

Swagelok® Alternative Fuel Service (AFS) Ball Valves

For High-Pressure, High-Flow Applications

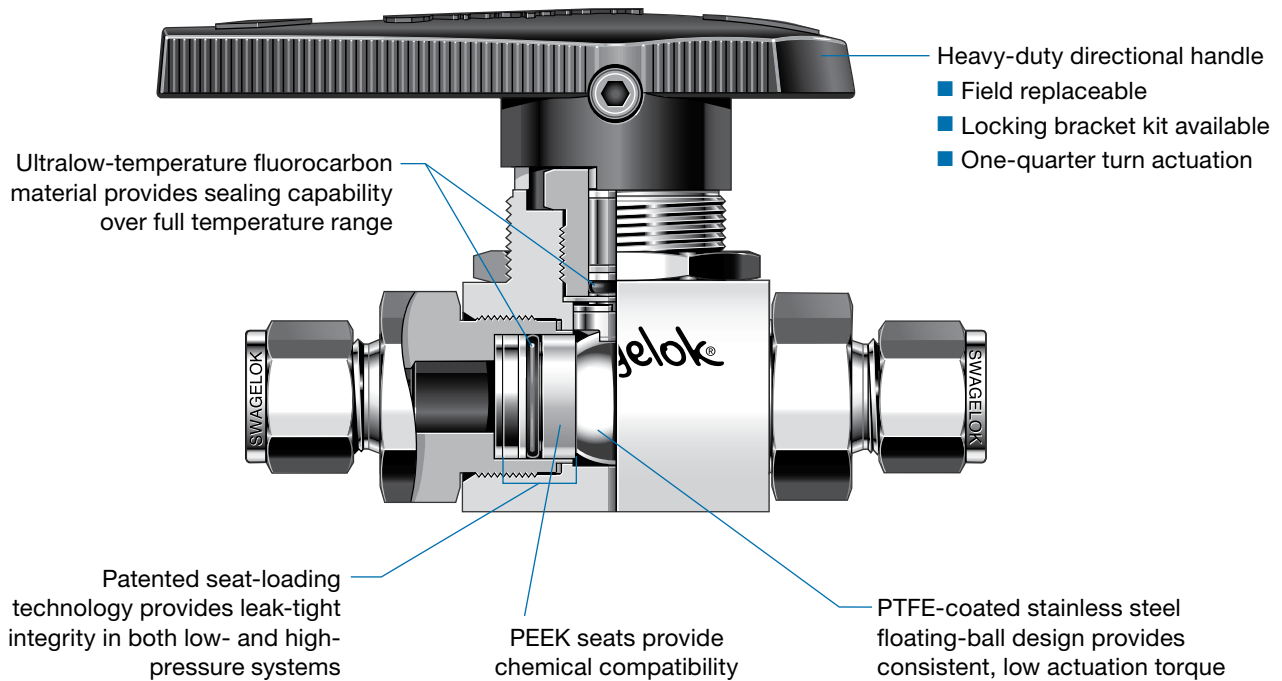


AFS
BALL

Swagelok AFS Ball Valves

- Working pressures up to 6000 psig (413 bar)
- Flow coefficients (C_v) from 4.0 to 13.8
- Fractional and metric Swagelok tube fittings; ISO and NPT pipe end connections available
- 316 stainless steel body and end connections
- Manual and pneumatic actuation

Swagelok Alternative Fuel Service (AFS) Ball Valves



Features

- High flow— C_v from 4.0 to 13.8
- All wetted components are compatible with hydrogen and compressed natural gas (CNG)
- Maximum pressure rating: 6000 psig (413 bar)
- Temperature rating: -40 to 250°F (-40 to 121°C)
- Low operating torque
- No packing adjustment required
- Field repairable with seal kit

Pressure-Temperature Ratings

End Connections	Swagelok Tube Fittings			Female Pipe	
	3/8, 1/2 in., 12 mm	3/4 in., 16 mm	1 in.	3/8, 1/2 in.	3/4 in.
Temperature, $^{\circ}\text{F}$ ($^{\circ}\text{C}$)	Working Pressure, psig (bar)				
-40 (-40) to 200 (93)	6000 (413)	5800 (400)	4700 (323)	6000 (413)	5532 (381)
250 (121)	6000 (413)	5742 (395)	4653 (320)	6000 (413)	5532 (381)

Ratings are based on ASME Code for Pressure Piping B31.3, Process Piping. To determine working pressure ratings in accordance with ASME B31.1, Power Piping, for 316 stainless steel, multiply pressure by:

- 0.86 for temperatures from 100 to 200°F (37 to 93°C).
- 0.82 for temperatures up to 250°F (121°C).

