connection

6 Vent Hose Nozzle End Connection

7 Vent Hose Dispenser End Connection

*See **End Connection Designator** column in tables on pages 132 to 174.*

*For fitting dimensions, see **End Connection** tables on pages 132 to 174. .*

9 Vent Hose Nozzle End Length Adjustment

Positive	Negative
X = None	**X** = None
1 = 2 in.	**A** = 2 in.
2 = 4 in.	**B** = 4 in.
3 = 6 in.	**C** = 6 in.
4 = 8 in.	**D** = 8 in.
5 = 10 in.	**E** = 10 in.
6 = 12 in.	**F** = 12 in.
7 = 15 in.	**G** = 15 in.
8 = 18 in.	**H** = 18 in.
9 = 21 in.	**J** = 21 in.
0 = 24 in.	**K** = 24 in.

Illustration shows adjustment **1**.

10 Vent Hose Dispenser End Length Adjustment

Positive	Negative
X = None	**X** = None
1 = 2 in.	**A** = 2 in.
2 = 4 in.	**B** = 4 in.
3 = 6 in.	**C** = 6 in.
4 = 8 in.	**D** = 8 in.
5 = 10 in.	**E** = 10 in.
6 = 12 in.	**F** = 12 in.
7 = 15 in.	**G** = 15 in.
8 = 18 in.	**H** = 18 in.
9 = 21 in.	**J** = 21 in.
0 = 24 in.	**K** = 24 in.

Illustration shows adjustment **3**.

8 Overall length (fill and Vent)

Insert length in inches.

11 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

N3 = Nitrogen pressure test

NGV = NGV 3.1 and 4.2 certified (NGT hose only)

W = Hydrostatic test

X = No spring guards①

① *This option should only be used in static bend applications.*

7R and 8R Series Nylon Hose

Features

- SAE general-purpose, hydraulic, nylon hose
- Smooth-bore nylon core
- Size range of 1/4 to 1 in. and working pressures up to 5000 psig (344 bar)
- Internal fiber reinforcement enhances hose pressure rating
- Smooth black polyurethane cover is perforated to prevent blistering
- Polyurethane cover resists abrasion
- Select 8R series hose assemblies are approved to ECE R110; see page 187 for the nominal sizes and end connections available
- Designed for use in hydraulic applications where outgassing is a concern
- Optional hose covers, spring guards, and additional testing; see page 180 for details
- For electrical properties, see page 23 for details

Ordering Information | 7R and 8R Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6			5	6
SS	-	7R	4		TA4		PM4	-	28	-	F	
									in.			
						or					71CM	- F
											cm	

1 Material End Connections

SS = 316 stainless steel

2 Hose

7R = 7R series SAE 100R7 nylon hose (1/4, 3/8, and 1/2 in. sizes *only*)
8R = 8R series SAE 100R8 nylon hose

3 Nominal Hose Size, in.

4 = 1/4 (7R, 8R series *only*)
6 = 3/8 (7R, 8R series *only*)
8 = 1/2 (7R, 8R series *only*)
12 = 3/4 (8R series *only*)
16 = 1 (8R series *only*)

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

CRN = Lanyard tag with CRN
F = Fire jacket
F1 = Thermosleeve
N3 = Nitrogen pressure test (7R and 8R Series *only*)
S = 302 SS spring guard, hoselength
S2 = 302 SS spring guard, 5 in. length (1/4 and 3/8 in. sizes *only*)
T = Lanyard tag
T2 = Two lanyard tags
W = Hydrostatic test
093 = ECE R110 approval, only on select end connections for 8R hose.

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

See page 184 for additional information.
See page 180 for detailed descriptions of options.

Technical Data | 7R and 8R Series Nylon Hose

Specification (Series)	Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)	Temperature Range °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
SAE J517 100R7 (7R series)	1/4 (6.4)	0.25 (6.4)	0.52 (13.2)	1.25 (3.18)	–40 to 200 (–40 to 93)	2750 (189)	11 000 (757)	0.07 (0.10)
	3/8 (9.6)	0.38 (9.8)	0.67 (17.0)	2.00 (5.08)		2250 (155)	9 000 (620)	0.10 (0.15)
	1/2 (12.7)	0.50 (12.7)	0.82 (20.8)	3.00 (7.62)		2000 (137)	8 000 (551)	0.14 (0.21)
SAE J517 100R8 (8R series)	1/4 (6.4)①	0.25 (6.4)	0.53 (13.5)	2.00 (5.08)	–40 to 200 (–40 to 93)	5000 (344)②	20 000 (1378)	0.08 (0.12)
	3/8 (9.6)	0.38 (9.8)	0.67 (17.0)	2.50 (6.35)		4000 (275)	16 000 (1102)	0.11 (0.16)
	1/2 (12.7)	0.50 (12.7)	0.84 (21.3)	4.00 (10.2)		3500 (241)	14 000 (964)	0.15 (0.22)
	3/4 (19.0)	0.75 (19.0)	1.15 (29.2)	6.50 (16.5)		2250 (155)	9 000 (620)	0.26 (0.39)
	1 (25.4)	1.00 (25.4)	1.48 (37.6)	10.0 (25.4)		2000 (137)	8 000 (551)	0.39 (0.58)

① 1/4 in. (6.4 mm) size does not meet SAE J517 impulse cycle requirements at maximum temperature and minimum bend radius.

② Pressure-temperature ratings may be limited by the end connections.

7N Series Nylon Hose

Features

- SAE nonconductive, nylon hose
- Smooth-bore nylon core
- Size range of 1/4 to 3/4 in. and working pressures up to 2750 psig (189 bar)
- Internal fiber reinforcement enhances hose pressure rating
- Smooth orange polyurethane cover is nonperforated to prevent moisture from entering hose
- Polyurethane cover resists abrasion
- Hose meets electrical conductivity requirements of SAE J343/SAE J517; hose is not intended for exposure to continuous electrical current
- Designed for use with petroleum-based and synthetic hydraulic fluids where SAE nonconductive properties are desired
- Optional hose covers, spring guards, and additional testing; see page 180 for details
- For electrical properties, see page 23 for details

⚠ **Caution**
System media can be conduits for electricity. Consider system media properties prior to use.

⚠ **Caution**
Nonperforated covers may blister in gas service.

Ordering Information | 7N Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4	5	6		5	6
SS -	7N	4	TA4		PM4	- 28	- F	or	71CM	- F
						in.			cm	

1 Material End Connections

SS = 316 stainless steel

2 Hose

7N = 7N series SAE 100R7 nonconductive nylon hose (1/4, 3/8, and 1/2 in. sizes *only*)

3 Nominal Hose Size, in.

4 = 1/4 (7N series *only*)
6 = 3/8 (7N series *only*)
8 = 1/2 (7N series *only*)

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

CRN= Lanyard tag with CRN
F = Fire jacket
F1 = Thermosleeve
S = 302 SS spring guard, hoselength
S2 = 302 SS spring guard, 5 in. length (1/4 and 3/8 in. sizes *only*)
T = Lanyard tag
T2 = Two lanyard tags
W = Hydrostatic test

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

See page 184 for additional information.
See page 180 for detailed descriptions of options.

Technical Data | 7N Series Nylon Hose

Specification (Series)	Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)	Temperature Range °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
SAE J517 100R7 (7N series)	1/4 (6.4)	0.26 (6.5)	0.49 (12.4)	1.25 (3.18)	–40 to 200 (–40 to 93)	2750 (189)	11 000 (757)	0.07 (0.10)
	3/8 (9.6)	0.38 (9.8)	0.65 (16.5)	2.00 (5.08)		2250 (155)	9 000 (620)	0.10 (0.15)
	1/2 (12.7)	0.50 (12.7)	0.80 (20.3)	3.00 (7.62)		2000 (137)	8 000 (551)	0.14 (0.21)
SAE J517 100R8 (8N series)	3/4 (19.0)	0.75 (19.0)	1.15 (29.2)	6.50 (16.5)	–40 to 200 (–40 to 93)	2250 (155)	9 000 (620)	0.26 (0.39)

Pressure-temperature ratings may be limited by the end connections.

Polyethylene Hose

7P Series Hose

Features

- Polyethylene hose designed for use in food, dairy, and water applications
- Smooth-bore polyethylene core
- Size range of 1/4 to 1 in. and working pressures up to 2750 psig (189 bar)
- Internal fiber reinforcement enhances hose pressure rating
- Smooth, polyurethane blue cover is nonperforated to prevent moisture entrapment and system contamination
- Polyurethane cover resists abrasion
- Polyethylene core material is compliant with FDA 21 CFR Part 177.1520 and NSF-51, for use with food, dairy, and water
- Optional hose covers, spring guards, and additional testing; see page 180 for details
- For electrical properties, see page 23 for details

⚠ **Caution**
Nonperforated covers may blister in gas service.

Ordering Information | 7P Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4		4		5	6			5	6
SS	-	7P	4		TA4		PM4	-	28	- F	or	71CM - F
									in.			cm

1 Material End Connections

SS = 316 stainless steel

2 Hose

7P = 7P series polyethylene hose

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2
12 = 3/4
16 = 1

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

F = Fire jacket
F1 = Thermosleeve
S = 302 SS spring guard, hoselength
S2 = 302 SS spring guard, 5 in. length (1/4 and 3/8 in. sizes *only*)
T = Lanyard tag
T2 = Two lanyard tags
W = Hydrostatic test

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

See page 184 for additional information.
See page 180 for detailed descriptions of options.

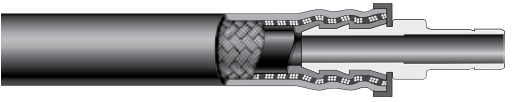
Technical Data | 7N Series Nylon Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)	Temperature Range °F (°C)	Working Pressure at 70°F (20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
1/4 (6.4)	0.25 (6.4)	0.52 (13.2)	1.25 (3.18)	−10 to 150 (−23 to 65)	2750 (189)	11 000 (757)	0.06 (0.09)
3/8 (9.7)	0.38 (9.7)	0.66 (16.8)	2.00 (5.08)		2250 (155)	9 000 (620)	0.09 (0.13)
1/2 (12.7)	0.50 (12.7)	0.81 (20.6)	3.00 (7.62)		2000 (137)	8 000 (551)	0.12 (0.18)
3/4 (19.0)	0.75 (19.0)	1.14 (29.0)	5.00 (12.7)		1500 (103)	6 000 (413)	0.25 (0.37)
1 (25.4)	1.00 (25.4)	1.48 (37.6)	8.00 (20.3)		1500 (103)	6 000 (413)	0.37 (0.55)

Pressure-temperature ratings may be limited by the end connections.

