



Swagelok Pittsburgh | Tri-State Area

PRESENTING
YOUR LOCAL SWAGELOK[®]
INDUSTRIAL HOSE PROS



**Expert and Warrantied
Assembly Services**



**Product Selection
Know-How per Application**



**Trusted and Proven
Technical Consultation**

The WHY

Flexible hose means fewer connections and less leakage. Result: a safer and far more efficient fluid system – with reduced inventory and labor costs, virtually no media entrapment or pressure drop, and easy cleaning, when required.

The WHEN

Flexible hose is ideal in applications necessitating a flexible connection between stationary and moving equipment, when a connection is temporary or there are frequent disconnects, and to isolate from high-vibration machinery.

3 SIMPLE STEPS

TO DETERMINE THE OPTIMUM SWAGelok HOSE FOR YOUR SPECIFIC APPLICATION



1

Apply our proven methodology for selecting the ideal Hose for your application:

S

= Size

What's the necessary OD, ID, and length of Hose for your application?

T

= Temperature

Similar considerations for the material being conveyed and the overall operating environment.

A

= Application

What are the conditions of use? How and where will Hoses be routed? What's bend radius?

M

= Media

What's the type and concentration of the conveyed material? What's its conductivity?

P

= Pressure

What's your working pressure? Is there surge and/or vacuum to consider?

E

= End Connection

11 different options, including Tube Stubs, Tube Fittings, VCR/VCO, Kwik Clamps, Tube Butt Welds, and more. Think about your attachment method and orientation as well.

D

= Delivery

Testing, packaging, quality, and delivery requirements?

4 PREMIUM-QUALITY HOSE CORE TYPES

All-Metal

For High-Temperature, Medium-Pressure, Vacuum, Corrosive, or General-Purpose applications.



FX-Series style shown

Fluoropolymer

For Inert and Flexible applications.



T Series PTFE style shown

Thermoplastic

For High-Pressure, Low-Temperature applications.



7P Series style shown

Rubber

For Flexible applications.



PB Series style shown

11 END CONNECTIONS

Tube Stub	Lap Joint Flange
Tube Fittings	ISO/BSP
VCR/VCO	KF
Tube Butt Weld	SAE 37 JICo (Male and Female)
Kwik Clamps	NPT (Male and Female)
Cam and Groove	

2

CHOOSE FROM 6 COVER OPTIONS

Fire Jacket:

Provides insulation from internal system temperature extremes.

Spring Guard:

Protects against kinking and abrasion; highly flexible.

Thermosleeve:

Protects from weld spatter and resists UV light effects.

Spiral Guard:

Protects against abrasion; highly flexible.

Armor Guard:

Protects against kinking and abrasion; highly flexible.

Thermal Wrap:

Delivers superior insulation.



3

CHOOSE FROM 4 TAGGING OPTIONS



Lanyard

Attaches with a stainless steel lanyard and aluminum clamp.



Clamp

Attaches with two metal bands.



Mat

Attaches via an adhesive.



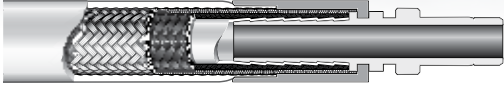
Perma

Attaches via an adhesive.

ATTACHMENT METHODS

Crimped

Available for our **Fluoropolymer and Thermoplastic hoses: T, B, X, S, C, N, W, F, and U Series; NG, 7R, 8R, 7N and 8N Nylon Series; 7P Polyethylene Series**



Welded

For our **All-Metal hoses: FM, FL, and FJ Series**



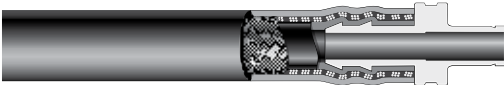
Swaged

Available for our **Thermoplastic hoses: NG, 7R, 8R, 7N, and 8N Nylon Series; 7P Polyethylene Series**

