

Hose and Flexible Tubing



Hose Assemblies, Bulk Hose, Flexible Tubing, and End Connections

- Core materials include metal, PTFE, PFA, vinyl, nylon, polyethylene, and rubber
- Nominal hose sizes 1/8 to 2 in.
- Wide range of fractional and metric end connections
- Custom lengths available
- Optional covers, tagging, and testing

Contents

Swagelok® Hose and Flexible Tubing Nomenclature, 4

Swagelok Hose and Flexible Tubing Selection Guide, 7

Considerations for Selecting a Hose Assembly Solution, 9

Swagelok Hose and Flexible Tubing Installation and Use Guide, 10

Metal Hose

FX Series Metal Hose, 11



FM Series Metal Hose, 16



FJ Series Metal Hose, 22



FL Series Metal Hose, 27



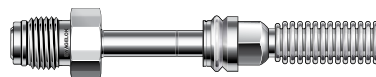
Metal Flexible Tubing

Convolute Metal Tubing, 31



Hybrid Hose

FP Series Hybrid Hose, 36



Fluoropolymer Hose

T Series PTFE Hose, 39



B Series PTFE Hose, 45



X Series PTFE Hose, 47



S Series PTFE Hose, 49



C Series PTFE Hose, 51



N Series PTFE Hose, 53



Contents

W Series PTFE Hose, 55



F Series PTFE Hose, 57



U Series PFA Hose, 59



PFA Tubing

PFA Series PFA Tubing, 71



Vinyl Tubing

LT Series Vinyl Tubing, 73



Hose Connectors

HC Series—End Connections for Soft Tubing and Hose, 74

Nylon Hose

NG Series Nylon Hose, 77



7R and 8R Series Nylon Hose, 82



7N and 8N Series Nylon Hose, 83



Polyethylene Hose

7P Series Polyethylene Hose, 88



Rubber Hose

PB Series Rubber Hose, 90



Options

Covers, 94



Testing, 94

Tags, 95



Approvals, 96

Tools and Accessories

Cutting Tools for Hose and Soft Tubing, 97



Assembly Tools for Nylon, Polyethylene, and Rubber Hose, 97

Dimensions, in inches (millimeters), are for reference only and are subject to change. Dimensions are shown with Swagelok nuts finger-tight. For Swagelok nut dimensions, refer to *Gaugeable Tube Fittings and Adapter Fittings* catalog, MS-01-140. For technical drawings showing dimensions, contact your authorized Swagelok sales and service representative.

Swagelok Hose and Flexible Tubing Nomenclature

Hose

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

Nominal Hose Size

An approximation of the hose inside diameter.

Flexible Tubing

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

Bend Radius

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

Minimum Dynamic Bend Radius

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

Minimum Static Bend Radius

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

Flexibility

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

Burst Pressure

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

Permeation

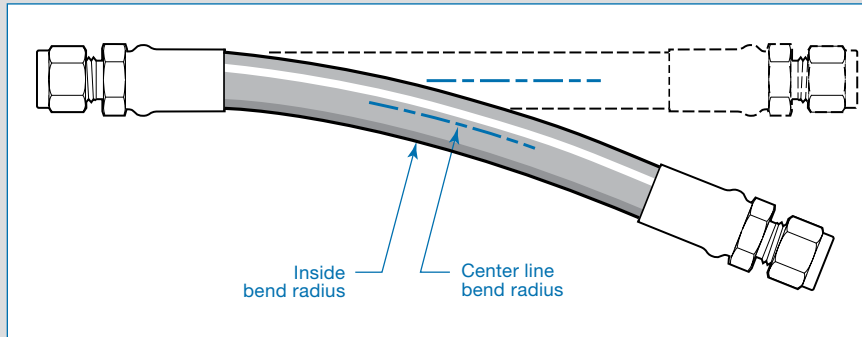
The movement of a liquid, gas, or vapor through a solid. All materials are permeable to a degree and should be tested for application compatibility prior to installation.

Dynamic Application

An application in which the hose flexes or changes position.

Static Application

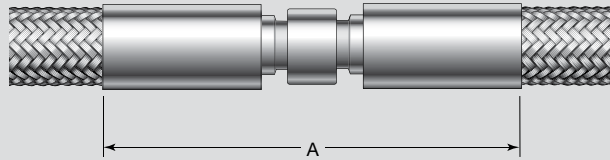
An application in which the hose is stationary and does not move in any plane.



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, N, W, F, and U series), as noted in the **Ordering Information** for each series.

Splice dimensions shown in the table at right 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.



| 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) |

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.

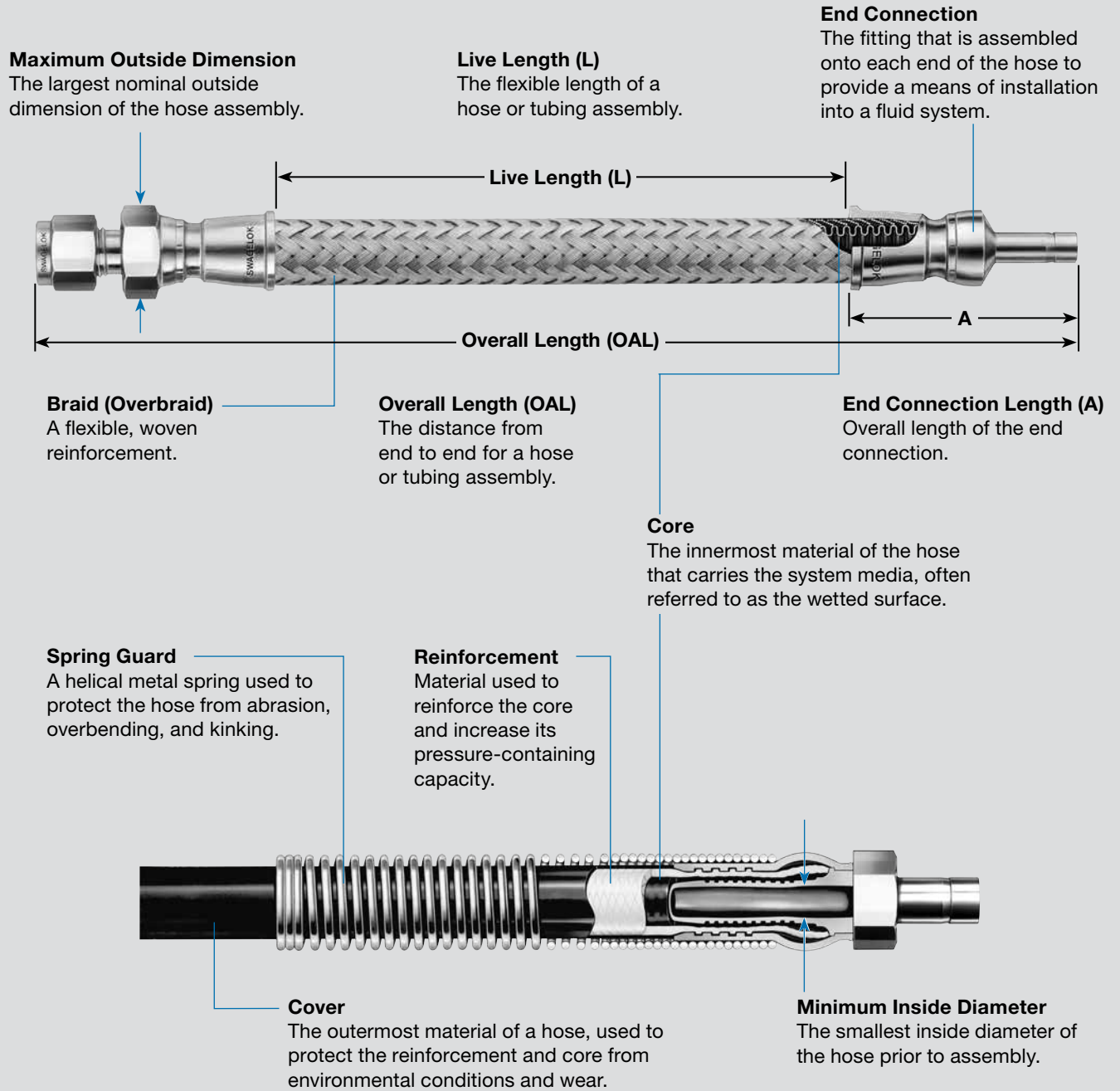
The table below summarizes the electrical properties of each hose series core, reinforcement layer(s), and total assembly end-to-end. Hoses are identified with a letter notation as follows:

- Non-conductive (N)
- Conductive (C)
- Static dissipative (D)
- Unspecified (U)

| 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 |
| Convolute Tube | C | C | 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 |

| Hose Series | Core | Reinforcement | End Connection to End Connection |
|-------------|------|---------------|----------------------------------|
| 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 |
| 8N | N | N | N |
| 7P | N | U | U |
| PB | N | U | U |

Swagelok Hose and Flexible Tubing Nomenclature



Swagelok Hose and Flexible Tubing Selection Guide

See individual hose series sections for additional technical information.

| Series | Materials of Construction | | | Page |
|------------------------------|--|---|--|------|
| | Core | Reinforcement | Cover | |
| Metal Hose | | | | |
| FX | Convuluted 316L SS | 321 SS braid standard; 316L SS braid available | — | 11 |
| FM | Convuluted 316L SS | 316L SS braid | — | 16 |
| FJ | Convuluted 316L SS | 304 SS braid standard; 316L SS braid available | — | 22 |
| FL | Convuluted 316L SS | 321 SS braid | — | 27 |
| Metal Flexible Tubing | | | | |
| Convuluted Tube | Convuluted 321 SS | — | — | 31 |
| Fluoropolymer Hose | | | | |
| T | Smooth-bore PTFE ^① | 304 SS braid standard; 316L SS and alloy 400 braid available | — | 39 |
| B | Smooth-bore PTFE | 304 SS braid | — | 45 |
| X | Smooth-bore PTFE ^① | Fiber braid with 304 SS braid | — | 47 |
| S | Smooth-bore PTFE ^① | Fiber braid with 304 SS braid | Silicone | 49 |
| C | Convuluted PTFE ^① | 300 series SS braid | No cover standard; silicone cover available | 51 |
| N | Convuluted, carbon black-filled PTFE | Insulating wrap and aramid fiber braid | — | 53 |
| W | Smooth-bore, carbon black-filled PTFE | Fiber braid with insulating wrap and 304 SS braid | Silicone | 55 |
| F | Smooth-bore PTFE ^① | Fiber braid | — | 57 |
| U | Smooth-bore PFA ^② | 302 SS braid | Silicone | 59 |
| PFA Tubing | | | | |
| PFA | Smooth-bore PFA | — | — | 71 |
| Vinyl Tubing | | | | |
| LT | Smooth-bore clear vinyl | — | — | 73 |
| Nylon Hose | | | | |
| NG | Smooth-bore, static dissipative nylon | Fiber braid | Perforated black polyurethane | 77 |
| 7R | Smooth-bore nylon | Fiber braid | Perforated black polyurethane | 82 |
| 8R | Smooth-bore nylon | Fiber braid | Perforated black polyurethane | 82 |
| 7N | Smooth-bore, nonconductive nylon | Fiber braid | Nonperforated orange polyurethane | 83 |
| 8N | Smooth-bore, nonconductive nylon | Fiber braid | Nonperforated orange polyurethane | 83 |
| Polyethylene Hose | | | | |
| 7P | Smooth-bore polyethylene | Fiber braid | Nonperforated blue polyurethane | 88 |
| Rubber Hose | | | | |
| PB | Smooth-bore Buna N | Synthetic fiber braid | Blue Buna N (other colors available) | 90 |

^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

See individual hose series sections for additional technical information.

| Series | Nominal Hose Size, in. | | | | | | | | | | Temperature Range °F (°C) ^④ | Page |
|------------------------------|--|-------------|----------------------------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|---|------|
| | 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) | 11 |
| 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) | 16 |
| 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) | 22 |
| FL | — | — | 1500 (103) | — | 1200 (82.6) | — | — | — | — | — | –325 to 850 (–200 to 454) | 27 |
| 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) | 31 |
| Fluoropolymer Hose | | | | | | | | | | | | |
| T | — | — | 3000 ^① (206) | 2500 (172) | 2000 (137) | 1500 (103) | 1000 (68.9) | — | — | — | –65 to 450 (–53 to 230) | 39 |
| B | 3000 (206) | — | — | — | — | — | — | — | — | — | | 45 |
| X | — | — | 3500 (241) | 3000 (206) | 1800 (124) | 1250 (86.1) | 1000 (68.9) | — | — | — | | 47 |
| S | 3000 (206) | — | 3500 (241) | 3000 (206) | 1800 (124) | 1250 (86.1) | 1000 (68.9) | — | — | — | –65 to 400 (–53 to 204) | 49 |
| C | — | — | — | — | 1500 (103) | 1100 (75.7) | 750 (51.6) | — | 700 (48.2) | 525 (36.1) | –65 to 450 ^② (–53 to 230) | 51 |
| N | — | — | — | 1250 (86.1) | 750 (51.6) | 375 (25.8) | — | — | — | — | | 53 |
| W | — | — | — | 750 (51.6) | 750 (51.6) | 500 (34.4) | — | — | — | — | –65 to 400 (–53 to 204) | 55 |
| F | — | — | 800 (55.1) | 650 (44.7) | 450 (31.0) | 325 (22.3) | — | — | — | — | –65 to 450 (–53 to 230) | 57 |
| U | — | — | — | — | 300 (20.6) | 300 (20.6) | 250 (17.2) | — | 200 (13.7) | 150 (10.3) | –65 to 400 (–53 to 204) | 59 |
| 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) | 71 |
| Vinyl Tubing | | | | | | | | | | | | |
| LT | 40 (2.7) | 30 (2.0) | 25 (1.7) | 15 (1.0) | 10 (0.68) | — | — | — | — | — | –40 to 165 (–40 to 73) | 73 |
| Nylon Hose | | | | | | | | | | | | |
| NG | — | — | 5000 (344) | 5000 (344) | 5000 (344) | — | — | — | — | — | –40 to 150 (–40 to 65) | 77 |
| 7R | — | — | 2750 (189) | 2250 (155) | 2000 (137) | — | — | — | — | — | –40 to 200 (–40 to 93) | 82 |
| 8R | — | — | 5000 (344) | 4000 (275) | 3500 (241) | 2250 (155) | 2000 (137) | — | — | — | –40 to 200 (–40 to 93) | 82 |
| 7N | — | — | 2750 (189) | 2250 (155) | 2000 (137) | — | — | — | — | — | –40 to 200 (–40 to 93) | 83 |
| 8N | — | — | — | — | — | 2250 (155) | — | — | — | — | –40 to 200 (–40 to 93) | 83 |
| Polyethylene Hose | | | | | | | | | | | | |
| 7P | — | — | 2750 (189) | 2250 (155) | 2000 (137) | 1500 (103) | 1500 (103) | — | — | — | –10 to 150 (–23 to 65) | 88 |
| 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) | 90 |

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.

C series hose is rated from –65 to 400°F (–53 to 204°C) for hose with a silicone cover.

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.

Vibration

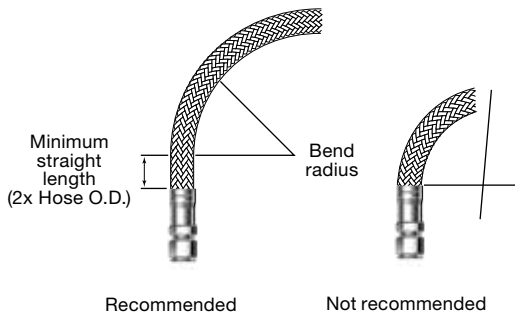
Evaluate amount of system vibration when selecting hose. Metal hose may not be appropriate for systems with constant or severe vibration.

Length

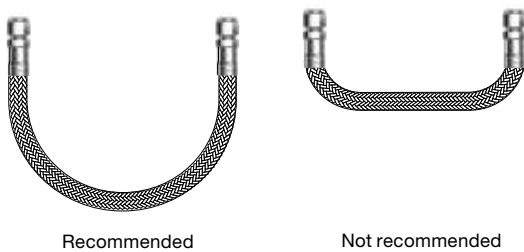
Take into consideration hose movement, system pressurization, and thermal expansion when determining hose length. Installing hose that does not have sufficient length to accommodate these factors may reduce hose life.

Minimum Bend Radius

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

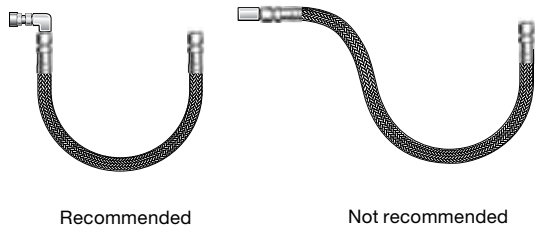


Hose rupture or leakage may result from bending too close to the hose/fitting connection.



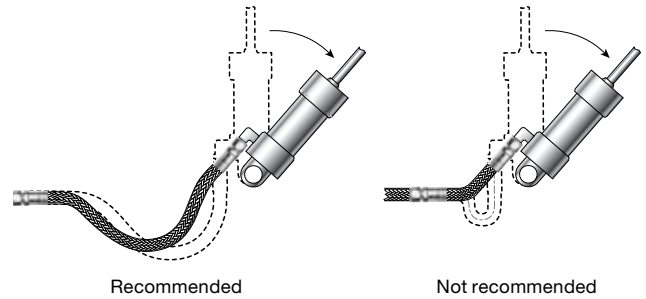
Hose Strain

Elbows and adapters can be used to relieve hose strain.



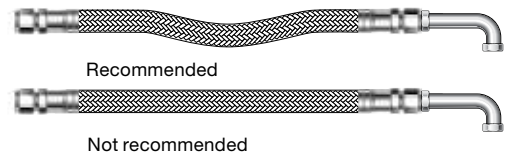
Motion Absorption

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



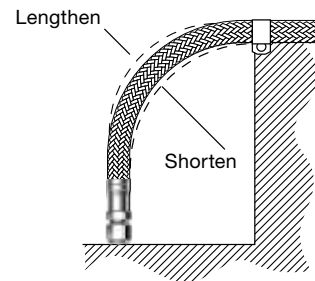
Machine Tolerance

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



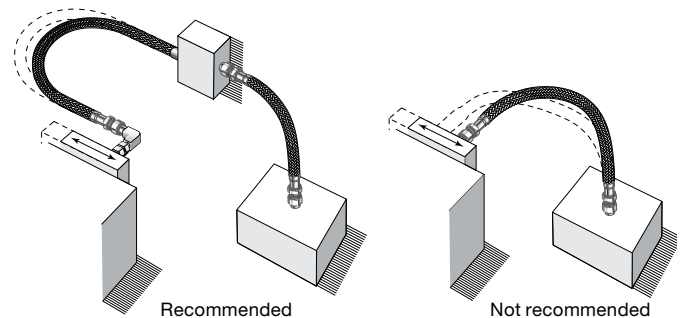
System Pressure Changes

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



Bending in One Plane

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

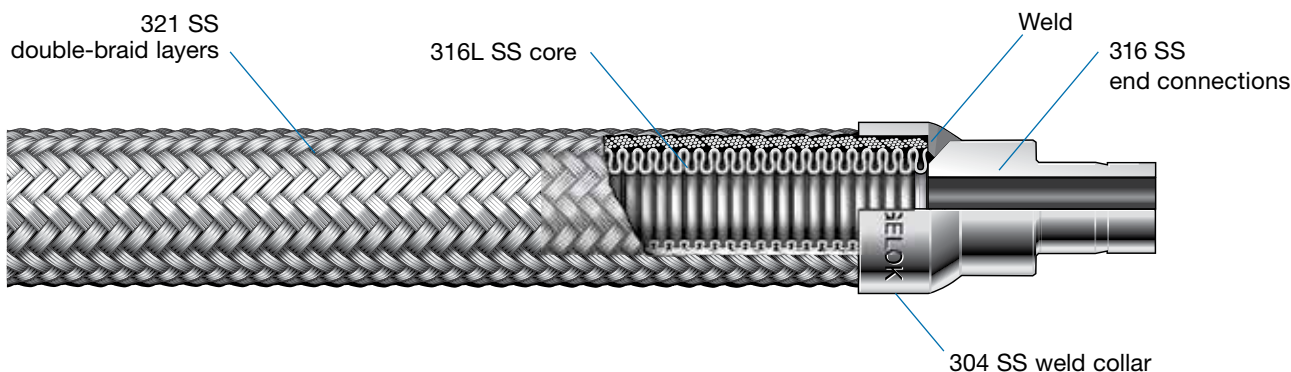


For additional information, see SAE J1273, *Recommended Practices for Hydraulic Hose Assemblies*.

FX Series Metal Hose

Features

- High-pressure corrosion resistant all-metal hose.
- 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.
- Standard and custom assemblies available.
- Options include hose covers, hose tags, and additional helium leak testing. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) | 0.25 (6.4) | 0.68 (17.3) | 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) | 0.92 (23.4) | 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) | 0.98 (24.9) | 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) | 1.40 (35.6) | 4.0 (10.2) | 10.0 (25.4) | | 3600 (248) | 14 400 (992) | 1.58 (2.35) |
| 1 (25.4) | 1.00 (25.4) | 1.70 (43.2) | 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) | 2.00 (50.8) | 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) | 2.36 (59.9) | 7.5 (19.1) | 13.0 (33.0) | | 2200 (151) | 8 800 (606) | 3.57 (5.31) |
| 2 (50.8) | 2.00 (50.8) | 2.82 (71.6) | 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

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

FX Series Metal Hose

End Connections

Swagelok Tube Adapters



End Connections
with Hex Flat

| Tube Adapter Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | TA4 | 1.64 (41.7) | 0.18 (4.6) | 0.78 (19.8) |
| 3/8 | 6 | TA6 | 1.81 (46.0) | 0.27 (6.9) | 1.01 (25.7) |
| 1/2 | 8 | TA8 | 2.28 (57.9) | 0.37 (9.4) | 1.08 (27.4) |
| 3/4 | 12 | TA12 | 2.62 (66.5) | 0.58 (14.7) | 1.50 (38.1) |
| 1 | 16 | TA16 | 2.99 (75.9) | 0.80 (20.3) | 1.79 (45.5) |
| 1 1/4 | 20 | TA20 | 3.91 (99.3) | 1.02 (25.9) | 2.16 (54.9) |
| 1 1/2 | 24 | TA24 | 4.47 (114) | 1.25 (31.8) | 2.59 (65.8) |
| 2 | 32 | TA32 | 5.70 (145) | 1.72 (43.7) | 3.45 (87.6) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | TM6 | 42.2 (1.66) | 4.1 (0.16) | 19.8 (0.78) |
| 8 | 4 | TM8 | 42.4 (1.67) | 5.6 (0.22) | 19.8 (0.78) |
| 10 | 6 | TM10 | 53.3 (2.10) | 7.1 (0.28) | 25.7 (1.01) |
| 12 | 8 | TM12 | 67.9 (2.67) | 8.9 (0.35) | 27.4 (1.08) |
| 18 | 12 | TM18 | 64.0 (2.52) | 14.0 (0.55) | 38.1 (1.50) |
| 25 | 16 | TM25 | 75.9 (2.99) | 19.8 (0.78) | 45.5 (1.79) |
| 32 | 20 | TM32 | 87.4 (3.44) | 26.4 (1.04) | 57.4 (2.26) |
| 38 | 24 | TM38 | 97.3 (3.83) | 31.8 (1.25) | 69.1 (2.72) |

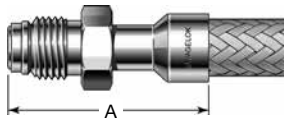
Swagelok Tube Fittings



| Tube Fitting Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|--------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | SL4 | 1.99 (50.5) | 0.19 (4.8) | 0.78 (19.8) |
| 3/8 | 6 | SL6 | 2.07 (52.6) | 0.28 (7.1) | 1.01 (25.7) |
| 1/2 | 8 | SL8 | 2.56 (65.0) | 0.41 (10.4) | 1.08 (27.4) |
| 3/4 | 12 | SL12 | 2.74 (69.6) | 0.63 (16.0) | 1.50 (38.1) |
| 1 | 16 | SL16 | 3.20 (81.3) | 0.88 (22.4) | 1.79 (45.5) |
| 1 1/4 | 20 | SL20 | 3.79 (96.3) | 1.09 (27.7) | 2.10 (53.3) |
| 1 1/2 | 24 | SL24 | 4.25 (108) | 1.35 (34.3) | 2.45 (62.2) |
| 2 | 32 | SL32 | 5.47 (138.9) | 1.82 (46.2) | 3.17 (80.5) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | SM6 | 50.5 (1.99) | 4.8 (0.19) | 19.8 (0.78) |
| 8 | 4 | SM8 | 51.6 (2.03) | 6.4 (0.25) | 19.8 (0.78) |
| 10 | 6 | SM10 | 53.6 (2.11) | 7.9 (0.31) | 25.7 (1.01) |
| 12 | 8 | SM12 | 65.0 (2.56) | 9.7 (0.38) | 27.4 (1.08) |
| 18 | 12 | SM18 | 69.6 (2.74) | 15.0 (0.59) | 38.1 (1.50) |
| 25 | 16 | SM25 | 81.3 (3.20) | 21.8 (0.86) | 45.5 (1.79) |
| 32 | 20 | SM32 | 98.8 (3.89) | 28.7 (1.13) | 53.3 (2.10) |
| 38 | 24 | SM38 | 111 (4.36) | 33.8 (1.33) | 63.2 (2.49) |

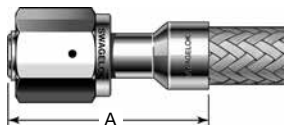
FX Series Metal Hose

Rotatable Male VCR® Metal Gasket Face Seal Fittings



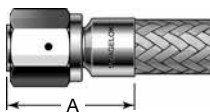
| VCR Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | RM4 | 1.81 (46) | 0.18 (4.6) | 0.78 (19.8) |
| 1/2 | 8 | RM8 | 2.13 (54.1) | 0.40 (10.2) | 1.08 (27.4) |
| 3/4 | 12 | RM12 | 2.75 (69.9) | 0.63 (16.0) | 1.51 (38.4) |
| 1 | 16 | RM16 | 2.97 (75.4) | 0.88 (22.4) | 1.88 (47.8) |

Rotatable Female VCR Metal Gasket Face Seal Fittings



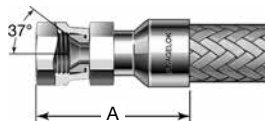
| VCR Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | RF4 | 1.81 (46) | 0.18 (4.6) | 0.87 (22.1) |
| 1/2 | 8 | RF8 | 2.13 (54.1) | 0.40 (10.2) | 1.23 (31.2) |
| 3/4 | 12 | RF12 | 2.75 (69.9) | 0.63 (16.0) | 1.73 (43.9) |
| 1 | 16 | RF16 | 2.97 (75.4) | 0.88 (22.4) | 2.02 (51.3) |

Female VCO O-Ring Face Seal Fittings



| VCO Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | VF4 | 1.27 (32.3) | 0.19 (4.8) | 0.79 (20.1) |
| 1/2 | 8 | VF8 | 1.44 (36.6) | 0.41 (10.4) | 1.08 (27.4) |
| 3/4 | 12 | VF12 | 1.69 (42.9) | 0.63 (16.0) | 1.73 (43.9) |
| 1 | 16 | VF16 | 1.73 (43.9) | 0.88 (22.4) | 2.02 (51.3) |

SAE 37° (JIC) Female Swivel



| Swivel Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|-----------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | AS4 | 1.67 (42.4) | 0.19 (4.8) | 0.78 (19.8) |
| 3/8 | 6 | AS6 | 1.79 (45.5) | 0.28 (7.1) | 1.01 (25.7) |
| 1/2 | 8 | AS8 | 2.08 (52.8) | 0.39 (9.9) | 1.08 (27.4) |
| 3/4 | 12 | AS12 | 2.39 (60.7) | 0.61 (15.5) | 1.50 (38.1) |
| 1 | 16 | AS16 | 2.64 (67.1) | 0.84 (21.3) | 1.79 (45.5) |

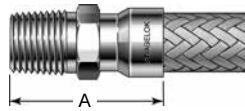
FX Series Metal Hose

Female Pipe Threads, NPT



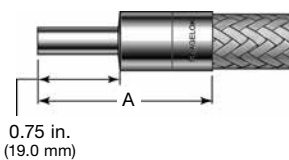
| NPT Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | PF4 | 1.72 (43.7) | 0.30 (7.6) | 0.87 (22.1) |
| 3/8 | 6 | PF6 | 1.84 (46.7) | 0.42 (10.7) | 1.01 (25.7) |
| 1/2 | 8 | PF8 | 2.58 (65.5) | 0.58 (14.7) | 1.23 (31.2) |
| 3/4 | 12 | PF12 | 2.53 (64.3) | 0.73 (18.5) | 1.51 (38.4) |
| 1 | 16 | PF16 | 2.92 (74.2) | 0.95 (24.1) | 1.88 (47.8) |
| 1 1/2 | 24 | PF24 | 3.28 (83.3) | 1.50 (38.1) | 2.74 (69.6) |

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



| NPT and ISO/BSP Tapered Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|----------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| NPT | | | | | |
| 1/4 | 4 | PM4 | 1.82 (46.2) | 0.28 (7.1) | 0.78 (19.8) |
| 3/8 | 6 | PM6 | 1.91 (48.5) | 0.38 (9.7) | 1.01 (25.7) |
| 1/2 | 8 | PM8 | 2.45 (62.2) | 0.47 (11.9) | 1.08 (27.4) |
| 3/4 | 12 | PM12 | 2.57 (65.3) | 0.63 (16.0) | 1.50 (38.1) |
| 1 | 16 | PM16 | 3.05 (77.5) | 0.88 (22.4) | 1.79 (45.5) |
| 1 1/4 | 20 | PM20 | 3.14 (79.8) | 1.09 (27.7) | 2.10 (53.3) |
| 1 1/2 | 24 | PM24 | 3.38 (85.9) | 1.34 (34.0) | 2.45 (62.2) |
| 2 | 32 | PM32 | 3.88 (98.6) | 1.81 (46.0) | 2.92 (74.2) |
| ISO/BSP Tapered | | | | | |
| 1/4 | 4 | MT4 | 1.82 (46.2) | 0.28 (7.1) | 0.78 (19.8) |
| 3/8 | 6 | MT6 | 1.91 (48.5) | 0.38 (9.7) | 1.01 (25.7) |
| 1/2 | 8 | MT8 | 2.45 (62.2) | 0.47 (11.9) | 1.08 (27.4) |
| 3/4 | 12 | MT12 | 2.57 (65.3) | 0.63 (16.0) | 1.50 (38.1) |
| 1 | 16 | MT16 | 3.05 (77.5) | 0.88 (22.4) | 1.79 (45.5) |
| 1 1/4 | 20 | MT20 | 3.14 (79.8) | 1.09 (27.7) | 2.10 (53.3) |
| 1 1/2 | 24 | MT24 | 3.38 (85.9) | 1.34 (34.0) | 2.45 (62.2) |

Tube Butt Welds

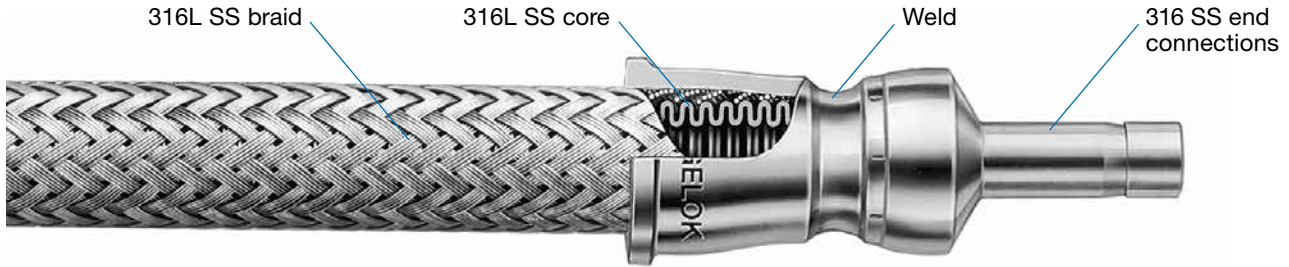


| Tube Butt Weld Size in. | Wall Thickness in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|-------------------------|--------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 0.035 | 4 | TB4 | 1.77 (45.0) | 0.18 (4.6) | 0.78 (19.8) |
| 3/8 | 0.035 | 6 | TB6 | 1.82 (46.2) | 0.31 (7.9) | 1.01 (25.7) |
| 1/2 | 0.049 | 8 | TB8 | 2.17 (55.1) | 0.40 (10.2) | 1.08 (27.4) |
| 3/4 | 0.049 | 12 | TB12 | 2.27 (57.7) | 0.65 (16.5) | 1.50 (38.1) |
| 1 | 0.065 | 16 | TB16 | 2.46 (62.5) | 0.87 (22.1) | 1.79 (45.5) |

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 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) | 0.33 (0.49) |
| 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) | 0.29 (0.43) |
| 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) | 1.75 (44.5) | 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

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) |

FM Series Metal Hose

Testing

Every Swagelok FM series hose assembly is inboard helium leak tested to a maximum leak rate of 1×10^{-5} std cm³/s.

