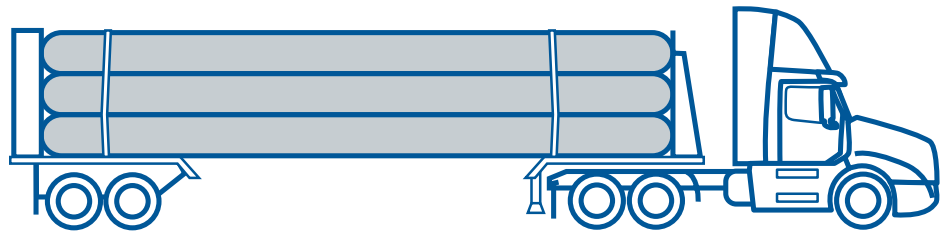


Swagelok[®] Hydrogen- Compatible Products

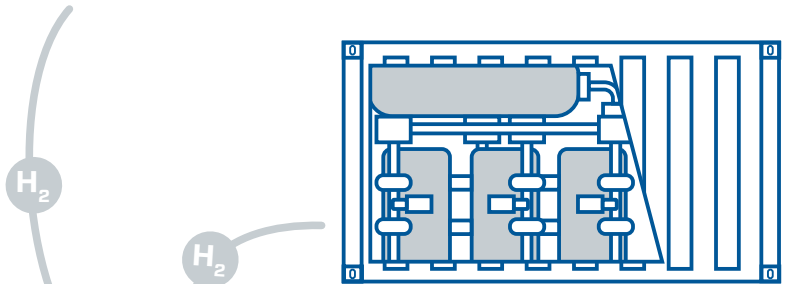
for the Alternative Fuels
Industry

Products that are compatible for
use in hydrogen on-vehicle and
infrastructure applications, available
from your local authorized sales and
service center.

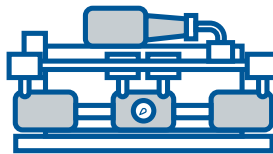
The design and operation of
hydrogen systems are the
responsibility of the user, who should
obtain qualified assistance to ensure
their safe use of hydrogen.



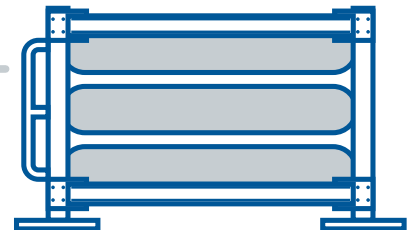
Gaseous Tube Trailer



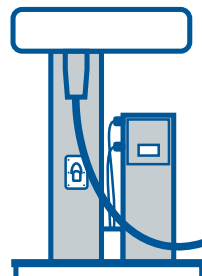
Electrolyzer System



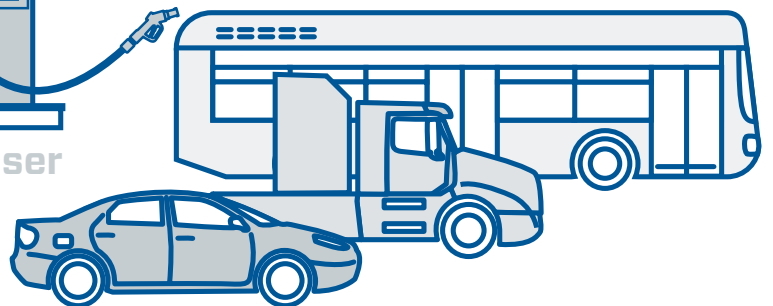
Compressor



**Compressed Hydrogen
Storage Tanks**



Dispenser



Fuel Cell Electric Vehicles

Swagelok[®]

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Introduction

Hydrogen fuel cell technology requires high-integrity fluid system components to fill and store hydrogen in cylinders and transfer it to the fuel cell on the vehicle. Swagelok offers a wide range of fluid system components for use in many types of hydrogen-related applications including the infrastructure that produces, transports, compresses, stores, and fills cylinders with hydrogen and for on-vehicle use.

Swagelok products, as listed in Table 1 (page 4) and Table 2 (page 6), are compatible with both on-vehicle and infrastructure hydrogen applications. Hydrogen-compatible products have had the materials of construction reviewed for appropriateness for use with hydrogen. Some metals are susceptible to hydrogen embrittlement, specifically hardened Belleville springs and stems. These have been replaced with less susceptible materials for compatibility with hydrogen service. Some elastomers are also more susceptible to hydrogen degradation and have also been replaced with more resilient materials. Products not listed in this document may not be suitable for hydrogen applications.

On-Vehicle Applications

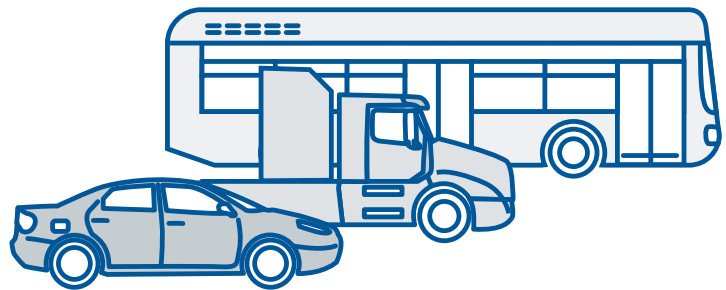
On-vehicle applications include light-duty (car and van), heavy-duty (bus and truck), rail, ship, and aerospace. Components used in light-duty cars and vans and heavy-duty trucks and buses may require EC-79 certification for use at working pressures above 435 psig (30 bar). Specific testing is required to achieve this certification, including corrosion resistance, endurance, hydraulic pressure cycle testing, and external leakage testing. Products with this certification will be specially marked to reflect the approval.

Fuel Cell Electric Vehicles

Hydrogen-compatible Products Available

Refer to Table 1 (page 4) for additional information.

- Assembly-by-torque (AbT) fittings
- FK series medium-pressure fittings
- VCO® O-ring face seal fittings
- VCR® metal gasket face seal fittings
- Pressure gauges
- All-metal hose
- Swagelok tubing
- Swagelok® Custom Solutions, such as CNC bent fuel lines



EC-79 Certified Products Available:

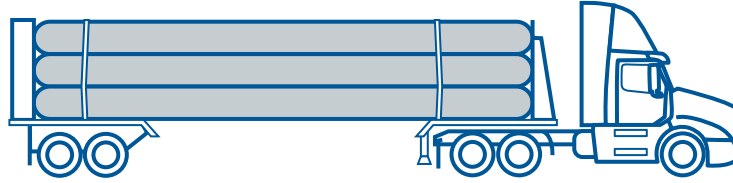
EC-79 Certified above 30 bar (435 psig) and up to 350 bar (5 076 psig). Refer to Table 2 (page 6) and Table 3 (page 7) for additional information.