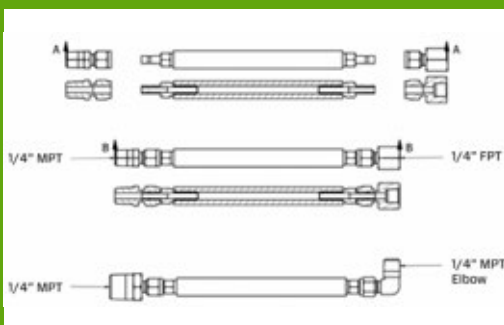


Push-On

For our **Rubber hoses: PB Series**



**ONE HOSE.
MULTIPLE END CONNECTIONS.
NUMEROUS APPLICATIONS!**



Bonus Hose Efficiency Tip:

By stocking a few Swagelok Tube Stub Adapters and some union tees and elbows, you can easily switch out end connections to adapt the same hose for multiple applications. Our adapters eliminate difficult alignment problems, too!

Swagelok Hose and Flexible Tubing Nomenclature

Conductive

A material that easily conducts an electrical current, having an electrical resistance less than 1×10^4 ohms. Swagelok hoses with metal cores are examples of conductive hoses.

Static Dissipative

A material that has the ability to alleviate a static electrical charge, having an electrical resistance more than 1×10^4 ohms but less than 1×10^{11} ohms. Select Swagelok hoses are constructed with carbon black filled core materials (nylon, PTFE, or PFA) to provide static dissipation. The intent of a hose being static dissipative is to alleviate any static charge that may build as fluid flows through the hose. Note that hoses with conductive cores may also be used in applications where fluid flow generates a static charge. The lower electrical resistance in a conductive core dissipates the charge more readily.

Non-Conductive

A material that does not normally transmit or conduct an electrical charge. Materials considered non-conductive have an electrical resistance in excess of 1×10^{11} ohms. Swagelok hoses constructed with non-metallic cores that do not contain carbon black are generally non-conductive. However, the presence of metal braid may make a hose conductive from end connection to end connection.

Unspecified

The term used for hoses that do not have a design intent concerning electrical properties. These hoses may be either conductive or non-conductive depending on assembly tolerances from hose to hose, or other factors.

It is important to consider the electrical properties of the hose core, the reinforcing layer(s), and the overall end-to-end assembly to ensure the desired results. A hose is considered conductive if it easily carries a charge from one end connection to the other, even if the core does not contain carbon black. The charge is carried through the metal reinforcing braid. If the core does not contain carbon black, the media in the hose is electrically insulated from the wire braid, making it possible for a charge to build along the core tube.



Swagelok Hose and Flexible Tubing Selection Guide

Series	Materials of Construction		
	Core	Reinforcement	Cover
Metal Hose			
FX	Convuluted 316L SS	321 SS braid standard; 316L SS braid available	—
FM	Convuluted 316L SS	316L SS braid	—
FJ	Convuluted 316L SS	304 SS braid standard; 316L SS braid available	—
FL	Convuluted 316L SS	321 SS braid (1/4 and 1/2 in.) 316L SS braid (all other sizes)	—
AH	Convuluted C-276	316L SS braid	—
Metal Flexible Tubing			
Convuluted Tube	Convuluted 321 SS	—	—
Fluoropolymer Hose			
T	Smooth-bore PTFE ^①	304 SS braid standard; 316L SS and alloy 400 braid available	—
B	Smooth-bore PTFE	304 SS braid	—
X	Smooth-bore PTFE ^①	Fiber braid with 304 SS braid	—
S	Smooth-bore PTFE ^①	Fiber braid with 304 SS braid	Silicone
C	Convuluted PTFE ^①	304 SS braid	—
J	Convuluted PTFE	304 SS braid	Silicone
N	Convuluted, carbon black-filled PTFE	Insulating wrap and aramid fiber braid	—
W	Smooth-bore, carbon black-filled PTFE	Fiber braid with insulating wrap and 304 SS braid	Silicone
F	Smooth-bore PTFE ^①	Fiber braid	—
U	Smooth-bore PFA ^②	302 SS braid	Silicone
PFA Tubing			
PFA	Smooth-bore PFA	—	—
Vinyl Tubing			
LT	Smooth-bore clear vinyl	—	—
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
8N	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)

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 and Flexible Tubing Selection Guide