For additional testing, see **Testing**, page 94.

Cleaning and Packaging

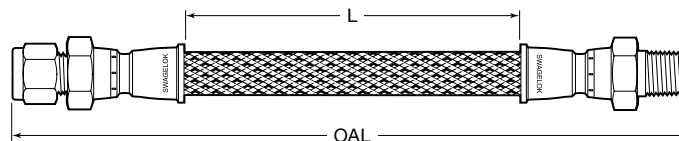
Swagelok FM series hose components are cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62. Each hose is bagged individually and boxed; longer hoses are coiled, bagged, and boxed.

⚠ 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 and Dimensions

Standard Length Hose Assemblies

Select an ordering number.



Swagelok Tube Fitting to Male NPT End Connection



| Nominal Hose Size in. | Tube Fitting Size in. | NPT Size in. | Overall Length OAL in. (cm) | Ordering Number | Dimensions | | |
|--------------------------|--------------------------|-----------------|--------------------------------|--------------------|---------------------------|-------------------------------------|---------------------------------------|
| | | | | | Live Length L in. (cm) | Minimum Inside Diameter in. (mm) | Maximum Outside Dimension in. (mm) |
| 1/4 | 1/4 | 1/4 | 12.0 (30.5) | SS-FM4SL4PM4-12 | 8.26 (21.0) | 0.19 (4.8) | 0.95 (24.1) |
| | | | 36.0 (91.4) | SS-FM4SL4PM4-36 | 32.3 (82.0) | | |
| 3/8 | 3/8 | 3/8 | 18.0 (45.7) | SS-FM6SL6PM6-18 | 14.2 (36.1) | 0.28 (7.1) | 1.09 (27.7) |
| | | | 36.0 (91.4) | SS-FM6SL6PM6-36 | 32.2 (81.8) | | |
| 1/2 | 1/2 | 1/2 | 18.0 (45.7) | SS-FM8SL8PM8-18 | 13.6 (34.5) | 0.41 (10.4) | 1.23 (31.2) |
| | | | 48.0 (122) | SS-FM8SL8PM8-48 | 43.6 (111) | | |
| 3/4 | 3/4 | 3/4 | 18.0 (45.7) | SS-FM12SL12PM12-18 | 13.4 (34.0) | 0.66 (16.0) | 1.74 (44.2) |

Swagelok Tube Fitting End Connections



| Nominal Hose Size in. | Tube Fitting Size in. | Overall Length OAL in. (cm) | Ordering Number | Dimensions | | |
|--------------------------|--------------------------|--------------------------------|--------------------|---------------------------|-------------------------------------|---------------------------------------|
| | | | | Live Length L in. (cm) | Minimum Inside Diameter in. (mm) | Maximum Outside Dimension in. (mm) |
| 1/4 | 1/4 | 12.0 (30.5) | SS-FM4SL4SL4-12 | 8.12 (20.6) | 0.19 (4.8) | 0.95 (24.1) |
| | | 36.0 (91.4) | SS-FM4SL4SL4-36 | 32.1 (81.5) | | |
| 3/8 | 3/8 | 18.0 (45.7) | SS-FM6SL6SL6-18 | 14.0 (35.6) | 0.28 (7.1) | 1.09 (27.7) |
| | | 36.0 (91.4) | SS-FM6SL6SL6-36 | 32.0 (81.3) | | |
| 1/2 | 1/2 | 18.0 (45.7) | SS-FM8SL8SL8-18 | 13.5 (34.3) | 0.41 (10.4) | 1.23 (31.2) |
| | | 48.0 (122) | SS-FM8SL8SL8-48 | 43.5 (110) | | |
| 3/4 | 3/4 | 18.0 (45.7) | SS-FM12SL12SL12-18 | 13.3 (33.8) | 0.66 (16.0) | 1.74 (44.2) |
| | | 48.0 (122) | SS-FM12SL12SL12-48 | 43.3 (110) | | |
| 1 | 1 | 24.0 (61.0) | SS-FM16SL16SL16-24 | 18.7 (47.5) | 0.88 (22.4) | 2.03 (51.6) |

FM Series Metal Hose

Swagelok Tube Adapter End Connections



| Nominal Hose Size in. | Tube Adapter Size in. | Overall Length OAL in. (cm) | Ordering Number | Dimensions | | |
|--------------------------|--------------------------|--------------------------------|-----------------|---------------------------|-------------------------------------|---------------------------------------|
| | | | | Live Length L in. (cm) | Minimum Inside Diameter in. (mm) | Maximum Outside Dimension in. (mm) |
| 1/4 | 1/4 | 12.0 (30.5) | SS-FM4TA4TA4-12 | 8.48 (21.5) | 0.16 (4.1) | 0.75 (19.0) |
| | | 24.0 (61.0) | SS-FM4TA4TA4-24 | 20.5 (52.1) | | |
| | | 36.0 (91.4) | SS-FM4TA4TA4-36 | 32.5 (82.6) | | |
| | | 48.0 (122) | SS-FM4TA4TA4-48 | 44.5 (113) | | |

Ordering Information

Custom Hose Assemblies

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 TA 4 PM 4 - 28 - F or **71 CM - 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 16 = 1
 6 = 3/8 20 = 1 1/4
 8 = 1/2 24 = 1 1/2
 12 = 3/4 32 = 2

4 End Connections

See **End Connection Designator** column in tables on next page.

5 Overall Length

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

6 Options

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

CRN = Lanyard tag with CRN

F = Fire jacket

F1 = Thermosleeve

H7 = Helium leak test (1 × 10⁻⁷ std cm³/s)

N3 = Nitrogen pressure test

S = 302 SS spring guard, hose-length (1/4, 3/8, and 1/2 in. sizes only)

T = Lanyard tag

T2 = Two lanyard tags

W = Hydrostatic test

Specify text for tags. See **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

FM Series Metal Hose

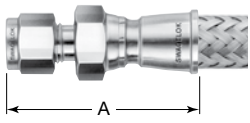
End Connections

Swagelok Tube Adapters

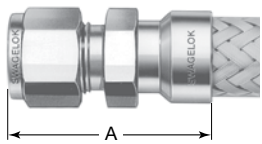


| Tube Adapter Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | TA4 | 1.76 (44.7) | 0.16 (4.1) | 0.75 (19.0) |
| 3/8 | 6 | TA6 | 1.82 (46.2) | 0.27 (6.9) | 0.93 (23.6) |
| 1/2 | 8 | TA8 | 2.22 (56.4) | 0.37 (9.4) | 1.05 (26.7) |
| 3/4 | 12 | TA12 | 2.35 (59.7) | 0.58 (14.7) | 1.38 (35.1) |
| 1 | 16 | TA16 | 2.69 (68.3) | 0.80 (20.3) | 1.69 (42.9) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | TM6 | 44.4 (1.75) | 4.1 (0.16) | 19.0 (0.75) |
| 10 | 6 | TM10 | 47.0 (1.85) | 7.1 (0.28) | 23.5 (0.93) |
| 12 | 8 | TM12 | 57.2 (2.25) | 8.9 (0.35) | 26.7 (1.05) |

Swagelok Tube Fittings



Cap Weld Style—
1 in. and Under

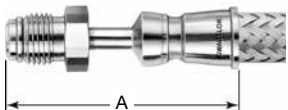


Manual Weld Style—
Over 1 in.

| Tube Fitting Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | SL4 | 1.94 (49.3) | 0.19 (4.8) | 0.95 (24.1) |
| 3/8 | 4 | SL6 | 2.00 (50.8) | 0.28 (7.1) | 0.95 (24.1) |
| | 6 | SL6 | 2.02 (51.3) | | 1.09 (27.7) |
| 1/2 | 8 | SL8 | 2.24 (56.9) | 0.41 (10.4) | 1.23 (31.2) |
| 5/8 | 8 | SL10 | 2.27 (57.7) | 0.50 (12.7) | 0.95 (24.1) |
| 3/4 | 12 | SL12 | 2.35 (59.7) | 0.63 (16.0) | 1.74 (44.2) |
| 1 | 16 | SL16 | 2.64 (67.1) | 0.88 (22.4) | 2.03 (51.6) |
| 1 1/4 ^① | 20 | SL20 | 4.04 (103) | 1.09 (27.7) | 2.23 (58.9) |
| 1 1/2 ^① | 24 | SL24 | 4.75 (121) | 1.34 (34.0) | 2.61 (66.3) |
| 2 ^① | 32 | SL32 | 5.72 (145) | 1.88 (47.8) | 3.48 (88.4) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | SM6 | 30.2 (1.19) | 4.8 (0.19) | 20.6 (0.81) |
| 8 | 4 | SM8 | 50.3 (1.98) | 6.4 (0.25) | 20.6 (0.81) |
| 10 | 6 | SM10 | 51.6 (2.03) | 7.9 (0.31) | 27.9 (1.10) |
| 12 | 8 | SM12 | 59.7 (2.35) | 9.7 (0.38) | 31.3 (1.23) |

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

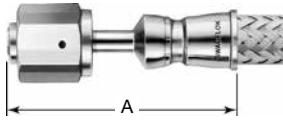
Rotatable Male VCR® Metal Gasket Face Seal Fittings



| VCR Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | RM4 | 2.60 (66.0) | 0.18 (4.6) | 0.73 (18.4) |
| 1/2 | 8 | RM8 | 2.83 (71.9) | 0.40 (10.2) | 1.09 (27.7) |
| 3/4 | 12 | RM12 | 4.19 (106) | 0.65 (16.5) | 1.52 (38.7) |
| 1 | 16 | RM16 | 4.80 (122) | 0.87 (22.1) | 1.89 (47.9) |

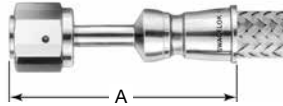
FM Series Metal Hose

Rotatable Female VCR Metal Gasket Face Seal Fittings



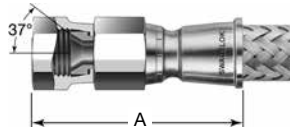
| VCR Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | RF4 | 2.00 (50.8) | 0.18 (4.6) | 0.87 (22.1) |
| 1/2 | 8 | RF8 | 2.16 (54.9) | 0.40 (10.2) | 1.23 (31.2) |
| 3/4 | 12 | RF12 | 4.15 (105) | 0.65 (16.5) | 1.74 (44.2) |
| 1 | 16 | RF16 | 4.76 (121) | 0.87 (22.1) | 2.03 (51.6) |

Female VCO® O-Ring Face Seal Fittings



| VCO Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | VF4 | 2.00 (50.8) | 0.18 (4.6) | 0.80 (20.3) |
| 1/2 | 8 | VF8 | 2.14 (54.4) | 0.40 (10.2) | 1.16 (29.5) |

SAE 37° (JIC) Female Swivel



| Swivel Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|-----------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | AS4 | 1.87 (47.5) | 0.17 (4.3) | 0.94 (23.9) |
| 3/8 | 6 | AS6 | 1.97 (50.0) | 0.28 (7.1) | 1.09 (27.7) |
| 1/2 | 8 | AS8 | 2.15 (54.6) | 0.42 (10.7) | 1.23 (31.2) |

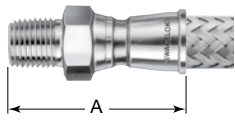
Female Pipe Threads, NPT



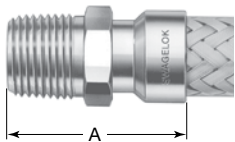
| NPT Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | PF4 | 1.81 (46.0) | 0.28 (7.1) | 0.94 (23.9) |
| 3/8 | 6 | PF6 | 1.87 (47.5) | 0.38 (9.7) | 1.09 (27.7) |
| 1/2 | 8 | PF8 | 2.18 (55.4) | 0.47 (11.9) | 1.23 (31.2) |
| 3/4 | 12 | PF12 | 2.21 (56.1) | 0.72 (18.3) | 1.74 (44.2) |

FM Series Metal Hose

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



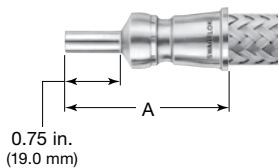
Cap Weld Style—
1 in. and Under



Manual Weld Style—
Over 1 in.

| NPT and ISO/BSP Tapered Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|----------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| NPT | | | | | |
| 1/4 | 4 | PM4 | 1.80 (45.7) | 0.28 (7.1) | 0.94 (23.9) |
| | 6 | PM4 | 1.81 (46.0) | 0.28 (7.1) | 1.09 (27.7) |
| 3/8 | 6 | PM6 | 1.81 (46.0) | 0.38 (9.7) | 1.09 (27.7) |
| 1/2 | 4 | PM8 | 1.99 (50.6) | 0.47 (11.9) | 1.02 (25.8) |
| | 8 | PM8 | 2.15 (54.6) | 0.47 (11.9) | 1.23 (31.2) |
| 3/4 | 12 | PM12 | 2.22 (56.4) | 0.63 (16.0) | 1.74 (44.2) |
| 1 | 16 | PM16 | 2.54 (64.5) | 0.88 (22.4) | 2.03 (51.6) |
| 1 1/4 | 20 | PM20 | 3.06 (77.7) | 1.09 (27.7) | 2.03 (51.6) |
| 1 1/2 | 24 | PM24 | 3.72 (94.5) | 1.34 (34.0) | 2.47 (62.6) |
| 2 | 32 | PM32 | 4.19 (106) | 1.81 (46.0) | 3.19 (81.0) |
| ISO/BSP Tapered | | | | | |
| 1/4 | 4 | MT4 | 1.80 (45.7) | 0.28 (7.1) | 0.94 (23.9) |
| 1/2 | 8 | MT8 | 2.16 (54.9) | 0.47 (11.9) | 1.23 (31.2) |

Tube Butt Welds

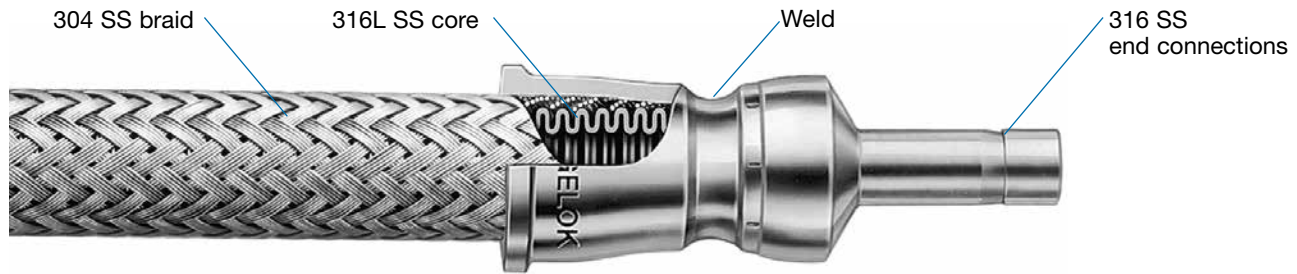


| Tube Butt Weld Size in. | Wall Thickness in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|-------------------------|--------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 0.035 | 4 | TB4 | 1.90 (48.3) | 0.18 (4.6) | 0.75 (19.0) |
| 3/8 | 0.035 | 6 | TB6 | 1.89 (48.0) | 0.37 (9.4) | 0.93 (23.6) |
| 1/2 | 0.049 | 8 | TB8 | 2.04 (51.8) | 0.50 (12.7) | 1.05 (26.7) |
| 3/4 | 0.049 | 12 | TB12 | 2.12 (53.8) | 0.65 (16.5) | 1.38 (35.1) |
| 1 | 0.065 | 16 | TB16 | 2.23 (56.6) | 0.87 (22.1) | 1.69 (42.9) |

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, and additional helium leak testing. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) | 0.47 (11.9) | 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) | 0.68 (17.3) | 1.20 (3.05) | 5.91 (15.0) | | 1470 (101) | 5880 (405) | 0.20 (0.30) |
| 1/2 (12.7) | 0.50 (12.7) | 0.81 (20.5) | 1.50 (3.81) | 6.50 (16.5) | | 1110 (76.4) | 4440 (306) | 0.22 (0.33) |
| 3/4 (19.0) | 0.75 (19.0) | 1.20 (30.5) | 2.10 (5.33) | 8.86 (22.5) | | 860 (59.2) | 3440 (237) | 0.37 (0.55) |
| 1 (25.4) | 1.00 (25.4) | 1.50 (38.0) | 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) | 1.80 (45.7) | 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) | 2.13 (54.0) | 3.90 (9.91) | 13.4 (34.0) | | 520 (35.8) | 2080 (143) | 0.85 (1.26) |
| 2 (50.8) | 2.00 (50.8) | 2.66 (67.5) | 5.10 (13.0) | 15.4 (39.1) | | 450 (31.0) | 1800 (124) | 1.10 (1.65) |

Pressure-Temperature Ratings

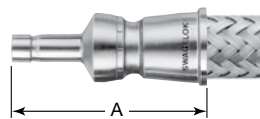
Ratings are based on ASME Code for Pressure Piping B31.3, Process Piping.

| 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) | 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) |

FJ Series Metal Hose

End Connections

Swagelok Tube Adapters



Cap Weld Style—
1/4 and 1/2 in.



End Connections
with Hex Flat
Manual Weld Style—
All other sizes



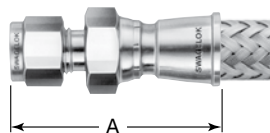
Preswaged
Nuts and Ferrules—
Over 1 in. / 25 mm
Manual Weld Style—
All other sizes

| Tube Adapter Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | TA4 | 1.82 (46.2) | 0.18 (4.6) | 0.76 (19.2) |
| 3/8 | 6 | TA6 | 1.81 (46.0) | 0.27 (6.9) | 0.78 (19.8) |
| 1/2 | 8 | TA8 ^② | 2.26 (57.4) | 0.37 (9.4) | 1.05 (26.7) |
| 3/4 | 12 | TA12 | 2.50 (63.5) | 0.58 (14.7) | 1.32 (33.5) |
| 1 | 16 | TA16 | 2.99 (75.9) | 0.80 (20.3) | 1.63 (41.4) |
| 1 1/4 ^① | 20 | TA20 | 3.91 (99.3) | 1.02 (25.9) | 2.18 (55.2) |
| 1 1/2 ^① | 24 | TA24 | 4.47 (114) | 1.25 (31.8) | 2.61 (66.3) |
| 2 ^① | 32 | TA32 | 5.45 (138) | 1.72 (43.7) | 3.48 (88.4) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | TM6 | 39.0 (1.54) | 4.1 (0.16) | 13.7 (0.54) |
| 8 | 4 | TM8 | 39.2 (1.54) | 5.6 (0.22) | 13.7 (0.54) |
| 10 | 6 | TM10 | 53.3 (2.10) | 7.1 (0.28) | 19.8 (0.78) |
| 12 | 8 | TM12 ^② | 64.8 (2.55) | 8.9 (0.35) | 25.5 (1.00) |
| 18 | 12 | TM18 ^② | 61.0 (2.40) | 14.0 (0.55) | 33.5 (1.32) |
| 25 | 16 | TM25 | 75.9 (2.99) | 19.8 (0.78) | 41.4 (1.63) |
| 32 ^① | 20 | TM32 | 87.4 (3.44) | 26.4 (1.04) | 58.0 (2.28) |
| 38 ^① | 24 | TM38 | 97.3 (3.83) | 31.8 (1.25) | 69.6 (2.74) |

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.

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 | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | SL4 | 2.08 (52.8) | 0.19 (4.8) | 0.94 (23.8) |
| 3/8 | 6 | SL6 | 2.07 (52.6) | 0.28 (7.1) | 0.80 (20.3) |
| 1/2 | 8 | SL8 | 2.28 (57.9) | 0.41 (10.4) | 1.23 (31.2) |
| 3/4 | 12 | SL12 | 2.62 (66.6) | 0.63 (16.0) | 1.32 (33.5) |
| 1 | 16 | SL16 | 3.20 (81.3) | 0.88 (22.4) | 1.63 (41.4) |
| 1 1/4 ^① | 20 | SL20 | 3.79 (96.3) | 1.09 (27.7) | 2.03 (51.6) |
| 1 1/2 ^① | 24 | SL24 | 4.25 (108) | 1.35 (34.3) | 2.47 (65.6) |
| 2 ^① | 32 | SL32 | 5.22 (133) | 1.82 (46.2) | 3.19 (81.0) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | SM6 | 47.5 (1.87) | 4.8 (0.19) | 16.2 (0.64) |
| 8 | 4 | SM8 | 48.3 (1.90) | 6.4 (0.25) | 17.4 (0.69) |
| 10 | 6 | SM10 | 53.3 (2.10) | 7.9 (0.31) | 20.9 (0.82) |
| 12 | 8 | SM12 | 61.7 (2.43) | 9.7 (0.38) | 25.5 (1.00) |
| 18 | 12 | SM18 | 66.5 (2.62) | 15.0 (0.59) | 31.3 (1.23) |
| 25 | 16 | SM25 | 81.3 (3.20) | 21.8 (0.86) | 40.5 (1.60) |
| 32 ^① | 20 | SM32 | 97.8 (3.85) | 28.7 (1.13) | 53.4 (2.10) |
| 38 ^① | 24 | SM38 | 111 (4.36) | 33.8 (1.33) | 63.8 (2.51) |

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 | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | RM4 | 1.69 (42.9) | 0.18 (4.6) | 0.73 (18.4) |
| 1/2 | 8 | RM8 | 2.00 (50.8) | 0.40 (10.2) | 1.09 (27.6) |
| 3/4 | 12 | RM12 | 2.63 (66.8) | 0.63 (16.0) | 1.52 (38.7) |
| 1 | 16 | RM16 | 2.97 (75.4) | 0.88 (22.4) | 1.89 (47.9) |

Rotatable Female VCR Metal Gasket Face Seal Fittings



| VCR Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | RF4 | 1.69 (42.9) | 0.18 (4.6) | 0.87 (22.1) |
| 1/2 | 8 | RF8 | 2.00 (50.8) | 0.40 (10.2) | 1.23 (31.2) |
| 3/4 | 12 | RF12 | 2.63 (66.8) | 0.63 (16.0) | 1.74 (44.2) |
| 1 | 16 | RF16 | 2.97 (75.4) | 0.88 (22.4) | 2.03 (51.6) |

Female VCO O-Ring Face Seal Fittings



| VCO Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | VF4 | 1.15 (29.2) | 0.19 (4.8) | 0.80 (20.3) |
| 1/2 | 8 | VF8 | 1.31 (33.3) | 0.41 (10.4) | 1.16 (29.5) |
| 3/4 | 12 | VF12 | 1.57 (39.9) | 0.63 (16.0) | 1.74 (44.2) |
| 1 | 16 | VF16 | 1.73 (43.9) | 0.88 (22.4) | 2.03 (51.6) |

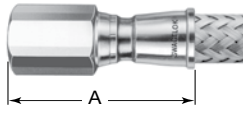
SAE 37° (JIC) Female Swivel



| Swivel Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|-----------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | AS4 | 2.01 (51.2) | 0.19 (4.8) | 0.94 (23.8) |
| 3/8 | 6 | AS6 | 1.79 (45.5) | 0.28 (7.1) | 0.80 (20.3) |
| 1/2 | 8 | AS8 | 2.21 (53.6) | 0.39 (9.9) | 1.23 (31.2) |
| 3/4 | 12 | AS12 | 2.27 (57.7) | 0.61 (15.5) | 1.45 (36.8) |
| 1 | 16 | AS16 | 2.64 (67.1) | 0.84 (21.3) | 1.74 (44.2) |

FJ Series Metal Hose

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 | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | PF4 | 1.74 (44.2) | 0.30 (7.6) | 0.94 (23.8) |
| 3/8 | 6 | PF6 | 1.84 (46.7) | 0.42 (10.7) | 1.02 (25.8) |
| 1/2 | 8 | PF8 | 2.11 (53.6) | 0.58 (14.7) | 1.23 (31.2) |
| 3/4 | 12 | PF12 | 2.41 (61.2) | 0.73 (18.5) | 1.52 (38.7) |
| 1 | 16 | PF16 | 2.92 (74.2) | 0.95 (24.1) | 1.89 (47.9) |
| 1 1/2 | 24 | PF24 | 3.28 (83.3) | 1.50 (38.1) | 2.76 (70.0) |

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



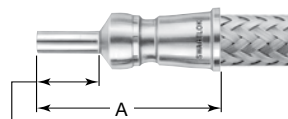
Cap Weld Style—
1/4 and 1/2 in.



Manual Weld Style—
All other sizes

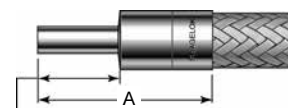
| NPT and ISO/BSP Tapered Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|----------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| NPT | | | | | |
| 1/4 | 4 | PM4 | 1.94 (49.3) | 0.28 (7.1) | 0.94 (23.8) |
| 3/8 | 6 | PM6 | 1.91 (48.5) | 0.38 (9.7) | 0.80 (20.3) |
| 1/2 | 8 | PM8 | 2.32 (58.9) | 0.47 (11.9) | 1.23 (31.2) |
| 3/4 | 12 | PM12 | 2.45 (62.2) | 0.63 (16.0) | 1.32 (33.5) |
| 1 | 16 | PM16 | 3.05 (77.5) | 0.88 (22.4) | 1.63 (41.4) |
| 1 1/4 | 20 | PM20 | 3.14 (79.8) | 1.09 (27.7) | 2.03 (51.6) |
| 1 1/2 | 24 | PM24 | 3.38 (85.9) | 1.34 (34.0) | 2.47 (62.6) |
| 2 | 32 | PM32 | 3.63 (92.2) | 1.81 (46.0) | 2.76 (70.0) |
| ISO/BSP Tapered | | | | | |
| 1/4 | 4 | MT4 | 1.94 (49.3) | 0.28 (7.1) | 0.94 (23.8) |
| 3/8 | 6 | MT6 | 1.91 (48.5) | 0.38 (9.7) | 0.80 (20.3) |
| 1/2 | 8 | MT8 | 2.32 (58.9) | 0.47 (11.9) | 1.23 (31.2) |
| 3/4 | 12 | MT12 | 2.45 (62.2) | 0.63 (16.0) | 1.32 (33.5) |
| 1 | 16 | MT16 | 3.05 (77.5) | 0.88 (22.4) | 1.63 (41.4) |
| 1 1/4 | 20 | MT20 | 3.14 (79.8) | 1.09 (27.7) | 2.03 (51.6) |
| 1 1/2 | 24 | MT24 | 3.38 (85.9) | 1.34 (34.0) | 2.47 (62.6) |

Tube Butt Welds



0.75 in.
(19.0 mm)

Cap Weld Style—
1/4 and 1/2 in.