Rubber Hose

PB Series Hose



Features

- Ozone-resistant, general-purpose rubber hose with push-on connections
- Smooth-bore Buna N core
- Size range of 1/4 to 1 in. and working pressures up to 350 psig (24.1 bar)
- Internal fiber reinforcement enhances hose pressure rating and ensures connection retention
- Hose cover resists abrasion
- Cover is flame-resistant in accordance with 30CFR Part 18
- Designed for use in general-purpose, compressed air applications and oil transfer
- Bulk hose and end connections available for field assembly; custom assemblies also available
- Standard hose color is blue; other hose colors include black, green, gray, red, and yellow.
- Black hose color provides additional UV and ozone resistance due to Neoprene cover
- Options include tags. See page 180 for details.
- For electrical properties, see page 23 for details

⚠ **Caution**
Users must evaluate compatibility in systems containing heated water-based fluids. Some conditions may affect the Buna N core.

Ordering Information | PB Series

Build a hose assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1	2	3	4	4	5	6		5	6	7
SS-	PB	**4**	**TA4**	**PM4-**	**28**	**- BK**	or	**71CM**	**- BK**	**- CRN**
					in.			cm		

1 Material End Connections

SS = 316 stainless steel
B = Brass

2 Hose

PB = PB series rubber hose

3 Nominal Hose Size, in.

4 = 1/4
6 = 3/8
8 = 1/2
12 = 3/4
16 = 1

4 End Connections

*See **End Connection Designator** column in tables on pages 132 to 174.*

5 Overall Length

*Inches or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths.*

6 Hose Color

None = Blue, standard hose color
BK = Black
GR = Green
GY = Gray
RD = Red
YW = Yellow

7 Options

For multiple options, add designators in alphanumeric order with a dash between each designator.

T = Lanyard tag
T2 = Two lanyard tags
W = Hydrostatic test

Mat Tags

MA = Gray
MB = Blue
MC = Brown
MG = Green
MK = Black
MN = Pink
MO = Orange
MP = Purple
MR = Red
MW = White
MY = Yellow

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

See page 184 for additional information.
See page 180 for detailed descriptions of options.

Technical Data | PB Series Rubber Hose

Nominal Hose Size in. (mm)	Inside Diameter in. (mm)	Outside Diameter in. (mm)	Minimum Inside Bend Radius in. (cm)	Temperature Range °F (°C)	Working Pressure at –40 to 70°F (–40 to 20°C) psig (bar)	Minimum Burst Pressure at 70°F (20°C) psig (bar)	Bulk Hose Weight lb/ft (kg/m)
1/4 (6.4)	0.26 (6.6)	0.51 (12.8)	3.00 (7.62)	–40 to 200 (–40 to 93)	350 (24.1)	1400 (96.4)	0.09 (0.13)
3/8 (9.7)	0.39 (9.9)	0.67 (17.0)	3.00 (7.62)		300 (20.6)	1200 (82.6)	0.14 (0.20)
1/2 (12.7)	0.50 (12.7)	0.75 (19.0)	5.00 (12.7)		300 (20.6)	1200 (82.6)	0.14 (0.20)
3/4 (19.0)	0.76 (19.3)	1.07 (27.2)	7.00 (17.8)		300 (20.6)	1200 (82.6)	0.25 (0.37)
1 (25.4)	1.00 (25.4)	1.34 (34.0)	10.00 (25.4)	–20 to 200 (–28 to 93)	300 (20.6)①	1200 (82.6)	0.33 (0.49)

Pressure-temperature ratings may be limited by the end connections.

① Working pressure of 1 in. PB hose is 300 psig (20.6 bar) from –20 to 70°F (–28 to 20°C)

Pressure-Temperature Ratings | PB Series Rubber Hose

Ratings maintain a minimum factor of 4:1 between working pressure and minimum burst pressure.

Nominal Hose Size, in.	1/4	3/8, 1/2, 3/4	1
Temperature, °F (°C)	**Working Pressure,** psig (bar)		
–40 (–40)	350 (24.1)	300 (20.6)	—
–20 (–28) to 70 (20)	350 (24.1)	300 (20.6)	300 (20.6)
100 (37)	315 (21.7)	270 (18.6)	270 (18.6)
150 (65)	210 (14.4)	180 (12.4)	180 (12.4)
200 (93)	100 (6.8)	80 (5.5)	80 (5.5)

Ordering Information

Bulk Hose

- Bulk hose is available in 250 ft (76 m) reels; the standard color is blue. Select an ordering number from the table below left.
  Example: **PB-4**
- For hose of a color other than blue, add a hose color designator from the table below right.
  Example PB-4-**BK**

Nominal Hose Size in.	Ordering Number
1/4	PB-4
3/8	PB-6
1/2	PB-8
3/4	PB-12
1	PB-16

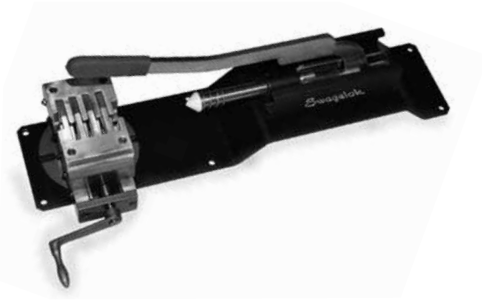
Rubber Hose Color	Designator
Black	-BK①
Gray	-GY
Green	-GR
Red	-RD
Yellow	-YW

① Black hose made with Neoprene cover. All other colors made with Buna N cover.

Tools

Push-On Tool

Portable, manually operated tool for inserting end connections into nylon, polyethylene, and rubber hose.



- Inserts end connections into 1/4 to 1 in. hose
- Bench mounting required
- Dimensions are 10 in. (25 cm) H, 14 in. (36 cm) W, 28 in. (71 cm) D; 35 lb (15.9 kg)

Ordering number: **MS-SPOT**

For more information, see the Swagelok Push-On Tool User's Manual, MS-CRD-0190.

Cutting Tool for Hose and Soft Tubing

This tool can be used to cut nylon, polyethylene, or rubber hose, as well as vinyl or PFA tubing, to the desired length for field assembly.

- Cuts hose and soft tubing up to 1 in. nominal size

Ordering number:
MS-HC-SC-1A

End Connections

Selecting end connections for hose assembly

- Eliminates the need for an adapter to attach the hose to your system
- Reduces potential leak points and production downtime
- Lowers the risk to personnel, equipment and your end product

There are three items to consider when selecting the end connection for your hose:

- Industry standards
- Hose type
- System specifications
  - Consider the materials and types of end connections in your system
  - Thread types and pressure ratings

End Connections—Metal Hose

FX Series Metal Hose

Swagelok Tube Adapters

1 in. and Under

Preswaged Nuts and Ferrules—Over 1 in. / 25 mm

Tube Adapter Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/4	4	TA4
3/8	6	TA6
1/2	8	TA8
3/4	12	TA12
1	16	TA16
1 1/4①	20	TA20
1 1/2①	24	TA24
2①	32	TA32
Dimensions, mm		
6	4	TM6
8	4	TM8
10	6	TM10
12	8	TM12
18	12	TM18
25	16	TM25
32①	20	TM32
38①	24	TM38

① Furnished with nut, preswaged silver-plated front ferrule, and uncoated back ferrule which are required for performance above 450°F (232°C).

Swagelok Tube Fittings

Tube Fitting Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/4	4	SL4
3/8	6	SL6
1/2	8	SL8
3/4	12	SL12
1	16	SL16
1 1/4①	20	SL20
1 1/2①	24	SL24
2①	32	SL32
Dimensions, mm		
6	4	SM6
8	4	SM8
10	6	SM10
12	8	SM12
18	12	SM18
25	16	SM25
32①	20	SM32
38①	24	SM38

① Furnished with silver-plated front ferrule and uncoated back ferrule which are required for performance above 450°F (232°C).

FX Series Metal Hose

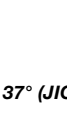
Rotatable Male VCR® Metal Gasket Face Seal Fittings

VCO Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RM4
1/2	8	RM8
3/4	12	RM12
1	16	RM16

Rotatable Female VCR Metal Gasket Face Seal Fittings

VCO Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RF4
1/2	8	RF8
3/4	12	RF12
1	16	RF16

Female VCO® O-Ring Face Seal Fittings



VCO Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	VF4
1/2	8	VF8
3/4	12	VF12
1	16	VF16

SAE 37° (JIC) Female Swivel

Swivel Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	AS4
3/8	6	AS6
1/2	8	AS8
3/4	12	AS12
1	16	AS16

Female Pipe Threads, NPT

NPT Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	PF4
3/8	6	PF6
1/2	8	PF8
3/4	12	PF12
1	16	PF16
1 1/2	24	PF24

FX Series Metal Hose

Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

NPT and ISO/BSP Tapered Size, in.	Nominal Hose Size Designator	End Connection Designator
NPT		
1/4	4	PM4
3/8	6	PM6
1/2	8	PM8
3/4	12	PM12
1	16	PM16
1 1/4	20	PM20
1 1/2	24	PM24
2	32	PM32
ISO/BSP Tapered		
1/4	4	MT4
3/8	6	MT6
1/2	8	MT8
3/4	12	MT12
1	16	MT16
1 1/4	20	MT20
1 1/2	24	MT24

Tube Butt Welds

Tube Butt Weld Size, in.	Wall Thickness in.	Nominal Hose Size Designator	End Connection Designator
1/4	0.035	4	TB4
3/8	0.035	6	TB6
1/2	0.049	8	TB8
3/4	0.049	12	TB12
1	0.065	16	TB16

FM Series Metal Hose

Swagelok Tube Adapters

Cap Weld Style—
1 in. and Under

Manual Weld
Style—
Over 1 in.

Tube Adapter Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/4	4	TA4
3/8	6	TA6
1/2	8	TA8
3/4	12	TA12
1	16	TA16
1 1/4①	20	TA20
1 1/2①	24	TA24
2①	32	TA32
Dimensions, mm		
6	4	TM6
10	6	TM10
12	8	TM12

① Furnished with nut, preswaged silver-plated front ferrule, and uncoated back ferrule which are required for performance above 450°F (232°C).