- Swagelok tube fittings
- AFS series ball valves
- Pipe fittings
- SK series ball valves

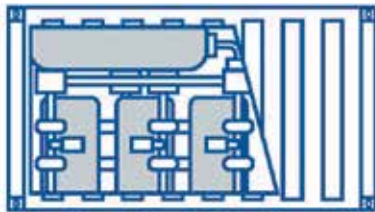
Infrastructure Applications

Infrastructure applications include the dispensers, storage cylinders, compressors, separators, and pressure control devices that make up the station, as well as the hydrogen tube trailers that bring the hydrogen to the stations. Components in these locations must be hydrogen-compatible but may not require specific certifications. In addition to standard Swagelok tube fittings, a range of FK series medium-pressure fittings, cone and thread fittings, hoses, valves, and pressure gauges that are hydrogen-compatible are available.

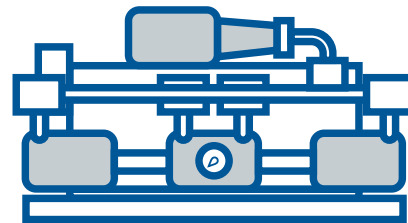
Note: For these applications, regional standards and specifications may vary. Please consult your local authorized Swagelok sales and service center for more information.



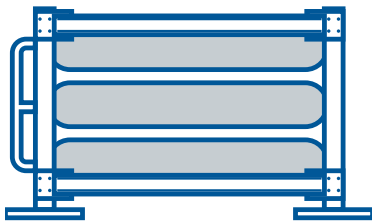
Gaseous Tube Trailer



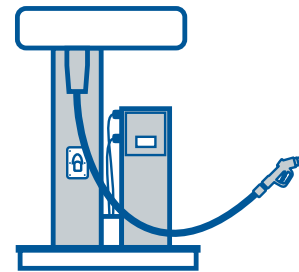
Electrolyzer System



Compressor



Compressed Hydrogen Storage Tanks



Dispenser

The following provides a list of products that are hydrogen-compatible for use in infrastructure applications. Refer to Table 1 (page 4) for additional information.

- Swagelok tube fittings and tubing
- FK series medium-pressure fittings and tubing
- FKB series medium-pressure ball valves
- IPT series needle and check valves
- IPT series cone and thread fittings and tubing
- AFS series ball valves
- FJ, FL, FM, and FX series hose
- S model pressure gauges
- Pipe fittings
- Swagelok Custom Solutions, such as filling, distribution, priority, and control panels and tubing manifolds.

Table 1—Hydrogen-Compatible Products for Applications Up to 1 378 bar (20 000 psig)

These products may be ordered using standard ordering numbers given in the product literature, except where noted. Individual product ratings are as noted in the product literature.

Product	Product Type/ Series	Description	Available Sizes	Working Pressure and Ordering Information
Fitting	Tube	Straight, elbow, tee, and cross standard tube fitting	1/16 to 2 in. 2 to 50 mm	Refer to <i>Tubing Data</i> , MS-01-107, for pressure rating information. Refer to <i>Gaugeable Tube Fittings and Adapter Fittings</i> , MS-01-140, for ordering information.
		Assembly-by-Torque (AbT)	1/4 to 1/2 in. 6 to 12 mm	Refer to <i>Assembly-by-Torque (AbT) Fittings</i> , MS-02-466
		Medium-pressure, FK series	1/4 to 1 in. 6 to 12 mm	Refer to <i>Medium- and High-Pressure Fittings, Tubing, Valves, and Accessories</i> , MS-02-472
	Cone and Thread, IPT	Medium- and high-pressure cone and thread, medium-pressure pipe fittings and adapters	1/4 to 1 1/2 in.	Refer to <i>Medium- and High-Pressure Fittings, Tubing, Valves, and Accessories</i> , MS-02-472
	Pipe	NPT/ISO	1/16 to 1 1/2 in.	Refer to <i>Pipe Fittings</i> , MS-01-147, and <i>Medium- and High-Pressure Fittings, Tubing, Valves, and Accessories</i> , MS-02-472
		Male/female SAE	3/16 to 1 in.	Refer to <i>Pipe Fittings</i> , MS-01-147
	VCO with ethylene propylene O-rings only	O-ring face seal	1/8 to 1 in.	Refer to <i>VCO O-ring Face Seal Fittings</i> , MS-01-28, add -EP to selected ordering number
	VCR with 316 stainless steel gaskets only	Metal gasket face seal	1/8 to 1 in.	Refer to <i>VCR Metal Gasket Face Seal Fittings</i> , MS-01-24, 316 stainless steel gaskets only
Hose	FJ	304 SS single braid layer reinforcement, 316L stainless steel annular convoluted core	1/4 to 2 in.	Refer to <i>Hose and Flexible Tubing</i> , MS-01-180
	FL	321 stainless steel single braid layer reinforced, 316L stainless steel annular convoluted core	1/4, 1/2 in.	
	FM	316L stainless steel single braid layer reinforced, 316L stainless steel annular convoluted core	1/4 to 2 in.	
	FX	321 stainless steel double braid layer reinforced, 316L stainless steel annular convoluted core	1/4 to 2 in.	

**Table 1—Hydrogen-Compatible Products for Applications Up to 1 378 bar (20 000 psig)
continued**

Product	Product Type/Series	Description	Working Pressure and Ordering Information
Tubing	316/316L seamless instrumentation grade	Stainless steel seamless tubing, ASTM A213/A269 1/8 to 2 in. and 3 to 25 mm	Refer to <i>Stainless Steel Seamless Tubing and Tube Support Systems</i> , MS-01-181
	Medium-pressure	Medium-pressure tubing, ASTM A213/A269 1/4, 3/8, 1/2, and 3/4 in.	Refer to <i>Medium- and High-Pressure Fittings, Tubing, Valves, and Accessories</i> , MS-02-472
	Cone and thread	Cone and thread tubing, medium-pressure ASTM A213 1/4 to 1 in.	Refer to <i>Medium- and High-Pressure Fittings, Tubing, Valves, and Accessories</i> , MS-02-472
Valve	AFS	Alternative fuel service (AFS) ball valve, 1/4-turn, PEEK seats	Refer to <i>Swagelok Alternative Fuel Service (AFS) Ball Valves</i> , MS-02-303
	FKB	Medium-pressure trunnion-style ball valve, PEEK seat	700 bar at -40°C (10 152 psig at -40°F) 1 034 bar at 85°C (15 000 psig at 185°F) SS-6FKBFK6-53402
	NVT	Integral bonnet needle valve, 2-way, bidirectional, two-piece Nitronic 50 stem	Refer to <i>Medium- and High-Pressure Fittings, Tubing, Valves, and Accessories</i> , MS-02-472
	SK	Multipurpose ball valve, 1/4-turn, PEEK seats	Refer to <i>Multipurpose Ball Valves</i> , MS-02-345
Gauge	PGI	S model industrial pressure gauge	Refer to <i>Process Gauges, Industrial and Process</i> , MS-02-170

Please consult your local authorized Swagelok sales and service center with any questions.

Products not listed in this document may not be suitable for hydrogen applications.