0.75 in.
(19.0 mm)

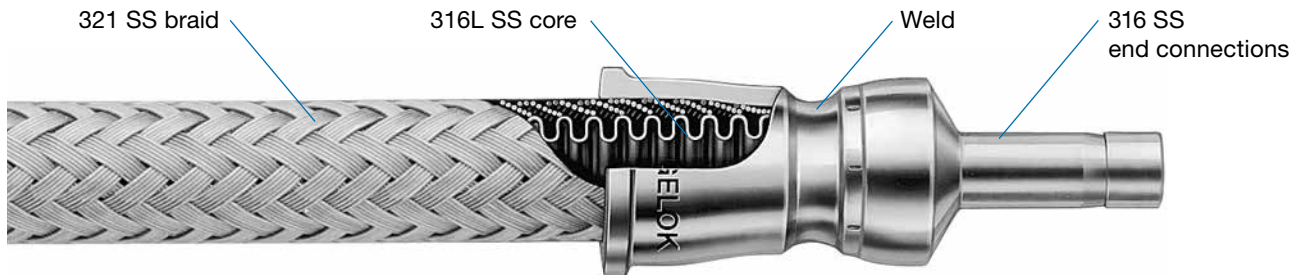
Manual Weld Style—
All other sizes

| Tube Butt Weld Size in. | Wall Thickness in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|-------------------------|--------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 0.035 | 4 | TB4 | 1.96 (49.8) | 0.18 (4.6) | 0.76 (19.2) |
| 3/8 | 0.035 | 6 | TB6 | 1.82 (46.2) | 0.31 (7.9) | 0.78 (19.8) |
| 1/2 | 0.049 | 8 | TB8 | 2.11 (53.6) | 0.40 (10.2) | 1.05 (26.7) |
| 3/4 | 0.049 | 12 | TB12 | 2.14 (54.4) | 0.65 (16.5) | 1.32 (33.5) |
| 1 | 0.065 | 16 | TB16 | 2.46 (62.5) | 0.87 (22.1) | 1.63 (41.4) |

FL Series Metal Hose

Features

- Highly flexible all-metal hose.
- 316L stainless steel annular convoluted core.
- 1/4 and 1/2 in. sizes and working pressures from vacuum to 1500 psig (103 bar).
- Single braid layer of 321 stainless steel 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, and additional helium leak testing. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) | 0.24 (6.1) | 0.47 (11.9) | 1.00 (2.54) | 5.50 (14.0) | -325 to 850 (-200 to 454) | 1500 (103) | 6000 (413) | 0.12 (0.18) |
| 1/2 (12.7) | 0.47 (11.9) | 0.82 (20.8) | 1.75 (4.45) | 7.00 (17.8) | | 1200 (82.6) | 4800 (330) | 0.24 (0.36) |

Pressure-Temperature Ratings

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 | 1/2 |
|-------------------------|--|-------------|
| Temperature °F (°C) | Working Pressure Vacuum to ... psig (bar) | |
| -325 (-200) to 100 (37) | 1500 (103) | 1200 (82.6) |
| 200 (93) | 1260 (86.8) | 1008 (69.4) |
| 300 (148) | 1140 (78.5) | 912 (62.8) |
| 400 (204) | 1050 (72.3) | 840 (57.8) |
| 500 (260) | 975 (67.1) | 780 (53.7) |
| 600 (315) | 930 (64.0) | 744 (51.2) |
| 700 (371) | 885 (60.9) | 708 (48.7) |
| 800 (426) | 855 (58.9) | 684 (47.1) |
| 850 (454) | 840 (57.8) | 672 (46.3) |

Testing

Every Swagelok FL series hose assembly is inboard helium leak tested to a maximum leak rate of 1×10^{-5} std cm³/s.

For additional testing, see **Testing**, page 94.

Cleaning and Packaging

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

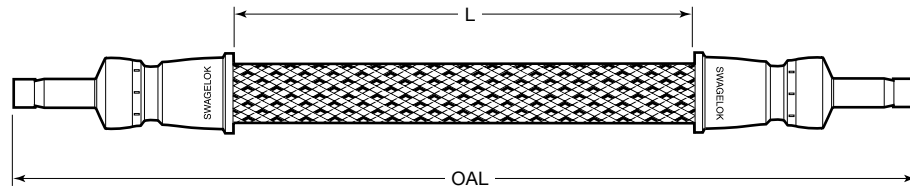
⚠ Do not subject flexible metal hose to pressure surges, shock, or pulsations, where the peak pressure is greater than 50 % of the working pressure rating.

FL Series Metal Hose

Ordering Information and Dimensions

Standard Length Hose Assemblies

Select an ordering number.



Swagelok Tube Adapter End Connections



| Nominal Hose Size | Tube Adapter Size | Overall Length OAL | Ordering Number | Dimensions | | |
|-------------------|-------------------|--------------------|-----------------|---------------|-------------------------|---------------------------|
| | | | | Live Length L | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. | | in. (cm) | | in. (cm) | in. (mm) | |
| 1/4 | 1/4 | 12.0 (30.5) | SS-FL4TA4TA4-12 | 8.48 (21.5) | 0.16 (4.1) | 0.66 (16.8) |
| | | 24.0 (61.0) | SS-FL4TA4TA4-24 | 20.5 (52.1) | | |
| | | 36.0 (91.4) | SS-FL4TA4TA4-36 | 32.5 (82.6) | | |
| | | 48.0 (122) | SS-FL4TA4TA4-48 | 44.5 (113) | | |
| 1/2 | 1/2 | 12.0 (30.5) | SS-FL8TA8TA8-12 | 7.50 (19.0) | 0.37 (9.4) | 1.01 (25.7) |
| | | 24.0 (61.0) | SS-FL8TA8TA8-24 | 19.5 (49.5) | | |
| | | 36.0 (91.4) | SS-FL8TA8TA8-36 | 31.5 (80.0) | | |

FL Series Metal Hose

Ordering Information

Custom Hose Assemblies

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 **71 CM - 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

8 = 1/2

4 End Connections

See **End Connection Designator** column in tables below.

5 Overall Length

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

6 Options

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

CRN = Lanyard tag with CRN

F = Fire jacket

F1 = Thermosleeve

H7 = Helium leak test (1×10^{-7} std cm³/s)

N3 = Nitrogen pressure test

T = Lanyard tag

T2 = Two lanyard tags

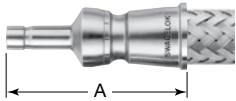
W = Hydrostatic test

Specify text for tags. See **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

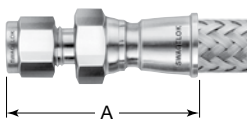
End Connections

Swagelok Tube Adapters



| Tube Adapter Size | Nominal Hose Size Designator | End Connection Designator | A | Minimum Inside Diameter | Maximum Outside Dimension |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | TA4 | 1.76 (44.7) | 0.16 (4.1) | 0.66 (16.8) |
| 3/8 | 4 | TA6 | 1.79 (45.5) | 0.27 (6.9) | 0.66 (16.8) |
| | 8 | TA6 | 2.03 (51.6) | | 1.01 (25.7) |
| 1/2 | 8 | TA8 | 2.25 (57.2) | 0.37 (9.4) | 1.01 (25.7) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | TM6 | 44.4 (1.75) | 4.1 (0.16) | 16.8 (0.66) |
| 8 | 4 | TM8 | 45.2 (1.78) | 5.6 (0.22) | 16.8 (0.66) |
| 10 | 4 | TM10 | 45.2 (1.78) | 7.1 (0.28) | 16.8 (0.66) |
| | 8 | TM10 | 51.3 (2.02) | | 25.7 (1.01) |
| 12 | 8 | TM12 | 57.4 (2.26) | 8.9 (0.35) | 25.7 (1.01) |

Swagelok Tube Fittings

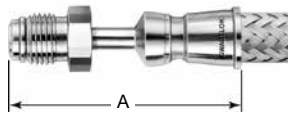


| Tube Fitting Size | Nominal Hose Size Designator | End Connection Designator | A | Minimum Inside Diameter | Maximum Outside Dimension |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | SL4 | 1.94 (49.3) | 0.19 (4.8) | 0.80 (20.3) |
| 3/8 | 8 | SL6 | 2.22 (56.4) | 0.28 (7.1) | 1.23 (31.2) |
| 1/2 | 8 | SL8 | 2.33 (59.2) | 0.41 (10.4) | 1.23 (31.2) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | SM6 | 49.3 (1.94) | 4.8 (0.19) | 20.3 (0.80) |
| 10 | 8 | SM10 | 56.4 (2.22) | 7.9 (0.31) | 31.3 (1.23) |
| 12 | 8 | SM12 | 59.2 (2.33) | 9.7 (0.38) | 31.3 (1.23) |

See next page for more end connections.

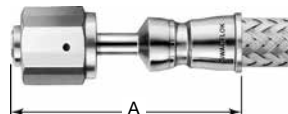
FL Series Metal Hose

Rotatable Male VCR Metal Gasket Face Seal Fittings



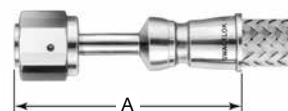
| VCR Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | RM4 | 2.60 (66.0) | 0.18 (4.6) | 0.73 (18.4) |
| 1/2 | 8 | RM8 | 2.88 (73.2) | 0.40 (10.2) | 1.09 (27.7) |

Rotatable Female VCR Metal Gasket Face Seal Fittings



| VCR Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | RF4 | 2.00 (50.8) | 0.18 (4.6) | 0.87 (22.1) |
| 1/2 | 8 | RF8 | 2.21 (56.1) | 0.40 (10.2) | 1.23 (31.2) |

Female VCO O-Ring Face Seal Fittings



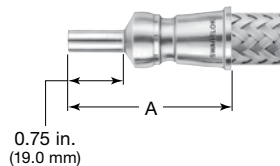
| VCO Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | VF4 | 2.50 (63.5) | 0.18 (4.6) | 0.80 (20.3) |
| 1/2 | 8 | VF8 | 2.73 (69.3) | 0.40 (10.2) | 1.16 (29.5) |

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



| NPT and ISO/BSP Tapered Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|----------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| NPT | | | | | |
| 1/4 | 4 | PM4 | 1.80 (45.7) | 0.28 (7.1) | 0.80 (20.3) |
| 3/8 | 8 | PM6 | 2.02 (51.3) | 0.38 (9.7) | 1.23 (31.2) |
| 1/2 | 8 | PM8 | 2.21 (56.1) | 0.47 (11.9) | 1.23 (31.2) |
| ISO/BSP Tapered | | | | | |
| 1/4 | 4 | MT4 | 1.80 (45.7) | 0.28 (7.1) | 0.80 (20.3) |
| 1/2 | 8 | MT8 | 2.21 (56.1) | 0.47 (11.9) | 1.23 (31.2) |

Tube Butt Welds

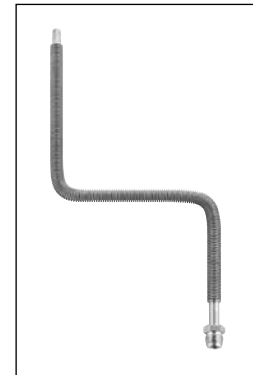
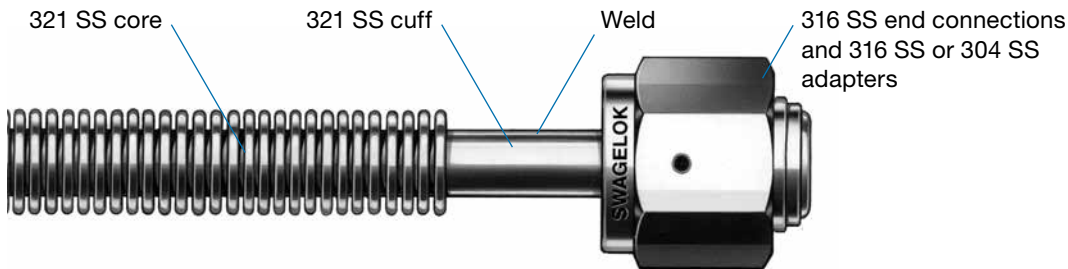


| Tube Butt Weld Size in. | Wall Thickness in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|-------------------------|--------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 0.035 | 4 | TB4 | 1.90 (48.3) | 0.18 (4.6) | 0.66 (16.8) |
| 1/2 | 0.049 | 8 | TB8 | 2.09 (53.1) | 0.40 (10.2) | 1.01 (25.7) |

Convolved Metal Tubing

Features

- Form-fit-and-stay, flexible, all-metal tubing.
- 321 stainless steel annular convoluted core.
- Size range of 1/4 through 1 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 low-pressure static applications.
- Standard and custom tubing lengths, custom tubing assemblies, and adapters for field assembly are available.
- Options include additional helium leak testing and tubing tags. See pages 94 and 95 for details.
- For electrical properties, see page 5 for details.



Form-fit-and-stay

Technical Data—Convolved Metal Tubing

| Nominal Tubing Size in. | Inside Diameter in. (mm) | Outside Diameter in. (mm) | Temperature Range °F (°C) | Working Pressure 10 ⁻⁹ torr to ... psig (bar) | Nominal Tubing Wall Thickness in. (mm) | Tubing Weight lb/ft (kg/m) | |
|----------------------------|-----------------------------|------------------------------|------------------------------|--|---|-------------------------------|-------------|
| 1/4 | 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 | 0.38 (9.5) | 0.58 (14.7) | | 25 (1.7) | | 0.006 (0.15) | 0.07 (0.10) |
| 1/2 | 0.50 (12.7) | 0.71 (17.9) | | | | | 0.09 (0.13) |
| 3/4 | 0.75 (19.0) | 1.08 (27.4) | | | | | 0.19 (0.28) |
| 1 | 1.00 (25.4) | 1.36 (34.5) | | | | | 0.23 (0.34) |
| 1 1/2 | 1.50 (38.1) | 1.92 (48.7) | | | | | 0.34 (0.51) |

Technical Data—End Connections and Adapters

| End Connection Type | Material | Temperature Range °F (°C) | Availability |
|------------------------|--|------------------------------|----------------------------------|
| VCR Male and female | 316 SS | 70 to 1000 (20 to 537) | Factory welded |
| VCO Male and female | 316 SS | 70 to 400 (20 to 204) | |
| XBA adapter | 304 SS (factory welded 1/2 in. and larger sizes; all sizes for field assembly) 316L SS (factory welded 1/4 and 3/8 in. sizes) | 70 to 1000 (20 to 537) | Factory welded or field assembly |
| XOA adapter | 304 SS | 70 to 400 (20 to 204) | Field assembly |

Testing

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 cm³/s.

For additional testing, see **Ordering Information**, page 33.

Cleaning and Packaging

Swagelok convoluted tubing assemblies and adapters are cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62. Each item is individually packaged for cleanliness and protection.

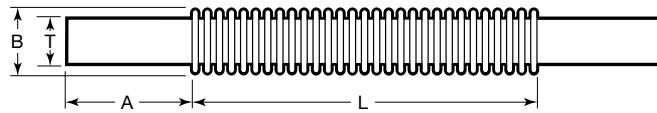
⚠ **Not suitable for dynamic flexing applications.**

Convoluting Metal Tubing

Ordering Information and Dimensions

Standard Tubing

Select an ordering number.



| Nominal Tube Size T in. | Ordering Number | Dimensions, in. (mm) | | | | | Maximum Angular Displacement ^① |
|-------------------------------|-----------------|----------------------|-------------------------------|----------------|--------------|-------------|---|
| | | Cuff Length A | Maximum Outside Diameter B | Live Length, L | | | |
| | | | | Compressed | Manufactured | Extended | |
| 1/4 | 321-4-X-2 | 0.75 (19.0) | 0.38 (9.7) | 1.50 (38.1) | 2.00 (50.8) | 3.00 (76.2) | 180° |
| | 321-4-X-4 | | | 3.25 (82.6) | 4.00 (102) | 6.00 (152) | |
| | 321-4-X-6 | | | 4.75 (121) | 6.00 (152) | 9.00 (229) | 360° |
| | 321-4-X-12 | | | 9.00 (229) | 12.0 (305) | 18.0 (457) | |
| | 321-4-X-24 | | | 18.0 (457) | 24.0 (610) | 36.0 (914) | |
| 3/8 | 321-6-X-1 | 0.75 (19.0) | 0.58 (14.7) | 0.75 (19.0) | 1.00 (25.4) | 1.50 (38.1) | 90° |
| | 321-6-X-3 | | | 2.50 (63.5) | 3.00 (76.2) | 4.50 (114) | 225° |
| | 321-6-X-6 | | | 4.75 (121) | 6.00 (152) | 9.00 (229) | 360° |
| | 321-6-X-12 | | | 9.00 (229) | 12.0 (305) | 18.0 (457) | |
| | 321-6-X-24 | | | 18.0 (457) | 24.0 (610) | 36.0 (914) | |
| 1/2 | 321-8-X-3 | 1.00 (25.4) | 0.71 (18.0) | 2.50 (63.5) | 3.00 (76.2) | 4.50 (114) | 180° |
| | 321-8-X-6 | | | 4.75 (121) | 6.00 (152) | 9.00 (229) | 360° |
| | 321-8-X-12 | | | 9.00 (229) | 12.0 (305) | 18.0 (457) | |
| | 321-8-X-24 | | | 18.0 (457) | 24.0 (610) | 36.0 (914) | |

^① Angular displacement based on nominal live length, as manufactured. Angular displacement is not recommended for applications involving pressure surges.

Convolute Metal Tubing

Ordering Information

Custom Tubing and Tubing Assemblies

Build a custom tubing or tubing assembly ordering number by combining the designators in the sequence shown below.

Typical Ordering Number

1 2 3 4 5 6
 3 2 1 - 4 - X - 36 F M R - H L T

1 Material

Tubing

321 = 321 stainless steel

2 Tube OD, in.

4 = 1/4

6 = 3/8

8 = 1/2

12 = 3/4

16 = 1

24 = 1 1/2

3 Tubing

X = CT series convolute 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.

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

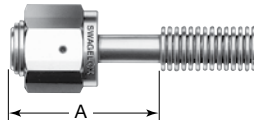
HLT = Inboard helium leak test with certification (1×10^{-9} std cm^3/s maximum leak rate)

*Specify text for tags. See **Hose Tag Text** table, page 95.*

Convuluted Metal Tubing

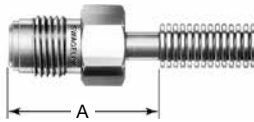
Factory-Welded End Connections

Rotatable Female VCR Metal Gasket Face Seal Fittings



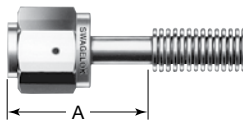
| VCR Size in. | Dimensions, in. (mm) | | |
|--------------|----------------------|-------------------------|---------------------------|
| | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 1.95 (49.5) | 0.18 (4.6) | 0.87 (22.1) |
| 3/8 | 2.06 (52.3) | 0.28 (7.1) | 1.23 (31.2) |
| 1/2 | 2.25 (57.2) | 0.40 (8.4) | 1.23 (31.2) |

Rotatable Male VCR Metal Gasket Face Seal Fittings



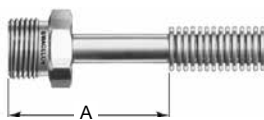
| VCR Size in. | Dimensions, in. (mm) | | |
|--------------|----------------------|-------------------------|---------------------------|
| | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 1.95 (49.5) | 0.18 (4.6) | 0.73 (18.4) |
| 3/8 | 2.06 (52.3) | 0.28 (7.1) | 1.09 (27.6) |
| 1/2 | 2.25 (57.2) | 0.40 (10.2) | 1.09 (27.6) |

Female VCO O-Ring Face Seal Fittings



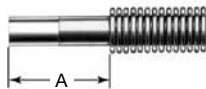
| VCO Size in. | Dimensions, in. (mm) | | |
|--------------|----------------------|-------------------------|---------------------------|
| | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 1.68 (42.7) | 0.13 (3.3) | 0.80 (20.3) |
| 3/8 | 1.40 (35.6) | 0.23 (5.8) | 1.16 (29.5) |
| 1/2 | 1.81 (46.0) | 0.33 (8.4) | 1.16 (29.5) |

Male VCO O-Ring Face Seal Fittings



| VCO Size in. | Dimensions, in. (mm) | | |
|--------------|----------------------|-------------------------|---------------------------|
| | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 2.13 (54.1) | 0.13 (3.3) | 0.73 (18.4) |
| 3/8 | 2.27 (57.7) | 0.23 (5.8) | 1.09 (27.6) |
| 1/2 | 2.46 (62.5) | 0.33 (8.4) | 1.09 (27.6) |

XBA Adapters

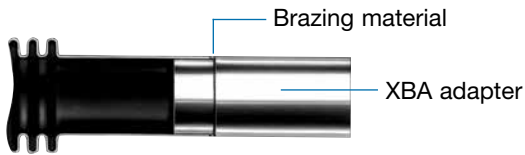


| Adapter Size in. | Dimensions, in. (mm) | | |
|------------------|----------------------|-------------------------|---------------------------|
| | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 1.55 (39.4) | 0.18 (4.6) | 0.38 (9.7) |
| 3/8 | 1.58 (40.1) | 0.31 (7.9) | 0.58 (14.7) |
| 1/2 | 1.94 (49.3) | 0.39 (9.9) | 1.08 (27.4) |
| 3/4 | 2.03 (51.6) | 0.61 (15.5) | 1.08 (27.4) |
| 1 | 2.31 (58.7) | 0.86 (21.8) | 1.36 (34.5) |
| 1 1/2 | 3.06 (77.7) | 1.36 (34.5) | 1.92 (48.8) |

Convuluted Metal Tubing

End Connections for Field Assembly

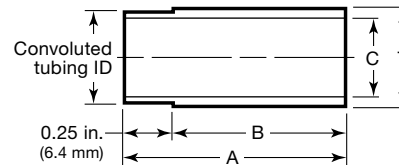
XBA Adapters



- XBA adapters are brazed or soldered to convoluted vacuum tubing.
- XBA adapters allow for connecting to socket and butt weld fittings, Swagelok tube fittings, and Ultra-Torr™ vacuum fittings.
- Material is 304 stainless steel.

Ordering Information and Dimensions

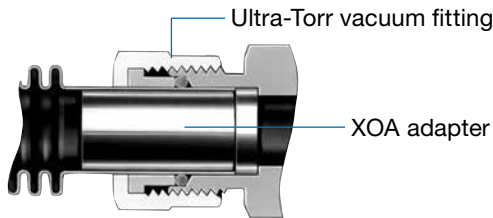
Select an adapter ordering number.



| T in. | Ordering Number | Dimensions, in. (mm) | | |
|----------|-------------------------|----------------------|-------------|-------------|
| | | A | B | C |
| 1/4 | 304-4-XBA | 0.94 (23.9) | 0.69 (17.5) | 0.16 (4.1) |
| 3/8 | 304-6-XBA | 1.00 (25.4) | 0.75 (19.0) | 0.28 (7.1) |
| 1/2 | 304-8-XBA | 1.19 (30.2) | 0.94 (23.9) | 0.38 (9.7) |
| 3/4 | 304-12-XBA | 1.28 (32.5) | 1.03 (26.2) | 0.60 (15.2) |
| 1 | 304-16-XBA ^① | 1.56 (39.6) | 1.31 (33.3) | 0.85 (21.6) |
| 1 1/2 | 304-24-XBA ^① | 2.31 (58.7) | 2.06 (52.3) | 1.35 (34.3) |

^① Not recommended for gas service with Swagelok tube fitting.

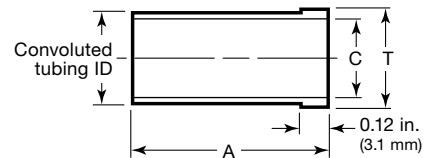
XOA Adapters



- XOA adapters support the tubing cuff when using convoluted vacuum tubing products with Ultra-Torr vacuum fittings.
- XOA adapters provide a leak-tight connection and are reusable.
- Material is 304 stainless steel.

Ordering Information and Dimensions

Select an adapter ordering number.



| T in. | Ordering Number | Dimensions, in. (mm) | |
|----------|--------------------|----------------------|-------------|
| | | A | C |
| 1/4 | 304-4-XOA | 0.75 (19.0) | 0.16 (4.1) |
| 3/8 | 304-6-XOA | | 0.28 (7.1) |
| 1/2 | 304-8-XOA | 1.00 (25.4) | 0.38 (9.7) |
| 3/4 | 304-12-XOA | | 0.60 (15.2) |
| 1 | 304-16-XOA | | 0.85 (21.6) |
| 1 1/2 | 304-24-XOA | | 1.35 (34.3) |

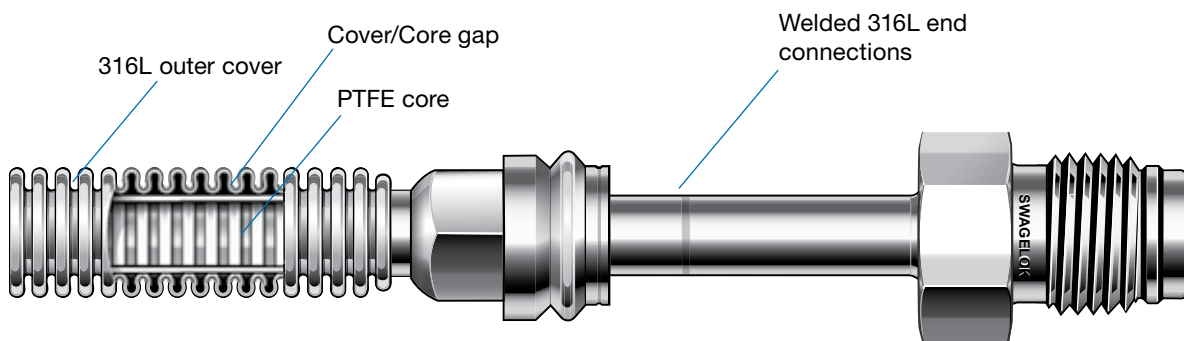
Ultra-Torr Vacuum Fittings

Refer to *Ultra-Torr Vacuum Fittings* catalog, MS-01-32, for additional information.

FP Series Hybrid Hose

Features

- PTFE smooth bore core hose.
- 316L stainless steel convoluted cover.
- Sizes of 1/4 and 1/2 in. and working pressures from vacuum to 116 psig (8.0 bar).
- End connections welded in accordance with ASME Boiler and Pressure Vessel Code Section IX.
- Commonly used as a low pressure transfer hose where a smooth bore for ultra-high purity is critical and permeation to the atmosphere is undesirable.



Technical Data

| 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 0 to 150°F (-17 to 65°C) Vacuum to ... psig (bar) | Minimum Permanent Deformation Pressure at 70°F (20°C) psig (bar) |
|----------------------------------|--------------------------------|---------------------------------|--|-------------|---------------------------------|--|---|
| | | | Static | Dynamic | | | |
| 1/4 (6.4) | 0.18 (4.6) | 0.38 (9.7) | 2.13 (5.4) | 4.33 (10.9) | 0 to 150 (-17 to 65) | 116 (8.0) | 464 (32.0) |
| 1/2 (12.7) | 0.37 (9.4) | 0.73 (18.5) | 4.33 (10.9) | 6.50 (16.5) | | 116 (8.0) | 464 (32.0) |

Pressure-temperature ratings may be limited by the end connections.
Exceeding the minimum permanent deformation pressure could result in core tube distortion.

Testing

Every Swagelok FP series hose assembly is inboard helium leak tested to a maximum leak rate of 1×10^{-9} std cm^3/s .

For additional testing, see **Testing**, page 94

Cleaning and Packaging

Each hose is bagged individually and boxed.

⚠ Permeation of gases will occur between the PTFE core and the convoluted metal layer. When system pressure is reduced, reverse permeation back into the flow path may occur. Contact your Swagelok representative for additional information.

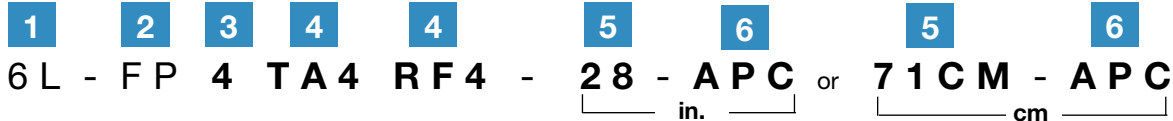
FP Series Hybrid Hose

Ordering Information

Custom Hose Assemblies

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

Typical Ordering Number



1 Material
End Connections
 6L = 316L stainless steel

2 Hose
 FP = FP series hose

3 Nominal Hose Size, in.
 4 = 1/4 8 = 1/2

4 End Connections
 See **End Connection Designator** column in tables on next page.

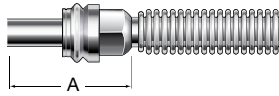
5 Overall Length
 Inches in tenths or centimeters, in whole numbers. Include **CM** as shown for centimeter lengths. Standard available lengths between 6-72 inches.