Series	Nominal Hose Size, in.										Temperature Range °F (°C) ^④
	Working Pressure at 70°F (20°C), psig (bar) ^④										
	1/8	3/16	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	
Metal Hose											
FX	—	—	6000 (413)	5000 (344)	4500 (310)	3600 (248)	3000 (206)	2600 (179)	2200 (151)	1675 (115)	-325 to 1000 (-200 to 537)
FM	—	—	3100 (213)	2000 (137)	1800 (124)	1500 (103)	1200 (82.6)	950 (65.4)	900 (62.0)	500 (34.4)	-325 to 850 (-200 to 454)
FJ	—	—	1600 (110)	1470 (101)	1110 (76.4)	860 (59.2)	680 (46.8)	680 (46.8)	520 (35.8)	450 (31.0)	-325 to 800 (-200 to 426)
FL	—	—	1500 (103)	1470 (101)	1200 (82.6)	860 (59.2)	680 (46.8)	645 (44.4)	520 (35.8)	380 (26.1)	-325 to 850 (-200 to 454)
AH	—	—	—	—	1110 (76.4)	860 (59.2)	680 (46.8)	—	520 (35.8)	450 (31.0)	-325 to 800 (-200 to 426)
Metal Flexible Tubing											
Convuluted Tube	—	—	100 (6.8)	25 (1.7)	25 (1.7)	25 (1.7)	25 (1.7)	—	25 (1.7)	—	70 to 1000 (20 to 537)
Fluoropolymer Hose											
T	—	—	3000 ^① (206)	2500 (172)	2000 (137)	1500 (103)	1000 (68.9)	—	—	—	-65 to 450 (-53 to 230)
B	3000 (206)	—	—	—	—	—	—	—	—	—	
X	—	—	3500 (241)	3000 (206)	1800 (124)	1250 (86.1)	1000 (68.9)	—	—	—	
S	3000 (206)	—	3500 (241)	3000 (206)	1800 (124)	1250 (86.1)	1000 (68.9)	—	—	—	-65 to 400 (-53 to 204)
C	—	—	—	—	1500 (103)	1100 (75.7)	750 (51.6)	—	700 (48.2)	525 (36.1)	-65 to 450 ^② (-53 to 230)
J	—	—	—	—	1500 (103)	1100 (75.7)	750 (51.6)	—	—	—	-65 to 400 (-53 to 204)
N	—	—	—	1250 (86.1)	750 (51.6)	375 (25.8)	—	—	—	—	-65 to 400 (-53 to 204)
W	—	—	—	750 (51.6)	750 (51.6)	500 (34.4)	—	—	—	—	-65 to 400 (-53 to 204)
F	—	—	800 (55.1)	650 (44.7)	450 (31.0)	325 (22.3)	—	—	—	—	-65 to 450 (-53 to 230)
U	—	—	—	—	300 (20.6)	300 (20.6)	250 (17.2)	—	200 (13.7)	150 (10.3)	-65 to 400 (-53 to 204)
PFA Tubing											
PFA	275 (18.9)	—	275 (18.9)	180 (12.4)	125 (8.6)	83 (5.7)	61 (4.2)	—	—	—	70 to 400 (20 to 204)
Vinyl Tubing											
LT	40 (2.7)	30 (2.0)	25 (1.7)	15 (1.0)	10 (0.68)	—	—	—	—	—	-40 to 165 (-40 to 73)
Nylon Hose											
NG	—	—	5000 (344)	5000 (344)	5000 (344)	—	—	—	—	—	-40 to 150 (-40 to 65)
7R	—	—	2750 (189)	2250 (155)	2000 (137)	—	—	—	—	—	-40 to 200 (-40 to 93)
8R	—	—	5000 (344)	4000 (275)	3500 (241)	2250 (155)	2000 (137)	—	—	—	-40 to 200 (-40 to 93)
7N	—	—	2750 (189)	2250 (155)	2000 (137)	—	—	—	—	—	-40 to 200 (-40 to 93)
8N	—	—	—	—	—	2250 (155)	—	—	—	—	-40 to 200 (-40 to 93)
Polyethylene Hose											
7P	—	—	2750 (189)	2250 (155)	2000 (137)	1500 (103)	1500 (103)	—	—	—	-10 to 150 (-23 to 65)
Rubber Hose											
PB	—	—	350 (24.1)	300 (20.6)	300 (20.6)	300 (20.6)	300 (20.6)	—	—	—	-40 to 200 ^③ (-40 to 93)

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

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

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

④ Pressure-temperature ratings may be limited by the end connections.