Swagelok Tube Fittings

Cap Weld Style—
1 in. and Under

Manual Weld
Style—
Over 1 in.

Tube Fitting Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/4	4	SL4
3/8	4	SL6
	6	SL6
1/2	8	SL8
5/8	8	SL10
3/4	12	SL12
1	16	SL16
1 1/4①	20	SL20
1 1/2①	24	SL24
2①	32	SL32
Dimensions, mm		
6	4	SM6
8	4	SM8
10	6	SM10
12	8	SM12

① Furnished with silver-plated front ferrule and uncoated back ferrule which are required for performance above 450°F (232°C).

FM Series Metal Hose

Rotatable Male VCR Metal Gasket Face Seal Fittings

VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RM4
1/2	8	RM8
3/4	12	RM12
1	16	RM16

Rotatable Female VCR Metal Gasket Face Seal Sittings

VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RF4
1/2	8	RF8
3/4	12	RF12
1	16	RF16

Female VCO O-Ring Face Seal Fittings

VCO Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	VF4
1/2	8	VF8

SAE 37° (JIC) Female Swivel

Swivel Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	AS4
3/8	6	AS6
1/2	8	AS8

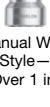
Female Pipe Threads, NPT

NPT Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	PF4
3/8	6	PF6
1/2	8	PF8
3/4	12	PF12

FM Series Metal Hose

Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

Cap Weld Style—
1 in. and Under



Manual Weld
Style—
Over 1 in.

NPT and ISO/ BSP Tapered Size, in.	Nominal Hose Size Designator	End Connection Designator
NPT		
1/4	4	PM4
	6	PM4
3/8	6	PM6
1/2	4	PM8
	8	PM8
3/4	12	PM12
1	16	PM16
1 1/4	20	PM20
1 1/2	24	PM24
2	32	PM32
ISO/BSP Tapered		
1/4	4	MT4
1/2	8	MT8

Tube Butt Welds

Tube Butt Weld Size, in.	Wall Thickness in.	Nominal Hose Size Designator	End Connection Designator
1/4	0.035	4	TB4
3/8	0.035	6	TB6
1/2	0.049	8	TB8
3/4	0.049	12	TB12
1	0.065	16	TB16

FJ Series Metal Hose

Swagelok Tube Adapters

Cap Weld Style—
1/4 and 1/2 in.

Manual Weld Style—
1 in. and Under

Manual Weld Style—
Preswaged
Nuts and Ferrules—
Over 1 in. / 25 mm

Tube Adapter Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/4	4	TA4
3/8	6	TA6
1/2	8	TA8 ②
3/4	12	TA12②
1	16	TA16
1 1/4①	20	TA20
1 1/2①	24	TA24
2①	32	TA32
Dimensions, mm		
6	4	TM6
8	4	TM8
10	6	TM10
12	8	TM12②
18	12	TM18②
25	16	TM25
32①	20	TM32
38①	24	TM38

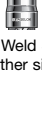
① Furnished with nut, preswaged silver-plated front ferrule, and uncoated back ferrule which are required for performance above 450°F (232°C).

② ECE R110 approval available.

FJ Series Metal Hose

Swagelok Tube Fittings

Cap Weld Style—
1/4 and 1/2 in.



Manual Weld Style—
All other sizes

Tube Fitting Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/4	4	SL4
3/8	6	SL6
1/2	8	SL8
3/4	12	SL12
1	16	SL16
1 1/4①	20	SL20
1 1/2①	24	SL24
2①	32	SL32
Dimensions, mm		
6	4	SM6
8	4	SM8
10	6	SM10
12	8	SM12
18	12	SM18
25	16	SM25
32①	20	SM32
38①	24	SM38

① Furnished with silver-plated front ferrule and uncoated back ferrule which are required for performance above 450°F (232°C).

FJ Series Metal Hose

Rotatable Male VCR Metal Gasket Face Seal Fittings

VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RM4
1/2	8	RM8
3/4	12	RM12
1	16	RM16

Rotatable Female VCR Metal Gasket Face Seal Fittings

VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RF4
1/2	8	RF8
3/4	12	RF12
1	16	RF16

Female VCO O-Ring Face Seal Fittings

Cap Weld Style—
1/4 in.

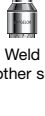
Manual Weld Style—
All other sizes

VCO Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	VF4
1/2	8	VF8
3/4	12	VF12
1	16	VF16

FJ Series Metal Hose

SAE 37° (JIC) Female Swivel

Cap Weld Style—
1/4 and 1/2 in.



Manual Weld Style—
All other sizes

Swivel Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	AS4
3/8	6	AS6
1/2	8	AS8
3/4	12	AS12
1	16	AS16

Female Pipe Threads, NPT

Cap Weld Style—
1/4 and 1/2 in.

Manual Weld Style—
All other sizes

NPT Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	PF4
3/8	6	PF6
1/2	8	PF8
3/4	12	PF12
1	16	PF16
1 1/2	24	PF24

FJ Series Metal Hose

Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

Cap Weld Style—
1/4 and 1/2 in.

Manual Weld Style—
All other sizes

NPT and ISO/BSP Tapered Size, in.	Nominal Hose Size Designator	End Connection Designator
NPT		
1/4	4	PM4
3/8	6	PM6
1/2	8	PM8
3/4	12	PM12
1	16	PM16
1 1/4	20	PM20
1 1/2	24	PM24
2	32	PM32
ISO/BSP Tapered		
1/4	4	MT4
3/8	6	MT6
1/2	8	MT8
3/4	12	MT12
1	16	MT16
1 1/4	20	MT20
1 1/2	24	MT24

Tube Butt Welds

Cap Weld Style—
1/4 and 1/2 in.

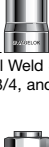
Manual Weld Style—
All other sizes

Tube Butt Weld Size, in.	Wall Thickness in.	Nominal Hose Size Designator	End Connection Designator
1/4	0.035	4	TB4
3/8	0.035	6	TB6
1/2	0.049	8	TB8
3/4	0.049	12	TB12
1	0.065	16	TB16

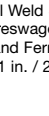
FL Series Metal Hose

Swagelok Tube Adapters

Cap Weld Style—
1/4 and 1/2 in.



Manual Weld Style—
3/8, 3/4, and 1 in.



Manual Weld Style—
Preswaged
Nuts and Ferrules—
Over 1 in. / 25 mm

Tube Adapter Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/4	4	TA4
3/8	4	TA6
	6	TA6
	8	TA6
1/2	8	TA8
3/4	12	TA12
1	16	TA16
1 1/4①	20	TA20
1 1/2①	24	TA24
2①	32	TA32
Dimensions, mm		
6	4	TM6
8	4	TM8
10	4	TM10
	6	TM10
	8	TM10
12	8	TM12
18	12	TM18
25	16	TM25
32①	20	TM32
38①	24	TM38

① Furnished with nut, preswaged silver-plated front ferrule, and uncoated back ferrule which are required for performance above 450°F (232°C).

FL Series Metal Hose

Swagelok Tube Fitting

Cap Weld Style—
1/4 and 1/2 in.

Manual Weld Style—
All other sizes

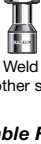
Tube Fitting Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/4	4	SL4
3/8	6	SL6
	8	SL6
1/2	8	SL8
3/4	12	SL12
1	16	SL16
1 1/4①	20	SL20
1 1/2①	24	SL24
2①	32	SL32
Dimensions, mm		
6	4	SM6
10	6	SM10
	8	SM10
12	8	SM12
18	12	SM18
25	16	SM25
32①	20	SM32
38①	24	SM38

① Furnished with silver-plated front ferrule and uncoated back ferrule which are required for performance above 450°F (232°C).

FL Series Metal Hose

Rotatable Male VCR Metal Gasket Face Seal Fittings

Cap Weld Style—
1/4 and 1/2 in.



Manual Weld Style—
All other sizes

VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RM4
1/2	8	RM8
3/4	12	RM12
1	16	RM16

Rotatable Female VCR Metal Gasket Face Seal Fittings

Cap Weld Style—
1/4 and 1/2 in.

Manual Weld Style—
All other sizes

VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RF4
1/2	8	RF8
3/4	12	RF12
1	16	RF16

FL Series Metal Hose

Female VCO O-Ring Face Seal Fittings

Cap Weld Style—
1/4 and 1/2 in.

Manual Weld Style—
All other sizes

VCO Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	VF4
1/2	8	VF8
3/4	12	VF12
1	16	VF16

SAE 37° (JIC) Female Swivel

Cap Weld Style—
1/4 and 1/2 in.

Manual Weld Style—
All other sizes

Swivel Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	AS4
3/8	6	AS6
1/2	8	AS8
3/4	12	AS12
1	16	AS16

Female Pipe Threads, NPT

Cap Weld Style—
1/4 and 1/2 in.

Manual Weld Style—
All other sizes

NPT Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	PF4
3/8	6	PF6
1/2	8	PF8
3/4	12	PF12
1	16	PF16
1 1/2	24	PF24

FL Series Metal Hose

Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

Cap Weld Style—
1/4 and 1/2 in.

Manual Weld Style—
All other sizes

NPT and ISO/BSP Tapered Size, in.	Nominal Hose Size Designator	End Connection Designator
NPT		
1/4	4	PM4
3/8	6	PM6
	8	PM6
1/2	8	PM8
3/4	12	PM12
1	16	PM16
1 1/4	20	PM20
1 1/2	24	PM24
2	32	PM32
ISO/BSP Tapered		
1/4	4	MT4
3/8	6	MT6
1/2	8	MT8
3/4	12	MT12
1	16	MT16
1 1/4	20	MT20
1 1/2	24	MT24

Tube Butt Welds

Cap Weld
Style—
1/4 and
1/2 in.

Manual Weld
Style—
All other sizes

Tube Butt Weld Size, in.	Wall Thickness in.	Nominal Hose Size Designator	End Connection Designator
1/4	0.035	4	TB4
3/8	0.035	6	TB6
1/2	0.049	8	TB8
3/4	0.049	12	TB12

AH Series Metal Hose

Swagelok Tube Adapters

End Connections with Hex Flat

Preswaged Nuts and Ferrules—Over 1 in. / 25 mm

Tube Adapter Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/2	8	TA8
3/4	12	TA12
1	16	TA16
1 1/2①	24	TA24
2①	32	TA32
Dimensions, mm		
12	8	TM12
18	12	TM18
25	16	TM25
38①	24	TM38

① Furnished with nut, preswaged silver-plated front ferrule, and uncoated back ferrule which are required for performance above 450°F (232°C)..