6 Options
 For multiple options, add designators with a dash between each designator.
APC = Airborne Particle Count
RGA = Residual Gas Analysis
UVA = Ultra Violet Inspection

FP Series Hybrid Hose

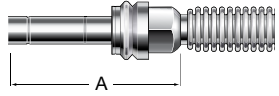
End Connections

Butt Weld Connection



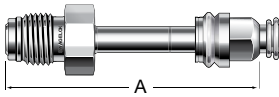
| Butt Weld Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | TB4 | 0.84 (21.3) | 0.18 (4.6) | 0.25 (6.4) |
| 1/2 | 8 | TB8 | 1.06 (26.9) | 0.40 (10.2) | 0.50 (12.7) |

Swagelok Tube Adapters



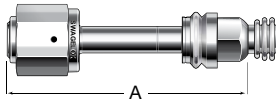
| Tube Adapter Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | TA4 | 2.24 (56.9) | 0.18 (4.6) | 0.25 (6.4) |
| 1/2 | 8 | TA8 | 2.79 (70.9) | 0.37 (9.4) | 0.50 (12.7) |

Rotatable Male VCR® Metal Gasket Face Seal Fittings



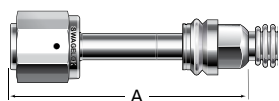
| VCR Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | RM4 | 2.04 (51.8) | 0.18 (4.6) | 0.78 (19.8) |
| 1/2 | 8 | RM8 | 2.35 (59.7) | 0.40 (10.2) | 1.08 (27.4) |

Rotatable Female VCR Metal Gasket Face Seal Fittings



| VCR Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | RF4 | 2.04 (51.8) | 0.16 (4.1) | 0.87 (22.1) |
| 1/2 | 8 | RF8 | 2.35 (59.7) | 0.34 (8.6) | 1.23 (31.2) |

Female VCO O-Ring Face Seal Fittings

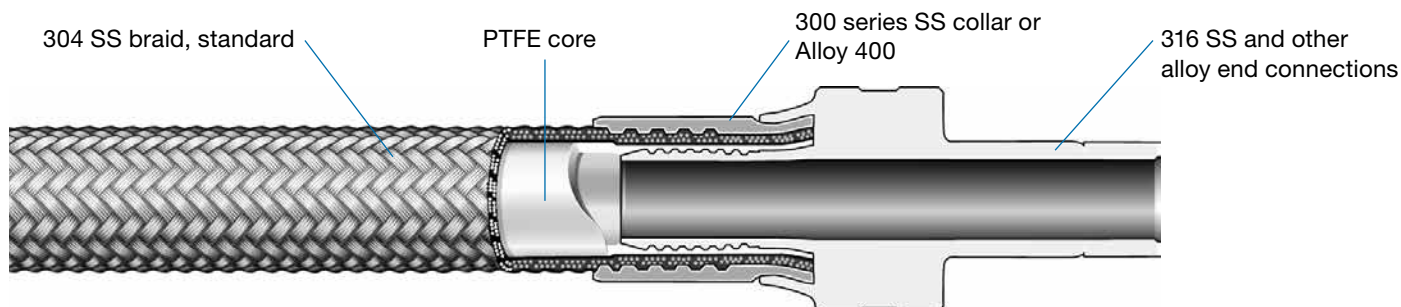


| VCO Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | VF4 | 1.44 (36.6) | 0.19 (4.8) | 0.79 (20.1) |
| 1/2 | 8 | VF8 | 1.66 (41.9) | 0.41 (10.4) | 1.08 (27.4) |

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 and 3-A for contact with water, food, and beverage.
- 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 96 for more information.
- Commonly used where chemical compatibility and permeation resistance is desired.
- Standard and custom assemblies available.
- Options include hose covers and hose tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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

Ratings are based on burst testing.

| Braid Material | 304 SS (TH and TC) | | | | | Alloy 400 (TL4) |
|--------------------------|-------------------------------------|-------------|-------------|-------------|-------------|-----------------|
| | 1/4 | 3/8 | 1/2 | 3/4 | 1 | |
| Nominal Hose Size in. | 1/4 | 3/8 | 1/2 | 3/4 | 1 | 1/4 |
| Temperature °F (°C) | Working Pressure, psig (bar) | | | | | |
| -65 (-53) | 2250 (155) | 1875 (129) | 1500 (103) | 1125 (77.5) | 750 (51.6) | 1500 (103) |
| 0 (-17) to 100 (37) | 3000 (206) | 2500 (172) | 2000 (137) | 1500 (103) | 1000 (68.9) | 1500 (103) |
| 200 (93) | 1740 (119) | 1450 (99.9) | 1160 (79.9) | 870 (59.9) | 580 (39.9) | 1305 (89.9) |
| 300 (148) | 1560 (107) | 1300 (89.5) | 1040 (71.6) | 780 (53.7) | 520 (35.8) | 1215 (83.7) |
| 400 (204) | 1440 (99.2) | 1200 (82.6) | 960 (66.1) | 720 (49.6) | 480 (33.0) | 1185 (81.6) |
| 450 (230) | 1380 (95.0) | 1150 (79.2) | 920 (63.3) | 690 (47.5) | 460 (31.6) | 1170 (80.6) |

Testing

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.

Cleaning and Packaging

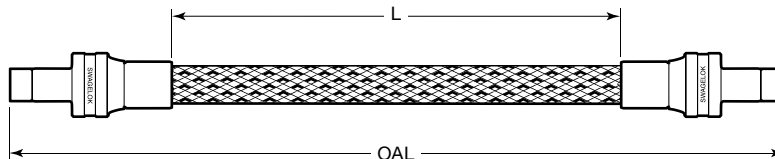
Swagelok T series hose components are cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62. Each hose is bagged individually and boxed; longer hoses are coiled, bagged, and boxed.

T Series PTFE Hose

Ordering Information and Dimensions

Standard Length Hose Assemblies

Select an ordering number.



Swagelok Tube Adapter End Connections



| Nominal Hose Size | Tube Adapter Size | Overall Length OAL | Ordering Number | Dimensions | | |
|-------------------|-------------------|--------------------|-----------------|---------------|-------------------------|---------------------------|
| | | | | Live Length L | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. | | in. (cm) | | in. (cm) | in. (mm) | |
| 1/4 | 1/4 | 8.00 (20.3) | SS-4BHT-6 | 4.72 (12.0) | 0.16 (4.1) | 0.54 (13.7) |
| | | 14.0 (35.6) | SS-4BHT-12 | 10.7 (27.2) | | |
| | | 20.0 (50.8) | SS-4BHT-18 | 16.7 (42.4) | | |
| | | 26.0 (66.0) | SS-4BHT-24 | 22.7 (57.7) | | |
| | | 38.0 (96.5) | SS-4BHT-36 | 34.7 (88.1) | | |
| | | 50.0 (127) | SS-4BHT-48 | 46.7 (119) | | |
| | | 62.0 (157) | SS-4BHT-60 | 58.7 (149) | | |
| | | 74.0 (188) | SS-4BHT-72 | 70.7 (180) | | |
| | | 122 (310) | SS-4BHT-120 | 119 (302) | | |
| 3/8 | 3/8 | 14.0 (35.6) | SS-6BHT-12 | 10.4 (26.4) | 0.27 (6.9) | 0.73 (18.5) |
| | | 20.0 (50.8) | SS-6BHT-18 | 16.4 (41.7) | | |
| | | 26.0 (66.0) | SS-6BHT-24 | 22.4 (56.9) | | |
| | | 38.0 (96.5) | SS-6BHT-36 | 34.4 (87.4) | | |
| | | 50.0 (127) | SS-6BHT-48 | 46.4 (118) | | |
| | | 62.0 (157) | SS-6BHT-60 | 58.4 (148) | | |
| | | 74.0 (188) | SS-6BHT-72 | 70.4 (179) | | |
| 1/2 | 1/2 | 14.5 (36.8) | SS-8BHT-12 | 10.0 (25.4) | 0.36 (9.1) | 0.86 (21.8) |
| | | 20.5 (52.1) | SS-8BHT-18 | 16.0 (40.6) | | |
| | | 26.5 (67.3) | SS-8BHT-24 | 22.0 (55.9) | | |
| | | 38.5 (97.8) | SS-8BHT-36 | 34.0 (86.4) | | |
| | | 50.5 (128) | SS-8BHT-48 | 46.0 (117) | | |
| | | 62.5 (159) | SS-8BHT-60 | 58.0 (147) | | |
| | | 74.5 (189) | SS-8BHT-72 | 70.0 (178) | | |
| | | 122.5 (311) | SS-8BHT-120 | 118 (300) | | |
| 3/4 | 3/4 | 26.5 (67.3) | SS-12BHT-24 | 21.0 (53.3) | 0.53 (13.5) | 1.04 (26.4) |
| | | 38.5 (97.8) | SS-12BHT-36 | 33.1 (84.1) | | |
| | | 50.5 (128) | SS-12BHT-48 | 45.2 (115) | | |
| Dimensions, mm | | cm (in.) | | cm (in.) | mm (in.) | |
| 1/4 in. | 6 | 35.6 (14.0) | SS-4MBHT-12 | 27.2 (10.7) | 4.1 (0.16) | 13.7 (0.54) |
| | | 66.0 (26.0) | SS-4MBHT-24 | 57.6 (22.7) | | |
| | | 96.5 (38.0) | SS-4MBHT-36 | 88.1 (34.7) | | |
| 1/2 in. | 12 | 67.3 (26.5) | SS-8MBHT-24 | 54.2 (21.3) | 8.4 (0.33) | 21.8 (0.86) |
| | | 97.8 (38.5) | SS-8MBHT-36 | 84.7 (33.3) | | |

T Series PTFE Hose

Ordering Information

Custom Hose Assemblies

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 TA 4 SL 2 - 28 - Z or **71 CM - Z**
└─── in. ───┘ └─── cm ───┘

1 Material

End Connections

- SS** = 316 stainless steel
- C20** = Alloy 20
- M** = Alloy 400
- INC** = Alloy 600
- 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 next page.

5 Overall Length

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

6 Options

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

- CRN** = Lanyard tag with CRN
- F** = Fire jacket
- F1** = Thermosleeve
- N3** = Nitrogen pressure test
- S** = 302 SS spring guard, hose-length
- T** = Lanyard tag
- T2** = Two lanyard tags
- W** = Hydrostatic test
- Z** = 316L SS braid material and 316 SS collar 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 96 for additional information.)

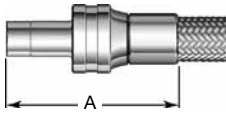
Specify text for tags. see **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

T Series PTFE Hose

End Connections

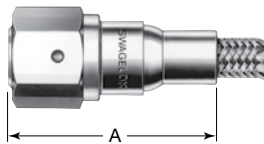
Swagelok Tube Adapters



| Tube Adapter Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 4 | TA4 ^① | 1.64 (41.7) | 0.16 (4.1) | 0.54 (13.7) |
| 3/8 | 6 | TA6 ^① | 1.74 (44.2) | 0.27 (6.9) | 0.73 (18.5) |
| | 8 | TA6 ^① | 2.34 (59.4) | | |
| 1/2 | 8 | TA8 ^① | 2.26 (57.4) | 0.36 (9.1) | 0.86 (21.8) |
| 3/4 | 12 | TA12 | 2.72 (69.1) | 0.53 (13.5) | 1.04 (26.4) |
| | 16 | TA12 | 3.33 (84.6) | 0.56 (14.2) | 1.36 (34.5) |
| 1 | 12 | TA16 | 2.93 (74.4) | 0.58 (14.7) | 1.34 (34.0) |
| | 16 | TA16 | 3.61 (91.7) | 0.80 (20.3) | 1.36 (34.5) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | TM6 ^① | 42.2 (1.66) | 4.1 (0.16) | 13.7 (0.54) |
| 8 | 4 | TM8 ^① | 50.5 (1.99) | 4.1 (0.16) | 13.7 (0.54) |
| 10 | 6 | TM10 ^① | 52.3 (2.06) | 6.9 (0.27) | 15.5 (0.61) |
| 12 | 8 | TM12 ^① | 67.1 (2.64) | 8.4 (0.33) | 20.1 (0.79) |
| 18 | 12 | TM18 ^① | 67.6 (2.66) | 13.5 (0.53) | 26.4 (1.04) |
| 25 | 16 | TM25 | 89.7 (3.53) | 19.0 (0.75) | 34.5 (1.36) |

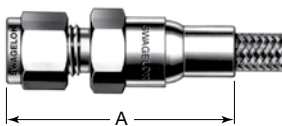
^① ECE R110 approval available.

Female VCO O-Ring Face Seal Fittings



| VCO Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | VF4 | 1.69 (42.9) | 0.16 (4.1) | 0.80 (20.3) |
| 1/2 | 6 | VF8 | 1.76 (44.7) | 0.27 (6.9) | 1.16 (29.5) |
| | 8 | VF8 | 2.02 (51.3) | 0.36 (9.1) | |
| 3/4 | 12 | VF12 | 2.15 (54.6) | 0.58 (14.7) | 1.26 (31.9) |
| | 16 | VF12 | 2.75 (69.9) | 0.63 (16.0) | |
| 1 | 16 | VF16 | 2.72 (69.1) | 0.80 (20.3) | 2.03 (51.6) |

Swagelok Tube Fittings

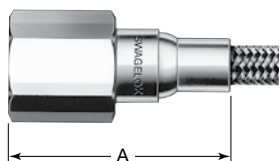


| Tube Fitting Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/8 | 4 | SL2 | 1.93 (49.0) | 0.09 (2.3) | 0.65 (16.6) |
| 1/4 | 4 | SL4 ^① | 1.97 (50.0) | 0.16 (4.1) | 0.65 (16.6) |
| 3/8 | 6 | SL6 ^① | 2.20 (55.9) | 0.27 (6.9) | 0.87 (22.1) |
| 1/2 | 8 | SL8 ^① | 2.50 (63.5) | 0.36 (9.1) | 1.09 (27.6) |
| 3/4 | 12 | SL12 | 2.81 (71.4) | 0.58 (14.7) | 1.31 (33.1) |
| Dimensions, mm (in.) | | | | | |
| 6 | 4 | SM6 ^① | 50.0 (1.97) | 4.1 (0.16) | 16.6 (0.65) |
| 10 | 6 | SM10 ^① | 57.2 (2.25) | 6.9 (0.27) | 22.1 (0.87) |
| 12 | 8 | SM12 ^① | 63.5 (2.50) | 9.1 (0.36) | 27.6 (1.09) |
| 18 | 12 | SM18 | 71.4 (2.81) | 14.7 (0.58) | 33.1 (1.31) |

^① ECE R110 approval available.

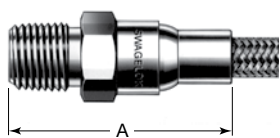
T Series PTFE Hose

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 | Dimensions, in. (mm) | | |
|---|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| NPT | | | | | |
| 1/4 | 4 | PF4 | 1.88 (47.8) | 0.16 (4.1) | 0.87 (22.1) |
| | 6 | PF4 | 1.84 (46.7) | 0.27 (6.9) | |
| 3/8 | 6 | PF6 | 1.95 (49.5) | 0.27 (6.9) | 1.02 (25.8) |
| 1/2 | 8 | PF8 | 2.49 (63.3) | 0.36 (9.1) | 1.23 (31.2) |
| 3/4 | 12 | PF12 | 2.51 (63.8) | 0.58 (14.7) | 1.52 (38.7) |
| ISO/BSP Tapered | | | | | |
| 1/4 | 4 | FT4 | 1.88 (47.8) | 0.16 (4.1) | 0.87 (22.1) |
| 1/2 | 8 | FT8 | 2.49 (63.3) | 0.36 (9.1) | 1.23 (31.2) |

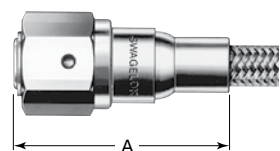
Male Pipe Threads,
NPT and ISO/BSP Tapered
(ISO 7)



| Male NPT and ISO/BSP Tapered Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|---------------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| NPT | | | | | |
| 1/4 | 4 | PM4 ^① | 1.88 (47.8) | 0.16 (4.1) | 0.80 (20.3) |
| | 6 | PM4 ^① | 1.91 (48.5) | 0.27 (6.9) | |
| | 8 | PM4 | 2.17 (55.1) | 0.28 (7.1) | |
| 3/8 | 6 | PM6 ^① | 1.91 (48.5) | 0.27 (6.9) | 0.80 (20.3) |
| | 8 | PM6 ^① | 2.17 (55.1) | 0.36 (9.1) | |
| 1/2 | 8 | PM8 ^① | 2.39 (60.7) | 0.36 (9.1) | 1.02 (25.8) |
| | 12 | PM8 | 2.41 (61.2) | 0.47 (11.9) | 1.23 (31.2) |
| 3/4 | 12 | PM12 | 2.41 (61.2) | 0.58 (14.7) | 1.23 (31.2) |
| | 16 | PM12 | 3.00 (76.2) | 0.63 (16.0) | 1.31 (33.1) |
| 1 | 16 | PM16 | 3.26 (82.8) | 0.80 (20.3) | 1.60 (40.5) |
| ISO/BSP Tapered | | | | | |
| 1/4 | 4 | MT4 ^① | 1.88 (47.8) | 0.16 (4.1) | 0.80 (20.3) |
| 1/2 | 8 | MT8 ^① | 2.39 (60.7) | 0.36 (9.1) | 1.02 (25.8) |
| 3/4 | 12 | MT12 | 2.41 (61.2) | 0.58 (14.7) | 1.23 (31.2) |
| 1 | 16 | MT16 | 3.26 (82.8) | 0.80 (20.3) | 1.60 (40.5) |

① ECE R110 approval available.

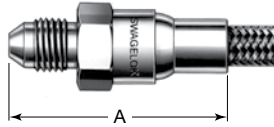
Female VCR Metal Gasket
Face Seal Fittings



| VCR Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | RF4 | 1.84 (46.7) | 0.16 (4.1) | 0.87 (22.1) |
| 1/2 | 8 | RF8 | 2.24 (56.9) | 0.36 (9.1) | 1.23 (31.2) |
| 3/4 | 12 | RF12 | 2.46 (62.5) | 0.58 (14.7) | 1.74 (44.2) |
| 1 | 16 | RF16 | 3.39 (86.1) | 0.80 (20.3) | 2.03 (51.6) |

T Series PTFE Hose

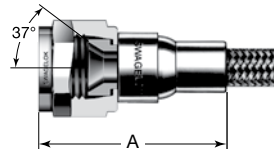
SAE 37° (JIC) Male Flare



| JIC Flare Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|--------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | AN4 ^① | 1.88 (47.8) | 0.16 (4.1) | 0.80 (20.3) |
| 3/8 | 6 | AN6 ^① | 1.91 (48.5) | 0.27 (6.9) | 0.73 (18.4) |
| 1/2 | 8 | AN8 ^① | 2.39 (60.7) | 0.36 (9.1) | 1.02 (25.8) |

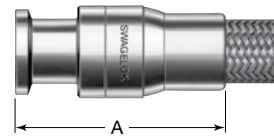
^① ECE R110 approval available.

SAE 37° (JIC) Female Swivel



| JIC Swivel Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|---------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 4 | AS4 | 1.62 (41.1) | 0.16 (4.1) | 0.65 (16.6) |
| 3/8 | 6 | AS6 | 1.76 (44.7) | 0.27 (6.9) | 0.87 (22.1) |
| 1/2 | 8 | AS8 | 2.16 (54.9) | 0.36 (9.1) | 1.09 (27.6) |

Sanitary Kwik-Clamps



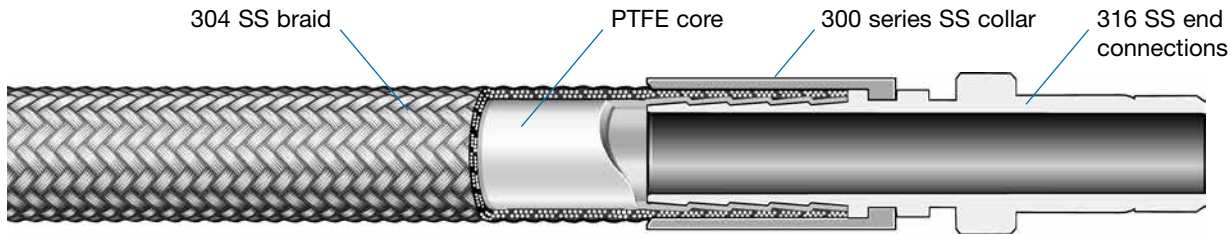
| Kwik-Clamp Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | |
|---------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/2 | 8 | KC8 | 2.15 (54.6) | 0.36 (9.1) | 0.99 (25.2) |
| 3/4 | 12 | KC12 | 2.17 (55.1) | 0.58 (14.7) | 0.99 (25.2) |
| 1 | 16 | KC16 | 2.95 (74.9) | 0.80 (20.3) | 1.98 (50.3) |
| 1 1/2 | 16 | KC24 | 2.39 (60.7) | 0.80 (20.3) | 1.98 (50.3) |

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 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.
- Commonly used where chemical compatibility is desired.
- Custom hose lengths and end connections available.
- Options include hose covers and hose tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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

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

Testing

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).

Cleaning and Packaging

Every Swagelok B series hose component is cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.

B Series PTFE Hose

Ordering Information

Custom Hose Assemblies

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 TA 2 PM 2 - 28 - MB or 71 CM - MB
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 61 to 70

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 4 for more information about splices.

6 Options

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

F = Fire jacket

Splices

SP1 = 1 splice

SP2 = 2 splices

Mat Tags

MA = Gray

MO = Orange

MB = Blue

MP = Purple

MC = Brown

MR = Red

MG = Green

MW = White

MK = Black

MY = Yellow

MN = Pink

Other Tags

T = Lanyard tag

T2 = Two lanyard tags

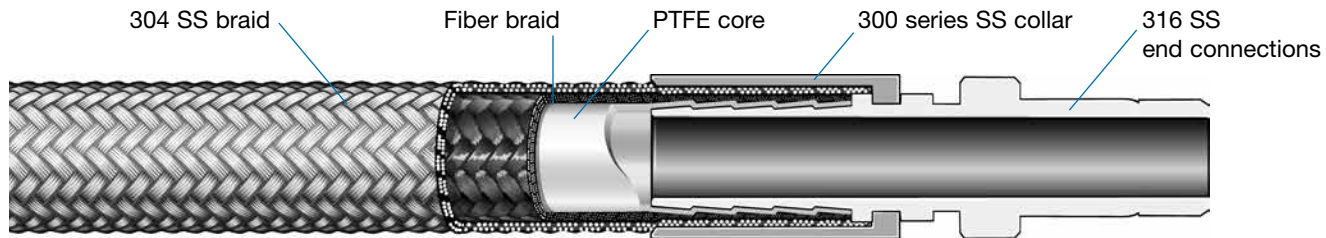
Specify text for tags. see **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

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, USP <88> Class VI, and 3-A.
- 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 and hose tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) | | 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) | 6.38 (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

| Nominal Hose Size, in. | 1/4 | 3/8 | 1/2 | 3/4 | 1 |
|------------------------|------------------------------|------------|------------|-------------|-------------|
| Temperature, °F (°C) | Working Pressure, psig (bar) | | | | |
| -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) |

X Series PTFE Hose

Testing

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).

Cleaning and Packaging

Every Swagelok X series hose component is cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.

Ordering Information

Custom Hose Assemblies

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 TA 8 KC 16 - 28 - MB or **71 CM - 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 PTFE 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 61 to 70.

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 4 for more information about splices.

6 Options

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

- A = Armor guard
- F = Fire jacket
- G6 = Spiral guard, black
- G7 = Spiral guard, blue
- G8 = Spiral guard, yellow

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

Other Tags

- T = Lanyard tag
- T2 = Two lanyard tags

Specify text for tags. see **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

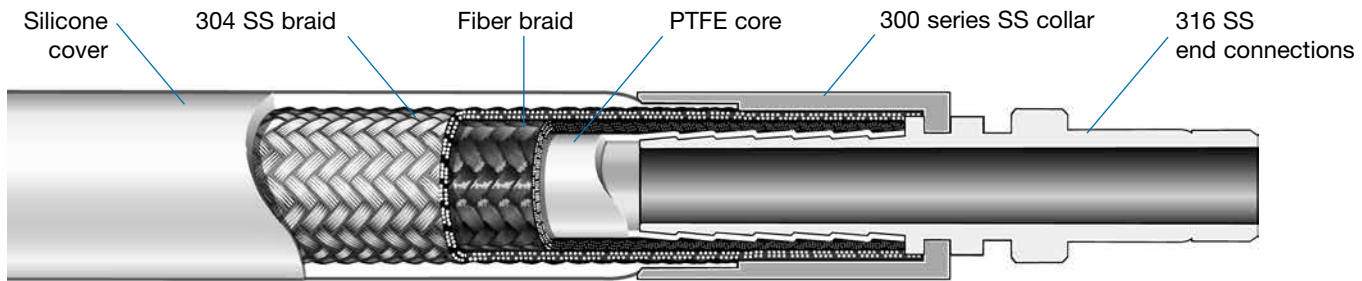
7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 64 for values and further information.

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), and 3-A.
- 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 and hose tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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

| 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) |

S Series PTFE Hose

Testing

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).

Cleaning and Packaging

Every Swagelok S series hose component is cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.

Ordering Information

Custom Hose Assemblies

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 - ST 8 TA 8 KC 16 - 28 - PB or **71 CM - 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 PTFE hose with silicone cover (not available 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 61 to 70.

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 4 for more information about splices.

6 Options

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

- A = Armor guard
- F = Fire jacket
- G6 = Spiral guard, black (not available in 1/8 in. ST hose size)
- G7 = Spiral guard, blue (not available in 1/8 in. ST hose size)
- G8 = Spiral guard, yellow (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

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

Other Tags

- T = Lanyard tag
- T2 = Two lanyard tags

Specify text for tags. see **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

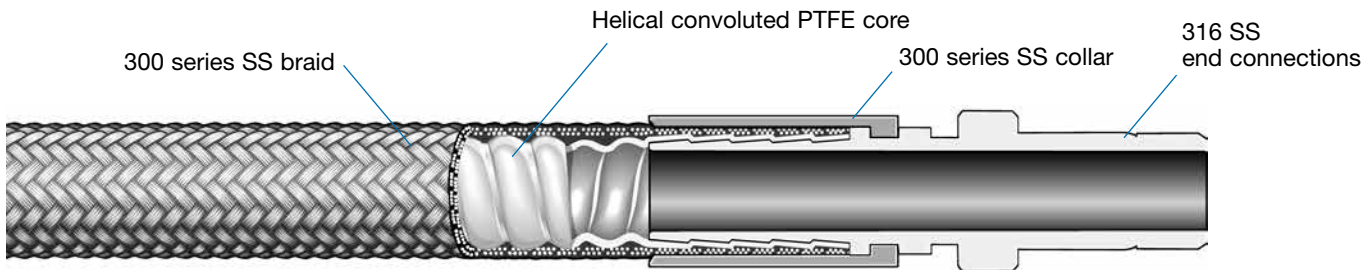
7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 64 for values and further information.

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.
- Optional 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, and 3-A.
- 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 and hose tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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 | | | | | |
| Without Silicone Cover | | | | | | | | | |
| 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) | 2.46 (62.5) | 7.50 (19.0) | 9.75 (24.8) | | — | 525 (36.1) | 2100 (144) | 1.02 (1.5) |
| With Silicone Cover | | | | | | | | | |
| 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

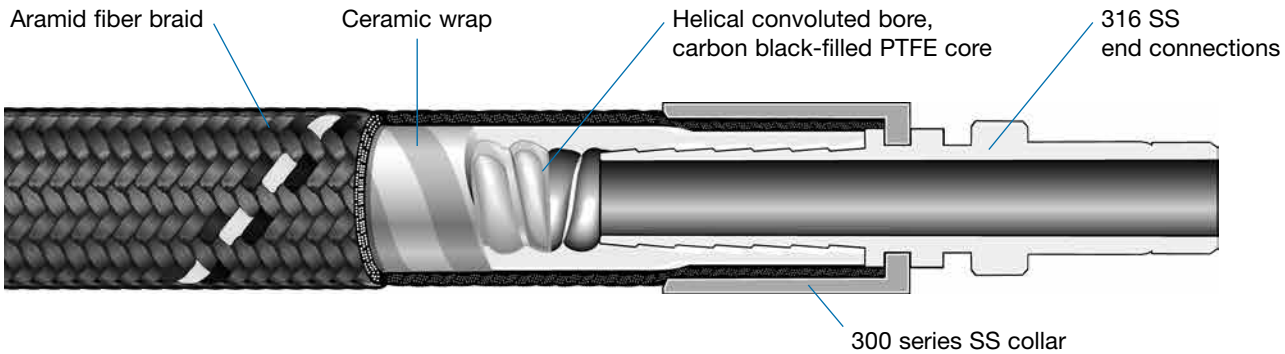
| Hose Style | Without Silicone Cover | | | | | With Silicone Cover | | |
|----------------------|-------------------------------------|------------------|----------------|--------------------|----------------|---------------------|-------------|------------|
| | 1/2 ^① | 3/4 ^① | 1 ^① | 1 1/2 ^① | 2 ^① | 1/2 | 3/4 | 1 |
| | Working Pressure, psig (bar) | | | | | | | |
| Temperature, °F (°C) | | | | | | | | |
| -65 (-53) | 1500 (103) | 1100 (75.7) | 750 (51.6) | — | — | 1500 (103) | 1100 (75.7) | 750 (51.6) |
| -20 (-28) | 1500 (103) | 1100 (75.7) | 750 (51.6) | 675 (46.5) | 525 (36.1) | 1500 (103) | 1100 (75.7) | 750 (51.6) |
| 0 (-17) to 100 (37) | 1500 (103) | 1100 (75.7) | 750 (51.6) | 700 (48.2) | 525 (36.1) | 1500 (103) | 1100 (75.7) | 750 (51.6) |
| 200 (93) | 1500 (103) | 1100 (75.7) | 700 (48.2) | 435 (29.9) | 525 (36.1) | 1500 (103) | 1100 (75.7) | 750 (51.6) |
| 300 (148) | 1500 (103) | 1100 (75.7) | 620 (42.7) | 405 (27.9) | 495 (34.1) | 1500 (103) | 1095 (75.4) | 620 (42.7) |
| 340 (171) | 1500 (103) | 1030 (70.9) | 600 (41.3) | 330 (22.7) | 485 (33.4) | 1500 (103) | 1075 (74.0) | 595 (40.9) |
| 400 (204) | 1500 (103) | 960 (66.1) | 565 (38.9) | — | — | 1500 (103) | 1050 (72.3) | 555 (38.2) |
| 450 (230) | 1500 (103) | 900 (62.0) | 490 (33.7) | — | — | — | — | — |

^① Hose with carbon black-filled PTFE core (CC series) is limited to -20 to 340°F (-28 to 171°C).

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 and USP <88> Class VI.
- Commonly used where flexibility, chemical compatibility, and a nonconductive braid are desired.
- Custom hose lengths and end connections available.
- Options include hose covers and hose tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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.

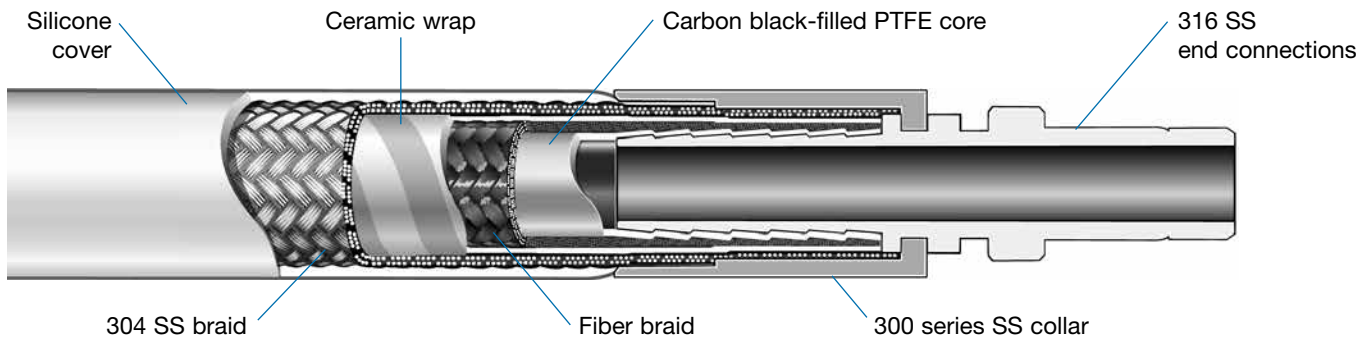
Pressure-Temperature Ratings

| 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 and USP <88> Class VI.
- 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 and hose tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) | 400 (204) | 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

| 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) |

W Series PTFE Hose

Testing

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).