Table 2—Fittings With EC-79 Certification, Systems Above 30 bar (435 psig) and Up to 350 bar (5 076 psig) — HV Designator Required

Product	Product Type	Description	Available Sizes ^①
Tube fitting	Straight	Union - Swagelok tube fitting to Swagelok tube fitting Port connector Cap Plug	Tube fitting sizes: 1/4, 5/16, 3/8, 1/2, 5/8 in. 6, 8, 10, 12, 14, 15, 16 mm Ordering Information: pages 8 and 11
		Male connector - Swagelok tube fitting to 1/4 in. male NPT	Tube fitting sizes: 1/4, 5/16, 3/8, 1/2, 5/8 in. 6, 8, 10, 12, 14 mm Ordering Information: page 8
		Male connector - Swagelok tube fitting to SAE/MS straight thread (ST and STH) fitting ^②	Tube fitting sizes: 1/4, 3/8, 1/2, 5/8 in. 6, 8, 10, 12 mm SAE/MS straight thread Male: ST: 7/16-20, 9/16-18, STH: 3/4-16 Female: ST: 7/16-20, 9/16-18, STH: 3/4-16 Ordering Information: page 9
		Female connector - Swagelok tube fitting to 1/4 in. female NPT	Tube fitting sizes: 1/4, 5/16, 3/8, 1/2 in. 6, 8, 10, 12 mm Ordering Information: page 9
		Reducer - Swagelok tube fitting to tube adapter	1/4, 5/16, 3/8, 1/2 in. 6, 8, 10, 12 mm in combinations listed on page 10
	Elbow	Union - Swagelok tube fitting to Swagelok tube fitting	1/4, 5/16, 3/8, 1/2, 5/8 in. 6, 8, 10, 12, 14, 15, 16 mm Ordering Information: page 12
		Male connector - Swagelok tube fitting to 1/4 in. male NPT Female connector - Swagelok tube fitting to 1/4 in. female NPT	Tube fitting sizes: 1/4, 5/16, 3/8, 1/2 in. 6, 8, 10, 12 mm Ordering Information: page 12
	Tee	Union - all Swagelok tube fitting ends	1/4, 5/16, 3/8, 1/2, 5/8 in. 6, 8, 10, 12, 14, 15, 16 mm Ordering Information: page 13
		1/4 in. Male NPT branch with Swagelok tube fittings 1/4 in. Female NPT branch with Swagelok tube fittings 1/4 in. Female NPT run with Swagelok tube fittings	Tube fitting sizes: 1/4, 3/8 in. 6, 8, 10, 12 mm Ordering Information: pages 13 and 14
		1/4 in. Male NPT run with Swagelok tube fittings	Tube fitting sizes: 1/4, 3/8 in. 6, 8, 12 mm Ordering Information: page 13
	Cross	Union - all Swagelok tube fitting ends	1/4, 5/16, 3/8, 1/2 in. 6, 8, 10, 12, 16 mm Ordering Information: page 14

① Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

② O-ring material used may affect the temperature rating.

Table 2—Fittings With EC-79 Certification, Systems Above 30 bar (435 psig) and Up to 350 bar (5 076 psig) — HV Designator Required, continued

Product	Product Type	Description	Available Sizes ^①
Tube adapter	Male	1/4 in. NPT	Tube adapter sizes: 1/4, 5/16, 3/8, 1/2 in. 6, 8, 10, 12 mm Ordering Information: page 15
		SAE/MS straight thread (ST and STH)	SAE/MS straight thread ST: 7/16-20, 9/16-18 STH: 3/4-16 Ordering Information: page 15
	Female	1/4 in. NPT	Tube adapter sizes: 1/4, 5/16, 3/8, 1/2 in. 6, 8, 10, 12 mm Ordering Information: page 15
Pipe fitting	Hex nipple	1/4 in. Male NPT	1/4 in. Ordering Information: page 16
	Adapter	1/4 in. Female to 1/4 in. male NPT	inch: 1/4 Ordering Information: page 16
		Male SAE/MS straight thread to 1/4 in. male NPT ^②	SAE/MS straight thread 7/16-20 to 1/4 in. NPT Ordering Information: page 16
		Male SAE/MS straight thread to 1/4 in. female NPT ^②	SAE/MS straight thread 7/16-20 to 1/4 in. NPT Ordering Information: page 16
	Reducer	Male to female SAE/MS straight thread ^②	SAE/MS straight thread 9/16-18 to 7/16-20 3/4-16 to 9/16-18 3/4-16 to 7/16-20 Ordering Information: page 17
	Plug	1/4 in. Male NPT	1/4 in. Ordering Information: page 17
	Hex coupling	1/4 in. Female NPT	1/4 in. Ordering Information: page 17
	Hollow hex plug	Male SAE/MS straight thread (ST and STH) ^②	SAE/MS straight thread ST: 3/8-24, 7/16-20, 9/16-18 STH: 3/4-16 Ordering Information: page 18
Hex head plug	Male SAE/MS straight thread (ST and STH) ^②	SAE/MS straight thread ST: 3/8-24, 7/16-20, 9/16-18 STH: 3/4-16 Ordering Information: page 18	

① Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

② O-ring material used may affect the temperature rating.

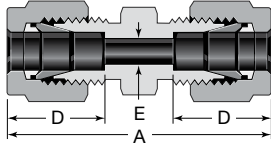
Table 3—Valves With EC-79 Certification

Series	Description	Available Sizes	Working Pressure bar (psig)
SK	Multipurpose ball valve, 1/4-turn, PEEK seats, 10 mm Swagelok tube fitting	10 mm Ordering Information: SS-4SKPS10MM-33397 Additional Information on page 19	260 (3 770) at -40 to 120°C (-40 to 248°F)
AFS	Alternative fuel service (AFS) ball valve, 1/4-turn, PEEK seats, Female SAE/MS straight thread 3/4-16	Female SAE/MS straight thread 3/4-16 Ordering Information: SS-AFSMS8-30259 Additional Information on page 20	413.7 (6 000) at -40 to 120°C (-40 to 248°F)

Ordering Numbers and Dimensions for EC-79 Certified Fittings

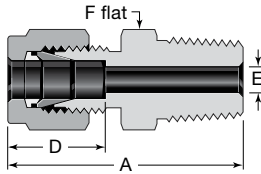
Straight Tube Fittings

Unions



Tube OD	Ordering Number	Dimensions		
		A	D	E
Dimensions, in.				
1/4	SS-400-6HV	1.61	0.60	0.19
5/16	SS-500-6HV	1.69	0.64	0.25
3/8	SS-600-6HV	1.77	0.66	0.28
1/2	SS-810-6HV	2.02	0.90	0.41
5/8	SS-1010-6HV	2.05	0.96	0.50
Dimensions, mm				
6	SS-6M0-6HV	41.0	15.3	4.8
8	SS-8M0-6HV	43.2	16.2	6.4
10	SS-10M0-6HV	46.2	17.2	7.9
12	SS-12M0-6HV	51.2	22.8	9.5
14	SS-14M0-6HV	52.0	24.4	11.1
15	SS-15M0-6HV			11.9
16	SS-16M0-6HV			12.7