Swagelok Tube Fitting

Tube Fitting Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/2	8	SL8
3/4	12	SL12
1	16	SL16
1 1/2①	24	SL24
2①	32	SL32
Dimensions, mm		
12	8	SM12
18	12	SM18
25	16	SM25
38①	24	SM38

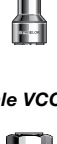
① Furnished with silver-plated front ferrule and uncoated back ferrule which are required for performance above 450°F (232°C).

AH Series Metal Hose

Rotatable Male VCR Metal Gasket Face Seal Fittings

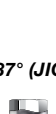
VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/2	8	RM8
3/4	12	RM12
1	16	RM16

Rotatable Female VCR Metal Gasket Face Seal Fittings



VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/2	8	RF8
3/4	12	RF12
1	16	RF16

Female VCO O-Ring Face Seal Fittings



VCO Size in.	Nominal Hose Size Designator	End Connection Designator
1/2	8	VF8
3/4	12	VF12
1	16	VF16

SAE 37° (JIC) Female Swivel

Swivel Size in.	Nominal Hose Size Designator	End Connection Designator
1/2	8	AS8
3/4	12	AS12
1	16	AS16

Female Pipe Threads, NPT

NPT Size in.	Nominal Hose Size Designator	End Connection Designator
1/2	8	PF8
3/4	12	PF12
1	16	PF16
1 1/2	24	PF24

AH Series Metal Hose

Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

NPT and ISO/BSP Tapered Size, in.	Nominal Hose Size Designator	End Connection Designator
NPT		
1/2	8	PM8
3/4	12	PM12
1	16	PM16
1 1/2	24	PM24
2	32	PM32
ISO/BSP Tapered		
1/2	8	MT8
3/4	12	MT12
1	16	MT16
1 1/2	24	MT24

Tube Butt Welds

Tube Butt Weld Size, in.	Nominal Hose Size Designator	End Connection Designator
1/2	8	TB8
3/4	12	TB12
1	16	TB16

FV Series Vacuum-Insulated Metal Hose

Tube Stubs, Annealed

Hose Size, in.	Wall Thickness, in.	End Connection Designator
1/2	0.035	TN8
3/4	0.049	TN12
1	0.065	TN16

End Connections—Flexible Metal Tubing

FN and FZ Series Metal Tubing

Swagelok Tube Adapters

Tube Adapter Size, in.	Nominal Tube Size Designator	End Connection Designator
1/4	4	TA4
3/8	6	TA6
1/2	8	TA8

Tube Butt Welds

Tube Butt Size in.	Nominal Tube Size Designator	End Connection Designator
1/4	4	TB4
3/8	6	TB6
1/2	8	TB8

Rotatable Male VCR Metal Gasket Face Seal Fittings

VCR Size in.	Nominal Tube Size Designator	End Connection Designator
1/4	4	RM4
1/2	6	RM8
1/2	8	RM8

Rotatable Female VCR Metal Gasket Face Seal Fittings

VCR Size in.	Nominal Tube Size Designator	End Connection Designator
1/4	4	RF4
1/2	6	RF8
1/2	8	RF8

Female VCO O-Ring Face Seal Fittings

VCO Size in.	Nominal Tube Size Designator	End Connection Designator
1/4	4	VF4
1/2	6	VF8
1/2	8	VF8

Convoluted Metal Tubing

Rotatable Female VCR Metal Gasket Face Seal Fittings

VCR Size in.
1/4
3/8
1/2

Rotatable Male VCR Metal Gasket Face Seal Fittings

VCR Size in.
1/4
3/8
1/2

Female VCO O-Ring Face Seal Fittings

VCO Size in.
1/4
1/2
1/2

Male VCO O-Ring Face Seal Fittings

VCO Size in.
1/4
1/2
1/2

XBA Adapters

Adapter Size in.
1/4
3/8
1/2
3/4
1
1 1/2

End Connections—Fluoropolymer

T Series PTFE Hose

Swagelok Tube Adapters

Tube Adapter Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/4	4	TA4①
3/8	6	TA6①
	8	TA6①
1/2	8	TA8①
3/4	12	TA12
	16	TA12
1	12	TA16
	16	TA16
Dimensions, mm		
6	4	TM6①
8	4	TM8①
10	6	TM10①
12	8	TM12①
18	12	TM18①
25	16	TM25

① ECE R110 approval available.

Swagelok Tube Fittings

Tube Fitting Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/8	4	SL2
1/4	4	SL4①
3/8	6	SL6①
1/2	8	SL8①
3/4	12	SL12
Dimensions, mm		
6	4	SM6①
10	6	SM10①
12	8	SM12①
18	12	SM18

① ECE R110 approval available.

T Series PTFE Hose

Female VCO O-Ring Face Seal Fittings

VCO Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	VF4
1/2	6	VF8
	8	VF8
3/4	12	VF12
1	16	VF16

Female Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

Female NPT and ISO/BSP Tapered Size, in.	Nominal Hose Size Designator	End Connection Designator
NPT		
1/4	4	PF4
	6	PF4
3/8	6	PF6
1/2	8	PF8
3/4	12	PF12
ISO/BSP Tapered		
1/4	4	FT4
1/2	8	FT8

Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

Male NPT and ISO/BSP Tapered Size, in.	Nominal Hose Size Designator	End Connection Designator
NPT		
1/4	4	PM4①
	6	PM4①
	8	PM4
3/8	6	PM6①
	8	PM6①
1/2	8	PM8①
	12	PM8
3/4	12	PM12
	16	PM12
1	16	PM16
ISO/BSP Tapered		
1/4	4	MT4①
1/2	8	MT8①
3/4	12	MT12
1	16	MT16

① ECE R110 approval available.

T Series PTFE Hose

Female VCR Metal Gasket Face Seal Fittings

VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RF4
1/2	8	RF8
3/4	12	RF12
1	16	RF16

SAE 37° (JIC) Male Flare

JIC Flare Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	AN4①
3/8	6	AN6①
1/2	8	AN8①

① ECE R110 approval available.

SAE 37° (JIC) Female Swivel

JIC Swivel Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	AS4
3/8	6	AS6
1/2	8	AS8

Sanitary Kwik-Clamps

Kwik-Clamp Size, in.	Nominal Hose Size Designator	End Connection Designator
1/2	8	KC8
3/4	12	KC12
1	16	KC16
1 1/2	16	KC24

Working pressure and temperature ratings of hoses with sanitary Kwik-Clamp end connections may be limited by the gasket material and clamp. Maximum pressure rating is 300 psig (20.6 bar).

B, X, S, C, J, N, W, F, and U Series Hose

These series of fluoropolymer hoses all share the same specifications for end connections.

Swagelok Tube Adapters

Tube Adapter Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/8	2	TA2
1/4	4	TA4
3/8	6	TA6
1/2	8	TA8
3/4	12	TA12
1	16	TA16
1 1/2①	24	TA24
2①	32	TA32
Dimensions, mm		
3	2	TM3
6	4	TM6
10	6	TM10
12	8	TM12
18	12	TM18
25	16	TM25
38①	24	TM38
50①	32	TM50

Alloy C-276 ends available for 1 in. and under tube adapters.
① Furnished with nut and preswaged ferrules.

Swagelok Tube Fittings

Tube Fitting Size	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.		
1/8	2	SL2
1/4	4	SL4
3/8	6	SL6
1/2	8	SL8
3/4	12	SL12
1	16	SL16
1 1/2	24	SL24
2	32	SL32
Dimensions, mm		
3	2	SM3
6	4	SM6
10	6	SM10
12	8	SM12
18	12	SM18
25	16	SM25
38	24	SM38
50	32	SM50

Alloy C-276 ends available for 1 in. and under tube adapters.

B, X, S, C, J, N, W, F, and U Series Hose

Female Pipe Threads, NPT

NPT Size in.	Nominal Hose Size Designator	End Connection Designator
1/8	2	PF2
1/4	4	PF4
3/8	6	PF6
1/2	8	PF8
3/4	12	PF12
1	16	PF16
1 1/2	24	PF24
2	32	PF32

Female Pipe Threads, NPT, with JIC (AN) 37° Union

NPT with JIC Union Size, in.	Nominal Hose Size Designator	End Connection Designator
1/8	2	FU2
1/4	4	FU4
3/8	6	FU6
1/2	8	FU8
3/4	12	FU12
1	16	FU16
1 1/2	24	FU24
2	32	FU32

Male Pipe Threads, NPT

NPT Size in.	Nominal Hose Size Designator	End Connection Designator
1/8	2	PM2
1/4	4	PM4
3/8	6	PM6
1/2	8	PM8
3/4	12	PM12
1	16	PM16
1 1/2	24	PM24
2	32	PM32

B, X, S, C, J, N, W, F, and U Series Hose

Male Pipe Threads, NPT, with JIC (AN) 37° Union

NPT with JIC Union Size, in.	Nominal Hose Size Designator	End Connection Designator
1/8	2	MU2
1/4	4	MU4
3/8	6	MU6
1/2	8	MU8
3/4	12	MU12
1	16	MU16
1 1/2	24	MU24
2	32	MU32

Sanitary Kwik-Clamps①

Kwik-Clamp Size, in.	Nominal Hose Size Designator	End Connection Designator	
		Standard Surface	Electro-polished
1/2	4	KC8	KE8
	6	KC8	KE8
	8	KC8	KE8
3/4	6	KC12	KE12
	8	KC12	KE12
	12	KC12	KE12
1	8	KC16	KE16
	12	KC16	KE16
	16	KC16	KE16
1 1/2	8	KC24	KE24
	12	KC24	KE24
	16	KC24	KE24
	24	KC24	KE24
2	16	KC32	KE32
	24	KC32	KE32
	32	KC32	KE32
2 1/2	24	KC40	KE40
	32	KC40	KE40

① 316L SS material with an I.D. of 15 µin. (0.38 µm) Ra max surface finish applies prior to crimp.