Cleaning and Packaging

Every Swagelok W series hose component is cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.

Ordering Information

Custom Hose Assemblies

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 71 CM - 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 61 to 70.

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 4 for more information about splices.

6 Silicone Cover Color

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

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

7 Options

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

A = Armor guard
 F = Fire jacket
 G6 = Spiral guard, black
 G7 = Spiral guard, blue
 G8 = Spiral guard, yellow

Splices

SP1 = 1 splice
 SP2 = 2 splices

Mat Tags

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

Perma Tags

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

Other Tags

T = Lanyard tag
 T2 = Two lanyard tags

Specify text for tags. see **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

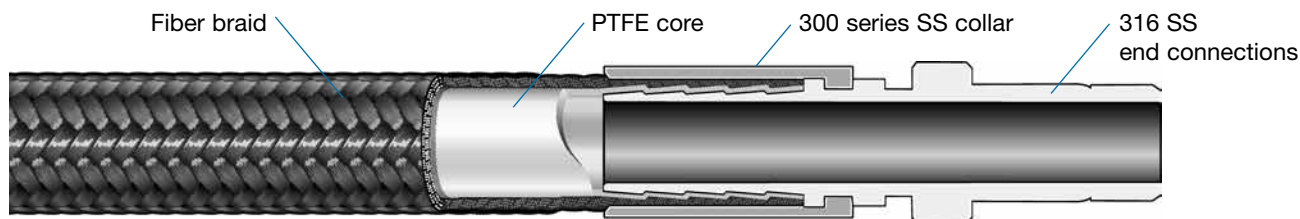
8 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 64 for values and further information.

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 and USP <88> Class VI.
- 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 and hose tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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

| 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) |

F Series PTFE Hose

Testing

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).

Cleaning and Packaging

Every Swagelok F series hose component is cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.

Ordering Information

Custom Hose Assemblies

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 TA 8 KC 1 6 - 2 8 - MB or **7 1 CM - 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 61 to 70.

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 in. hose.

Longer assemblies may be spliced; specify splices under **Options**. See page 4 for more information about splices.

6 Options

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

A = Armor guard
 F = Fire jacket
 G6 = Spiral guard, black
 G7 = Spiral guard, blue
 G8 = Spiral guard, yellow

Splices

SP1 = 1 splice
 SP2 = 2 splices

Mat Tags

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

Other Tags

T = Lanyard tag
 T2 = Two lanyard tags

Specify text for tags. see **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

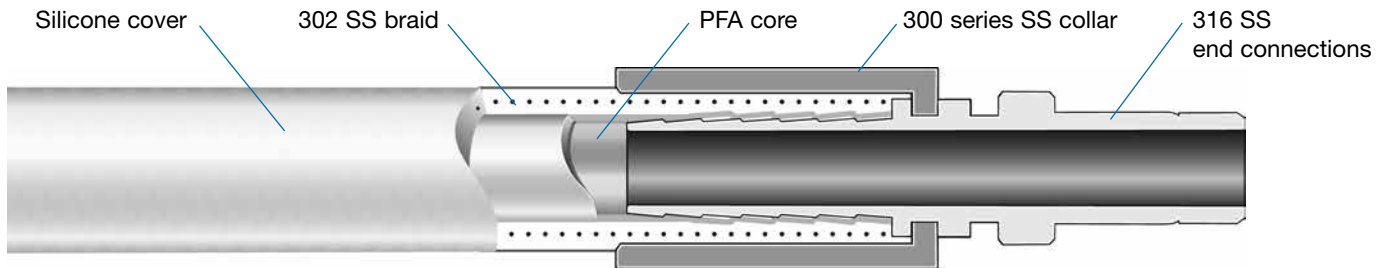
7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 64 for values and further information.

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 (M).
- 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), and 3-A.
- 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 and hose tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) | 0.80 (20.3) | 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) | 1.12 (28.6) | 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) | 1.46 (37.0) | 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) | 2.01 (51.1) | 7.00 (17.8) | 9.10 (23.1) | | 250 (121) | 200 (13.7) | 800 (55.1) | 0.88 (1.3) |
| 2 (50.8) | 2.00 (50.8) | 2.51 (63.8) | 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

| 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) |

U Series PFA Hose

Testing

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).

Cleaning and Packaging

Every Swagelok U series hose component is cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62.

Ordering Information

Custom Hose Assemblies

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 TA8 KC16 - 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 61 to 70.

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 4 for more information about splices.

6 Options

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

A = Armor guard
 F = Fire jacket
 G6 = Spiral guard, black
 G7 = Spiral guard, blue
 G8 = Spiral guard, yellow

Splices

SP1 = 1 splice
 SP2 = 2 splices

Mat Tags

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

Perma Tags

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

Other Tags

T = Lanyard tag
 T2 = Two lanyard tags

Specify text for tags. See **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

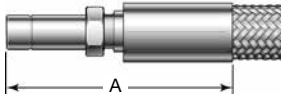
7 Two Elbow Orientation

Only include a value in the assembly number when both end connections are elbows. See page 64 for values and further information.

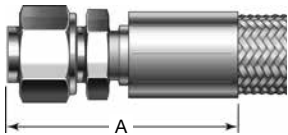
End Connections for B, X, S, C, N, W, F and U Series Hose

End Connections

Swagelok Tube Adapters



1 in. / 25 mm and Under

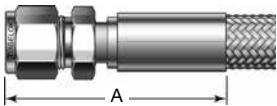


Over 1 in. / 25 mm

| Tube Adapter Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | | Pressure Rating psig (bar) |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|-------------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| Dimensions, in. (mm) | | | | | | |
| 1/8 | 2 | TA2 | 1.86 (47.2) | 0.070 (1.7) | 0.55 (14.0) | Determined by hose |
| 1/4 | 4 | TA4 | 1.96 (49.8) | 0.16 (4.0) | 0.59 (15.0) | |
| 3/8 | 6 | TA6 | 2.42 (61.5) | 0.26 (6.6) | 0.82 (20.8) | |
| 1/2 | 8 | TA8 | 2.91 (73.9) | 0.34 (8.6) | 1.04 (26.4) | |
| 3/4 | 12 | TA12 | 3.53 (89.7) | 0.54 (13.7) | 1.35 (34.3) | |
| 1 | 16 | TA16 | 3.78 (96.0) | 0.78 (19.8) | 1.75 (44.5) | |
| 1 1/2 ^① | 24 | TA24 | 5.22 (133) | 1.24 (31.4) | 2.60 (66.0) | |
| 2 ^① | 32 | TA32 | 6.82 (173) | 1.68 (42.6) | 3.46 (87.9) | |
| Dimensions, mm (in.) | | | | | | |
| 3 | 2 | TM3 | 47.8 (1.88) | 1.7 (0.070) | 14.0 (0.55) | Determined by hose |
| 6 | 4 | TM6 | 50.3 (1.98) | 4.0 (0.16) | 15.0 (0.59) | |
| 10 | 6 | TM10 | 62.0 (2.44) | 6.6 (0.26) | 20.8 (0.82) | |
| 12 | 8 | TM12 | 74.4 (2.93) | 8.6 (0.34) | 23.1 (0.91) | |
| 18 | 12 | TM18 | 90.2 (3.55) | 13.7 (0.54) | 34.3 (1.35) | |
| 25 | 16 | TM25 | 96.5 (3.80) | 19.8 (0.78) | 44.5 (1.75) | |
| 38 ^① | 24 | TM38 | 133 (5.24) | 31.4 (1.24) | 69.3 (2.73) | |
| 50 ^① | 32 | TM50 | 173 (6.81) | 42.6 (1.68) | 87.9 (3.46) | |

① Furnished with nut and preswaged ferrules.

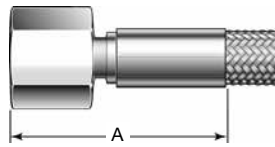
Swagelok Tube Fittings



| Tube Fitting Size | Nominal Hose Size Designator | End Connection Designator | Dimensions | | | Pressure Rating psig (bar) |
|-----------------------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|-------------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| Dimensions, in. (mm) | | | | | | |
| 1/8 | 2 | SL2 | 1.88 (47.8) | 0.070 (1.7) | 0.55 (14.0) | Determined by hose |
| 1/4 | 4 | SL4 | 2.02 (51.3) | 0.16 (4.0) | 0.59 (15.0) | |
| 3/8 | 6 | SL6 | 2.48 (63.0) | 0.26 (6.6) | 0.82 (20.8) | |
| 1/2 | 8 | SL8 | 2.81 (71.4) | 0.34 (8.6) | 1.04 (26.4) | |
| 3/4 | 12 | SL12 | 3.44 (87.4) | 0.54 (13.7) | 1.35 (34.3) | |
| 1 | 16 | SL16 | 3.61 (91.7) | 0.78 (19.8) | 1.75 (44.5) | |
| 1 1/2 | 24 | SL24 | 5.12 (130) | 1.24 (31.4) | 2.60 (66.0) | |
| 2 | 32 | SL32 | 6.72 (171) | 1.68 (42.6) | 3.46 (87.9) | |
| Dimensions, mm (in.) | | | | | | |
| 3 | 2 | SM3 | 48.5 (1.91) | 1.7 (0.070) | 14.0 (0.55) | Determined by hose |
| 6 | 4 | SM6 | 51.3 (2.02) | 4.0 (0.16) | 16.3 (0.64) | |
| 10 | 6 | SM10 | 64.5 (2.54) | 6.6 (0.26) | 20.8 (0.82) | |
| 12 | 8 | SM12 | 71.9 (2.83) | 8.6 (0.34) | 26.4 (1.04) | |
| 18 | 12 | SM18 | 78.0 (3.07) | 13.7 (0.54) | 34.3 (1.35) | |
| 25 | 16 | SM25 | 91.7 (3.61) | 19.8 (0.78) | 44.5 (1.75) | |
| 38 | 24 | SM38 | 133 (5.24) | 31.4 (1.24) | 69.3 (2.73) | |
| 50 | 32 | SM50 | 169 (6.65) | 42.6 (1.68) | 87.9 (3.46) | |

End Connections for B, X, S, C, N, W, F and U Series Hose

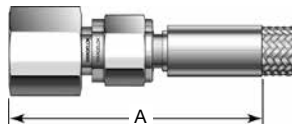
Female Pipe Threads, NPT



| NPT Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|---------------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/8 | 2 | PF2 | 1.76 (44.7) | 0.070 (1.7) | 0.65 (16.5) | Determined by hose ^① |
| 1/4 | 4 | PF4 | 1.85 (47.0) | 0.16 (4.0) | 0.87 (22.1) | |
| 3/8 | 6 | PF6 | 2.31 (58.7) | 0.26 (6.6) | 1.01 (25.7) | |
| 1/2 | 8 | PF8 | 2.66 (67.6) | 0.34 (8.6) | 1.30 (33.0) | |
| 3/4 | 12 | PF12 | 3.32 (84.3) | 0.54 (13.7) | 1.52 (38.6) | |
| 1 | 16 | PF16 | 3.44 (87.4) | 0.78 (19.8) | 1.88 (47.8) | |
| 1 1/2 | 24 | PF24 | 4.19 (106) | 1.24 (31.4) | 2.75 (69.9) | |
| 2 | 32 | PF32 | 4.88 (124) | 1.68 (42.6) | 3.18 (80.8) | |

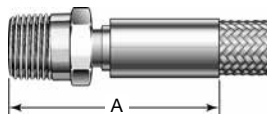
① Brass PF4 pressure rating is 3300 psig (228 bar).

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



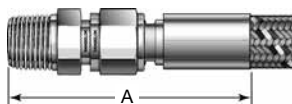
| NPT with JIC Union Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|-----------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/8 | 2 | FU2 | 2.38 (60.5) | 0.070 (1.7) | 0.65 (16.5) | Determined by hose |
| 1/4 | 4 | FU4 | 2.61 (66.3) | 0.16 (4.0) | 0.87 (22.1) | |
| 3/8 | 6 | FU6 | 3.07 (78.0) | 0.26 (6.6) | 1.01 (25.7) | |
| 1/2 | 8 | FU8 | 3.59 (91.2) | 0.34 (8.6) | 1.23 (31.2) | |
| 3/4 | 12 | FU12 | 4.47 (114) | 0.54 (13.7) | 1.52 (38.6) | |
| 1 | 16 | FU16 | 4.77 (121) | 0.78 (19.8) | 2.02 (51.3) | |
| 1 1/2 | 24 | FU24 | 6.12 (155) | 1.24 (31.4) | 2.75 (69.9) | |
| 2 | 32 | FU32 | 7.05 (179) | 1.68 (42.6) | 3.46 (87.9) | |

Male Pipe Threads, NPT



| NPT Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/8 | 2 | PM2 | 1.70 (43.2) | 0.077 (1.9) | 0.55 (14.0) | Determined by hose |
| 1/4 | 4 | PM4 | 1.91 (48.5) | 0.19 (4.8) | 0.65 (16.5) | |
| 3/8 | 6 | PM6 | 2.31 (58.7) | 0.28 (7.1) | 0.82 (20.8) | |
| 1/2 | 8 | PM8 | 2.72 (69.1) | 0.37 (9.3) | 1.04 (26.4) | |
| 3/4 | 12 | PM12 | 3.26 (82.8) | 0.63 (16.0) | 1.35 (34.3) | |
| 1 | 16 | PM16 | 3.45 (87.6) | 0.87 (22.0) | 1.75 (44.5) | |
| 1 1/2 | 24 | PM24 | 4.24 (108) | 1.36 (34.5) | 2.31 (58.7) | |
| 2 | 32 | PM32 | 5.12 (130) | 1.84 (46.7) | 2.89 (73.4) | |

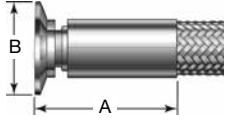
Male Pipe Threads, NPT, with JIC (AN) 37° Union



| NPT with JIC Union Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|-----------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/8 | 2 | MU2 | 2.37 (60.2) | 0.070 (1.7) | 0.55 (14.0) | Determined by hose |
| 1/4 | 4 | MU4 | 2.70 (68.6) | 0.16 (4.0) | 0.65 (16.5) | |
| 3/8 | 6 | MU6 | 3.19 (81.0) | 0.26 (6.6) | 0.82 (20.8) | |
| 1/2 | 8 | MU8 | 3.71 (94.2) | 0.34 (8.6) | 1.04 (26.4) | |
| 3/4 | 12 | MU12 | 4.52 (115) | 0.54 (13.7) | 1.45 (36.8) | |
| 1 | 16 | MU16 | 4.75 (121) | 0.78 (19.8) | 1.75 (44.5) | |
| 1 1/2 | 24 | MU24 | 5.88 (149) | 1.24 (31.4) | 2.60 (66.0) | |
| 2 | 32 | MU32 | 7.08 (180) | 1.68 (42.6) | 3.32 (84.3) | |

End Connections for B, X, S, C, N, W, F and U Series Hose

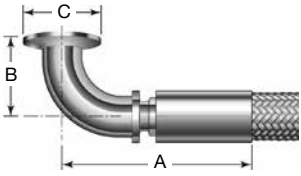
Sanitary Kwik-Clamps^①



① 316L SS material with an I.D. of 15 $\mu\text{in.}$ (0.38 μm) R_a max surface finish applies prior to crimp.

| Kwik-Clamp Size in. | Nominal Hose Size Designator | End Connection Designator | | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|---------------------|------------------------------|---------------------------|------------------|----------------------|-------------------------|----------------------------|----------------------------|
| | | Standard Surface | Electro-polished | A Max | Minimum Inside Diameter | B, Flange Outside Diameter | |
| 1/2 | 4 | KC8 | KE8 | 1.60 (40.6) | 0.16 (4.0) | 0.98 (25.0) | 1500 (103) |
| | 6 | KC8 | KE8 | 1.97 (50.0) | 0.26 (6.6) | | |
| | 8 | KC8 | KE8 | 2.32 (58.9) | 0.34 (8.6) | | |
| 3/4 | 6 | KC12 | KE12 | 1.97 (50.0) | 0.26 (6.6) | 0.98 (25.0) | 1500 (103) |
| | 8 | KC12 | KE12 | 2.20 (55.9) | 0.34 (8.6) | | |
| | 12 | KC12 | KE12 | 2.48 (63.0) | 0.54 (13.7) | | |
| 1 | 8 | KC16 | KE16 | 2.16 (54.9) | 0.34 (8.6) | 1.98 (50.3) | 500 (34.4) |
| | 12 | KC16 | KE16 | 2.70 (68.6) | 0.54 (13.7) | | |
| | 16 | KC16 | KE16 | 2.76 (70.1) | 0.78 (19.8) | | |
| 1 1/2 | 8 | KC24 | KE24 | 2.17 (55.1) | 0.34 (8.6) | 1.98 (50.3) | 500 (34.4) |
| | 12 | KC24 | KE24 | 2.70 (68.6) | 0.54 (13.7) | | |
| | 16 | KC24 | KE24 | 2.60 (66.0) | 0.78 (19.8) | | |
| | 24 | KC24 | KE24 | 3.31 (84.1) | 1.24 (31.4) | | |
| 2 | 16 | KC32 | KE32 | 2.60 (66.0) | 0.78 (19.8) | 2.52 (64.0) | 450 (31.0) |
| | 24 | KC32 | KE32 | 3.21 (81.5) | 1.24 (31.4) | | |
| | 32 | KC32 | KE32 | 3.98 (101) | 1.68 (42.6) | | |
| 2 1/2 | 24 | KC40 | KE40 | 3.32 (84.3) | 1.24 (31.4) | 3.05 (77.5) | 400 (27.5) |
| | 32 | KC40 | KE40 | 3.97 (101) | 1.68 (42.6) | | |

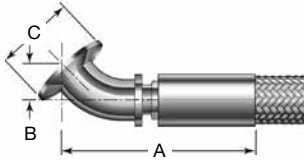
Sanitary Kwik-Clamp 90° Elbows



| Kwik-Clamp Size in. | Nominal Hose Size Designator | End Connection Designator | | Dimensions, in. (mm) | | | | Pressure Rating psig (bar) |
|---------------------|------------------------------|---------------------------|------------------|----------------------|-------------|-------------------------|----------------------------|----------------------------|
| | | Standard Surface | Electro-polished | A Max | B | Minimum Inside Diameter | C, Flange Outside Diameter | |
| 1/2 | 8 | KR8 | RE8 | 2.92 (74.2) | 1.27 (32.3) | 0.34 (8.6) | 0.98 (25.0) | 1500 (103) |
| 3/4 | 12 | KR12 | RE12 | 3.45 (87.6) | 1.63 (41.4) | 0.54 (13.7) | 0.98 (25.0) | 1500 (103) |
| 1 | 16 | KR16 | RE16 | 4.10 (104) | 2.02 (51.3) | 0.78 (19.8) | 1.98 (50.3) | 500 (34.4) |
| 1 1/2 | 24 | KR24 | RE24 | 5.90 (150) | 2.77 (70.4) | 1.24 (31.4) | 1.98 (50.3) | 500 (34.4) |
| 2 | 32 | KR32 | RE32 | 7.56 (192) | 3.51 (89.2) | 1.68 (42.6) | 2.52 (64.0) | 450 (31.0) |

End Connections for B, X, S, C, N, W, F and U Series Hose

Sanitary Kwik-Clamp 45° Elbows

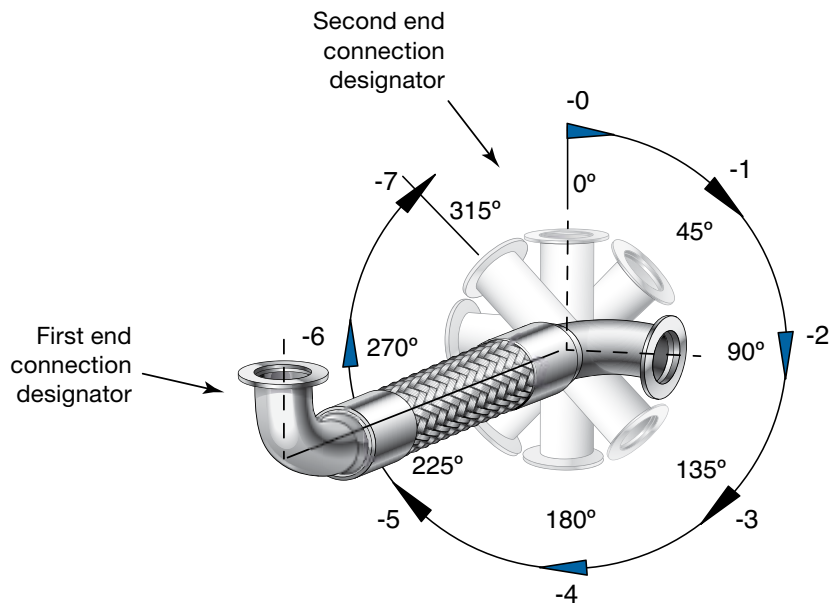


| Kwik-Clamp Size in. | Nominal Hose Size Designator | End Connection Designator | | Dimensions, in. (mm) | | | | Pressure Rating psig (bar) |
|---------------------|------------------------------|---------------------------|------------------|----------------------|-------------|-------------------------|----------------------------|----------------------------|
| | | Standard Surface | Electro-polished | A Max | B | Minimum Inside Diameter | C, Flange Outside Diameter | |
| 1/2 | 8 | KA8 | AE8 | 3.05 (77.5) | 0.70 (17.8) | 0.34 (8.6) | 0.98 (25.0) | 1500 (103) |
| 3/4 | 12 | KA12 | AE12 | 3.85 (97.8) | 0.69 (17.6) | 0.54 (13.7) | 0.98 (25.0) | 1500 (103) |
| 1 | 16 | KA16 | AE16 | 4.02 (102) | 0.81 (20.5) | 0.78 (19.8) | 1.98 (50.3) | 500 (34.4) |
| 1 1/2 | 24 | KA24 | AE24 | 5.60 (142) | 1.03 (26.2) | 1.24 (31.4) | 1.98 (50.3) | 500 (34.4) |
| 2 | 32 | KA32 | AE32 | 7.03 (179) | 1.27 (32.3) | 1.68 (42.6) | 2.52 (64.0) | 450 (31.0) |

Two Elbow Hose Options

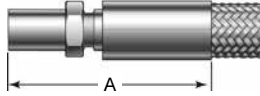
For hoses with two elbow end connections, a suffix is needed to indicate the angle offset between the first end connection and the second end connection. The first end connection is indicated by the first end connection designator in the part number. The second end connection is indicated by the second 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° |



End Connections for B, X, S, C, N, W, F and U Series Hose

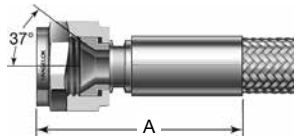
Tube Butt Welds^①



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

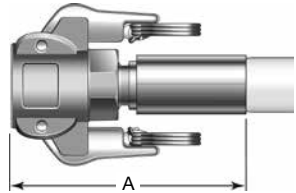
| Tube Butt Weld Size in. | Wall Thickness in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|-------------------------|--------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/2 | 0.049 | 8 | TB8 | 2.70 (68.6) | 0.34 (8.6) | 1.04 (26.4) | Determined by hose |
| 3/4 | 0.049 | 12 | TB12 | 3.26 (82.8) | 0.54 (13.7) | 1.35 (34.3) | |
| 1 | 0.065 | 16 | TB16 | 3.26 (82.8) | 0.78 (19.8) | 1.75 (44.5) | |
| 1 1/2 | 0.095 | 24 | TB24 | 4.65 (118) | 1.24 (31.4) | 2.20 (55.9) | |
| 2 | 0.109 | 32 | TB32 | 5.56 (141) | 1.68 (42.6) | 2.75 (69.9) | |

SAE 37° (JIC) Female Swivel



| SAE 37° (JIC) Female Swivel Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--------------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/8 | 2 | AS2 | 1.43 (36.3) | 0.070 (1.7) | 0.55 (14.0) | Determined by hose |
| 1/4 | 4 | AS4 | 1.57 (39.8) | 0.16 (4.0) | 0.66 (16.8) | |
| 3/8 | 6 | AS6 | 1.97 (50.0) | 0.26 (6.6) | 0.82 (20.8) | |
| 1/2 | 8 | AS8 | 2.28 (57.9) | 0.34 (8.6) | 1.04 (26.4) | |
| 3/4 | 12 | AS12 | 2.92 (74.2) | 0.54 (13.7) | 1.35 (34.3) | |
| 1 | 16 | AS16 | 2.93 (74.4) | 0.78 (19.8) | 1.75 (44.5) | |
| 1 1/2 | 24 | AS24 | 3.72 (94.5) | 1.24 (31.4) | 2.61 (66.3) | |
| 2 | 32 | AS32 | 4.61 (117) | 1.68 (42.6) | 3.33 (84.6) | |

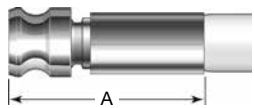
Female Cam and Groove



| Female Cam and Groove Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 3/4 | 12 | GF12 | 4.03 (102) | 0.54 (13.7) | 3.27 (83.1) | 250 (17.2) |
| 1 | 16 | GF16 | 4.53 (115) | 0.78 (19.8) | 3.50 (88.9) | |
| 1 1/2 | 24 | GF24 | 5.39 (137) | 1.24 (31.4) | 4.44 (113) | |
| 2 | 32 | GF32 | 6.30 (160) | 1.68 (42.6) | 4.82 (122) | |

The A dimension may vary if armor guard hose cover is ordered.

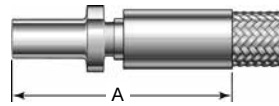
Male Cam and Groove



| Male Cam and Groove Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 3/4 | 12 | GM12 | 2.92 (74.2) | 0.54 (13.7) | 1.27 (32.3) | 250 (17.2) |
| 1 | 16 | GM16 | 3.54 (89.9) | 0.78 (19.8) | 1.45 (36.8) | |
| 1 1/2 | 24 | GM24 | 4.40 (112) | 1.24 (31.4) | 2.11 (53.6) | |
| 2 | 32 | GM32 | 5.15 (131) | 1.68 (42.6) | 2.47 (62.7) | |

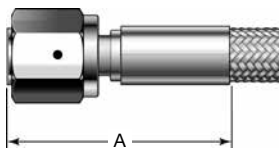
End Connections for B, X, S, C, N, W, F and U Series Hose

Tube Stubs



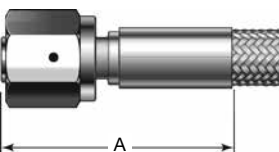
| Tube Stub Size | Wall Thickness | Nominal Hose Size Designator | End Connection Designator | Dimensions | | | Pressure Rating psig (bar) |
|-----------------------------|----------------|------------------------------|---------------------------|-------------|-------------------------|---------------------------|----------------------------|
| | | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| Dimensions, in. (mm) | | | | | | | |
| 1/8 | 0.028 | 2 | TN2 | 1.96 (49.8) | 0.069 (1.8) | 0.31 (7.9) | Determined by hose |
| 1/4 | 0.035 | 4 | TN4 | 2.24 (56.9) | 0.16 (4.1) | 0.46 (11.7) | |
| 3/8 | 0.049 | 6 | TN6 | 2.55 (64.8) | 0.26 (6.6) | 0.63 (16.0) | |
| 1/2 | 0.049 | 8 | TN8 | 3.08 (78.2) | 0.34 (8.6) | 0.86 (21.8) | |
| 3/4 | 0.065 | 12 | TN12 | 3.45 (87.6) | 0.54 (13.7) | 0.99 (25.1) | |
| 1 | 0.083 | 16 | TN16 | 3.92 (99.6) | 0.78 (19.8) | 1.39 (35.3) | |
| 1 1/2 | 0.134 | 24 | TN24 | 6.08 (154) | 1.24 (31.5) | 1.96 (49.8) | |
| 2 | 0.188 | 32 | TN32 | 6.74 (171) | 1.68 (42.7) | 2.43 (61.7) | |
| Dimensions, mm (in.) | | | | | | | |
| 3 | 0.80 | 2 | TE3 | 41.7 (1.64) | 1.3 (0.052) | 7.9 (0.31) | Determined by hose |
| 6 | 1.0 | 4 | TE6 | 57.2 (2.25) | 4.0 (0.16) | 11.7 (0.46) | |
| 8 | 1.0 | 4 | TE8 | 57.9 (2.28) | 4.0 (0.16) | 16.0 (0.63) | |
| 8 | 1.0 | 6 | TE8 | 64.3 (2.53) | 6.0 (0.24) | 16.0 (0.63) | |
| 10 | 1.0 | 6 | TE10 | 65.0 (2.56) | 6.6 (0.26) | 16.0 (0.63) | |
| 12 | 1.0 | 6 | TE12 | 71.6 (2.82) | 6.6 (0.26) | 16.0 (0.63) | |
| 12 | 1.0 | 8 | TE12 | 77.5 (3.05) | 8.7 (0.34) | 21.9 (0.86) | |
| 18 | 1.5 | 12 | TE18 | 87.4 (3.44) | 13.8 (0.54) | 25.2 (0.99) | |
| 25 | 1.5 | 16 | TE25 | 101 (3.98) | 19.7 (0.78) | 35.4 (1.39) | |
| 38 | 3.5 | 24 | TE38 | 133 (5.23) | 30.9 (1.22) | 50.6 (1.99) | |
| 50 | 5.0 | 32 | TE50 | 179 (7.03) | 39.9 (1.57) | 64.8 (2.55) | |

Female VCO O-Ring Face Seal Fittings



| VCO Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 4 | VF4 | 1.67 (42.4) | 0.16 (4.0) | 0.80 (20.3) | Determined by hose |
| 1/2 | 8 | VF8 | 2.18 (55.4) | 0.34 (8.6) | 1.16 (29.5) | |
| 3/4 | 12 | VF12 | 2.79 (70.9) | 0.54 (13.7) | 1.74 (44.2) | |
| 1 | 16 | VF16 | 2.67 (67.8) | 0.78 (19.8) | 2.03 (51.6) | |

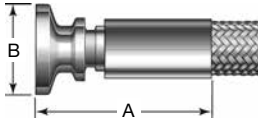
Female VCR Metal Gasket Face Seal Fittings



| VCR Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 4 | RF4 | 1.76 (44.7) | 0.16 (4.0) | 0.87 (22.1) | Determined by hose |
| 1/2 | 8 | RF8 | 2.37 (60.2) | 0.34 (8.6) | 1.23 (31.2) | |
| 3/4 | 12 | RF12 | 3.08 (78.2) | 0.54 (13.7) | 1.74 (44.2) | |
| 1 | 16 | RF16 | 3.20 (81.3) | 0.78 (19.8) | 2.03 (51.6) | |

End Connections for B, X, S, C, N, W, F and U Series Hose

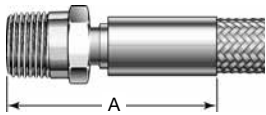
TS Series Sanitary Clamps^①



① 316L SS material with an I.D. of 15 μ m. (0.38 μ m) R_a max surface finish applies prior to crimp.