Important Information About Swagelok AFS Ball Valves

- ⚠ Swagelok AFS ball valves are designed to be used in the fully open or fully closed position.
- ⚠ Valves that have not been cycled for a period of time may have a higher initial actuation torque.

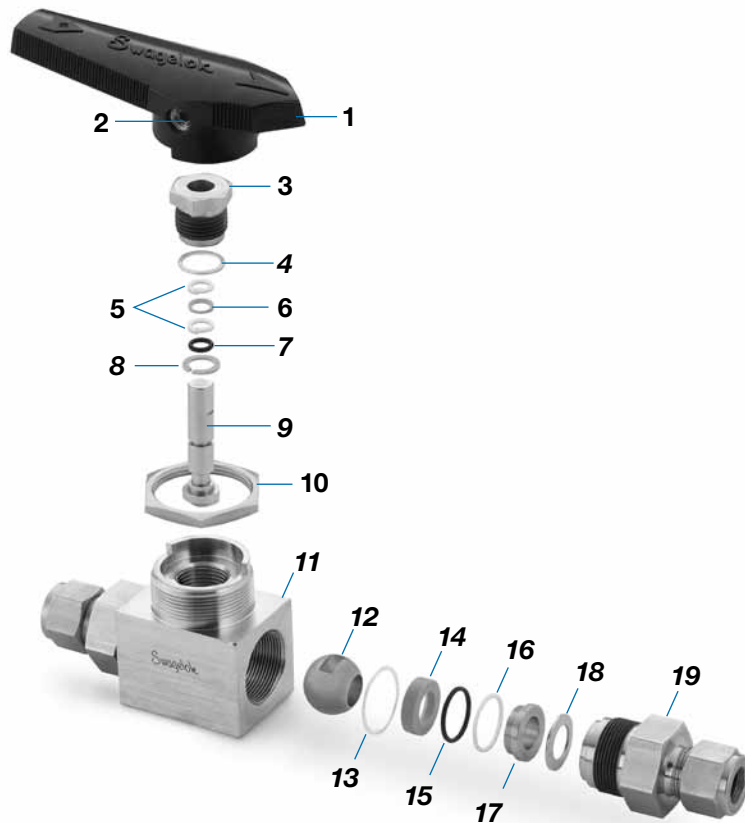
Certifications

- ANSI / AGA NGV 3.1 / CGA 12.3-M95, Classification: Manual valve
Pressure: 4500 psig (310 bar)
Temperature: -40 to 250°F (-40 to 121°C)
- ANSI / IAS NGV 4.6 / CSA 12.56-M99, Classification: Class A
Pressure: 4500 psig (310 bar)
Temperature: -40 to 185°F (-40 to 85°C)
- ECE R110 Manual Service Valve Type Approval
Classification: Class 0
Pressure: 3770 psig (260 bar)
Temperature: -40 to 248°F (-40 to 120°C)
- Certifications do not include attachments to the valve, such as actuators or a different handle mechanism.

Materials of Construction

Component	Material Grade/ ASTM Specification
1 Handle	Nylon with brass insert
2 Set screw	S17400 SS
3 Packing bolt	316 SS / A479
4 Packing bolt gasket	Silver-plated 316 SS / A240
5 Guide ring (2)	PTFE / D1710
6 Stem backup ring	PEEK
7 Stem O-ring	Ultralow-temperature fluorocarbon / D2000
8 Thrust washer	PEEK
9 Stem	316 SS / A276
10 Panel nut	316 SS / B783
11 Body	316 SS / A479
12 Ball	PTFE-coated 316 SS / A276
13 End screw gasket (2)	Silver-plated 316 SS / A240
14 Seat (2)	PEEK
15 Seat O-ring (2)	Ultralow-temperature fluorocarbon / D2000
16 Seat backup ring (2)	PTFE / D1710
17 Seat gland (2)	316 SS / A479
18 Seat spring (2)	316 SS / A240 or A666
19 End screw (2)	316 SS / A479
Lubricant	PTFE-based