B, X, S, C, J, N, W, F, and U Series Hose

Sanitary Kwik-Clamp 90° Elbows

Kwik-Clamp Size, in.	Nominal Hose Size Designator	End Connection Designator	
		Standard Surface	Electro-polished
1/2	8	KR8	RE8
3/4	12	KR12	RE12
1	16	KR16	RE16
1 1/2	24	KR24	RE24
2	32	KR32	RE32

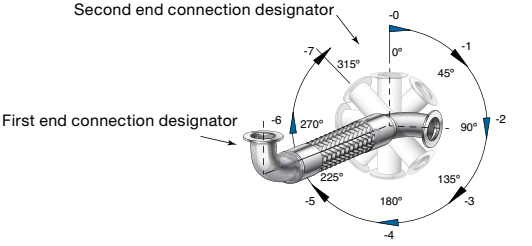
Sanitary Kwik-Clamp 45° Elbows

Kwik-Clamp Size, in.	Nominal Hose Size Designator	End Connection Designator	
		Standard Surface	Electro-polished
1/2	8	KA8	AE8
3/4	12	KA12	AE12
1	16	KA16	AE16
1 1/2	24	KA24	AE24
2	32	KA32	AE32

Two Elbow Hose Options

For hoses with two elbow end connections, a suffix is needed to indicate the angle offset between the first end connection and the second end connection. The first end connection is indicated by the first end connection designator in the part number. The second end connection is indicated by the second end connection designator in the part number. See the table and diagram below for the part number suffix and its corresponding angle offset.

Part Number Suffix	Rotation Amount
-0	0°
-1	45°
-2	90°
-3	135°
-4	180°
-5	225°
-6	270°
-7	315°



B, X, S, C, J, N, W, F, and U Series Hose

Tube Butt Welds①

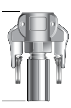
Tube Butt Weld Size, in.	Wall Thickness in.	Nominal Hose Size Designator	End Connection Designator
1/2	0.049	8	TB8
3/4	0.049	12	TB12
1	0.065	16	TB16
1 1/2	0.095	24	TB24
2	0.109	32	TB32

① 316 SS material with an I.D. of 15 µin. (0.38 µm) Ra max surface finish applies prior to crimp.

SAE 37° (JIC) Female Swivel

SAE 37° (JIC) Female Swivel Size, in.	Nominal Hose Size Designator	End Connection Designator
1/8	2	AS2
1/4	4	AS4
3/8	6	AS6
1/2	8	AS8
3/4	12	AS12
1	16	AS16
1 1/2	24	AS24
2	32	AS32

Female Cam and Groove



Female Cam and Groove Size, in.	Nominal Hose Size Designator	End Connection Designator
3/4	12	GF12
1	16	GF16
1 1/2	24	GF24
2	32	GF32

Male Cam and Groove

Male Cam and Groove Size, in.	Nominal Hose Size Designator	End Connection Designator
3/4	12	GM12
1	16	GM16
1 1/2	24	GM24
2	32	GM32

B, X, S, C, J, N, W, F, and U Series Hose

Tube Stubs, Annealed

Tube Stub Size	Wall Thickness	Nominal Hose Size Designator	End Connection Designator
Dimensions, in.			
1/8	0.028	2	TN2
1/4	0.035	4	TN4
3/8	0.049	6	TN6
1/2	0.049	8	TN8
3/4	0.065	12	TN12
1	0.083	16	TN16
1 1/2	0.134	24	TN24
2	0.188	32	TN32
Dimensions, mm			
3	0.80	2	TE3
6	1.0	4	TE6
8	1.0	4	TE8
8	1.0	6	TE8
10	1.0	6	TE10
12	1.0	6	TE12
12	1.0	8	TE12
18	1.5	12	TE18
25	1.5	16	TE25
38	3.5	24	TE38
50	5.0	32	TE50

Female VCO O-Ring Face Seal Fittings

VCO Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	VF4
1/2	8	VF8
3/4	12	VF12
1	16	VF16

Female VCR Metal Gasket Face Seal Fittings

VCR Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	RF4
1/2	8	RF8
3/4	12	RF12
1	16	RF16

B, X, S, C, J, N, W, F, and U Series Hose

TS Series Sanitary Clamps①

Sanitary Clamp Size, in.	Nominal Hose Size Designator	End Connection Designator
1/2	8	TS8
3/4	12	TS12
1	16	TS16
1 1/2	24	TS24
2	32	TS32

① 316L SS material with an I.D. of 15 µin. (0.38 µm) Ra max surface finish applies prior to crimp.

Male Pipe Threads, ISO/BSP Tapered (ISO 7)

Male Pipe Thread, ISO/BSP Tapered Size, in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	MT4
3/8	6	MT6
1/2	8	MT8
3/4	12	MT12
1	16	MT16
1 1/2	24	MT24
2	32	MT32

Male ISO/BSP Parallel Threads with 60° Male Cone (ISO 228)

ISO/BSP Parallel, 60° Male Cone Size, in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	MS4
3/8	6	MS6
1/2	8	MS8
3/4	12	MS12
1	16	MS16
1 1/2	24	MS24
2	32	MS32

B, X, S, C, J, N, W, F, and U Series Hose

Female Pipe Threads, ISO/BSP Tapered (ISO 7)

Female Pipe Thread, ISO/BSP Tapered Size, in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	FT4
3/8	6	FT6
1/2	8	FT8
3/4	12	FT12
1	16	FT16
1 1/2	24	FT24
2	32	FT32

Female ISO/BSP Parallel Threads (ISO 228)

ISO/BSP Parallel Thread Size, in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	FS4
3/8	6	FS6
1/2	8	FS8
3/4	12	FS12
1	16	FS16
1 1/2	24	FS24
2	32	FS32

Female Swivel ISO/BSP Parallel Threads with 30° Cone

Swivel ISO/BSP Parallel Thread, 30° Cone Size, in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	BS4
3/8	6	BS6
1/2	8	BS8

Female Swivel ISO/BSP Parallel Threads with 60° Cone

Swivel ISO/BSP Parallel Thread, 60° Cone Size in.	Nominal Hose Size Designator	End Connection Designator
1/4	4	BM4
3/8	6	BM6
1/2	8	BM8

B, X, S, C, J, N, W, F, and U Series Hose

*JIS(A)/ISO 2852-Type Sanitary*①

JIS(A)/ISO 2852-Type Sanitary Size	Nominal Hose Size Designator	End Connection Designator
8A	6	JS8
10A	8	JS10
15A	12	JS15

① 316L SS material with an I.D. of 15 µin. (0.38 µm) Ra max surface finish applies prior to crimp.

ISO-KF Vacuum Flange

ISO-KF Vacuum Flange Size mm	Nominal Hose Size Designator	End Connection Designator
16	12	KF16
25	16	KF25
40	24	KF40
50	32	KF50

*Sanitary DIN 11864-3 Form A*①

Sanitary DIN 11864-3 Series A, Form A, Clamp Ferrule with Groove, Size, mm	Nominal Hose Size Designator	End Connection Designator
10	6	DB10
15	8	DB15
	12	DB15
20	12	DB20
25	16	DB25
40	24	DB40
50	32	DB50

① 316L SS material with an ID of 15 µin. (0.38 µm) R_a max surface finish applies prior to crimp.

*Female DIN 11851 with Nut*①

Female DIN 11851 with Nut Size, mm	Nominal Hose Size Designator	End Connection Designator
15	8	DF15
20	12	DF20
25	16	DF25
40	24	DF40
50	32	DF50

① 316L SS material with an ID of 15 µin. (0.38 µm) R_a max surface finish applies prior to crimp.

B, X, S, C, J, N, W, F, and U Series Hose

ASME Class 150 Lap Joint Flange

ASME Class 150 Lap Joint Flange Size, in.	Nominal Hose Size Designator	End Connection Designator
1/2	8	GA8
3/4	12	GA12
1	16	GA16
1 1/2	24	GA24
2	32	GA32

JIS 10K Lap Joint Flange

JIS 10K Lap Joint Flange Size, mm	Nominal Hose Size Designator	End Connection Designator
15	8	HA15
20	12	HA20
25	16	HA25
40	24	HA40
50	32	HA50

DIN PN10 Lap Joint Flange

DIN PN10 Lap Joint Flange Size, mm	Nominal Hose Size Designator	End Connection Designator
15	8	FA15
20	12	FA20
25	16	FA25
40	24	FA40
50	32	FA50

*Sanitary I-Line Male*①

Sanitary I-Line Male Size, in.	Nominal Hose Size Designator	End Connection Designator
1	16	MD16
1 1/2	24	MD24
2	32	MD32

① 316L SS material with an ID of 15 µin. (0.38 µm) R_a max surface finish applies prior to crimp.

B, X, S, C, J, N, W, F, and U Series Hose

Sanitary I-Line Female[1]

Sanitary I-Line Female Size, in.	Nominal Hose Size Designator	End Connection Designator
1	16	FD16
1 1/2	24	FD24
2	32	FD32

① 316L SS material with an ID of 15 µin. (0.38 µm) R_a max surface finish applies prior to crimp.

Sanitary (DIN 32676)[1]

Sanitary (DIN 32676) Size, mm	Nominal Hose Size Designator	End Connection Designator
10	4	DA10
	6	DA10
	8	DA10
15	8	DA15
	12	DA15
20	12	DA20
25	16	DA25
32	16	DA32
40	24	DA40
50	32	DA50

① 316L SS material with an ID of 15 µin. (0.38 µm) R_a max surface finish applies prior to crimp.

Sanitary (ISO 2852)[1]

Sanitary (ISO 2852) Size, mm	Nominal Hose Size Designator	End Connection Designator
12	8	ES12
13	6	ES13
20	12	ES20
26	12	ES26
25	16	ES25
40	24	ES40
50	32	ES50

① 316L SS material with an ID of 15 µin. (0.38 µm) R_a max surface finish applies prior to crimp.

End Connections—
Nylon and Polyethylene Hose

NG Series (Nylon)

Swagelok Tube Fittings

Tube Fitting Size	Nominal Hose Size	End Connection Designator
Dimensions, in.		
1/4	1/4	S4①
3/8	3/8	S6①
1/2	1/2	S8①
Dimensions, mm		
6	1/4 in.	G6①
8		G8①
10	3/8 in.	G1①
12	1/2 in.	G2①

① NGV 3.1 and 4.2 certification available.