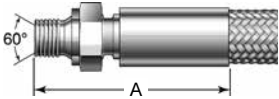
| Sanitary Clamp Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Maximum Outside Dimension | Pressure Rating psig (bar) |
|-------------------------|------------------------------|---------------------------|----------------------|-------------------------|----------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | B, Flange Outside Diameter | | |
| 1/2 | 8 | TS8 | 2.20 (55.9) | 0.34 (8.6) | 0.98 (25.0) | 1.04 (26.4) | 3100 (213) |
| 3/4 | 12 | TS12 | 2.70 (68.6) | 0.54 (13.7) | 0.98 (25.0) | 1.35 (34.3) | 2800 (192) |
| 1 | 16 | TS16 | 2.88 (73.2) | 0.78 (19.8) | 1.98 (50.3) | 1.98 (50.3) | 1200 (82.6) |
| 1 1/2 | 24 | TS24 | 3.35 (85.1) | 1.24 (31.4) | 1.98 (50.3) | 2.20 (55.9) | 1200 (82.6) |
| 2 | 32 | TS32 | 4.01 (102) | 1.68 (42.6) | 2.52 (64.0) | 2.74 (69.6) | 650 (44.7) |

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



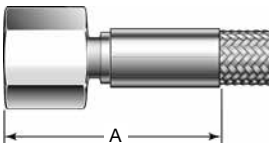
| Male Pipe Thread, ISO/BSP Tapered Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 4 | MT4 | 1.91 (48.5) | 0.16 (4.0) | 0.66 (16.8) | Determined by hose |
| 3/8 | 6 | MT6 | 2.31 (58.7) | 0.26 (6.6) | 0.82 (20.8) | |
| 1/2 | 8 | MT8 | 2.72 (69.1) | 0.34 (8.6) | 1.04 (26.4) | |
| 3/4 | 12 | MT12 | 3.26 (82.8) | 0.54 (13.7) | 1.35 (34.3) | |
| 1 | 16 | MT16 | 3.45 (87.6) | 0.78 (19.8) | 1.75 (44.5) | |
| 1 1/2 | 24 | MT24 | 4.25 (108) | 1.24 (31.4) | 2.31 (58.7) | |
| 2 | 32 | MT32 | 5.12 (130) | 1.68 (42.6) | 2.89 (73.4) | |

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 | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 4 | MS4 | 1.99 (50.5) | 0.16 (4.0) | 0.87 (22.1) | Determined by hose |
| 3/8 | 6 | MS6 | 2.38 (60.5) | 0.26 (6.6) | 1.01 (25.7) | |
| 1/2 | 8 | MS8 | 2.65 (67.3) | 0.34 (8.6) | 1.23 (31.2) | |
| 3/4 | 12 | MS12 | 3.37 (85.6) | 0.54 (13.7) | 1.52 (38.6) | |
| 1 | 16 | MS16 | 3.38 (85.9) | 0.78 (19.8) | 1.88 (47.8) | |
| 1 1/2 | 24 | MS24 | 4.21 (107) | 1.24 (31.4) | 2.53 (64.3) | |
| 2 | 32 | MS32 | 5.16 (131) | 1.68 (42.6) | 3.18 (80.8) | |

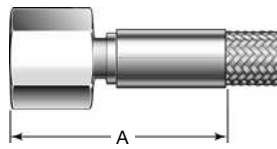
Female Pipe Threads, ISO/BSP Tapered (ISO 7)



| Female Pipe Thread, ISO/BSP Tapered Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 4 | FT4 | 1.85 (47.0) | 0.16 (4.0) | 0.87 (22.1) | Determined by hose |
| 3/8 | 6 | FT6 | 2.32 (58.9) | 0.26 (6.6) | 1.01 (25.7) | |
| 1/2 | 8 | FT8 | 2.67 (67.8) | 0.34 (8.6) | 1.23 (31.2) | |
| 3/4 | 12 | FT12 | 3.37 (85.6) | 0.54 (13.7) | 1.52 (38.6) | |
| 1 | 16 | FT16 | 3.45 (87.6) | 0.78 (19.8) | 1.88 (47.8) | |
| 1 1/2 | 24 | FT24 | 4.15 (105) | 1.24 (31.4) | 2.75 (69.9) | |
| 2 | 32 | FT32 | 4.99 (127) | 1.68 (42.6) | 3.32 (84.3) | |

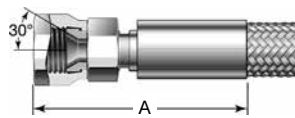
End Connections for B, X, S, C, N, W, F and U Series Hose

Female ISO/BSP Parallel Threads (ISO 228)



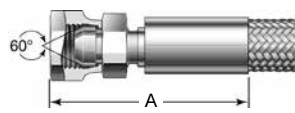
| ISO/BSP Parallel Thread Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|----------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 4 | FS4 | 2.06 (52.3) | 0.16 (4.0) | 0.87 (22.1) | Determined by hose |
| 3/8 | 6 | FS6 | 2.57 (65.3) | 0.26 (6.6) | 1.09 (27.7) | |
| 1/2 | 8 | FS8 | 2.84 (72.1) | 0.34 (8.6) | 1.23 (31.2) | |
| 3/4 | 12 | FS12 | 3.39 (86.1) | 0.54 (13.7) | 1.59 (40.4) | |
| 1 | 16 | FS16 | 3.46 (87.9) | 0.78 (19.8) | 1.88 (47.8) | |
| 1 1/2 | 24 | FS24 | 4.29 (109) | 1.24 (31.4) | 2.60 (66.0) | |
| 2 | 32 | FS32 | 4.95 (126) | 1.68 (42.6) | 3.18 (80.8) | |

Female Swivel ISO/BSP Parallel Threads with 30° Cone



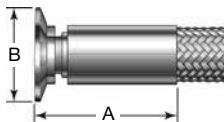
| Swivel ISO/BSP Parallel Thread, 30° Cone Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|---|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 4 | BS4 | 2.19 (55.6) | 0.16 (4.0) | 0.87 (22.1) | Determined by hose |
| 3/8 | 6 | BS6 | 2.72 (69.1) | 0.26 (6.6) | 1.01 (25.7) | |
| 1/2 | 8 | BS8 | 3.10 (78.7) | 0.34 (8.6) | 1.23 (31.2) | |

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 | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|---|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 4 | BM4 | 2.08 (52.8) | 0.16 (4.0) | 0.87 (22.1) | Determined by hose |
| 3/8 | 6 | BM6 | 2.59 (65.8) | 0.26 (6.6) | 1.01 (25.7) | |
| 1/2 | 8 | BM8 | 2.95 (74.9) | 0.34 (8.6) | 1.23 (31.2) | |

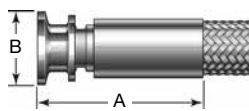
JIS(A)/ISO 2852-Type Sanitary^①



| JIS(A)/ISO 2852-Type Sanitary Size | Nominal Hose Size Designator | End Connection Designator | | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|------------------------------------|------------------------------|---------------------------|------------------|----------------------|-------------------------|----------------------------|----------------------------|
| | | Standard Surface | Electro-polished | A Max | Minimum Inside Diameter | B, Flange Outside Diameter | |
| 8A | 6 | JS8 | JE8 | 2.16 (54.9) | 0.26 (6.6) | 1.34 (34.0) | 500 (34.4) |
| 10A | 8 | JS10 | JE10 | 2.34 (59.4) | 0.34 (8.6) | | |
| 15A | 12 | JS15 | JE15 | 2.88 (73.2) | 0.54 (13.7) | | |

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

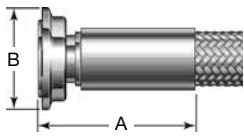
ISO-KF Vacuum Flange



| ISO-KF Vacuum Flange Size mm | Nominal Hose Size Designator | End Connection Designator | Dimensions, mm (in.) | | | | Pressure Rating bar (psig) |
|------------------------------|------------------------------|---------------------------|----------------------|-------------------------|----------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | B, Flange Outside Diameter | Maximum Outside Dimension | |
| 16 | 12 | KF16 | 71.1 (2.80) | 13.7 (0.54) | 30.0 (1.18) | 34.3 (1.35) | 10.0 (145) |
| 25 | 16 | KF25 | 68.6 (2.70) | 19.8 (0.78) | 40.0 (1.57) | 44.5 (1.75) | |
| 40 | 24 | KF40 | 82.6 (3.25) | 31.4 (1.24) | 55.0 (2.16) | 55.9 (2.20) | |
| 50 | 32 | KF50 | 106 (4.16) | 42.6 (1.68) | 75.0 (2.95) | 75.2 (2.96) | |

End Connections for B, X, S, C, N, W, F and U Series Hose

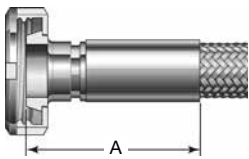
Sanitary DIN 11864-3 Series A, Form A, Clamp Ferrule with Groove^①



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

| Sanitary DIN 11864-3 Series A, Form A, Clamp Ferrule with Groove, Size mm | Nominal Hose Size Designator | End Connection Designator | Dimensions, mm (in.) | | | Pressure Rating bar (psig) |
|---|------------------------------|---------------------------|----------------------|-------------------------|----------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | B, Flange Outside Diameter | |
| 10 | 6 | DB10 | 51.8 (2.04) | 6.6 (0.26) | 35.6 (1.40) | 40.0 (580) |
| 15 | 8 | DB15 | 56.9 (2.24) | 8.6 (0.34) | 34.0 (1.34) | |
| | 12 | DB15 | 70.4 (2.77) | 13.7 (0.54) | 34.0 (1.34) | |
| 20 | 12 | DB20 | 60.5 (2.38) | 13.7 (0.54) | 50.3 (1.98) | |
| 25 | 16 | DB25 | 67.3 (2.65) | 19.8 (0.78) | 50.3 (1.98) | |
| 40 | 24 | DB40 | 83.6 (3.29) | 31.4 (1.24) | 64.0 (2.52) | |
| 50 | 32 | DB50 | 101 (3.97) | 42.6 (1.68) | 77.5 (3.05) | |

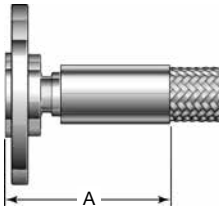
Female DIN 11851 with Nut^①



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

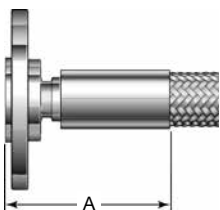
| Female DIN 11851 with Nut Size mm | Nominal Hose Size Designator | End Connection Designator | Dimensions, mm (in.) | | | Pressure Rating bar (psig) |
|-----------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 15 | 8 | DF15 | 57.4 (2.26) | 8.6 (0.34) | 44.2 (1.74) | 40.0 (580) |
| 20 | 12 | DF20 | 73.7 (2.90) | 13.7 (0.54) | 54.4 (2.14) | |
| 25 | 16 | DF25 | 70.6 (2.78) | 19.8 (0.78) | 63.2 (2.49) | |
| 40 | 24 | DF40 | 87.6 (3.45) | 31.4 (1.24) | 78.2 (3.08) | |
| 50 | 32 | DF50 | 106 (4.19) | 42.6 (1.68) | 92.2 (3.63) | 24.8 (360) |

ASME Class 150 Lap Joint Flange



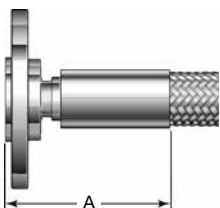
| ASME Class 150 Lap Joint Flange Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|--|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/2 | 8 | GA8 | 2.75 (69.9) | 0.34 (8.6) | 3.56 (90.4) | 275 (18.9) |
| 3/4 | 12 | GA12 | 3.41 (86.6) | 0.54 (13.7) | 3.91 (99.3) | |
| 1 | 16 | GA16 | 3.38 (85.9) | 0.78 (19.8) | 4.28 (109) | |
| 1 1/2 | 24 | GA24 | 4.09 (104) | 1.24 (31.4) | 5.03 (128) | |
| 2 | 32 | GA32 | 5.06 (129) | 1.68 (42.6) | 6.03 (153) | |

JIS 10K Lap Joint Flange



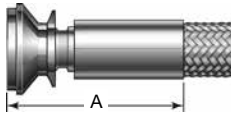
| JIS 10K Lap Joint Flange Size mm | Nominal Hose Size Designator | End Connection Designator | Dimensions, mm (in.) | | | Pressure Rating bar (psig) |
|----------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 15 | 8 | HA15 | 69.9 (2.75) | 8.6 (0.34) | 95.3 (3.75) | 9.7 (142) |
| 20 | 12 | HA20 | 86.6 (3.41) | 13.7 (0.54) | 100 (3.95) | |
| 25 | 16 | HA25 | 85.9 (3.38) | 19.8 (0.78) | 125 (4.93) | |
| 40 | 24 | HA40 | 104 (4.09) | 31.4 (1.24) | 140 (5.52) | |
| 50 | 32 | HA50 | 123 (4.86) | 42.6 (1.68) | 155 (6.11) | |

DIN PN10 Lap Joint Flange



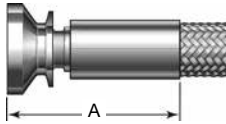
| DIN PN10 Lap Joint Flange Size mm | Nominal Hose Size Designator | End Connection Designator | Dimensions, mm (in.) | | | Pressure Rating bar (psig) |
|-----------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 15 | 8 | FA15 | 69.9 (2.75) | 8.6 (0.34) | 95.3 (3.75) | 10.0 (145) |
| 20 | 12 | FA20 | 86.6 (3.41) | 13.7 (0.54) | 105 (4.14) | |
| 25 | 16 | FA25 | 88.9 (3.50) | 19.8 (0.78) | 115 (4.54) | |
| 40 | 24 | FA40 | 121 (4.76) | 31.4 (1.24) | 150 (5.92) | |
| 50 | 32 | FA50 | 123 (4.86) | 42.6 (1.68) | 165 (6.51) | |

End Connections for B, X, S, C, N, W, F and U Series Hose

Sanitary I-Line Male^①

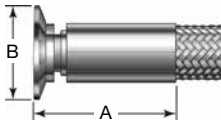
① 316L SS material with an I.D. of 15 μm . (0.38 μm) R_a max surface finish applies prior to crimp.

| Sanitary I-Line Male Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|-------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1 | 16 | MD16 | 2.99 (75.9) | 0.78 (19.8) | 2.01 (51.1) | 1220 (84.0) |
| 1 1/2 | 24 | MD24 | 3.70 (94.0) | 1.24 (31.4) | 2.20 (55.9) | 1220 (84.0) |
| 2 | 32 | MD32 | 4.45 (113) | 1.68 (42.6) | 2.74 (69.6) | 900 (62.0) |

Sanitary I-Line Female^①

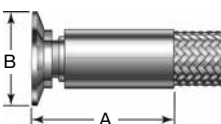
① 316L SS material with an I.D. of 15 μm . (0.38 μm) R_a max surface finish applies prior to crimp.

| Sanitary I-Line Female Size in. | Nominal Hose Size Designator | End Connection Designator | Dimensions, in. (mm) | | | Pressure Rating psig (bar) |
|---------------------------------|------------------------------|---------------------------|----------------------|-------------------------|---------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1 | 16 | FD16 | 2.98 (75.7) | 0.78 (19.8) | 2.01 (51.1) | 1220 (84.0) |
| 1 1/2 | 24 | FD24 | 3.69 (93.7) | 1.24 (31.4) | 2.20 (55.9) | 1220 (84.0) |
| 2 | 32 | FD32 | 4.44 (113) | 1.68 (42.6) | 2.74 (69.6) | 900 (62.0) |

Sanitary (DIN 32676)^①

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

| Sanitary (DIN 32676) Size mm | Nominal Hose Size Designator | End Connection Designator | Dimensions, mm (in.) | | | Pressure Rating bar (psig) |
|------------------------------|------------------------------|---------------------------|----------------------|-------------------------|----------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | B, Flange Outside Diameter | |
| 10 | 4 | DA10 | 46.0 (1.81) | 4.0 (0.16) | 34.0 (1.34) | 15.8 (230) |
| | 6 | DA10 | 56.1 (2.21) | 6.6 (0.26) | 34.0 (1.34) | |
| | 8 | DA10 | 56.6 (2.23) | 8.6 (0.34) | 34.0 (1.34) | |
| 15 | 8 | DA15 | 58.9 (2.32) | 11.1 (0.44) | 34.0 (1.34) | |
| | 12 | DA15 | 72.6 (2.86) | 13.7 (0.54) | 34.0 (1.34) | |
| 20 | 12 | DA20 | 72.6 (2.86) | 13.7 (0.54) | 34.0 (1.34) | |
| 25 | 16 | DA25 | 72.6 (2.86) | 19.8 (0.78) | 50.5 (1.99) | |
| 32 | 16 | DA32 | 72.6 (2.86) | 19.8 (0.78) | 50.5 (1.99) | |
| 40 | 24 | DA40 | 84.6 (3.33) | 31.4 (1.24) | 50.5 (1.99) | |
| 50 | 32 | DA50 | 113 (4.44) | 42.6 (1.68) | 64.0 (2.52) | |

Sanitary (ISO 2852)^①

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

| Sanitary (ISO 2852) Size mm | Nominal Hose Size Designator | End Connection Designator | Dimensions, mm (in.) | | | Pressure Rating bar (psig) |
|-----------------------------|------------------------------|---------------------------|----------------------|-------------------------|----------------------------|----------------------------|
| | | | A Max | Minimum Inside Diameter | B, Flange Outside Diameter | |
| 12 | 8 | ES12 | 58.4 (2.30) | 8.6 (0.34) | 34.0 (1.34) | 103 (1500) |
| 13 | 6 | ES13 | 54.1 (2.13) | 6.6 (0.26) | 34.0 (1.34) | |
| 20 | 12 | ES20 | 72.6 (2.86) | 13.7 (0.54) | 34.0 (1.34) | |
| 26 | 12 | ES26 | 73.9 (2.91) | 13.7 (0.54) | 50.5 (1.99) | |
| 25 | 16 | ES25 | 72.4 (2.85) | 19.8 (0.78) | 50.5 (1.99) | 34.4 (500) |
| 40 | 24 | ES40 | 88.9 (3.50) | 31.4 (1.24) | 64.0 (2.52) | 34.4 (500) |
| 50 | 32 | ES50 | 106 (4.16) | 42.6 (1.68) | 64.0 (2.52) | 31.0 (450) |

PFA Series PFA Tubing

Features

- Chemically resistant, translucent PFA flexible tubing.
- Smooth-bore, perfluoroalkoxy (PFA) material.
- Size range of 1/8 through 1 in. and 6 through 12 mm and working pressures up to 275 psig (18.9 bar).
- PFA tubing material in accordance with ASTM D3307, Type II.
- Flexible tubing commonly used where chemical compatibility is desired.
- Designed for use with both Swagelok PFA tube fittings and metal Swagelok tube fittings.
- Groove cutter required for installation of Swagelok PFA tube fittings. See page 72.
- Tube cutter tool is available. See page 97 for details.



Technical Data

Pressure ratings are for properly grooved Swagelok PFA tubing used with Swagelok PFA tube fittings and for Swagelok PFA tubing used with metal Swagelok tube fittings.

Fractional Tubing

| Tubing Wall, in. | 0.030 | 0.047 | 0.062 | | | | |
|-----------------------|--------------------------------|---------------|---------------|---------------|--------------|---------------|---------------|
| Nominal Tube Size in. | 1/8 | 1/4 | 1/4 | 3/8 | 1/2 | 3/4 | 1 |
| Temperature °F (°C) | Working Pressure psig (bar) | | | | | | |
| 70 (20) | 275 (18.9) | 200 (13.7) | 275 (18.9) | 180 (12.4) | 125 (8.6) | 83 (5.7) | 61 (4.2) |
| 100 (37) | 245 (16.8) | 180 (12.4) | 245 (16.8) | 155 (10.6) | 115 (7.9) | 73 (5.0) | 54 (3.7) |
| 200 (93) | 145 (9.9) | 110 (7.5) | 145 (9.9) | 93 (6.4) | 68 (4.6) | 43 (2.9) | 32 (2.2) |
| 300 (148) | 87 (5.9) | 64 (4.4) | 87 (5.9) | 48 (3.3) | 32 (2.2) | 19 (1.3) | 13 (0.89) |
| 400 (204) | 47 (3.2) | 34 (2.3) | 47 (3.2) | 11 (0.75) | 11 (0.75) | 5.0 (0.34) | 3.0 (0.20) |

Metric Tubing

| Tubing Wall, mm | 1 | | | | 1.5 | | | |
|----------------------|--------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Nominal Tube Size mm | 6 | 8 | 10 | 12 | 6 | 8 | 10 | 12 |
| Temperature °C (°F) | Working Pressure bar (psig) | | | | | | | |
| 20 (70) | 12 (174) | 8.9 (129) | 7.0 (101) | 5.7 (82) | 19 (275) | 14 (203) | 11 (159) | 8.9 (129) |
| 50 (122) | 9.7 (140) | 7.1 (103) | 5.5 (79) | 4.6 (66) | 15 (217) | 11 (159) | 8.7 (126) | 7.1 (103) |
| 100 (212) | 6.1 (88) | 4.4 (63) | 3.4 (49) | 2.8 (40) | 9.5 (137) | 6.9 (100) | 5.3 (76) | 4.4 (63) |
| 150 (302) | 3.8 (55) | 2.5 (36) | 1.8 (26) | 1.4 (20) | 5.9 (85) | 4.0 (58) | 2.9 (42) | 2.2 (31) |
| 200 (392) | 2.2 (31) | 1.3 (18) | 0.8 (11) | 0.6 (8.7) | 3.4 (49) | 2.0 (29) | 1.3 (18) | 0.9 (13) |

Cleaning and Packaging

Swagelok PFA tubing is cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62. Each tube length is bagged individually and boxed.

PFA Series PFA Tubing

Ordering Information

Select an ordering number.



| Nominal Tube Size | Length | Ordering Number | Nominal Wall Thickness |
|-------------------|------------|-------------------|------------------------|
| Dimensions | ft (m) | | in. |
| 1/8 in. | 100 (30.5) | PFA-T2-030-100 | 0.030 |
| | 500 (152) | PFA-T2-030-500 | |
| 1/4 in. | 100 (30.5) | PFA-T4-047-100 | 0.047 |
| | | PFA-T4-062-100 | 0.062 |
| 3/8 in. | 50 (15.2) | PFA-T6-062-50 | 0.062 |
| | 100 (30.5) | PFA-T6-062-100 | |
| 1/2 in. | 50 (15.2) | PFA-T8-062-50 | 0.062 |
| | 100 (30.5) | PFA-T8-062-100 | |
| 3/4 in. | 50 (15.2) | PFA-T12-062-50 | 0.062 |
| 1 in. | 50 (15.2) | PFA-T16-062-50 | 0.062 |
| Dimensions | m (ft) | | mm |
| 6 mm | 30 (98.4) | PFA-T6M-1M-30M | 1.0 |
| | | PFA-T6M-1.5M-30M | 1.5 |
| 8 mm | | PFA-T8M-1M-30M | 1.0 |
| | | PFA-T8M-1.5M-30M | 1.5 |
| 10 mm | | PFA-T10M-1M-30M | 1.0 |
| | | PFA-T10M-1.5M-30M | 1.5 |
| 12 mm | | PFA-T12M-1M-30M | 1.0 |
| | | PFA-T12M-1.5M-30M | 1.5 |

Custom sizes, wall thickness, and lengths are available. Contact your authorized Swagelok representative.

Groove Cutter

⚠ PFA tubing MUST be grooved for use with PFA tube fittings. Use the Swagelok groove cutter tool. It is not necessary to groove tubing for use with metal fittings.

Groove PFA tubing for use with Swagelok PFA tube fittings.



For 1/4, 3/8,
and 1/2 in. tubing



For 1/8 in.
tubing

| Tube Size in. | Ordering Number |
|---------------|-----------------|
| 1/8 | MS-GC-2 |
| 1/4 | MS-GC-4 |
| 3/8 | MS-GC-6 |
| 1/2 | MS-GC-8 |

PFA Tube Fittings



Swagelok PFA tube fittings in sizes from 1/8 to 1/2 in. are available for use with PFA tubing. For more information on Swagelok PFA tube fittings, refer to *PFA Tube Fittings* catalog, MS-01-05.

Ultrahigh-Purity PFA Tubing (PFA4 and PFA9D)



Swagelok PFA tubing is available in ultrahigh-purity (PFA4) and advanced (fluorosurfactant resistant) ultrahigh-purity (PFA9D) grades. Refer to *Ultrahigh-Purity PFA Tubing—PFA4 and PFA9D* catalog, MS-02-196, for additional information.

High-Purity PFA Fine Thread Flare Tube Fittings

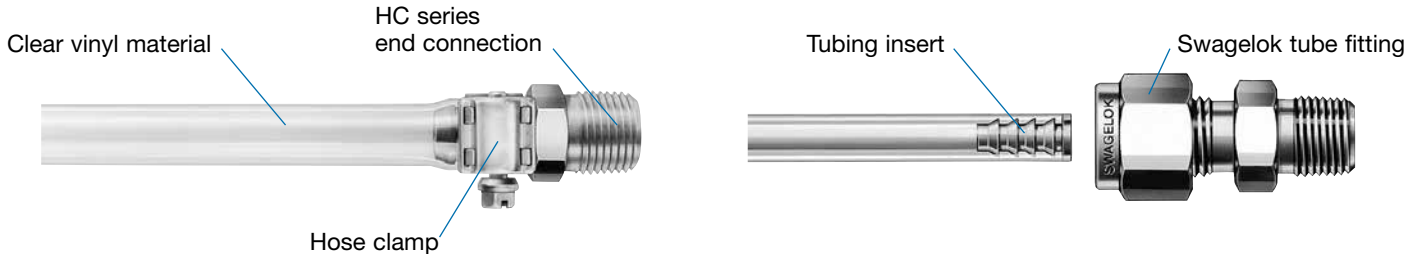


Swagelok high-purity PFA fine thread flare fittings in sizes from 1/4 to 1 in. are available for use with PFA tubing. For more information on Swagelok high-purity PFA fine thread flare fittings, refer to *High-Purity PFA Fine Thread Flare Tube Fittings* catalog, MS-02-195.

LT Series Vinyl Tubing

Features

- General purpose, clear vinyl, flexible tubing.
- Smooth-bore, polyvinyl chloride (PVC) material.
- Size range of 1/8 through 1/2 in. and working pressures from vacuum up to 40 psig (2.7 bar).
- Can be used with Swagelok tube fitting and metal insert.
- Good for a variety of applications where system transparency is desired.
- Bulk tubing and end connections available for field assembly.
- Thick-wall tubing available in 1/4 and 3/8 in. sizes for vacuum-service applications.



Technical Data and Ordering Information

- Pressure ratings are based on tubing used with an HC series end connection secured by a clamp or with a Swagelok tube fitting and metal insert.
- Tubing is sold in 50 ft (15.2 m) rolls.
- Select an ordering number.

| Nominal Inside Diameter in. | Nominal Outside Diameter in. | Temperature Range °F (°C) | Working Pressure at 70°F (20°C) psig (bar) | Bulk Tubing Weight lb/ft (kg/m) | Ordering Number |
|--------------------------------|---------------------------------|------------------------------|---|------------------------------------|-----------------|
| Standard Wall | | | | | |
| 1/8 | 1/4 | -40 to 165 (-40 to 73) | 40 (2.7) | 0.02 (0.03) | LT-2-4 |
| 3/16 | 5/16 | | 30 (2.0) | 0.03 (0.04) | LT-3-5 |
| 1/4 | 3/8 | | 25 (1.7) | 0.04 (0.05) | LT-4-6 |
| 3/8 | 1/2 | | 15 (1.0) | 0.05 (0.07) | LT-6-8 |
| 1/2 | 5/8 | | 10 (0.68) | 0.06 (0.08) | LT-8-10 |
| Thick-Wall Vacuum | | | | | |
| 1/4 | 5/8 | -40 to 165 (-40 to 73) | Vacuum service over entire temperature range | 0.13 (0.20) | LT-4-10V |
| 3/8 | 7/8 | | | 0.27 (0.41) | LT-6-14V |



Pressure-Temperature Ratings

| Nominal Tubing Size in. | Standard Wall | | | | |
|----------------------------|------------------------------|------------|------------|------------|------------|
| | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 |
| Temperature °F (°C) | Working Pressure, psig (bar) | | | | |
| -40 (-40) to 70 (20) | 40 (2.7) | 30 (2.0) | 25 (1.7) | 15 (1.0) | 10 (0.68) |
| 80 (26) | 38 (2.6) | 29 (1.9) | 24 (1.6) | 14 (1.0) | 10 (0.68) |
| 100 (37) | 32 (2.2) | 24 (1.6) | 20 (1.3) | 12 (0.82) | 8.0 (0.55) |
| 120 (48) | 24 (1.6) | 18 (1.2) | 15 (1.0) | 9.0 (0.62) | 6.0 (0.41) |
| 140 (60) | 16 (1.1) | 12 (0.82) | 10 (0.68) | 6.0 (0.41) | 4.0 (0.27) |
| 160 (71) | 8.4 (0.57) | 6.3 (0.43) | 5.3 (0.36) | 3.2 (0.21) | 2.1 (0.14) |
| 165 (73) | 6.4 (0.44) | 4.8 (0.33) | 4.0 (0.27) | 2.4 (0.16) | 1.6 (0.11) |

Cleaning and Packaging

Swagelok vinyl tubing is cleaned in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, MS-06-62. Each roll of tubing is coiled individually and boxed.

HC Series—End Connections for Soft Tubing and Hose

Features

- HC series end connections allow for easy installation of soft plastic or rubber tubing.
- 316 stainless steel or brass material.
- Size range of 1/8 to 1 in.
- Reusable for other assemblies.
- May be used without a hose clamp or sleeve in low-pressure applications.
- Use of a hose clamp or sleeve may be required in higher-pressure applications.