Considerations for Selecting a Hose Assembly Solution

Temperature

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

Pressure

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

Material

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

Movement

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

Length

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

Cleanliness

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

End Connection

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

Orientation

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

Desired Flow

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

Drainability

Consider core construction as this will impact drainability.

Test Reports

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

Special Testing

Many applications may require testing to requirements different from the production tests listed. For example, metal hose assemblies undergo an inboard helium leak test to a maximum leak rate of 1×10^{-5} std cm³/s. If your application uses liquid at a positive pressure, you may request an additional hydrostatic proof test.

Special Marking

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

Documentation and Regulatory Requirements

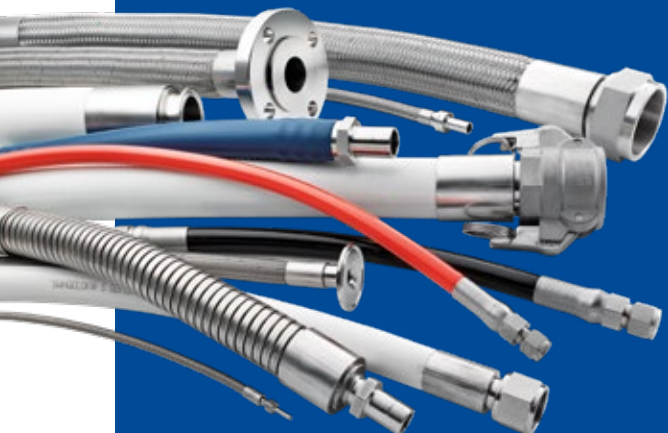
Identify the need for special regulatory approvals or documentation.

Additional Protection and Covers

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

Additional Considerations

Use of hose and tubing within applications and handling practices will affect how it performs over time. Catalog performance claims such as burst pressure, working pressure, static dissipation, moisture content, permeation rates, and cycle life apply to never-used products. For this reason, system maintenance and replacement schedules should be considered.



Cautions

- 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 variables.
- Nonperforated covers may blister in gas service.
- 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.
- All equipment must be properly grounded to allow static dissipation and help to prevent static sparking.
- Nonconductive hoses can be conduits for electricity if they contain conductive fluids. Verify the conductive properties of the system media prior to use.

Swagelok Hose and Flexible Tubing Installation and Use Guide

Inspection

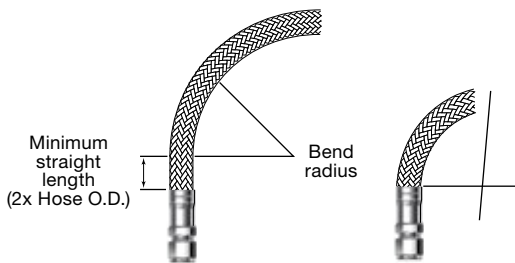
Establish an inspection schedule based on system application and replacement history.

Electrostatic Discharge

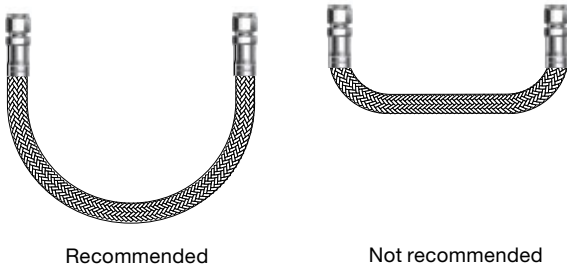
Static electricity can be generated by fluid passing through the hose. Select hose with sufficient conductivity to ground the static electric charge and allow static dissipation. If static electricity generation is possible within an application, choose static dissipative hose and properly ground to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

Minimum Bend Radius

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

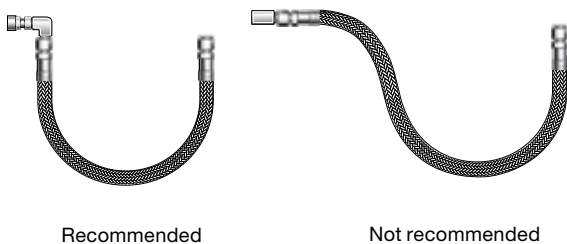


Hose rupture or leakage may result from bending too close to the hose/fitting connection.