Swagelok Tube Adapters

Tube Adapter Size	Nominal Hose Size	End Connection Designator
Dimensions, in.		
1/4	1/4	T4①
3/8	1/4	T6①
	3/8	T6①
1/2		T8①
	1/2	T8①
5/8		T5①
3/4		T7
Dimensions, mm		
6	1/4 in.	E6①
8		E8①
10	3/8 in.	E1①
12	1/2 in.	E2①

① NGV 3.1 and 4.2 certification available.

NG Series Nylon Hose

Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

NPT and ISO/BSP Tapered Size, in.	Nominal Hose Size, in.	End Connection Designator
NPT		
1/4	1/4	P4①
	3/8	P4①
3/8		P6①
1/2	1/2	P8①
ISO/BSP Tapered		
1/4	1/4	K4
3/8	3/8	K6
1/2	1/2	K8

① NGV 3.1 and 4.2 certification available.

SAE 37° (JIC) Female Swivel

Swivel Size in.	Nominal Hose Size, in.	End Connection Designator
1/4	1/4	A4①
3/8	3/6	A6①
1/2	1/2	A8①

① NGV 3.1 and 4.2 certification available.

7R, 8R, and 7N Series Nylon Hose and 7P Series Polyethylene Hose

Swagelok Tube Adapters

Tube Adapter Size	Nominal Hose Size	End Connection Designator
Dimensions, in.		
1/4	1/4	TA4①
3/8	1/4	TA6
	3/8	TA6①
1/2	1/2	TA8①
5/8	1/2	TA10①
3/4	3/4	TA12
1	1	TA16
Dimensions, mm		
6	1/4 in.	TM6①
8	1/4 in.	TM8①
10	3/8 in.	TM10①
12	1/2 in.	TM12①

① ECE R110 approval available.

Swagelok Tube Fittings

Tube Fitting Size	Nominal Hose Size	End Connection Designator
Dimensions, in.		
1/4	1/4	SL4①
3/8	3/8	SL6①
1/2	1/2	SL8①
Dimensions, mm		
6	1/4 in.	SM6①
8	1/4 in.	SM8①
10	1/4 in.	SM10
	3/8 in.	SM10①
12	1/2 in.	SM12①

① ECE R110 approval available.

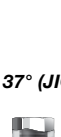
7R, 8R, and 7N Series Nylon Hose and 7P Series Polyethylene Hose

Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

NPT and ISO/ BSP Tapered Size, in.	Nominal Hose Size in.	End Connection Designator
NPT		
1/4	1/4	PM4①
	3/8	PM4①
3/8	3/8	PM6①
1/2	1/2	PM8①
ISO/BSP Tapered		
1/4	1/4	MT4①
3/8	3/8	MT6①
1/2	1/2	MT8①

① ECE R110 approval available.

Male ISO/BSP Parallel Threads with 60° Male Cone (ISO 228)



ISO/BSP Parallel, 60° Male Cone Size, in.	Nominal Hose Size in.	End Connection Designator
1/4	1/4	MS4
3/8	3/8	MS6
1/2	1/2	MS8

SAE 37° (JIC) Female Swivel

Swivel Size in.	Nominal Hose Size in.	End Connection Designator
1/4	1/4	AS4
3/8	3/8	AS6
1/2	1/2	AS8

Dimensions shown with swivel nut pushed toward hex.

7R, 8R, and 7N Series (Nylon) and 7P Series (Polyethylene)

Female Swivel ISO/BSP Parallel Threads with 60° Cone

Swivel ISO/BSP Parallel Thread, 60° Cone Size, in.	Nominal Hose Size in.	End Connection Designator
1/4	1/4	BM4
3/8	3/8	BM6
1/2	1/2	BM8

Dimensions shown with swivel nut pushed toward hex.

SAE 37° (JIC) Male Flare

JIC Flare Size, in.	Nominal Hose Size in.	End Connection Designator
1/4	1/4	AN4①
3/8	3/8	AN6①
1/2	1/2	AN8①

① ECE R110 approval available.

Female Swivel ISO/BSP Parallel Threads with 30° Cone

Swivel ISO/BSP Parallel Thread, 30° Cone Size, in.	Nominal Hose Size in.	End Connection Designator
1/4	1/4	BS4
3/8	3/8	BS6
1/2	1/2	BS8

Dimensions shown with swivel nut pushed toward hex.

Universal Globe Seal, Metric Female Swivel Nut

Universal Globe Seal, Metric Female Swivel Nut Size, mm	Nominal Hose Size in.	End Connection Designator
14	1/4	MC14
18	3/8	MC18
22	1/2	MC22

Dimensions shown with swivel nut pushed toward hex.

End Connections—Rubber Hose

PB Series

Swagelok Tube Fittings

Tube Fitting Size, in.	Nominal Hose Size, in.	End Connection Designator	Basic Ordering Number
1/4	1/4	SL4	-PB4-SL4
3/8	3/8	SL6	-PB6-SL6
1/2	1/2	SL8	-PB8-SL8

Swagelok Tube Adapters

Tube Adapter Size	Nominal Hose Size	End Connection Designator	Basic Ordering Number
Dimensions, in.			
1/4	1/4	TA4	-PB4-TA4
3/8	3/8	TA6	-PB6-TA6
1/2	1/2	TA8	-PB8-TA8
3/4	3/4	TA12	-PB12-TA12
1	1	TA16	-PB16-TA16
Dimensions, mm			
6	1/4 in.	TM6	-PB4-TM6
8	1/4 in.	TM8	-PB6-TM8
	3/8 in.	TM8	-PB8-TM8
10	3/8 in.	TM10	-PB12-TM10
12	1/2 in.	TM12	-PB16-TM12
18	3/4 in.	TM18	-PB12-TM18
25	1 in.	TM25	-PB16-TM25

Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)

NPT and ISO/BSP Tapered Size, in.	Nominal Hose Size, in.	End Connection Designator	Basic Ordering Number
NPT			
1/4	1/4	PM4	-PB4-PM4
	3/8	PM4	-PB6-PM4
3/8	3/8	PM6	-PB6-PM6
1/2	1/2	PM8	-PB8-PM8
3/4	3/4	PM12	PB12-PM12
1	1	PM16	PB16-PM16
ISO/BSP Tapered			
1/4	1/4	MT4	-PB4-MT4
3/8	3/8	MT6	-PB6-MT6
1/2	1/2	MT8	-PB8-MT8
3/4	3/4	MT12	-PB12-MT12
1	1	MT16	-PB16-MT16

PB Series Rubber Hose

Unions

Nominal Hose Size, in.	Basic Ordering Number
1/4	-PB4-6
3/8	-PB6-6
1/2	-PB8-6
3/4	-PB12-6

Cleaning, Packaging and Testing

Cleaning and Packaging

Swagelok hose components are cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)*, MS-06-62. Each custom hose assembly is bagged individually and boxed; longer hoses are coiled, bagged, and boxed.

Swagelok Specification SC-10 establishes the practices used to meet requirements for cleaning, lubrication, assembly, and packaging for standard Swagelok products. SC-10 covers basic industrial procedures. The system designer and user should reference this specification to determine whether it meets the user's cleaning needs. Please reference *Standard Cleaning and Packaging (SC-10)*, MS-06-62. Special cleaning processes are also available for Swagelok hose assemblies. Contact your Swagelok authorized sales and service center for additional information.

Standard Testing

By series, the following are standard tests conducted on every assembly produced.

FX Series Metal Hose

Every Swagelok FX series hose assembly is inboard helium tank tested to a maximum leak rate of 1×10^{-5} std cm^3/s.

FM Series Metal Hose

Every Swagelok FM series hose assembly is inboard helium tank tested to a maximum leak rate of 1×10^{-5} std cm^3/s.

FJ Series Metal Hose

Every Swagelok FJ series hose assembly is inboard helium tank tested to a maximum leak rate of 1×10^{-5} std cm^3/s.

FL Series Metal Hose

Every Swagelok FL series hose assembly is inboard helium tank tested to a maximum leak rate of 1×10^{-5} std cm^3/s.

AH Series Metal Hose

Every Swagelok AH series hose assembly is inboard helium tank tested to a maximum leak rate of 1×10^{-5} std cm^3/s.

FN Series Metal Tubing

Every Swagelok FN series tube assembly is inboard helium tank tested to a maximum leak rate of 1×10^{-7} std cm^3/s.

FZ Series Metal Tubing

Every Swagelok FZ series tube assembly is inboard helium tank tested to a maximum leak rate of 1×10^{-7} std cm^3/s.

Convoluted Metal Tubing

Every Swagelok convoluted tubing assembly with factory-welded end connections is inboard helium leak tested to a maximum leak rate of 1.8×10^{-7} std cm^3/s.

T Series PTFE Hose

Every Swagelok T series hose assembly is pressure tested with water for 30 to 60 seconds at 1.5 times the working pressure to a requirement of no visible leakage at ambient temperature.

B Series PTFE Hose

Every Swagelok B series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage. Testing is performed at a minimum of 1000 psig (69 bar), or 225 psig (15.5 bar) if an end connection is rated below 1000 psig (69 bar).

X Series PTFE Hose

Every Swagelok X series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage. Testing is performed at 1000 psig (69 bar), or 225 psig (15.5 bar) if an end connection is rated below 1000 psig (69 bar).

S Series PTFE Hose

Every Swagelok S series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage. Testing is performed at 1000 psig (69 bar), or 225 psig (15.5 bar) if an end connection is rated below 1000 psig (69 bar).

C Series PTFE Hose

Every Swagelok C series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage.

- For hose assemblies 1 in. and under, testing is performed at 1000 psig (69 bar), or 225 psig (15.5 bar) if an end connection is rated below 1000 psig (69 bar).
- For hose assemblies over 1 in., testing is performed at 500 psig (34.4 bar), or 225 psig (15.5 bar) if an end connection is rated below 500 psig (34.4 bar).

J Series PTFE Hose

Every Swagelok J series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage. Testing is performed at 1000 psig (69 bar), or 225 psig (15.5 bar) if an end connection is rated below 1000 psig (69 bar).

N Series PTFE Hose

Every Swagelok N series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage. Testing is performed at 500 psig (34.4 bar), or 225 psig (15.5 bar) if an end connection is rated below 500 psig (34.4 bar).

W Series PTFE Hose

Every Swagelok W series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage. Testing is performed at 500 psig (34.4 bar), or 225 psig (15.5 bar) if an end connection is rated below 500 psig (34.4 bar).