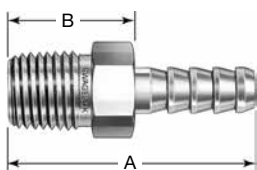
Ordering Information

Add **SS** for 316 stainless steel or **B** for brass to the basic ordering number.

Example: **SS-2-HC-1-2**

For end connection barb dimensions, see page 76. To determine the cut length of bulk hose for field assembly, subtract dimension *B* for each end connection from the desired overall length.

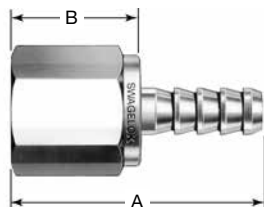
Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)



| NPT and ISO/BSP Tapered Size in. | Nominal Tubing ID in. | Basic Ordering Number | Dimensions, in. (mm) | | | |
|----------------------------------|-----------------------|-----------------------|----------------------|-------------|-------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension |
| NPT | | | | | | |
| 1/8 | 1/8 | -2-HC-1-2 | 1.08 (27.4) | 0.68 (17.3) | 0.13 (3.3) | 0.51 (12.9) |
| | 3/16 | -3-HC-1-2 | 1.27 (32.2) | | 0.13 (3.3) | |
| | 1/4 | -4-HC-1-2 | 1.47 (37.3) | | 0.19 (4.8) | |
| | 5/16 | -5-HC-1-2 | 1.55 (39.4) | | 0.19 (4.8) | |
| 1/4 | 1/8 | -2-HC-1-4 | 1.26 (32.0) | 0.86 (21.8) | 0.08 (2.0) | 0.65 (16.6) |
| | 3/16 | -3-HC-1-4 | 1.45 (36.8) | | 0.13 (3.3) | |
| | 1/4 | -4-HC-1-4 | 1.65 (41.9) | | 0.19 (4.8) | |
| | 5/16 | -5-HC-1-4 | 1.73 (43.9) | | 0.19 (4.8) | |
| | 3/8 | -6-HC-1-4 | 1.73 (43.9) | | 0.30 (7.6) | |
| | 1/2 | -8-HC-1-4 | 1.80 (45.7) | | 0.28 (7.1) | |
| 3/8 | 1/4 | -4-HC-1-6 | 1.66 (42.2) | 0.87 (22.1) | 0.19 (4.8) | 0.80 (20.3) |
| | 5/16 | -5-HC-1-6 | 1.74 (44.2) | 0.87 (22.1) | 0.19 (4.8) | |
| | 3/8 | -6-HC-1-6 | 1.74 (44.2) | 0.87 (22.1) | 0.30 (7.6) | |
| | 1/2 | -8-HC-1-6 | 1.81 (46.0) | 0.87 (22.1) | 0.38 (9.7) | |
| | 5/8 | -10-HC-1-6 | 1.88 (47.8) | 0.90 (22.9) | 0.38 (9.7) | 1.23 (31.2) |
| 1/2 | 1/4 | -4-HC-1-8 | 1.85 (47.0) | 1.06 (26.9) | 0.19 (4.8) | 1.02 (25.8) |
| | 5/16 | -5-HC-1-8 | 1.96 (49.8) | 1.09 (27.7) | 0.19 (4.8) | |
| | 3/8 | -6-HC-1-8 | 1.96 (49.8) | 1.09 (27.7) | 0.30 (7.6) | |
| | 1/2 | -8-HC-1-8 | 2.03 (51.6) | 1.09 (27.7) | 0.38 (9.7) | |
| | 5/8 | -10-HC-1-8 | 2.07 (52.6) | 1.09 (27.7) | 0.47 (11.9) | 1.23 (31.2) |
| | 3/4 | -12-HC-1-8 | 2.14 (54.4) | 1.09 (27.7) | 0.47 (11.9) | |
| 3/4 | 5/8 | -10-HC-1-12 | 2.07 (52.6) | 1.09 (27.7) | 0.50 (12.7) | 1.23 (31.2) |
| | 3/4 | -12-HC-1-12 | 2.14 (54.4) | 1.09 (27.7) | 0.63 (16.0) | |
| | 1 | -16-HC-1-12 | 2.38 (60.5) | 1.19 (30.2) | 0.63 (16.0) | |
| 1 | 3/4 | -12-HC-1-16 | 2.43 (61.7) | 1.38 (35.1) | 0.63 (16.0) | 1.60 (40.5) |
| | 1 | -16-HC-1-16 | 2.57 (65.3) | | 0.88 (22.4) | |
| ISO/BSP Tapered | | | | | | |
| 1/8 | 1/8 | -2-HC-1-2RT | 1.28 (32.5) | 0.88 (22.4) | 0.08 (2.0) | 0.51 (12.9) |
| | 1/4 | -4-HC-1-2RT | 1.47 (37.3) | 0.68 (17.3) | 0.19 (4.8) | |
| 1/4 | 1/4 | -4-HC-1-4RT | 1.65 (41.9) | 0.86 (21.8) | 0.19 (4.8) | 0.65 (16.6) |
| | 3/8 | -6-HC-1-4RT | 1.73 (43.9) | | 0.30 (7.6) | |
| 3/8 | 1/4 | -4-HC-1-6RT | 1.66 (42.2) | 0.87 (22.1) | 0.30 (7.6) | 0.80 (20.3) |
| | 3/8 | -6-HC-1-6RT | 1.74 (44.2) | | 0.30 (7.6) | |
| 1/2 | 3/8 | -6-HC-1-8RT | 1.96 (49.8) | 1.09 (27.7) | 0.30 (7.6) | 1.02 (25.8) |
| | 1/2 | -8-HC-1-8RT | 2.03 (51.6) | | 0.38 (9.7) | |

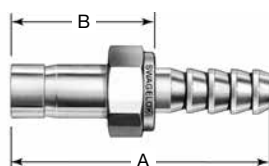
HC Series—End Connections for Soft Tubing and Hose

Female Pipe Threads, NPT



| NPT Size in. | Nominal Tubing ID in. | Basic Ordering Number | Dimensions, in. (mm) | | | |
|--------------|-----------------------|-----------------------|----------------------|-------------|-------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/8 | 1/8 | -2-HC-7-2 | 1.11 (28.2) | 0.71 (18.0) | 0.08 (2.0) | 0.65 (16.6) |
| | 3/16 | -3-HC-7-2 | 1.29 (32.8) | 0.70 (17.8) | 0.13 (3.3) | |
| | 1/4 | -4-HC-7-2 | 1.47 (37.3) | 0.68 (17.3) | 0.19 (4.8) | |
| 1/4 | 1/8 | -2-HC-7-4 | 1.26 (32.0) | 0.86 (21.8) | 0.08 (2.0) | 0.87 (22.1) |
| | 3/16 | -3-HC-7-4 | 1.44 (36.6) | 0.85 (21.6) | 0.13 (3.3) | |
| | 1/4 | -4-HC-7-4 | 1.64 (41.7) | 0.85 (21.6) | 0.19 (4.8) | |
| | 5/16 | -5-HC-7-4 | 1.73 (43.9) | 0.86 (21.8) | 0.19 (4.8) | |
| | 3/8 | -6-HC-7-4 | 1.69 (42.9) | 0.82 (20.8) | 0.30 (7.6) | |
| 3/8 | 1/4 | -4-HC-7-6 | 1.71 (43.4) | 0.92 (23.4) | 0.19 (4.8) | 1.02 (25.8) |
| | 5/16 | -5-HC-7-6 | 1.82 (46.2) | 0.95 (24.1) | 0.19 (4.8) | |
| | 3/8 | -6-HC-7-6 | 1.78 (45.2) | 0.91 (23.1) | 0.30 (7.6) | |
| 1/2 | 3/8 | -6-HC-7-8 | 2.03 (51.6) | 1.16 (29.5) | 0.30 (7.6) | 1.23 (31.2) |
| | 1/2 | -8-HC-7-8 | 2.13 (54.1) | 1.19 (30.2) | 0.38 (9.7) | |

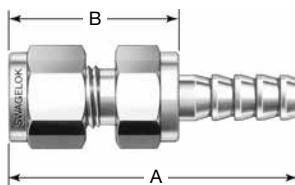
Swagelok Tube Adapters



| Tube Adapter Size | Nominal Tubing ID | Basic Ordering Number | Dimensions | | | |
|----------------------|-------------------|-----------------------|-------------|-------------|-------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | | |
| 1/8 | 1/8 | -2-HC-A-201 | 1.36 (34.5) | 0.96 (24.4) | 0.08 (2.0) | 0.36 (9.2) |
| 1/4 | 1/8 | -2-HC-A-401 | 1.45 (36.8) | 1.05 (26.7) | 0.08 (2.0) | 0.44 (11.0) |
| | 1/4 | -4-HC-A-401 | 1.85 (47.0) | 1.06 (26.9) | 0.16 (4.1) | 0.51 (12.9) |
| | 5/16 | -5-HC-A-401 | 1.93 (49.0) | | | 0.51 (12.9) |
| | 3/8 | -6-HC-A-401 | 1.93 (49.0) | | | 0.65 (16.6) |
| 3/8 | 1/4 | -4-HC-A-601 | 1.91 (48.5) | 1.12 (28.4) | 0.19 (4.8) | 0.51 (12.9) |
| | 3/8 | -6-HC-A-601 | 1.99 (50.5) | | 0.27 (6.9) | 0.65 (16.6) |
| | 1/2 | -8-HC-A-601 | 2.06 (52.3) | | | 0.80 (20.3) |
| 1/2 | 3/8 | -6-HC-A-811 | 2.25 (57.2) | 1.38 (35.1) | 0.30 (7.6) | 0.73 (18.4) |
| | 1/2 | -8-HC-A-811 | 2.32 (58.9) | | 0.33 (8.4) | 0.80 (20.3) |
| 3/4 | 3/4 | -12-HC-A-1211 | 2.49 (63.3) | 1.44 (36.6) | 0.58 (14.7) | 1.23 (31.2) |
| 1 | 1 | -16-HC-A-1611 | 3.05 (77.5) | 1.86 (47.2) | 0.80 (20.3) | 1.60 (40.5) |
| Dimensions, mm (in.) | | | | | | |
| 6 | 1/4 in. | -4-HC-A-6MTA | 47.8 (1.88) | 27.7 (1.09) | 4.1 (0.16) | 12.9 (0.51) |

Swagelok tube adapters are to be used only with Swagelok tube fittings.

Swagelok Tube Fittings

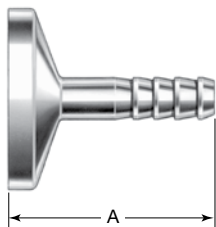


| Tube Fitting Size in. | Nominal Tubing ID in. | Basic Ordering Number | Dimensions, in. (mm) | | | |
|-----------------------|-----------------------|-----------------------|----------------------|-------------|-------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/8 | 1/8 | -2-HC-1-200 | 1.42 (36.1) | 1.02 (25.9) | 0.08 (2.0) | 0.51 (12.9) |
| | 1/4 | -4-HC-1-200 | 1.81 (46.0) | | 0.09 (2.3) | |
| 1/4 | 1/4 | -4-HC-1-400 | 1.92 (48.8) | 1.13 (28.7) | 0.19 (4.8) | 0.65 (16.6) |
| | 3/8 | -6-HC-1-400 | 1.99 (50.6) | 1.12 (28.5) | | |
| 3/8 | 3/8 | -6-HC-1-600 | 2.06 (52.3) | 1.19 (30.2) | 0.28 (7.1) | 0.87 (22.1) |
| 1/2 | 1/2 | -8-HC-1-810 | 2.24 (56.9) | 1.30 (33.0) | 0.38 (9.7) | 1.02 (25.8) |

HC Series—End Connections for Soft Tubing and Hose

Sanitary Kwik-Clamps

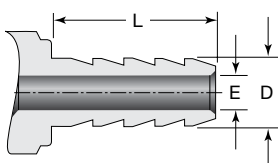
- Smooth internal finish (20 μ in. R_a) and tapered orifice reduce entrapment and facilitate cleaning.



| Kwik-Clamp Size in. | Nominal Tubing ID in. | Ordering Number | Dimensions, in. (mm) | | |
|---------------------|-----------------------|--------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/2 | 3/16 | SS-3-HC-8SC | 1.10 (27.9) | 0.13 (3.3) | 0.99 (25.2) |
| | 1/4 | SS-4-HC-8SC | 1.28 (32.5) | 0.19 (4.8) | |
| | 3/8 | SS-6-HC-8SC | 1.36 (34.5) | 0.30 (7.6) | |
| | 1/2 | SS-8-HC-8SC ^① | 1.44 (36.6) | 0.38 (9.7) | |
| 1 | 3/16 | SS-3-HC-16SC | 1.50 (38.1) | 0.13 (3.3) | 1.98 (50.3) |
| | 1/4 | SS-4-HC-16SC | | 0.19 (4.8) | |
| | 3/8 | SS-6-HC-16SC | | 0.30 (7.6) | |
| | 1/2 | SS-8-HC-16SC | | 0.38 (9.7) | |

① Without 30° inside diameter taper.

End Connection Barb Dimensions



| Nominal Tubing ID, in. | Dimensions, in. (mm) | | |
|------------------------|----------------------|-------------|-------------|
| | D | E | L |
| 1/8 | 0.15 (3.7) | 0.08 (2.0) | 0.40 (9.8) |
| 3/16 | 0.23 (5.6) | 0.12 (2.9) | 0.59 (14.5) |
| 1/4 | 0.30 (7.4) | 0.19 (4.7) | 0.79 (19.4) |
| 5/16 | 0.38 (9.3) | 0.19 (4.7) | 0.87 (21.3) |
| 3/8 | 0.45 (11.0) | 0.30 (7.4) | 0.87 (21.3) |
| 1/2 | 0.60 (14.7) | 0.38 (9.3) | 0.94 (23.0) |
| 5/8 | 0.75 (19.0) | 0.50 (12.7) | 0.98 (24.0) |
| 3/4 | 0.90 (22.0) | 0.63 (15.4) | 1.05 (25.7) |
| 1 | 1.20 (29.4) | 0.88 (21.6) | 1.19 (29.2) |

Sleeves, Clamps, and Inserts

Hose Connector Sleeves



- Used to secure soft plastic or rubber tubing to hose connectors.
- Constructed of aluminum.
- Helically grooved ID and outer hex allow for easy installation with a wrench.
- Reusable for other assemblies.

| Hose OD in. | Hose ID in. | Ordering Number | Dimensions, in. (mm) | | |
|-------------|-------------|-----------------|----------------------|-------------|---------------------------|
| | | | A | E | Maximum Outside Dimension |
| 1/4 | 1/8 | A-2-L-4 | 0.40 (10.2) | 0.26 (6.6) | 0.44 (11.0) |
| 3/8 | 1/4 | A-4-L-6 | 0.79 (20.1) | 0.41 (10.4) | 0.65 (16.6) |
| 7/16 | 1/4 | A-4-L-7 | | 0.46 (11.7) | 0.73 (18.4) |
| 1/2 | 1/4 | A-4-L-8 | 0.87 (22.1) | 0.52 (13.2) | 0.80 (20.3) |
| 7/16 | 5/16 | A-5-L-7 | | 0.48 (12.2) | 0.73 (18.4) |
| 1/2 | 3/8 | A-6-L-8 | 0.94 (23.9) | 0.55 (14.0) | 0.80 (20.3) |
| 9/16 | 3/8 | A-6-L-9 | | 0.61 (15.5) | 0.87 (22.1) |
| 5/8 | 7/16 | A-7-L-10 | 1.07 (27.2) | 0.69 (17.5) | 0.94 (23.9) |
| 11/16 | 1/2 | A-8-L-11 | | 0.76 (19.3) | 1.02 (25.8) |
| 1 | 3/4 | A-12-L-16 | 1.10 (27.9) | 1.45 (36.8) | |

Hose Clamps

- Material:
Band, saddle, housing: 304 SS
Screw: 304 SS / 305 SS
- 4-corner clinched saddle and housing with no spot welds to corrode or break.
- Smooth inside diameter surface provides high sealing pressure and reduces torque on screw.



| Min Hose OD in. | Max Hose OD in. | Ordering Number | Band Marking |
|-----------------|-----------------|-----------------|--------------|
| 7/16 | 25/32 | MS-HCC-6 | 6 |
| 1/2 | 29/32 | MS-HCC-8 | 8 |
| 9/16 | 1 1/16 | MS-HCC-10 | 10 |
| 11/16 | 1 1/4 | MS-HCC-12 | 12 |
| 13/16 | 1 1/2 | MS-HCC-16 | 16 |

Tubing Inserts

- Tubing inserts help secure soft plastic tubing used with standard Swagelok tube fittings.
- Some tubing inserts may be non-barbed depending on size and material.
- For materials, ordering information, and dimensions, refer to *Gaugeable Tube Fittings and Adapter Fittings* catalog, MS-01-140.



NG Series Nylon 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 5 for details.

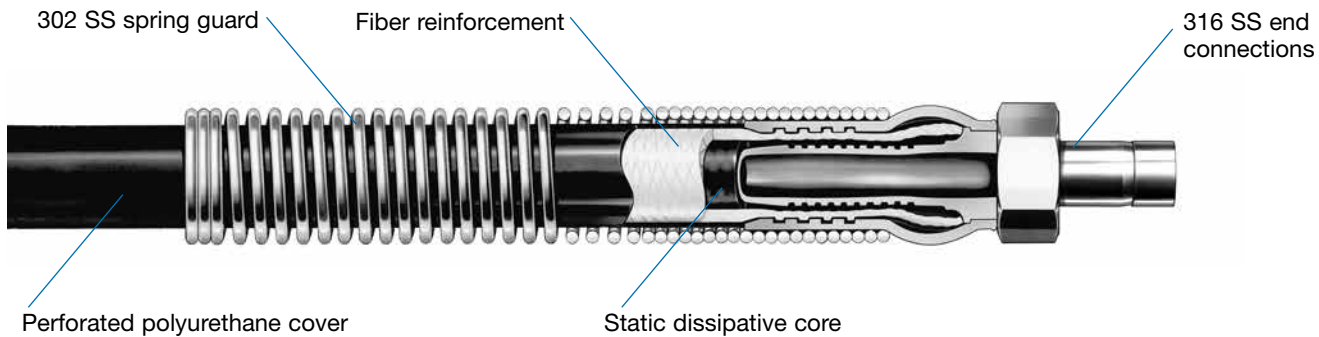
Single hose



Twin hose (high-pressure vent)



Vent hose (low-pressure vent)



Technical Data

| 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) |
| Vent ^① (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 0.77 (19.6) Vent 0.63 (16.0) | 4.00 (10.2) | 0.25 (0.37) | | | |

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

Testing

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 Swagelok NG series hose assembly is factory tested for electrical conductivity.

Cleaning and Packaging

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

⚠ Warning:

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

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.

NG Series Nylon Hose

Ordering Information and Dimensions

Custom Hose Assemblies—Single Hose

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 page 80.

For fitting dimensions, see **End Connection** tables, page 80.

5 Overall Length

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

X = No spring guards^①

NGV = NGV 3.1 and 4.2 certified

^① 5 in. spring guards at each end are standard. The X option should only be used in static bend applications.

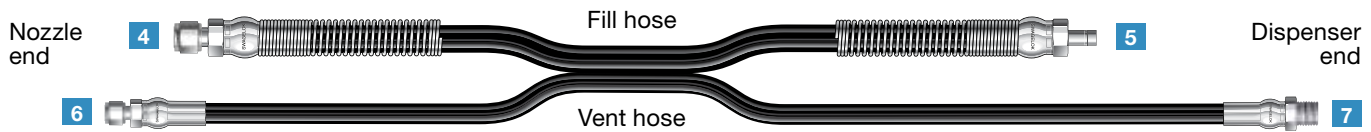
See page 94 for detailed descriptions of options.

NG Series Nylon Hose

Ordering Information and Dimensions

Custom Hose Assemblies—Twin and Vent Hoses

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 Fill 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 page 80.

For fitting dimensions, see **End Connection** tables, page 80.

8 Overall Length (Fill and Vent)

Insert length in inches.

9 Vent Hose Nozzle End Length Adjustment

Positive

X = None

1 = 2 in.

2 = 4 in.

3 = 6 in.

4 = 8 in.

5 = 10 in.

6 = 12 in.

7 = 15 in.

8 = 18 in.

9 = 21 in.

0 = 24 in.

Negative

X = None

A = 2 in.

B = 4 in.

C = 6 in.

D = 8 in.

E = 10 in.

F = 12 in.

G = 15 in.

H = 18 in.

J = 21 in.

K = 24 in.

Illustration shows adjustment 1.

10 Vent Hose Dispenser End Length Adjustment

Positive

X = None

1 = 2 in.

2 = 4 in.

3 = 6 in.

4 = 8 in.

5 = 10 in.

6 = 12 in.

7 = 15 in.

8 = 18 in.

9 = 21 in.

0 = 24 in.

Negative

X = None

A = 2 in.

B = 4 in.

C = 6 in.

D = 8 in.

E = 10 in.

F = 12 in.

G = 15 in.

H = 18 in.

J = 21 in.

K = 24 in.

Illustration shows adjustment 3.

11 Options

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

5 in. spring guards at each end are standard.

X = No spring guards^①

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

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

NG Series Nylon Hose

End Connections

Swagelok Tube Fittings



| Tube Fitting Size | Nominal Hose Size | End Connection Designator | Dimensions | | |
|-----------------------------|-------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 1/4 | S4 ^① | 2.57 (65.3) | 0.15 (3.8) | 0.80 (20.3) |
| 3/8 | 3/8 | S6 ^① | 2.94 (74.7) | 0.24 (6.1) | 0.87 (22.1) |
| 1/2 | 1/2 | S8 ^① | 3.30 (83.8) | 0.36 (9.1) | 1.16 (29.5) |
| Dimensions, mm (in.) | | | | | |
| 6 | 1/4 in. | G6 ^① | 65.5 (2.57) | 3.8 (0.15) | 20.3 (0.80) |
| 8 | | G8 ^① | 65.5 (2.58) | 3.8 (0.15) | 20.3 (0.80) |
| 10 | 3/8 in. | G1 ^① | 74.9 (2.95) | 6.1 (0.24) | 22.1 (0.87) |
| 12 | 1/2 in. | G2 ^① | 83.8 (3.30) | 9.1 (0.36) | 29.5 (1.16) |

① NGV 3.1 and 4.2 certification available.

Swagelok Tube Adapters



| Tube Adapter Size | Nominal Hose Size | End Connection Designator | Dimensions | | |
|-----------------------------|-------------------|---------------------------|-------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| Dimensions, in. (mm) | | | | | |
| 1/4 | 1/4 | T4 ^① | 2.48 (63.0) | 0.15 (3.8) | 0.80 (20.3) |
| 3/8 | 1/4 | T6 ^① | 2.47 (62.7) | 0.15 (3.8) | 0.80 (20.3) |
| | 3/8 | T6 ^① | 2.82 (71.6) | 0.24 (6.1) | 0.87 (22.1) |
| 1/2 | 3/8 | T8 ^① | 3.20 (81.3) | 0.28 (7.1) | 1.09 (27.7) |
| | | T8 ^① | 3.40 (86.4) | 0.36 (9.1) | 1.16 (29.5) |
| 5/8 | 1/2 | T5 ^① | 3.40 (86.4) | 0.39 (9.9) | 1.09 (27.7) |
| 3/4 | | T7 | 3.70 (94.0) | 0.56 (14.2) | 1.31 (33.1) |
| Dimensions, mm (in.) | | | | | |
| 6 | 1/4 in. | E6 ^① | 65.3 (2.57) | 3.8 (0.15) | 20.3 (0.80) |
| 8 | | E8 ^① | 62.7 (2.47) | 3.8 (0.15) | 20.3 (0.80) |
| 10 | 3/8 in. | E1 ^① | 71.6 (2.82) | 6.1 (0.24) | 22.1 (0.87) |
| 12 | 1/2 in. | E2 ^① | 86.4 (3.40) | 9.1 (0.36) | 29.5 (1.16) |

① NGV 3.1 and 4.2 certification available.

NG Series Nylon Hose

End Connections

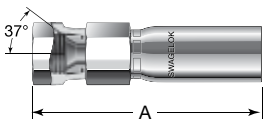
Male Pipe Threads,
NPT and ISO/BSP Tapered
(ISO 7)



| NPT and ISO/BSP Tapered Size in. | Nominal Hose Size in. | End Connection Designator | Dimensions, in. (mm) | | |
|----------------------------------|-----------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| NPT | | | | | |
| 1/4 | 1/4 | P4 ^① | 2.28 (57.9) | 0.15 (3.8) | 0.80 (20.3) |
| | 3/8 | P4 ^① | 2.65 (67.3) | 0.24 (6.1) | 0.87 (22.1) |
| 3/8 | 3/8 | P6 ^① | 2.65 (67.3) | 0.24 (6.1) | 0.87 (22.1) |
| 1/2 | 1/2 | P8 ^① | 3.09 (78.5) | 0.36 (9.1) | 1.16 (29.5) |
| ISO/BSP Tapered | | | | | |
| 1/4 | 1/4 | K4 | 2.28 (57.9) | 0.15 (3.8) | 0.80 (20.3) |
| 3/8 | 3/8 | K6 | 2.65 (67.3) | 0.24 (6.1) | 0.87 (22.1) |
| 1/2 | 1/2 | K8 | 3.09 (78.5) | 0.36 (9.1) | 1.16 (29.5) |

^① NGV 3.1 and 4.2 certification available.

SAE 37° (JIC) Female Swivel



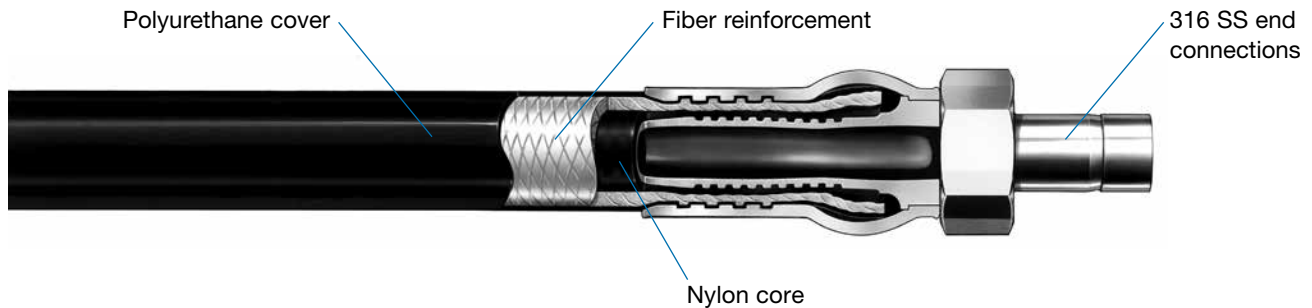
| Swivel Size in. | Nominal Hose Size in. | End Connection Designator | Dimensions, in. (mm) | | |
|-----------------|-----------------------|---------------------------|----------------------|-------------------------|---------------------------|
| | | | A | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | 1/4 | A4 ^① | 2.62 (66.6) | 0.15 (3.8) | 0.80 (20.3) |
| 3/8 | 3/8 | A6 ^① | 3.03 (77.0) | 0.24 (6.1) | 0.87 (22.1) |
| 1/2 | 1/2 | A8 ^① | 3.34 (84.8) | 0.36 (9.1) | 1.09 (27.6) |

^① NGV 3.1 and 4.2 certification available.

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 96 for more information.
- Designed for use in hydraulic applications where outgassing is a concern.
- Options include hose covers and spring guard. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) | 0.19 (0.28) |
| | 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.

Cleaning and Packaging

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

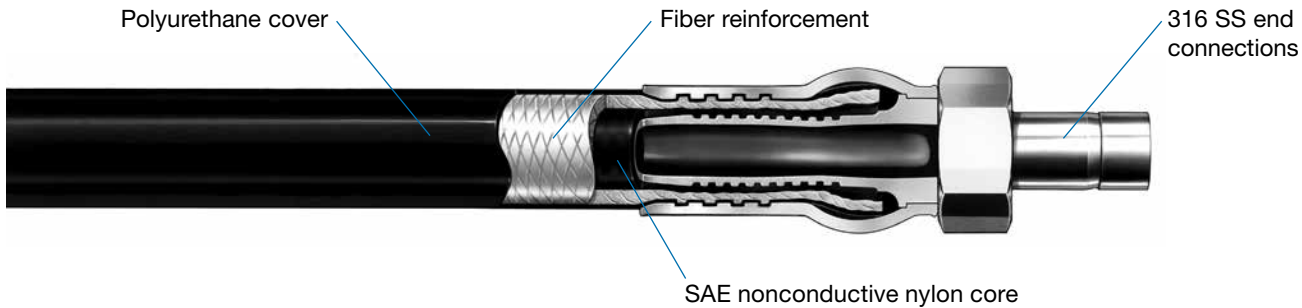
Ordering Information and Dimensions

- For custom hose assemblies, see page for 87 for hose sizes, end connections, lengths, and options.

7N and 8N 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.
- Options include hose covers and spring guards. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) |

Cleaning and Packaging

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

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

⚠ Nonperforated covers may blister in gas service.

Ordering Information and Dimensions

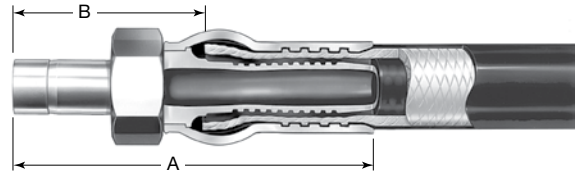
- For custom hose assemblies, see page 87 for hose sizes, end connections, lengths, and options.

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

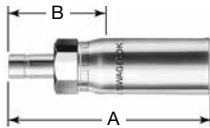
End Connections

Select an ordering number.

To determine the cut length of bulk hose for field assembly, subtract dimension *B* for each end connection from the desired overall length.