Hose Strain

Elbows and adapters can be used to relieve hose strain.



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

Vibration

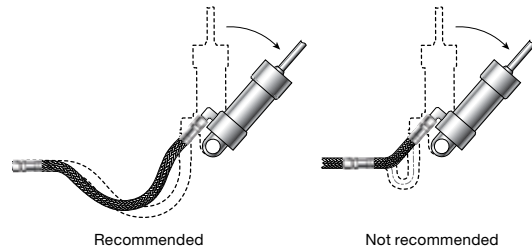
Evaluate amount of system vibration when selecting hose. Metal hose may not be appropriate for systems with constant or severe vibration.

Length

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

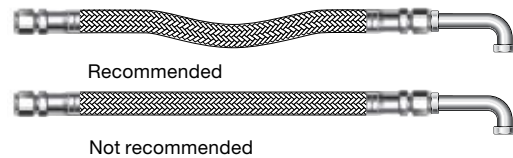
Motion Absorption

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



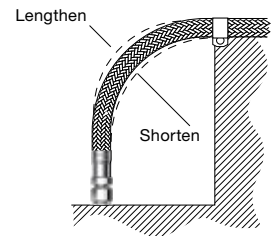
Machine Tolerance

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



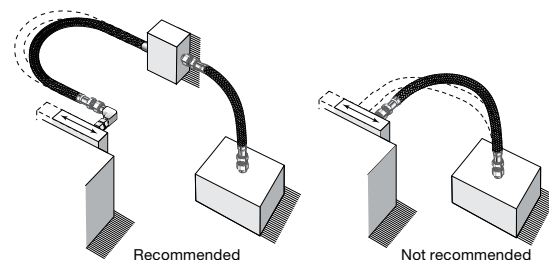
System Pressure Changes

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



Bending in One Plane

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



MEET YOUR CERTIFIED SWAGELOK HOSE ADVISORS



Gary Osman
Swagelok Field
Engineer



Mike Gagel
Strategic Support
Services Specialist

During their survey, Gary and Mike will look for, evaluate, and report:

- Broken Wires
- Abrasion
- Corrosion
- Ovality
- Stiffness/Hardness
- Color Changes
- Cover Blisters
- Kinks/Flat Spots
- Leakage
- Improper Sizing
- Damaged Reinforcements
- Correct Type for Application
- Operating Conditions: Pressure, Temperature, Flow...
- Environmental Factors: Temperature, Humidity...
- Motion
- Cleaning and Storage Practices
-and so much more!

Delivering Difference-Making Solutions:

Gary and Mike will walk the floor with you to thoroughly analyze your current hose applications, including critical cleaning and storage activities. They'll next issue you a Swagelok Hose Management & Efficiency Report loaded with our expert recommendations on how you can rapidly improve and sustain your overall hose safety and health. Our Advisors will also help you set up a routine hose-maintenance schedule – enabling you to avoid lengthy downtime, excess waste, and high repair/replace costs.

"Initially, I was a bit skeptical when Swagelok Pittsburgh | Tri-State Area approached me about a no-cost Hose Advisory. Though I believed we'd receive some value from such an audit, I also saw it as a way for them to simply sell us more hoses. Once we began the actual walk-through – and I heard the probing questions the Advisors asked, I knew we had agreed to something that would truly boost our site's productivity and efficiency."

- Chemical Lab Senior Technician

Swagelok Hose Essentials Technical Training



- Graduate with a complete understanding of critical Hose terminology, selection variables, and industry-best inspection and preventative maintenance processes.
- Learn exactly why/when/how Hose should be used and how to achieve maximum service life.
- Determine how to optimally apply our STAMPED acronym to your everyday Hose employment.
- Half-day; available at your location or at our Pittsburgh Training Center.



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