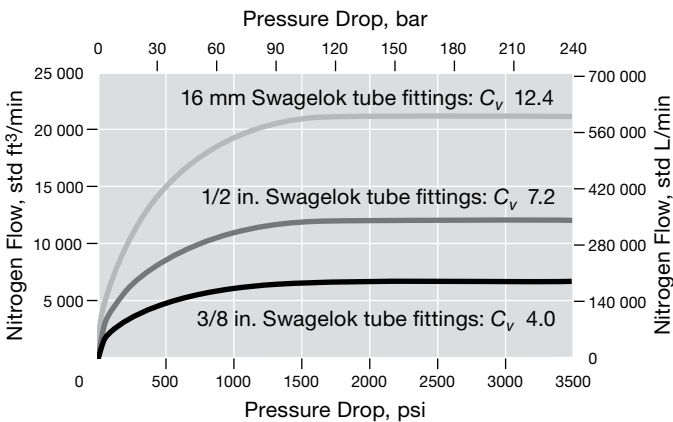
Wetted components listed in *italics*.



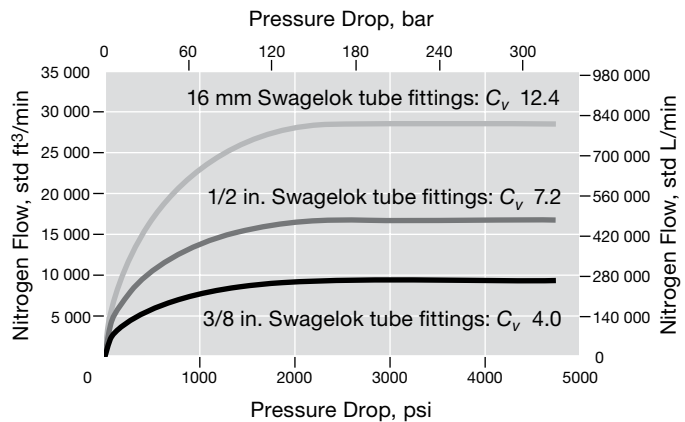
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Flow Data at 70°F (20°C)

Inlet Pressure 3600 psig (248 bar)



Inlet Pressure 5000 psig (344 bar)



Testing

Every Swagelok AFS ball valve is factory tested in both directions with nitrogen at 1000 psig (69 bar). Seats have a maximum allowable leak rate of 0.1 std cm³/min. Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

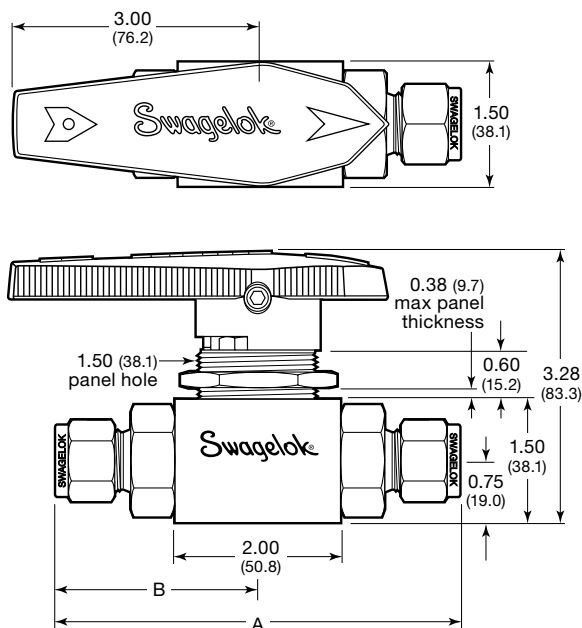
Cleaning and Packaging

All Swagelok AFS ball valves are cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging* (SC-10) (MS-06-62), page 1174.

Ordering Information and Dimensions

Select an ordering number.

Dimensions, in inches (millimeters), are for reference only and are subject to change.