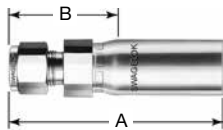
Swagelok Tube Adapters



| Tube Adapter Size | Nominal Hose Size | Ordering Number | Dimensions | | | | End Connection Designator |
|-----------------------------|-------------------|-----------------|-------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| Dimensions, in. (mm) | | | | | | | |
| 1/4 | 1/4 | SS-TP4-TA4 | 2.48 (63.0) | 1.45 (36.8) | 0.15 (3.8) | 0.80 (20.3) | TA4 ^① |
| 3/8 | 1/4 | SS-TP4-TA6 | 2.47 (62.7) | 1.44 (36.6) | 0.15 (3.8) | 0.80 (20.3) | TA6 |
| | 3/8 | SS-TP6-TA6 | 2.82 (71.6) | 1.51 (38.4) | 0.24 (6.1) | 0.87 (22.1) | TA6 ^① |
| 1/2 | 1/2 | SS-TP8-TA8 | 3.40 (86.4) | 1.84 (46.7) | 0.36 (9.1) | 1.09 (27.6) | TA8 ^① |
| 5/8 | 1/2 | SS-TP8-TA10 | 3.40 (86.4) | 1.84 (46.7) | 0.39 (9.9) | 1.09 (27.6) | TA10 ^① |
| 3/4 | 3/4 | SS-TP12-TA12 | 3.70 (94.0) | 1.95 (49.5) | 0.56 (14.2) | 1.31 (33.1) | TA12 |
| 1 | 1 | SS-TP16-TA16 | 4.47 (113) | 2.26 (57.4) | 0.76 (19.3) | 1.60 (40.5) | TA16 |
| Dimensions, mm (in.) | | | | | | | |
| 6 | 1/4 in. | SS-TP4-TM6 | 63.0 (2.48) | 36.8 (1.45) | 3.8 (0.15) | 20.3 (0.80) | TM6 ^① |
| 8 | 1/4 in. | SS-TP4-TM8 | 62.7 (2.47) | 36.6 (1.44) | 3.8 (0.15) | 20.3 (0.80) | TM8 ^① |
| 10 | 3/8 in. | SS-TP6-TM10 | 71.6 (2.82) | 38.4 (1.51) | 6.1 (0.24) | 22.1 (0.87) | TM10 ^① |
| 12 | 1/2 in. | SS-TP8-TM12 | 86.4 (3.40) | 46.7 (1.84) | 9.1 (0.36) | 27.6 (1.09) | TM12 ^① |

^① ECE R110 approval available.

Swagelok Tube Fittings

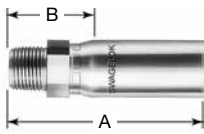


| Tube Fitting Size | Nominal Hose Size | Ordering Number | Dimensions | | | | End Connection Designator |
|-----------------------------|-------------------|-----------------|-------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| Dimensions, in. (mm) | | | | | | | |
| 1/4 | 1/4 | SS-TP4-SL4 | 2.57 (65.3) | 1.54 (39.1) | 0.15 (3.8) | 0.80 (20.3) | SL4 ^① |
| 3/8 | 3/8 | SS-TP6-SL6 | 2.94 (74.7) | 1.63 (41.4) | 0.24 (6.1) | 0.87 (22.1) | SL6 ^① |
| 1/2 | 1/2 | SS-TP8-SL8 | 3.30 (83.8) | 1.74 (44.2) | 0.36 (9.1) | 1.09 (27.6) | SL8 ^① |
| Dimensions, mm (in.) | | | | | | | |
| 6 | 1/4 in. | SS-TP4-SM6 | 65.3 (2.57) | 39.1 (1.54) | 3.8 (0.15) | 20.3 (0.80) | SM6 ^① |
| 8 | 1/4 in. | SS-TP4-SM8 | 65.5 (2.58) | 39.4 (1.55) | 3.8 (0.15) | 20.3 (0.80) | SM8 ^① |
| 10 | 1/4 in. | SS-TP4-SM10 | 71.9 (2.83) | 45.7 (1.80) | 3.8 (0.15) | 22.1 (0.87) | SM10 |
| | 3/8 in. | SS-TP6-SM10 | 74.9 (2.95) | 41.7 (1.64) | 6.1 (0.24) | 22.1 (0.87) | SM10 ^① |
| 12 | 1/2 in. | SS-TP8-SM12 | 83.8 (3.30) | 44.2 (1.74) | 9.1 (0.36) | 27.6 (1.09) | SM12 ^① |

^① ECE R110 approval available.

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

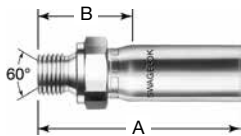
Male Pipe Threads, NPT and ISO/BSP Tapered (ISO 7)



| NPT and ISO/BSP Tapered Size in. | Nominal Hose Size in. | Ordering Number | Dimensions, in. (mm) | | | | End Connection Designator |
|----------------------------------|-----------------------|-----------------|----------------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| NPT | | | | | | | |
| 1/4 | 1/4 | SS-TP4-PM4 | 2.28 (57.9) | 1.25 (31.8) | 0.15 (3.8) | 0.80 (20.3) | PM4 ^① |
| | 3/8 | SS-TP6-PM4 | 2.65 (67.3) | 1.34 (34.0) | 0.24 (6.1) | 0.87 (22.1) | PM4 ^① |
| 3/8 | 3/8 | SS-TP6-PM6 | 2.65 (67.3) | 1.34 (34.0) | 0.24 (6.1) | 0.87 (22.1) | PM6 ^① |
| 1/2 | 1/2 | SS-TP8-PM8 | 3.09 (78.5) | 1.53 (38.9) | 0.36 (9.1) | 1.09 (27.6) | PM8 ^① |
| ISO/BSP Tapered | | | | | | | |
| 1/4 | 1/4 | SS-TP4-MT4 | 2.28 (57.9) | 1.25 (31.8) | 0.15 (3.8) | 0.80 (20.3) | MT4 ^① |
| 3/8 | 3/8 | SS-TP6-MT6 | 2.65 (67.3) | 1.34 (34.0) | 0.24 (6.1) | 0.87 (22.1) | MT6 ^① |
| 1/2 | 1/2 | SS-TP8-MT8 | 3.09 (78.5) | 1.53 (38.9) | 0.36 (9.1) | 1.09 (27.6) | MT8 ^① |

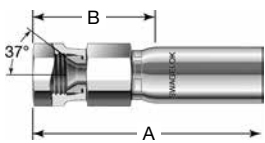
① ECE R110 approval available.

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



| ISO/BSP Parallel, 60° Male Cone Size in. | Nominal Hose Size in. | Ordering Number | Dimensions, in. (mm) | | | | End Connection Designator |
|--|-----------------------|-----------------|----------------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 1/4 | SS-TP4-MS4 | 2.53 (64.3) | 1.50 (38.1) | 0.15 (3.8) | 0.80 (20.3) | MS4 |
| 3/8 | 3/8 | SS-TP6-MS6 | 2.73 (69.3) | 1.42 (36.1) | 0.24 (6.1) | 0.87 (22.1) | MS6 |
| 1/2 | 1/2 | SS-TP8-MS8 | 3.00 (76.2) | 1.44 (36.6) | 0.36 (9.1) | 1.23 (31.2) | MS8 |

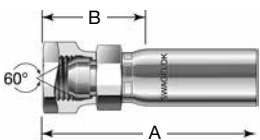
SAE 37° (JIC) Female Swivel



| Swivel Size in. | Nominal Hose Size in. | Ordering Number | Dimensions, in. (mm) | | | | End Connection Designator |
|-----------------|-----------------------|-----------------|----------------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 1/4 | SS-TP4-AS4 | 2.62 (66.6) | 1.59 (40.4) | 0.15 (3.8) | 0.80 (20.3) | AS4 |
| 3/8 | 3/8 | SS-TP6-AS6 | 3.03 (77.0) | 1.71 (43.4) | 0.24 (6.1) | 0.87 (22.1) | AS6 |
| 1/2 | 1/2 | SS-TP8-AS8 | 3.34 (84.8) | 1.77 (45.0) | 0.36 (9.1) | 1.09 (27.6) | AS8 |

Dimensions shown with swivel nut pushed toward hex.

Female Swivel ISO/BSP Parallel Threads with 60° Cone

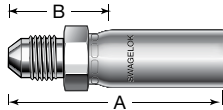


| Swivel ISO/BSP Parallel Thread, 60° Cone Size in. | Nominal Hose Size in. | Ordering Number | Dimensions, in. (mm) | | | | End Connection Designator |
|---|-----------------------|-----------------|----------------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 1/4 | SS-TP4-BM4 | 2.45 (62.2) | 1.42 (36.1) | 0.15 (3.8) | 0.87 (22.1) | BM4 |
| 3/8 | 3/8 | SS-TP6-BM6 | 2.87 (72.9) | 1.56 (39.6) | 0.24 (6.1) | 1.02 (25.8) | BM6 |
| 1/2 | 1/2 | SS-TP8-BM8 | 3.23 (82.0) | 1.67 (42.4) | 0.36 (9.1) | 1.23 (31.2) | BM8 |

Dimensions shown with swivel nut pushed toward hex.

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

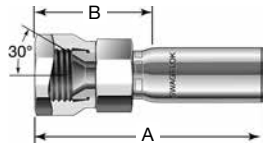
SAE 37° (JIC) Male Flare



| JIC Flare Size in. | Nominal Hose Size in. | Ordering Number | Dimensions, in. (mm) | | | | End Connection Designator |
|--------------------|-----------------------|-----------------|----------------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 1/4 | SS-TP4-AN4 | 2.27 (57.7) | 1.24 (31.5) | 0.15 (3.8) | 0.80 (20.3) | AN4 ^① |
| 3/8 | 3/8 | SS-TP6-AN6 | 2.60 (66.0) | 1.29 (32.8) | 0.28 (7.1) | 0.87 (22.1) | AN6 ^① |
| 1/2 | 1/2 | SS-TP8-AN8 | 3.09 (78.5) | 1.53 (38.9) | 0.39 (9.9) | 1.09 (27.6) | AN8 ^① |

① ECE R110 approval available.

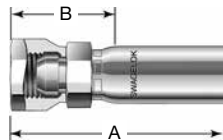
Female Swivel ISO/BSP Parallel Threads with 30° Cone



| Swivel ISO/BSP Parallel Thread, 30° Cone Size in. | Nominal Hose Size in. | Ordering Number | Dimensions, in. (mm) | | | | End Connection Designator |
|---|-----------------------|-----------------|----------------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 1/4 | SS-TP4-BS4 | 2.56 (65.0) | 1.53 (38.9) | 0.15 (3.8) | 0.87 (22.1) | BS4 |
| 3/8 | 3/8 | SS-TP6-BS6 | 3.00 (76.2) | 1.69 (42.9) | 0.24 (6.1) | 1.02 (25.8) | BS6 |
| 1/2 | 1/2 | SS-TP8-BS8 | 3.38 (85.9) | 1.81 (46.0) | 0.36 (9.1) | 1.23 (31.2) | 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. | Ordering Number | Dimensions, in. (mm) | | | | End Connection Designator |
|--|-----------------------|-----------------|----------------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| 14 | 1/4 | SS-TP4-MC14 | 2.38 (60.5) | 1.35 (34.3) | 0.15 (3.8) | 0.87 (22.1) | MC14 |
| 18 | 3/8 | SS-TP6-MC18 | 2.77 (70.4) | 1.46 (37.1) | 0.24 (6.1) | 1.02 (25.8) | MC18 |
| 22 | 1/2 | SS-TP8-MC22 | 3.08 (78.2) | 1.51 (38.4) | 0.36 (9.1) | 0.80 (20.3) | MC22 |

Dimensions shown with swivel nut pushed toward hex.

7R, 8R, 7N, 8N Series Nylon Hose

Ordering Information

Custom Hose Assemblies

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 TA 4 PM 4 - 28 - F or **71 CM - F**
in. 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

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

8N = 8N series SAE 100R8
nonconductive nylon hose
(3/4 in. size *only*)

3 Nominal Hose Size, in.

4 = 1/4 (7R, 8R, 7N series *only*)

6 = 3/8 (7R, 8R, 7N series *only*)

8 = 1/2 (7R, 8R, 7N series *only*)

12 = 3/4 (8R, 8N series *only*)

16 = 1 (8R series *only*)

4 End Connections

See **End Connection Designator**
column in tables on pages 84 to 86.

5 Overall Length

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

6 Options

*For multiple options, add designators
with a dash between each designator.*

CRN = Lanyard tag with CRN

F = Fire jacket

F1 = Thermosleeve

S = 302 SS spring guard, hose-
length

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
8R hoses with select end
connections. See page 96
for additional information.

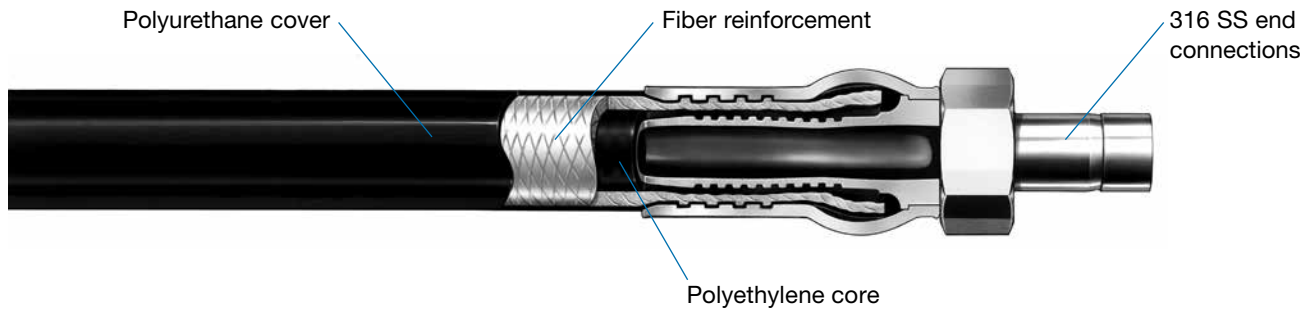
*Specify text for tags. See **Hose Tag
Text** table, page 95.*

*See page 94 for detailed descriptions
of options.*

7P Series—Polyethylene 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.
- Options include hose covers and spring guards. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) |

Cleaning and Packaging

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

Ordering Information and Dimensions

- For custom hose assemblies, see page for 89 for hose sizes, end connections, lengths, and options.

⚠ Caution:
Nonperforated covers may blister in gas service.

7P Series Polyethylene Hose

Ordering Information

Custom Hose Assemblies

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 - 7 P 4 T A 4 P M 4 - 2 8 - F or **7 1 C M - 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 84 to 86.

5 Overall Length

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

6 Options

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

CRN = Lanyard tag with CRN

F = Fire jacket

F1 = Thermosleeve

S = 302 SS spring guard, hose-length

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

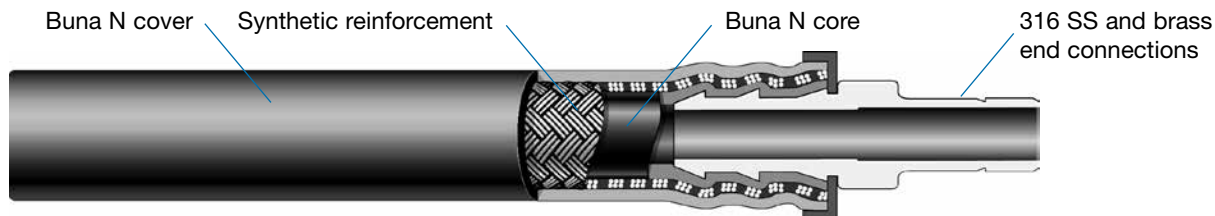
Specify text for tags. See **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

PB Series Rubber 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.
- Buna N 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.
- Options include tags. See page 94 for details.
- For electrical properties, see page 5 for details.



Technical Data

| 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) | 2.50 (6.35) | -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) | 8.00 (20.3) | -20 to 200 (-28 to 93) | 300 (20.6) ^① | 1200 (82.6) | 0.33 (0.49) |

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

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) |

Cleaning and Packaging

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

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

PB Series Rubber Hose

Ordering Information and Dimensions

- For bulk hose, see below; for end connections for field assembly, see below.
- For custom hose assemblies, see page 93 for hose sizes, end connections, lengths, and options.
- For hose cutters for field assembly, see page 97.
- For a push-on tool for field assembly, see page 97.

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**



Reels contain up to three lengths of hose.

| 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 | -BK |
| Gray | -GY |
| Green | -GR |
| Red | -RD |
| Yellow | -YW |

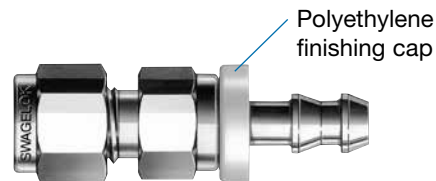
End Connections

Select a basic ordering number and add **SS** for 316 SS or **B** for brass.

Example: **SS-PB4-SL4**

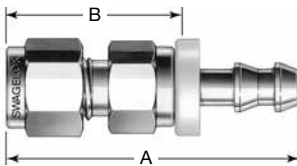
To determine the cut length of bulk hose for field assembly, subtract dimension **B** for each end connection from the desired overall length.

For field assembly instructions, see *PB Series Rubber Hose Assembly and Disassembly*, MS-CRD-0125 and *Push-On Tool User's Manual*, MS-CRD-0190.



1 in. size (PB16) does not have a finishing cap.

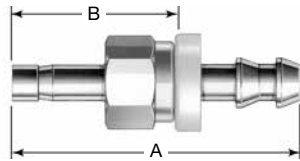
Swagelok Tube Fittings



| Tube Fitting Size in. | Nominal Hose Size in. | Basic Ordering Number | Dimensions, in. (mm) | | | | End Connection Designator |
|--------------------------|--------------------------|-----------------------|----------------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| 1/4 | 1/4 | -PB4-SL4 | 1.97 (50.0) | 1.14 (29.0) | 0.15 (3.8) | 0.67 (17.0) | SL4 |
| 3/8 | 3/8 | -PB6-SL6 | 2.11 (53.6) | 1.17 (29.7) | 0.26 (6.6) | 0.87 (22.1) | SL6 |
| 1/2 | 1/2 | -PB8-SL8 | 2.47 (62.7) | 1.37 (34.8) | 0.36 (9.1) | 1.02 (25.8) | SL8 |

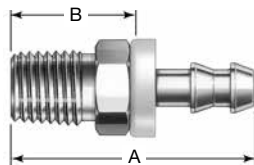
PB Series Rubber Hose

Swagelok Tube Adapters



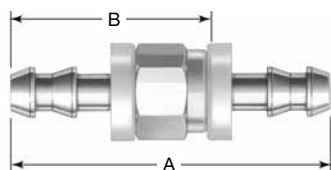
| Tube Adapter Size | Nominal Hose Size | Basic Ordering Number | Dimensions | | | | End Connection Designator |
|-----------------------------|-------------------|-----------------------|-------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| Dimensions, in. (mm) | | | | | | | |
| 1/4 | 1/4 | -PB4-TA4 | 1.93 (49.0) | 1.10 (27.9) | 0.15 (3.8) | 0.58 (14.7) | TA4 |
| 3/8 | 3/8 | -PB6-TA6 | 2.03 (51.6) | 1.09 (27.7) | 0.24 (6.1) | 0.72 (18.3) | TA6 |
| 1/2 | 1/2 | -PB8-TA8 | 2.47 (62.7) | 1.37 (34.8) | 0.34 (8.6) | 0.86 (21.8) | TA8 |
| 3/4 | 3/4 | -PB12-TA12 | 3.14 (79.8) | 1.43 (36.3) | 0.57 (14.5) | 1.22 (31.0) | TA12 |
| 1 | 1 | -PB16-TA16 | 4.13 (105) | 1.90 (48.3) | 0.79 (20.1) | 1.58 (40.1) | TA16 |
| Dimensions, mm (in.) | | | | | | | |
| 6 | 1/4 in. | -PB4-TM6 | 49.0 (1.93) | 27.9 (1.10) | 3.8 (0.15) | 14.7 (0.58) | TM6 |
| 8 | 1/4 in. | -PB4-TM8 | 48.8 (1.92) | 27.7 (1.09) | 3.8 (0.15) | 14.7 (0.58) | TM8 |
| | 3/8 in. | -PB6-TM8 | 52.1 (2.05) | 28.2 (1.11) | 5.6 (0.22) | 18.3 (0.72) | TM8 |
| 10 | 3/8 in. | -PB6-TM10 | 51.6 (2.03) | 27.7 (1.09) | 6.9 (0.27) | 18.3 (0.72) | TM10 |
| 12 | 1/2 in. | -PB8-TM12 | 62.7 (2.47) | 34.7 (1.38) | 8.1 (0.32) | 21.8 (0.86) | TM12 |
| 18 | 3/4 in. | -PB12-TM18 | 79.8 (3.14) | 36.3 (1.43) | 13.7 (0.54) | 31.0 (1.22) | TM18 |
| 25 | 1 in. | -PB16-TM25 | 105 (4.13) | 48.3 (1.90) | 19.8 (0.78) | 40.1 (1.58) | TM25 |

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



| NPT and ISO/BSP Tapered Size in. | Nominal Hose Size in. | Basic Ordering Number | Dimensions, in. (mm) | | | | End Connection Designator |
|----------------------------------|-----------------------|-----------------------|----------------------|-------------|-------------------------|---------------------------|---------------------------|
| | | | A | B | Minimum Inside Diameter | Maximum Outside Dimension | |
| NPT | | | | | | | |
| 1/4 | 1/4 | -PB4-PM4 | 1.68 (42.7) | 0.85 (21.6) | 0.15 (3.8) | 0.65 (16.5) | PM4 |
| | 3/8 | -PB6-PM4 | 1.80 (45.7) | 0.86 (21.8) | 0.27 (6.9) | 0.79 (20.1) | PM4 |
| 3/8 | 3/8 | -PB6-PM6 | 1.80 (45.7) | 0.86 (21.8) | 0.27 (6.9) | 0.79 (20.1) | PM6 |
| 1/2 | 1/2 | -PB8-PM8 | 2.19 (55.6) | 1.09 (27.7) | 0.37 (9.4) | 1.01 (25.7) | PM8 |
| 3/4 | 3/4 | -PB12-PM12 | 2.81 (71.4) | 1.10 (27.9) | 0.61 (15.5) | 1.29 (32.8) | PM12 |
| 1 | 1 | -PB16-PM16 | 3.78 (96.0) | 1.55 (39.4) | 0.79 (20.1) | 1.58 (40.1) | PM16 |
| ISO/BSP Tapered | | | | | | | |
| 1/4 | 1/4 | -PB4-MT4 | 1.68 (42.7) | 0.85 (21.6) | 0.15 (3.8) | 0.65 (16.5) | MT4 |
| 3/8 | 3/8 | -PB6-MT6 | 1.80 (45.7) | 0.86 (21.8) | 0.27 (6.9) | 0.79 (20.1) | MT6 |
| 1/2 | 1/2 | -PB8-MT8 | 2.19 (55.6) | 1.09 (27.7) | 0.37 (9.4) | 1.01 (25.7) | MT8 |
| 3/4 | 3/4 | -PB12-MT12 | 2.81 (71.4) | 1.10 (27.9) | 0.61 (15.5) | 1.29 (32.8) | MT12 |
| 1 | 1 | -PB16-MT16 | 3.78 (96.0) | 1.55 (39.4) | 0.79 (20.1) | 1.58 (40.1) | MT16 |

Unions



| Nominal Hose Size in. | Basic Ordering Number | Dimensions, in. (mm) | | | |
|-----------------------|-----------------------|----------------------|-------------|-------------------------|---------------------------|
| | | A | B | Minimum Inside Diameter | Maximum Outside Dimension |
| 1/4 | -PB4-6 | 2.07 (52.6) | 1.24 (31.5) | 0.15 (3.8) | 0.58 (14.7) |
| 3/8 | -PB6-6 | 2.25 (57.2) | 1.31 (33.3) | 0.27 (6.9) | 0.72 (18.3) |
| 1/2 | -PB8-6 | 2.61 (66.3) | 1.51 (38.4) | 0.37 (9.4) | 0.86 (21.8) |
| 3/4 | -PB12-6 | 3.86 (98.0) | 2.14 (54.4) | 0.61 (15.5) | 1.22 (31.0) |

PB Series Rubber Hose

Ordering Information

Custom Hose Assemblies

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 TA 4 PM 4 - 28 - BK or **71 CM - 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 91 and 92.

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 with a dash between each designator.

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

Specify text for tags. See **Hose Tag Text** table, page 95.

See page 94 for detailed descriptions of options.

Options

Covers

Covers do not change hose technical data.

Fire Jacket (Option F)

- Woven fiberglass coated with specially compounded aerospace-grade silicone rubber.
- Resists many hydraulic fluids and lubricating oils.
- Provides insulation from internal system fluid temperature extremes.
- 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.
- Creates a barrier that prevents direct contact with the hose and resists abrasion.
- Protects hose from weld splatter and resists effects of UV light.
- Operating temperature: up to 1000°F (537°C).



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



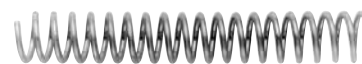
316 Stainless Steel Material (Option Z)

- Replaces standard 304 stainless steel overbraided with 316L stainless steel and 300 series stainless steel collar with 316 stainless steel
- Provides greater corrosion resistance.



Spring Guard (Options S, S2, and S7)

- 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).



Hose-Length Spring Guard



5 in. Long Spring Guard

Testing

These tests are in addition 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 cm³/s.
- Test certification included with order.

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 representative.

Nitrogen Pressure Testing (Option N3)

- Nitrogen gas bubble leak test at 200 psig (13.7 bar) with no visible leakage.
- Test certification included with order.
- Customer-specified testing is available; contact your authorized Swagelok representative

Options

Tags

Lanyard Tag (Option T)

- Stainless steel tag with customer-specified text. See **Hose Tag Text** table for details.
- Attached to the hose with a stainless steel lanyard and aluminum clamp.
- Specify a quantity of 1 or 2.



Lanyard Tag with CRN (Option CRN)

- Stainless steel tag with customer-provided, national or provincial Canadian Registration Number (CRN number).
- Attached to the hose with a stainless steel lanyard and aluminum clamp.

Clamp Tag (Option T5)

- Stainless steel tag with customer-specified text.
- See **Hose Tag Text** table 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 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.



Perma Tag (Option P_)

- Polyester tag encapsulated in platinum-cured silicone with customer-specified text. See **Hose Tag Text** table 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 |

Hose Tag Text

Specify up to 5 lines of text with 25 characters per line including spaces and commas.

Exception: Clamp tag 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 |

| 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 |

Options

Approvals

Alternative Fuels-Type Approval (Option 093)

Select FJ series hose assemblies, 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.

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 | | | | | | | | | | | | | | | | | | | | | |
|-----------|---------------------------------|----|-----|---------------|---|---|---|---|---|---|---|---|---|-------|-----|----|--------------|--------|----|----|---|--|
| | FX | FM | FJ | FL | T | B | X | S | C | N | W | F | U | NG | 7R | 8R | 7N | 8N | 7P | PB | | |
| Covers | Fire jacket | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | Thermosleeve | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | Armor guard | ✓ | | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | |
| | Spiral guard | | | | | | | ✓ | ○ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | |
| | Spring guard— Hose length | | ○ | | | ✓ | | | | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Spring guard— 5 in. long | | | | | | | | | | | | | | Std | ○ | ○ | ○ | | ○ | | |
| | 316L SS braid | ✓ | Std | ✓ | | ○ | | | | | | | | | | | | | | | | |
| Testing | Helium leak testing | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | |
| | Hydrostatic testing | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Nitrogen pressure testing | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | ✓ | | | | | | |
| Tags | Lanyard tag | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Two lanyard tags | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Lanyard tag, CRN | | ✓ | ✓ | ✓ | ✓ | | | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Clamp tag | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | |
| | Mat tag | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | |
| | Perma tag | | | | | | | | ○ | | | ✓ | | ✓ | | | | | | | | |
| Approval | Alternative fuels-type ECE R110 | | | ○ | | ○ | | | | | | | | | | ○ | | | | | | |
| Hose Core | Metal | | | Fluoropolymer | | | | | | | | | | Nylon | | | Polyethylene | Rubber | | | | |

✓ Available in all sizes.

○ Available in select hose sizes.

Tools and Accessories

Assembly Tools for Nylon, Polyethylene, and Rubber Hose

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.
- 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

Use to cut nylon, polyethylene, or rubber hose, as well as vinyl or PFA tubing to the desired length for field assembly.



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

Ordering number: **MS-HC-SC-1A**

See SAE J1273, *Recommended Practices for Hydraulic Hose Assemblies*, for information on installation and use of hose.

www.sae.org

Caution: Do not mix or interchange parts with those of other manufacturers.

About this document

Thank you for downloading this electronic catalog, which is part of General Product catalog Swagelok published in print. This type of electronic catalog is updated as new information arises or revisions, which may be more current than the printed version.

Swagelok Company is a major developer and provider of fluid system solutions, including products, integration solutions and services for industry research, instrumentation, pharmaceutical, oil and gas, power, petrochemical, alternative fuels, and semiconductor. Our manufacturing facilities, research, service and distribution facilities support a global network of more than 200 authorized sales and service centers in 57 countries.

Visit www.swagelok.com to locate your Swagelok representative and obtain any information on features, technical information and product references, or to learn about the variety of services available only through authorized sales centers and service Swagelok.

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.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit your Swagelok Web site or contact your authorized Swagelok representative.

Swagelok, Ferrule-Pak, Goop, Hinging-Colleting, IGC, Kenmac, Micro-Fit, Nupro, Snoop, Sno-Trik, SWAK, VCO, VCR, Ultra-Torr, Whitey—TM Swagelok Company
Aflas—TM Asahi Glass Co. Ltd.
AL-6XN—TM Allegheny Ludlum Corporation
AutoCAD—TM Autodesk, Inc.
CSA—TM Canadian Standards Association
DeviceNet—TM ODVA
Kalrez, Krytox—TM DuPont
Elgiloy—TM Elgiloy Specialty Metals
FM—TM FM Global
Grafoil—TM GrafTech International Holdings, Inc.
MAC—TM MAC Valves Inc.
Microsoft, Windows—TM Microsoft Corp.
NACE—TM NACE International
Nitronic—TM AK Steel Corporation
picofast—TM HansTurck KG
Pillar—TM Nippon Pillar Packing Company, Ltd.
Rapid Tap—TM Relton Corporation
15-7 PH, 17-7 PH—TM AK Steel Corp.
Sandvik—TM SandvikAB
Silconert—TM Silcotek Corporation
Simriz—TM Freudenberg-NOK
SolidWorks—TM SolidWorks Corporation
© 2017 Swagelok Company