Male Connectors



NPT

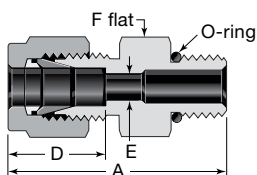
Tube OD	NPT Size	Ordering Number	Dimensions			
			A	D	E ^①	F
Dimensions, in.						
1/4	1/4	SS-400-1-4HV	1.49	0.60	0.19	9/16
5/16		SS-500-1-4HV	1.52	0.64	0.25	9/16
3/8		SS-600-1-4HV	1.57	0.66	0.28	5/8
1/2		SS-810-1-4HV	1.71	0.90	0.28	13/16
5/8		SS-1010-1-4HV	1.74	0.96	0.28	15/16
Dimensions, mm						
6	1/4	SS-6M0-1-4HV	37.9	15.3	4.8	14
8		SS-8M0-1-4HV	38.7	16.2	6.4	15
10		SS-10M0-1-4HV	40.9	17.2	7.1	18
12		SS-12M0-1-4HV	43.4	22.8	7.1	22
14		SS-14M0-1-4HV	44.1	24.4	7.1	24

① The E dimension is the minimum nominal opening. These fittings may have a larger opening at the pipe/straight thread end.

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

Straight Tube Fittings

Male Connectors



Adapts to SAE J1926/1 and ISO 11926-1 straight thread boss.

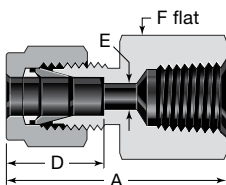
SAE/MS Straight Thread (ST) and (STH - heavy wall)

Tube OD	SAE/MS ^① Thread Size	Ordering Number	Dimensions			
			A	D	E ^②	F
Dimensions, in.						
1/4	7/16-20	SS-400-1-4STHV	1.34	0.60	0.19	9/16
	9/16-18	SS-400-1-6STHV	1.40			11/16
	3/4-16	SS-400-1-8STHHV	1.57			7/8
3/8	7/16-20	SS-600-1-4STHV	1.40	0.66	0.20	5/8
	9/16-18	SS-600-1-6STHV	1.46			11/16
	3/4-16	SS-600-1-8STHHV	1.63			7/8
1/2	9/16-18	SS-810-1-6STHV	1.54	0.90	0.28	13/16
	3/4-16	SS-810-1-8STHHV	1.74			7/8
5/8	3/4-16	SS-1010-1-8STHHV	1.74	0.96	0.39	15/16
Dimensions, mm						
6	7/16-20	SS-6M0-1-4STHV	34.0	15.3	4.8	14
	9/16-18	SS-6M0-1-6STHV	35.6			18
8	7/16-20	SS-8M0-1-4STHV	35.0	16.2	5.2	15
	9/16-18	SS-8M0-1-6STHV	36.6			18
10	7/16-20	SS-10M0-1-4STHV	35.8	17.2	5.2	18
	9/16-18	SS-10M0-1-6STHV	37.3			18
	3/4-16	SS-10M0-1-8STHHV	39.4			22
12	7/16-20	SS-12M0-1-4STHV	40.6	22.8	5.2	22
	9/16-18	SS-12M0-1-6STHV	39.9			22
	3/4-16	SS-12M0-1-8STHHV	41.9			22

① O-ring material is 75 durometer fluorocarbon FKM.

② The E dimension is the minimum nominal opening. These fittings may have a larger opening at the pipe/straight thread end.

Female Connectors



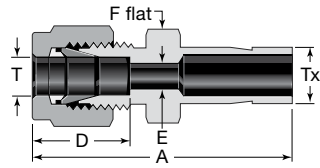
NPT

Tube OD	NPT Size	Ordering Number	Dimensions			
			A	D	E	F
Dimensions, in.						
1/4	1/4	SS-400-7-4HV	1.41	0.60	0.19	3/4
5/16	1/4	SS-500-7-4HV	1.45	0.64	0.25	3/4
3/8	1/4	SS-600-7-4HV	1.48	0.66	0.28	3/4
1/2	1/4	SS-810-7-4HV	1.59	0.90	0.41	13/16
Dimensions, mm						
6	1/4	SS-6M0-7-4HV	35.8	15.3	4.8	19
8	1/4	SS-8M0-7-4HV	37.0	16.2	6.4	19
10	1/4	SS-10M0-7-4HV	37.8	17.2	7.9	19
12	1/4	SS-12M0-7-4HV	40.3	22.8	9.5	22

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

Straight Tube Fittings

Reducers

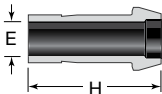


Tube OD		Ordering Number	Dimensions			
T	Tx		A	D	E	F
Dimensions, in.						
1/4	1/4	SS-400-R-4HV	1.54	0.60	0.17	1/2
	5/16	SS-400-R-5HV	1.57		0.19	1/2
	3/8	SS-400-R-6HV	1.60		0.19	1/2
	1/2	SS-400-R-8HV	1.82		0.19	9/16
5/16	3/8	SS-500-R-6HV	1.65	0.64	0.25	9/16
	1/2	SS-500-R-8HV	1.87			
3/8	1/4	SS-600-R-4HV	1.63	0.66	0.17	5/8
	3/8	SS-600-R-6HV	1.70		0.27	5/8
	1/2	SS-600-R-8HV	1.91		0.28	5/8
	5/8	SS-600-R-10HV	1.98		0.28	11/16
1/2	1/4	SS-810-R-4HV	1.77	0.90	0.17	13/16
	3/8	SS-810-R-6HV	1.84		0.27	
	1/2	SS-810-R-8HV	2.06		0.37	
	5/8	SS-810-R-10HV	2.12		0.41	
Dimensions, mm						
6	8	SS-6M0-R-8MHV	39.9	15.3	4.8	14
	10	SS-6M0-R-10MHV	40.7			
	12	SS-6M0-R-12MHV	46.3			
8	6	SS-8M0-R-6MHV	40.3	16.2	4.1	15
	10	SS-8M0-R-10MHV	42.0		6.4	
	12	SS-8M0-R-12MHV	47.6		6.4	
10	6	SS-10M0-R-6MHV	42.4	17.2	4.1	18
	8	SS-10M0-R-8MHV	43.4		5.6	
	12	SS-10M0-R-12MHV	49.8		7.9	
	15	SS-10M0-R-15MHV	51.3		7.9	
12	6	SS-12M0-R-6MHV	44.9	22.8	4.1	22
	8	SS-12M0-R-8MHV	45.9		5.6	
	10	SS-12M0-R-10MHV	46.7		7.1	
	16	SS-12M0-R-16MHV	53.8		9.5	

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

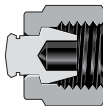
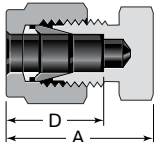
Straight Tube Fittings