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End Connections ^①		Ordering Number	C _v	Orifice in. (mm)	Dimensions in. (mm)	
Type	Size				A	B
Fractional Swagelok tube fitting	3/8 in.	SS-AFSS6	4.0	0.281 (7.1)	4.57 (116)	2.29 (58.2)
	1/2 in.	SS-AFSS8	7.2	0.406 (10.3)	4.80 (122)	2.40 (61.0)
	3/4 in.	SS-AFSS12	7.1	0.472 (12.0)	4.80 (122)	2.40 (61.0)
	1 in.	SS-AFSS16 ^②	6.5	0.472 (12.0)	5.10 (130)	2.55 (64.8)
Metric Swagelok tube fitting	12 mm	SS-AFSS12MM	5.2	0.406 (10.3)	4.80 (122)	2.20 (55.9)
	16 mm	SS-AFSS16MM	12.4	0.472 (12.0)	4.80 (122)	2.40 (61.0)
Female NPT	3/8 in.	SS-AFSF6	11.0	0.472 (12.0)	4.00 (102)	2.00 (50.8)
	1/2 in.	SS-AFSF8	13.8		4.00 (102)	2.00 (50.8)
	3/4 in.	SS-AFSF12 ^②	7.8		4.12 (105)	2.06 (52.3)
Female ISO tapered ^③	1/2 in.	SS-AFSF8RT	13.8	0.472 (12.0)	4.00 (102)	2.00 (50.8)

Dimensions shown with Swagelok tube fitting nuts finger-tight.

① Valves can be ordered with two different end connections. Contact your authorized Swagelok sales and service representative.

② Not available with AGA, IAS, and ECE R110 certifications; not recommended for panel mounting; not available with pneumatic actuator.

③ Thread type ISO/BSP (tapered), based on DIN 3852, Swagelok RT fittings. See specifications ISO 7/1, BS EN ISO 10226-1, and JIS B0203.

Options and Accessories

Handle Options

Black nylon directional handles are standard.

- To order a directional handle of another color, add a handle color designator to the valve ordering number.

Handle Color	Designator
Blue	-BL
Green	-GR
Orange	-OG
Red	-RD
Yellow	-YW

Example: SS-AFSS6-RD

- To order a nylon oval handle, add **-K** to the valve ordering number.

Example: SS-AFSS6-K

- To order a black aluminum directional handle, add **-AHD** to the valve ordering number.

Example: SS-AFSS6-AHD



Handle Kits

The replacement handle kit includes a handle with set screw and instructions.

- Black nylon directional handle kit ordering number: **NY-5K-AFS-BK**

To order a nylon directional handle kit in a color other than black, replace **-BK** in the kit ordering number with a handle color designator.

Example: NY-5K-AFS-RD

- Nylon oval handle kit ordering number: **NY-5K-AFSK-BK**
- Black aluminum directional handle kit ordering number: **A-5K-AFS-BK**

Stem Seal Material Option

Ultralow-temperature fluorocarbon FKM is standard. Ultralow-temperature nitrile (Buna C) is available as an option to enhance valve cycle life. Valves with ultralow-temperature nitrile have a temperature rating of -40 to 200°F (-40 to 93°C) and are not certified to AGA, IAS, or ECE R110.

To order, add **-BCS** to the valve ordering number.

Example: SS-AFSS6-BCS

Locking Brackets



- Designed to lock valve in the open and closed position
- Accommodates shackle diameters up to 0.344 in. (8.7 mm)
- To order the locking bracket factory-assembled on a valve, add **-LH** to the valve ordering number.

Example: SS-AFSS6-LH

To order the locking bracket for field assembly, use kit ordering number: **SS-51K-AFS-LH**

Swagelok Pneumatic Actuators



The Swagelok rack and pinion pneumatic actuator is compact, lightweight, easily mountable, and can be operated with standard shop air. The actuators are available in spring-return and double-acting modes.

For technical data, including materials of construction, air displacement, and weight, see the *Swagelok Ball Valve Actuation Options* catalog (MS-02-343), page 468.

⚠ Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in shorter valve life.