F Series PTFE Hose

Every Swagelok F series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage. Testing is performed at 500 psig (34.4 bar), or 225 psig (15.5 bar) if an end connection is rated below 500 psig (34.4 bar).

U Series PFA Hose

Every Swagelok U series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage. Testing is performed at 225 psig (15.5 bar).

NG Series Nylon Hose

Every Swagelok NG series hose assembly is pressure tested with water at room temperature for 30 seconds to a requirement of no detectable leakage. Testing is performed at 5000 psig (344 bar). Every NG series hose assembly is factory tested for electrical conductivity.

Options

Testing

These tests are in addition to or a replacement to the standard testing performed on each hose series.

Helium Leak Testing (Option H7)

- Inboard helium leak tested to a maximum leak rate of 1×10^{-7} std cm^3/s
- Test certification included with order
- Customer-specified testing is available; contact your authorized Swagelok sales and service center

Hydrostatic Testing (Option W)

- Hydrostatic pressure test to 1.5 times the rated working pressure of the hose at 70°F (20°C) with no visible leakage
- Test certification included with order
- Customer-specified testing is available; contact your authorized Swagelok sales and service center

Nitrogen Pressure Testing (Option N3)

- Nitrogen gas bubble leak test at 200 psig (13.7 bar) at 70°F (20°C) with no visible leakage
- Test certification included with order
- Customer-specified testing is available; contact your authorized Swagelok sales and service center

Covers

Fire Jacket (Option F)

- Woven fiberglass coated with specially compounded aerospace-grade silicon rubber
- Insulation from internal system fluid temperature extremes
- Resistant to many hydraulic fluids and lubricating oils
- Operating temperature: –65 to 500°F (–53 to 260°C) with short-term flame exposure to 2000°F (1093°C)

Thermosleeve (Option F1)

- Braided fiberglass with saturated synthetic material coating
- Hose protected from weld splatter and effects of UV light
- Barrier that prevents direct contact with the hose and resists abrasion
- Operating temperature: up to 1000°F (537°C)

Covers

Armor Guard (Option A)

- Interlocking, flexible 302 stainless steel
- Highly flexible, protects against kinking and abrasion
- Covers entire length of hose
- Operating temperature: –325 to 750°F (–200 to 398°C)

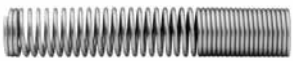
Spiral Guard (Options G6, G7, and G8)

- Helical HDPE plastic covers entire length of hose
- Highly flexible, protects against abrasion
- Covers enitre length of hose
- Operating temperature: –180 to 250°F (–117 to 121°C)
- Standard colors are blue, black, and yellow

316 Stainless Steel Material (Option Z)

- Replaces standard 304 stainless steel overbraid with 316L stainless steel
- Provides greater corrosion resistance

Spring Guard (Options S and S2)



- Helical 302 stainless steel
- Highly flexible, protects against kinking and abrasion
- Hose-length version covers entire length of hose (option S)
- Five-inch-long version protects each end of hose (option S2)
- Operating temperature: –325 to 850°F (–200 to 454°C)

Tags

Lanyard Tag (Option T)

- Stainless steel tag with customer specified text; see Hose Tag Text table on page 184
- Attached to the hose with a stainless steel lanyard and aluminum clamp
- Specify a quantity of 1 or 2

Clamp Tag (Option T5)

- Stainless steel tag with customer-specified text
- See Hose Tag Text table on page 184 for details; limited to 2 lines of text
- Attached to the hose with two metal bands

Mat Tag (Option M_)

- Polyester tag with customer-specified text; see Hose Tag Text table on page 184 for details
- Operating temperature range: –40 to 302°F (–40 to 150°C)
- Attached to the hose with an adhesive
- Standard colors are black, blue, brown, gray, green, orange, pink, purple, red, white, and yellow

Key Color	Designator
Gray	MA
Blue	MB
Brown	MC
Green	MG
Black	MK
Pink	MN
Orange	MO
Purple	MP
Red	MR
White	MW
Yellow	MY

*Add **2** to the end of the Mat Tag designator for two tags.*
*Example: **MA2***

Perma Tag (Option P_)

- Encapsulated polyester tag in platinum-cured silicone with customer-specified text; see Hose Tag Text table on page 184 for details
- Attached to the hose with an adhesive
- Designed for sterilization-in-place (SIP), clean-in-place (CIP), and autoclave applications
- Standard colors are black, blue, brown, gray, green, orange, pink, purple, red, white, and yellow

Key Color	Designator
Gray	PA
Blue	PB
Brown	PC
Green	PG
Black	PK
Pink	PN
Orange	PO
Purple	PP
Red	PR
White	PW
Yellow	PY

*Add **2** to the end of the Perma Tag designator for two tags.*
*Example: **PA2***

Hose Tag Text

- *Specify up to 5 lines of text with 25 characters per line including spaces and commas*
- *Exception: Clamp tag (T5) is limited to 2 lines of text*

Line Number	For Example
1	Ordering number
2	Process line
3	Location
4	Supplier phone number
5	Date of manufacture

Approvals

Alternative Fuels-Type Approval (Option 093)

Select T series hose assemblies and 8R series hose assemblies are available tested, tagged, and approved to ECE R110. See the table for the nominal sizes and end connections available.

FJ Series Hose Assemblies

- Operating temperature –260 to 221°F (–162 to 105°C)
- Maximum working pressure 750 psig (51.7 bar); pressure classification 5

T Series Carbon Black-Filled PTFE Hose Assemblies:

- Operating temperature –40 to 248°F (–40 to 120°C)
- Maximum working pressure 435 psig (30 bar); pressure classification 1

8R Series Hose Assemblies:

- Operating temperature –40 to 185°F (–40 to 85°C)
- Maximum working pressure 3770 psig (260 bar); pressure classification 0

Processing

Cleaning to CGA 4.1 (Option G)

Hose wetted surfaces are cleaned to CGA 4.1 for use in non-oxygen enriched applications.

Cleaning to ASTM G93, Level C (Option C)

Clean hose assembly wetted surfaces to ASTM G93 level C.

Oxygen Service Hazards

For more information about hazards and risks of oxygen-enriched systems, refer to Oxygen System Safety technical report, MS-06-13.

Options Availability

Availability of options by hose series is shown below, but may be limited by hose size. Applications, hose operating parameters, and hose length must be considered when selecting options.

	Options	Hose Series						
		Metal						
		FX	FM	FJ	FL	AH	FN	FZ
Covers	Y Insulation	✓	✓	✓	✓	✓		
	Fire jacket	✓	✓	✓	✓	✓		
	Thermosleeve	✓	✓	✓	✓	✓		
	Armor guard	✓		✓		✓		
	Spiral guard							
	Spring guard—Hose length		❍					
	Spring guard—5 in. long							
	316L SS braid	✓	Std	✓		Std		
Testing	Helium leak testing	✓	✓	✓	✓	✓	✓	✓
	Hydrostatic testing		✓	✓	✓	✓		
	Nitrogen pressure testing	✓	✓	✓	✓	✓		
Tags	Lanyard tag	✓	✓	✓	✓	✓	✓	✓
	Two lanyard tags	✓	✓	✓	✓	✓	✓	✓
	Clamp tag	✓	✓	✓		✓		
	Mat tag	✓	✓	✓	✓	✓		
	Perma tag							
Approval	Alternative fuels-type ECE R110			❍				
Processing	Cleaning to CGA 4.1	✓		✓	❍	✓	✓	✓
	Cleaning to ASTM G93, Level C	✓	✓	✓	✓	✓	✓	✓

✓ Available in all sizes.
❍ Available in select hose sizes.

Options Availability

Availability of options by hose series is shown below, but may be limited by hose size. Applications, hose operating parameters, and hose length must be considered when selecting options.

	Options	Hose Series									
		Fluoropolymer									
		T	B	X	S	C	J	N	W	F	U
Covers	Y Insulation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Fire jacket	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Thermosleeve	✓									
	Armor guard			✓	✓	✓	✓	✓	✓	✓	✓
	Spiral guard			✓	❍	✓	✓	✓	✓	✓	✓
	Spring guard—Hose length	✓									
	Spring guard—5 in. long										
	316L SS braid	❍									
Testing	Helium leak testing										
	Hydrostatic testing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Nitrogen pressure testing	✓									
Tags	Lanyard tag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Two lanyard tags	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Clamp tag	✓	✓	✓		✓					
	Mat tag		✓	✓	✓	✓	✓	✓	✓	✓	✓
	Perma tag	✓			❍		✓		✓		✓
Approval	Alternative fuels-type ECE R110	❍									
Processing	Cleaning to CGA 4.1										
	Cleaning to ASTM G93, Level C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

✓ Available in all sizes.
❍ Available in select hose sizes.

Options Availability

Availability of options by hose series is shown below, but may be limited by hose size. Applications, hose operating parameters, and hose length must be considered when selecting options.

	Options	Hose Series			
		Nylon			
		NG	7R	8R	7N
Covers	Y Insulation				
	Fire jacket	✓	✓	✓	✓
	Thermosleeve	✓	✓	✓	✓
	Armor guard				
	Spiral guard				
	Spring guard—Hose length		✓	✓	✓
	Spring guard—5 in. long	Std		❍	
	316L SS braid				
Testing	Helium leak testing				
	Hydrostatic testing	✓	✓	✓	✓
	Nitrogen pressure testing	✓	✓	✓	
Tags	Lanyard tag		✓	✓	✓
	Two lanyard tags		✓	✓	✓
	Clamp tag				
	Mat tag	❍	✓	✓	✓
	Perma tag				
Approval	Alternative fuels-type ECE R110			❍	
Processing	Cleaning to CGA 4.1				
	Cleaning to ASTM G93, Level C				

✓ Available in all sizes.
❍ Available in select hose sizes.

Options Availability

Availability of options by hose series is shown below, but may be limited by hose size. Applications, hose operating parameters, and hose length must be considered when selecting options.