Port Connectors



Tube OD	Ordering Number	Dimensions	
		E	H
Dimensions, in.			
1/4	SS-401-PCHV	0.17	0.98
5/16	SS-501-PCHV	0.22	1.02
3/8	SS-601-PCHV	0.27	1.05
1/2	SS-811-PCHV	0.37	1.43
5/8	SS-1011-PCHV	0.47	1.49
Dimensions, mm			
6	SS-6M1-PCHV	4.1	25.0
8	SS-8M1-PCHV	5.6	26.0
10	SS-10M1-PCHV	7.1	27.1
12	SS-12M1-PCHV	8.8	36.2
15	SS-15M1-PCHV	11.2	37.8
16	SS-16M1-PCHV	12.0	37.8

Caps and Plugs



Cap

Tube OD	Ordering Number	A	D
Dimensions, in.			
1/4	SS-400-CHV	0.92	0.60
5/16	SS-500-CHV	0.96	0.64
3/8	SS-600-CHV	1.01	0.66
1/2	SS-810-CHV	1.21	0.90
5/8	SS-1010-CHV	1.24	0.96
Dimensions, mm			
6	SS-6M0-CHV	23.1	15.3
8	SS-8M0-CHV	24.5	16.2
10	SS-10M0-CHV	26.6	17.2
12	SS-12M0-CHV	30.6	22.8
14	SS-14M0-CHV	31.4	24.4
15	SS-15M0-CHV	31.4	24.4
16	SS-16M0-CHV	31.4	24.4

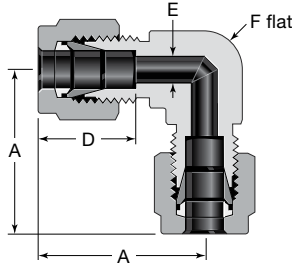
Plug

Tube OD	Ordering Number
Dimensions, in.	
1/4	SS-400-PHV
5/16	SS-500-PHV
3/8	SS-600-PHV
1/2	SS-810-PHV
5/8	SS-1010-PHV
Dimensions, mm	
6	SS-6M0-PHV
8	SS-8M0-PHV
10	SS-10M0-PHV
12	SS-12M0-PHV
14	SS-14M0-PHV
15	SS-15M0-PHV
16	SS-16M0-PHV

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

90° Elbows

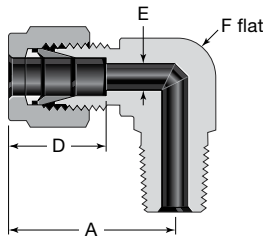
Unions



Tube ports are identical.

Tube OD	Ordering Number	Dimensions			
		A	D	E	F, in.
Dimensions, in.					
1/4	SS-400-9HV	1.06	0.60	0.19	1/2
5/16	SS-500-9HV	1.13	0.64	0.25	9/16
3/8	SS-600-9HV	1.20	0.66	0.28	5/8
1/2	SS-810-9HV	1.42	0.90	0.41	13/16
5/8	SS-1010-9HV	1.50	0.96	0.50	15/16
Dimensions, mm					
6	SS-6M0-9HV	27.0	15.3	4.8	1/2
8	SS-8M0-9HV	28.8	16.2	6.4	9/16
10	SS-10M0-9HV	31.5	17.2	7.9	11/16
12	SS-12M0-9HV	36.0	22.8	9.5	13/16
14	SS-14M0-9HV	38.0	24.4	11.1	15/16
15	SS-15M0-9HV	38.0	24.4	11.9	15/16
16	SS-16M0-9HV	38.0	24.4	12.7	15/16

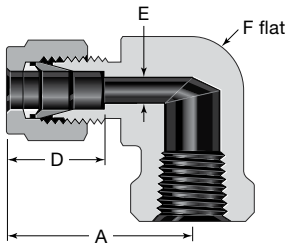
Male NPT



Tube OD	NPT Size	Ordering Number	Dimensions			
			A	D	E ^①	F, in.
Dimensions, in.						
1/4	1/4	SS-400-2-4HV	1.06	0.60	0.19	1/2
5/16	1/4	SS-500-2-4HV	1.13	0.64	0.25	9/16
3/8	1/4	SS-600-2-4HV	1.20	0.66	0.28	5/8
1/2	1/4	SS-810-2-4HV	1.42	0.90	0.28	13/16
Dimensions, mm						
6	1/4	-6M0-2-4HV	27.0	15.3	4.8	1/2
8	1/4	-8M0-2-4HV	28.8	16.2	6.4	9/16
10	1/4	-10M0-2-4HV	31.5	17.2	7.1	11/16
12	1/4	-12M0-2-4HV	36.0	22.8	7.1	13/16

① The E dimension is the minimum nominal opening. These fittings may have a larger opening at the pipe/straight thread end.

Female NPT

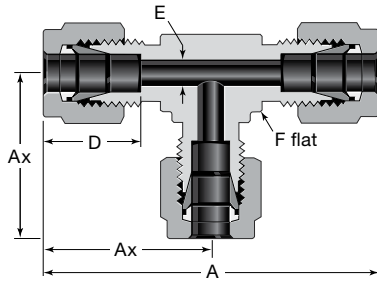


Tube OD	NPT Size	Ordering Number	Dimensions			
			A	D	E	F, in.
Dimensions, in.						
1/4	1/4	SS-400-8-4HV	1.17	0.60	0.19	11/16
5/16	1/4	SS-500-8-4HV	1.20	0.64	0.25	11/16
3/8	1/4	SS-600-8-4HV	1.23	0.66	0.28	11/16
1/2	1/4	SS-810-8-4HV	1.42	0.90	0.41	13/16
Dimensions, mm						
6	1/4	SS-6M0-8-4HV	29.8	15.3	4.8	11/16
8	1/4	SS-8M0-8-4HV	30.6	16.2	6.4	11/16
10	1/4	SS-10M0-8-4HV	33.5	17.2	7.9	13/16
12	1/4	SS-12M0-8-4HV	36.0	22.8	9.5	13/16

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

Tees

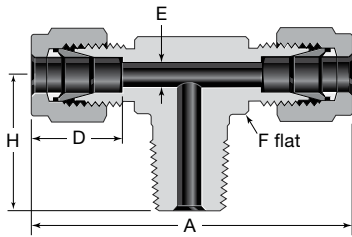
Unions



Tube ports are identical.

Tube OD	Ordering Number	Dimensions				
		A	Ax	D	E	F, in.
Dimensions, in.						
1/4	SS-400-3HV	2.12	1.06	0.60	0.19	1/2
5/16	SS-500-3HV	2.34	1.17	0.64	0.25	5/8
3/8	SS-600-3HV	2.40	1.20	0.66	0.28	5/8
1/2	SS-810-3HV	2.84	1.42	0.90	0.41	13/16
5/8	SS-1010-3HV	3.06	1.53	0.96	0.50	1
Dimensions, mm						
6	SS-6M0-3HV	53.9	27.0	15.3	4.8	1/2
8	SS-8M0-3HV	59.7	29.9	16.2	6.4	5/8
10	SS-10M0-3HV	63.0	31.5	17.2	7.9	11/16
12	SS-12M0-3HV	72.0	36.0	22.8	9.5	13/16
14	SS-14M0-3HV	77.6	38.8	24.4	11.1	1
15	SS-15M0-3HV	77.6	38.8	24.4	11.9	1
16	SS-16M0-3HV	77.6	38.8	24.4	12.7	1

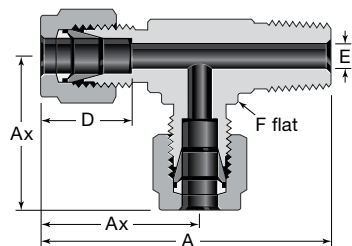
Male



Branch, NPT (TTM)

Tube OD	NPT Size in.	Ordering Number	Dimensions				
			A	D	E ^①	F, in.	H
Dimensions, in.							
1/4	1/4	SS-400-3-4TTMHV	2.12	0.60	0.19	1/2	0.92
3/8	1/4	SS-600-3TTMHV	2.40	0.66	0.28	5/8	1.00
Dimensions, mm							
6	1/4	SS-6M0-3-4TTMHV	53.9	15.3	4.8	1/2	23.4
8	1/4	SS-8M0-3-4TTMHV	59.7	16.2	6.4	5/8	25.4
10	1/4	SS-10M0-3TTMHV	67.0	17.2	7.1	13/16	26.2
12	1/4	SS-12M0-3-4TTMHV	72.0	22.8	7.1	13/16	28.2

① The E dimension is the minimum nominal opening. These fittings may have a larger opening at the pipe/straight thread end.



Run, NPT (TMT)

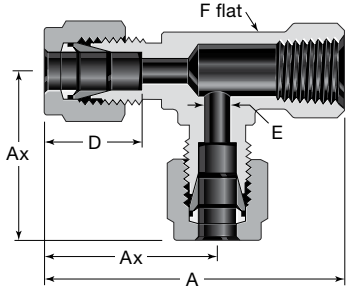
Tube OD	NPT Size in.	Ordering Number	Dimensions				
			A	Ax	D	E ^①	F, in.
Dimensions, in.							
1/4	1/4	SS-400-3-4TMTHV	1.98	1.06	0.60	0.19	1/2
3/8	1/4	SS-600-3TMTHV	2.20	1.20	0.66	0.28	5/8
Dimensions, mm							
6	1/4	SS-6M0-3-4TMTHV	50.3	27.0	15.3	4.8	1/2
8	1/4	SS-8M0-3-4TMTHV	55.3	29.9	16.2	6.4	5/8
12	1/4	SS-12M0-3-4TMTHV	64.2	36.0	22.8	7.1	13/16

① The E dimension is the minimum nominal opening. These fittings may have a larger opening at the pipe/straight thread end.

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

Tees

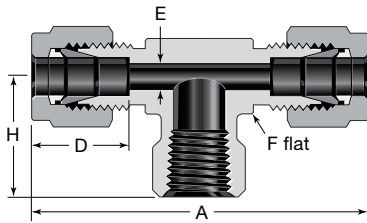
Female



Tube ports are identical.

Run, NPT (TFT)

Tube OD	NPT Size in.	Ordering Number	Dimensions				
			A	Ax	D	E	F, in.
Dimensions, in.							
1/4	1/4	SS-400-3-4TTFHV	2.05	1.17	0.60	0.19	11/16
3/8	1/4	SS-600-3TTFHV	2.11	1.23	0.66	0.28	11/16
Dimensions, mm							
6	1/4	SS-6M0-3-4TTFHV	52.1	29.8	15.3	4.8	11/16
8	1/4	SS-8M0-3-4TTFHV	53.0	30.6	16.2	6.4	11/16
10	1/4	SS-10M0-3TTFHV	55.9	33.5	17.2	7.9	13/16
12	1/4	SS-12M0-3-4TTFHV	58.4	36.0	22.8	9.5	13/16

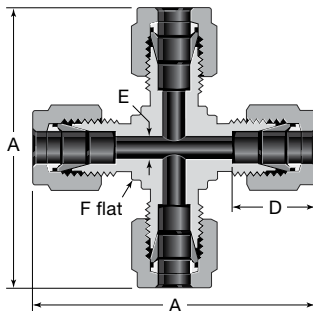


Branch, NPT (TTF)

Tube OD	NPT Size in.	Ordering Number	Dimensions				
			A	D	E	F, in.	H
Dimensions, in.							
1/4	1/4	SS-400-3-4TTFHV	2.34	0.60	0.19	11/16	0.88
3/8	1/4	SS-600-3TTFHV	2.46	0.66	0.28	11/16	0.88
Dimensions, mm							
6	1/4	SS-6M0-3-4TTFHV	59.5	15.3	4.8	11/16	22.4
8	1/4	SS-8M0-3-4TTFHV	61.2	16.2	6.4	11/16	22.4
10	1/4	SS-10M0-3TTFHV	67.0	17.2	7.9	13/16	22.4
12	1/4	SS-12M0-3-4TTFHV	72.0	22.8	9.5	13/16	22.4

Cross

Union



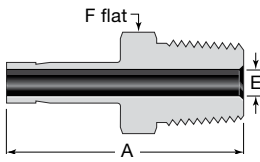
Tube ports are identical.

Tube OD	Ordering Number	Dimensions			
		A	D	E	F, in.
Dimensions, in.					
1/4	SS-400-4HV	2.12	0.60	0.19	1/2
5/16	SS-500-4HV	2.34	0.64	0.25	5/8
3/8	SS-600-4HV	2.40	0.66	0.28	5/8
1/2	SS-810-4HV	2.84	0.90	0.41	13/16
Dimensions, mm					
6	SS-6M0-4HV	53.9	15.3	4.8	1/2
8	SS-8M0-4HV	59.7	16.2	6.4	5/8
10	SS-10M0-4HV	67.0	17.2	7.9	13/16
12	SS-12M0-4HV	72.0	22.8	9.5	13/16
16	SS-16M0-4HV	74.0	24.4	12.7	15/16

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

Tube Adapters

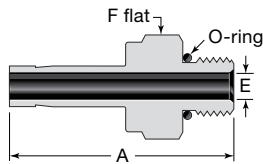
Male



NPT

Tube OD	NPT Size in.	Ordering Number	Dimensions		
			A	E ^①	F
Dimensions, in.					
1/4	1/4	SS-4-TA-1-4HV	1.46	0.17	9/16
5/16	1/4	SS-5-TA-1-4HV	1.50	0.22	9/16
3/8	1/4	SS-6-TA-1-4HV	1.53	0.27	9/16
1/2	1/4	SS-8-TA-1-4HV	1.75	0.28	9/16
Dimensions, mm					
6	1/4	SS-6-MTA-1-4HV	38.1	4.1	14
8	1/4	SS-8-MTA-1-4HV	39.1	5.6	14
10	1/4	SS-10-MTA-1-4HV	39.9	7.1	14
12	1/4	SS-12-MTA-1-4HV	46.5	7.1	16

① The E dimension is the minimum nominal opening. These fittings may have a larger opening at the pipe/straight thread end.