	Options	Hose Series	
		Polyethylene	Rubber
		7P	PB
Covers	Y Insulation		
	Fire jacket	✓	
	Thermosleeve	✓	
	Armor guard		
	Spiral guard		
	Spring guard—Hose length	✓	
	Spring guard—5 in. long	❍	
	316L SS braid		
Testing	Helium leak testing		
	Hydrostatic testing	✓	✓
	Nitrogen pressure testing		
Tags	Lanyard tag	✓	✓
	Two lanyard tags	✓	✓
	Clamp tag		
	Mat tag		
	Perma tag		
Approval	Alternative fuels-type ECE R110		
Processing	Cleaning to CGA 4.1		

✓ Available in all sizes.
❍ Available in select hose sizes.

Certifications of Compliance, Testing and Evaluation Options

Every Swagelok hose assembly meets rigorous quality standards and is backed by the Swagelok Limited Lifetime Warranty. Swagelok hoses are compliant with dozens of third-party governing bodies. Please contact your authorized Swagelok sales and service center for a full list of available certificates for your hose needs.

Additional testing and evaluation options may include:

- Customer test reports
- Customer-specified helium leak test
- Customer-specified hydrostatic test
- Customer-specified nitrogen pressure test
- Helium leak test
- Product test reports
- Application-specific product test reports
- Product evaluations by the Swagelok testing lab

Contact your authorized Swagelok sales and service center to discuss these additional testing and product evaluation options.

Installation and Maintenance

Installation Considerations

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 length to accommodate these factors may reduce hose life.

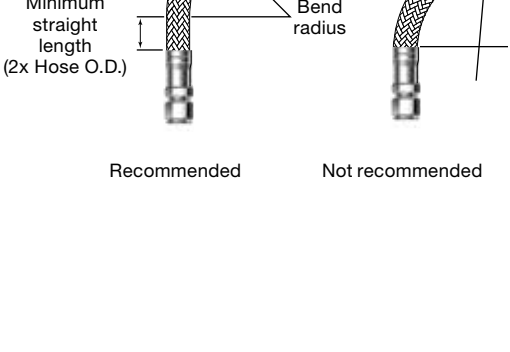
Shelf Life

Shelf life is dependent upon storage methods. Swagelok does not publish shelf life data for hose products. However, it is recommended that unused hose be stored in the original, unopened factory packaging, in a clean, cool, dry environment to maximize storage life potential.

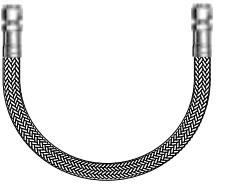
Minimum Bend Radius

In the following situations, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.

- 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.



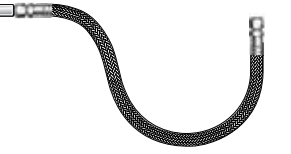
Recommended

Not recommended

Hose Strain

Elbows and adapters can be used to relieve hose strain.

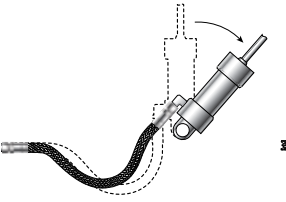
Recommended



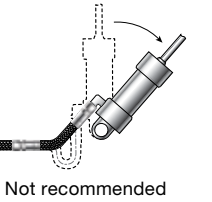
Not recommended

Motion Absorption

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



Recommended



Not recommended

Machine Tolerance

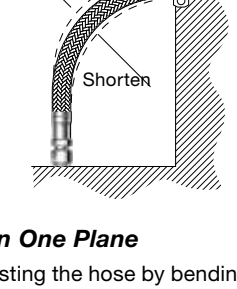
Allow for changes in length resulting from machine motion and tolerances.

Recommended

Not recommended

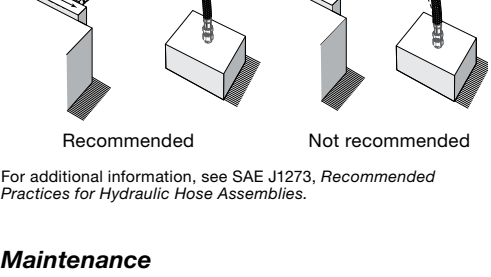
System Pressure Changes

Allow sufficient hose length to accommodate changing 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 compound bends, use multiple hose pieces or other isolation methods



For additional information, see SAE J1273, *Recommended Practices for Hydraulic Hose Assemblies.*

Maintenance

Hose has a limited life and the user must be aware of potential performance issues, particularly when the conditions of service include high working pressures and/or the conveyance or containment of hazardous materials.

Inspection

It is important to establish an inspection schedule based on your system applications and replacement history. Hose tagging is an important part of identifying and tracking hoses.

A visual inspection of the hose should be completed regularly. Any of the following are causes for concern and should be further evaluated:

- Abrasions, fraying, cuts or tears
- Bending in multiple planes
- Blistering
- Bulges and soft spots
- Corrosion
- Discoloration
- Inappropriate live length
- Kinks
- Loose covers
- Stress on end connections

The end connection or fitting should be closely examined. If there is any sign of movement of the hose from the end connection, the hose should be removed from service.

Service Life

- A number of variables impact hose performance and service life. For example, installation routing, amount and rate of flex, operating pressure, media, media and ambient temperature, and environmental exposure can affect service life. As a result it is not possible for Swagelok to determine service life of a hose for a specific application. However, there are a number of test methods used in the hose industry that can help develop a service life schedule relative to a specific hose used in an application. Please refer to the list of test methods below①
- SAE J1655 Predictive and Preventative Diagnostic Maintenance of Hydraulic Systems
- SAE J2545 Test Procedures for Non-SAE Hydraulic Hoses
- J1273 Recommended Practice for Hydraulic Hose Assemblies
- SAE J1927 Cumulative Damage Analysis for Hydraulic Hose Assemblies. Helps develop service life based on actual use, installation, maintenance and history
- SAE J517 Hydraulic Hoses

① Note that some of the methods listed within these specifications look at age and testing to determine if the hose meets original performance criteria.

Glossary of Terms

Bend Radius

The radius of the bent section of hose, measured to the center line or inside of the curved section.

Braid (overbraid)

A flexible, woven reinforcement.

Burst Pressure

The pressure at which leakage occurs when exposed to a laboratory burst test.

Conductivity

The ability of a material to transmit or conduct an electrical charge. Swagelok hoses constructed with a metallic braid layer have the potential to be conductive hoses.

Core

The innermost material of the hose that carries the system media, and is often referred to as the wetted surface.

Cover

The outermost material that protects the reinforcement and core from environmental conditions and wear.

Dynamic Application

An application in which the hose flexes or changes position.

End Connection

The fitting that is assembled onto each end of the hose to provide a means of installation in a fluid system.

End Connection Length

Overall length of the end connection.

Flexibility

The relative ease or difficulty of bending a nonpressurized hose or tubing assembly.

Flexible Tubing

A single-layered flexible conduit through which fluid is conveyed from one point to another.

Hose

A multiple-layered flexible conduit through which fluid is conveyed from one point to another.

Live Length

The flexible length of a hose or tubing assembly. (Does not include the end connections)

Maximum Outside Dimension

The largest nominal outside dimension of the hose assembly.

Minimum Dynamic Bend Radius

The smallest bend radius that a hose is rated to perform in a dynamic application.

Minimum Inside Diameter

The smallest inside diameter of the hose prior to assembly.

Minimum Static Bend Radius

The smallest bend radius that a hose is rated to perform in a static application.

Overall Length

The distance from end to end for a hose or tubing assembly.

Nominal Hose Size

An approximation of the hose inside diameter.

Permeation

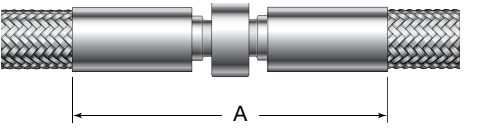
The movement of a liquid, gas, or vapor through a solid. All materials are permeable to a degree and should be tested for application compatibility prior to installation.

Reinforcement

Material used to reinforce the core and increase its pressure-containing capacity.

Splices

Splices consist of a connector fitting and crimp collars that join two lengths of hose to form assemblies. Splices may be required to obtain longer hose lengths of fluoropolymer hose (B, X, S, C, J, N, W, F, and U series), as noted in the Ordering Information for each series.



Nominal Hose Size in. (mm)	Dimensions, in. (mm)		
	A Maximum	Minimum Inside Diameter	Maximum Outside Dimension
1/8 (3.2)	2.60 (66.0)	0.070 (1.7)	0.55 (14.0)
1/4 (6.4)	2.60 (66.0)	0.16 (4.0)	0.59 (15.0)
3/8 (9.6)	3.30 (83.8)	0.26 (6.6)	0.82 (20.8)
1/2 (12.7)	3.70 (94.0)	0.34 (8.6)	1.04 (26.4)
3/4 (19.0)	4.80 (122)	0.54 (13.7)	1.35 (34.3)
1 (25.4)	4.60 (117)	0.78 (19.8)	1.75 (44.4)
1 1/2 (38.1)	5.60 (142)	1.24 (31.4)	2.20 (55.9)
2 (50.8)	6.90 (175)	1.68 (42.6)	2.74 (69.6)

Splice dimensions shown in the table above are for reference only and are subject to change.

Additional overall hose length may be needed to compensate for the effect of splices on hose minimum bend radius. For more information, contact your authorized Swagelok sales and service representative.

Spring Guard

A helical metal spring used to protect the hose from abrasion, overbending, and kinking.

Static Application

An application in which the hose is stationary and does not move in any plane.

Static Dissipation

The ability of a material to alleviate a static electrical charge. Select Swagelok hoses are constructed with carbon black-filled nylon, PTFE, or PFA core material for static dissipation.

Resources

Complementary Products and Services

- Leak Detectors, Lubricants, and Sealants
- Pipe Fittings
- Quick Connects
- Regulators
- Tube Fittings

Swagelok Hose Videos

- Swagelok - The Right Hose with the Right End Connections
- How to Select Hose End Connections | Tech Tips | Swagelok [2020]
- Hose Advisory and Optimization | Swagelok Services | Swagelok [2020]
- How to Choose the Right Hose

Swagelok Catalogs and Reference Literature

- Product Test Reports (PTRs)
- *Hose and Flexible Tubing* catalog, MS-01-180

Safe Product Selection
When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user. The complete catalog contents must be reviewed to ensure that the system designer and user make a safe product selection.

⚠ WARNING
Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty, MS-13-123. For a copy, visit swagelok.com or contact your authorized Swagelok sales and service center.

Printed in U.S.A., AGS
MS-13-332, RevD April 2024