Adapts to SAE J1926/1 and ISO 11926-1 straight thread boss.

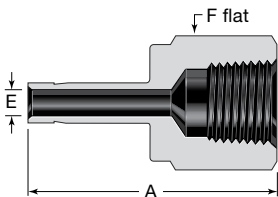
SAE/MS Straight Thread (ST) and (STH - Heavy Wall)

Tube OD	SAE/MS Thread Size	Ordering Number	Dimensions		
			A	E ^①	F
Dimensions, in.					
1/4	7/16-20	SS-4-TA-1-4STHV	1.39	0.17	9/16
3/8	7/16-20	SS-6-TA-1-4STHV	1.46	0.20	9/16
	9/16-18	SS-6-TA-1-6STHV	1.52	0.27	11/16
1/2	3/4-16	SS-6-TA-1-8STHHV	1.69	0.27	7/8
	9/16-18	SS-8-TA-1-6STHV	1.74	0.28	11/16
	3/4-16	SS-8-TA-1-8STHHV	1.95	0.37	7/8
	Dimensions, mm				
6	7/16-20	SS-6-MTA-1-4STHV	32.0	4.1	14
8	7/16-20	SS-8-MTA-1-4STHV	32.8	5.2	14
	9/16-18	SS-8-MTA-1-6STHV	34.5		18
10	9/16-18	SS-10-MTA-1-6STHV	35.1	7.1	18
	3/4-16	SS-10-MTA-1-8STHHV	39.9		22
12	9/16-18	SS-12-MTA-1-6STHV	41.7	7.1	18
	3/4-16	SS-12-MTA-1-8STHHV	46.5		8.8

O-ring material is 75 durometer fluorocarbon FKM.

① The E dimension is the minimum nominal opening. These fittings may have a larger opening at the pipe/straight thread end.

Female



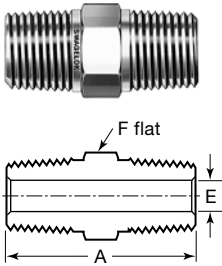
Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

NPT

Tube OD	NPT Size in.	Ordering Number	Dimensions		
			A	E	F
Dimensions, in.					
1/4	1/4	SS-4-TA-7-4HV	1.46	0.17	3/4
5/16	1/4	SS-5-TA-7-4HV	1.48	0.22	3/4
3/8	1/4	SS-6-TA-7-4HV	1.50	0.27	3/4
1/2	1/4	SS-8-TA-7-4HV	1.71	0.37	3/4
Dimensions, mm					
6	1/4	SS-6-MTA-7-4HV	37.1	4.1	19
8	1/4	SS-8-MTA-7-4HV	37.6	5.6	19
10	1/4	SS-10-MTA-7-4HV	38.1	7.1	19
12	1/4	SS-12-MTA-7-4HV	43.7	8.8	19

Pipe Fittings

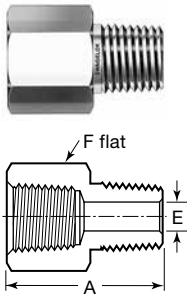
Hex Nipple



Male NPT

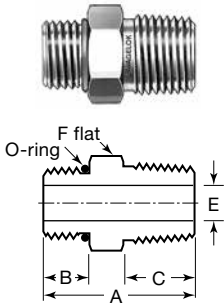
NPT Size in.	Ordering Number	Dimensions, in. (mm)		
		A	E	F
1/4	SS-4-HNHV	1.40 (35.6)	0.28 (7.1)	9/16

Adapters



Female to Male NPT

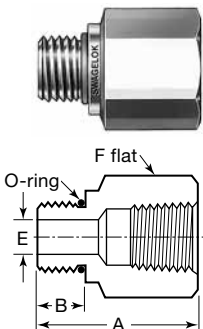
NPT Size in.	Ordering Number	Dimensions, in. (mm)		
		A	E	F
1/4	SS-4-AHV	1.40 (35.6)	0.28 (7.1)	3/4



Male SAE/MS Straight Thread to Male NPT

SAE/MS Thread Size in.	NPT Size in.	Ordering Number	Dimensions in. (mm)					Uniform O-Ring ^① Size
			A	B	C	E	F	
7/16-20	1/4	SS-4-SAE-1-4HV	1.20 (30.5)	0.36 (9.1)	0.56 (14.2)	0.20 (5.1)	9/16	-904

① O-ring material is 75 durometer fluorocarbon FKM.



Male SAE/MS Straight Thread to Female NPT

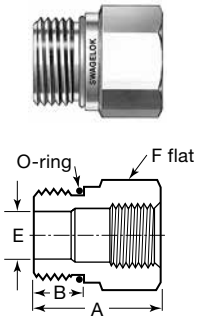
SAE/MS Thread Size in.	NPT Size in.	Ordering Number	Dimensions in. (mm)				Uniform O-Ring ^① Size
			A	B	E	F	
7/16-20	1/4	SS-4-SAE-7-4HV	1.32 (33.5)	0.36 (9.1)	0.20 (5.1)	3/4	-904

① O-ring material is 75 durometer fluorocarbon FKM.

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

Pipe Fittings

Reducers

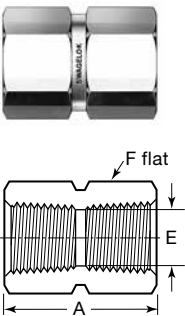


Male to Female SAE/MS Straight Thread (ST)

Male Thread Size in.	Female Thread Size in.	Ordering Number	Dimensions in. (mm)				Uniform O-Ring ^① Size
			A	B	E	F	
9/16-18	7/16-20	SS-6-RBST-4HV	1.12 (28.4)	0.39 (9.9)	0.28 (7.1)	13/16	-906
3/4-16	7/16-20	SS-8-RBSTH-4HV	1.10 (28.0)	0.55 (14.0)	0.39 (9.9)	7/8	-908
	9/16-18	SS-8-RBSTH-6HV	1.31 (33.3)	0.55 (14.0)	0.42 (10.7)	1	-908

① O-ring material is 75 durometer fluorocarbon FKM.

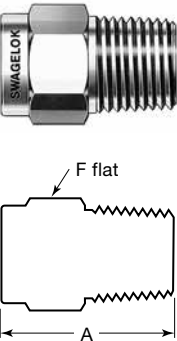
Hex Couplings



Female NPT

NPT Size in.	Ordering Number	Dimensions, in. (mm)		
		A	E	F
1/4	SS-4-HCGHV	1.19 (30.2)	0.45 (11.4)	3/4

Pipe Plugs



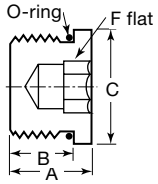
Male NPT

NPT Size in.	Ordering Number	Dimensions in. (mm)	
		A	F
1/4	SS-4-PHV	0.96 (24.4)	9/16

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

Pipe Fittings

Hollow Hex Plugs

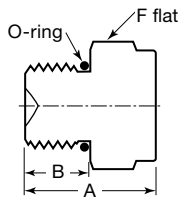


Male SAE/MS Straight Thread (ST) and (STH - Heavy Wall)

SAE/MS Thread Size in.	Ordering Number	Dimensions in. (mm)				Uniform O-Ring ^① Size
		A	B	C	F	
3/8-24	SS-3-HPSTHV	0.39 (9.9)	0.30 (7.6)	0.49 (12.5)	1/8	-903
7/16-20	SS-4-HPSTHV	0.45 (11.4)	0.36 (9.1)	0.56 (14.2)	3/16	-904
9/16-18	SS-6-HPSTHV	0.48 (12.2)	0.39 (9.9)	0.69 (17.5)	1/4	-906
3/4-16	SS-8-HPSTHV	0.67 (17.0)	0.55 (14.0)	0.87 (22.1)	5/16	-908

① O-ring material is 75 durometer fluorocarbon FKM.

Hex Head Plugs



Male SAE/MS Straight Thread (ST) and (STH - Heavy Wall)

SAE/MS Thread Size in.	Basic Ordering Number	Dimensions in. (mm)			Uniform O-Ring ^① Size
		A	B	F	
3/8-24	SS-3-PSTHV	0.68 (17.3)	0.30 (7.6)	1/2	-903
7/16-20	SS-4-PSTHV	0.76 (19.3)	0.36 (9.1)	9/16	-904
9/16-18	SS-6-PSTHV	0.82 (20.8)	0.39 (9.9)	11/16	-906
3/4-16	SS-8-PSTHV	0.99 (25.1)	0.55 (14.0)	7/8	-908

① O-ring material is 75 durometer fluorocarbon FKM.

Additional sizes are available. Contact your local authorized Swagelok sales and service center for details.

Ordering Numbers and Dimensions for EC-79 Certified Valves

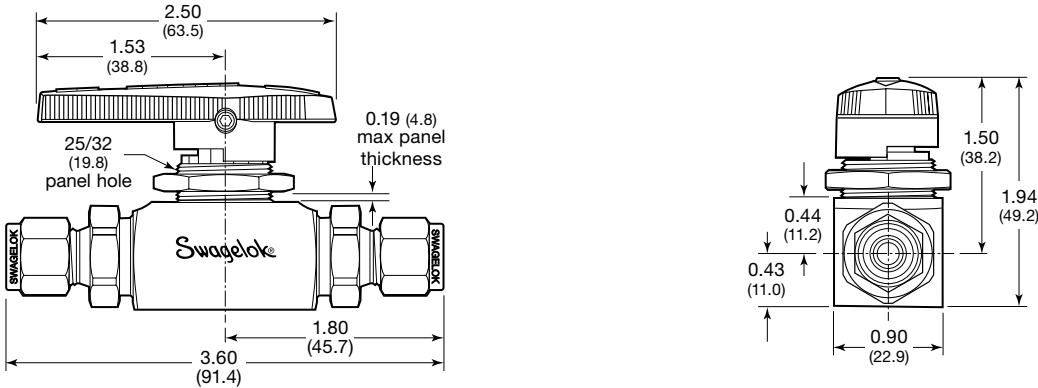
Multipurpose Ball Valve (SK Series)

Pressure rating: 260 bar at -40 to 120°C (3 770 psig at -40 to 248°F)

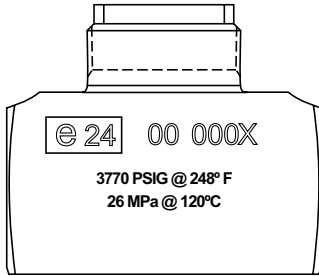
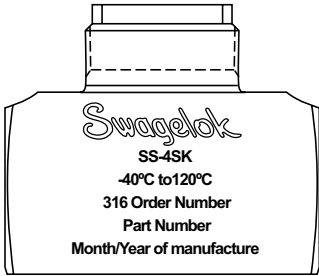
End connection: 10 mm Swagelok tube fitting

Ordering number: SS-4SKPS10MM-33397

Dimensions



Marking



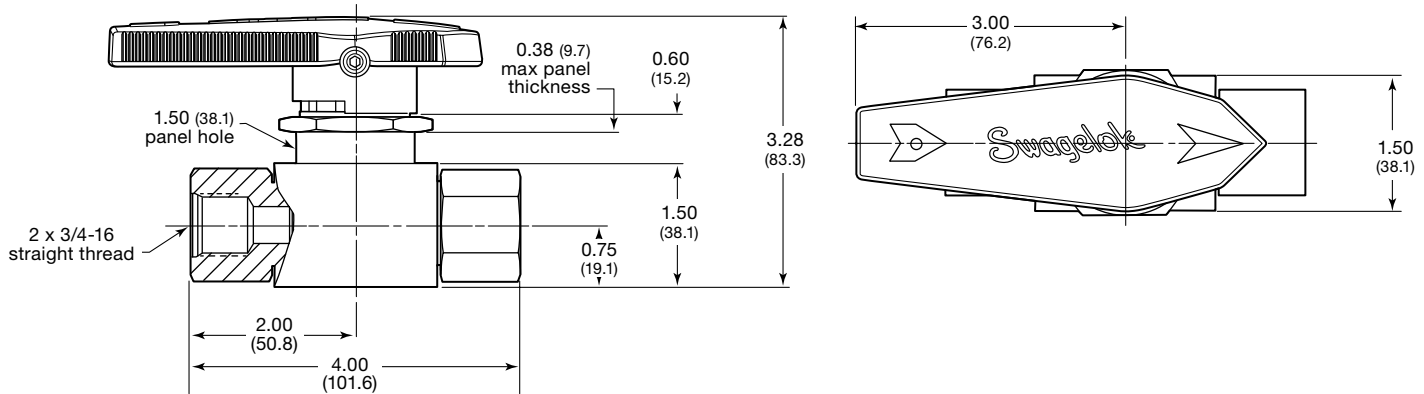
Alternative Fuel Service Ball Valve (AFS Series)

Pressure rating: 6 000 psig at -40 to 248°F (413.7 bar at -40 to 120°C)

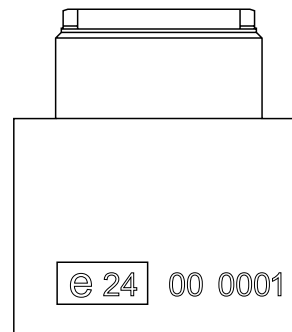
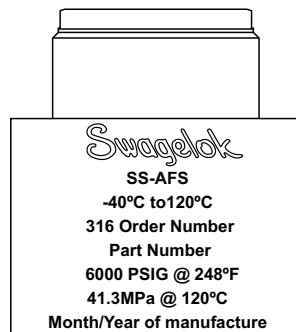
End connection: 3/4 – 16 SAE/MS Female

Ordering number: SS-AFSMS8-30259

Dimensions



Marking



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.

⚠ WARNING

Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.

Warranty Information

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