Ordering Information

Factory Assembly

Typical Ordering Number

Valve Ordering Number: **SS-AFSS6 - 33 D HT**

Actuator Model: **D**

Actuation Mode: **HT**

Actuator Service: **HT**

D = Double acting
C = Normally closed spring return
O = Normally open spring return

None = Standard
HT = High temperature
LT = Low temperature^①

For dual-mounted assemblies (two valves mounted to one actuator), add **DM** to the ordering number. Example: SS-AFSS6-33DHTDM

Actuator Service Ratings

Actuator Service	Temperature °F (°C)	Maximum Actuator Pressure, psig (bar)	
		At 100°F (37°C)	At Maximum Temperature
Standard	-20 to 200 (-28 to 93)	200 (13.7)	165 (11.3)
High temperature	0 to 400 (-17 to 204)		100 (6.8)
Low temperature ^①	-40 to 200 (-40 to 93)		165 (11.3)

^① Maximum working pressure for valves mounted to low-temperature service actuators is 4500 psig (310 bar).

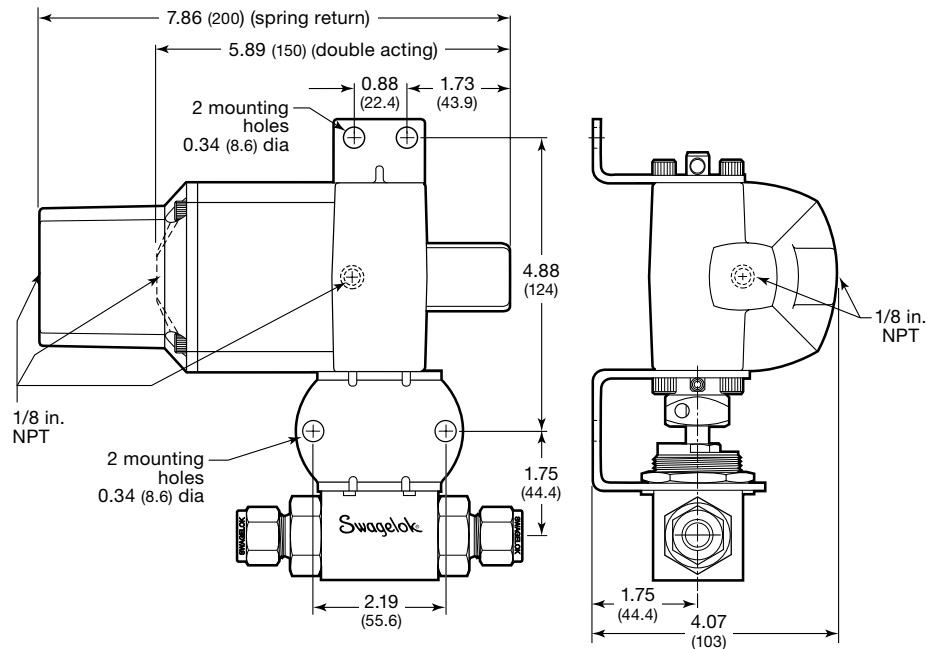
Actuator Pressure at Maximum System Pressure

Required pressures based on valve performance using pressurized air or nitrogen.

Actuator Model	Actuation Modes			
	Spring Return		Double Acting	
	Single	Dual	Single	Dual
	Minimum Actuator Pressure, psig (bar) at 100°F (37°C)			
133	80 (5.6)	—	40 (2.8)	80 (5.6)

Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.



Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Mounting bracket kit ordering number:
MS-MB-AFS-133

Actuator Mode	Actuator Service	Kit Ordering Number
Spring return	Standard	MS-133-SR
	High temperature	MS-133-SR-HT
	Low temperature ^①	MS-133-SR-LT
Double acting	Standard	MS-133-DA
	High temperature	MS-133-DA-HT
	Low temperature ^①	MS-133-DA-LT

^① Maximum working pressure for valves mounted to low-temperature service actuators is 4500 psig (310 bar).

ISO 5211-Compliant Pneumatic Actuators



Swagelok ISO 5211-compliant rack and pinion pneumatic actuators are available in spring-return and double-acting modes.

For technical data, including actuator materials of construction and weight, see the *Swagelok Ball Valve Actuation Options* catalog (MS-02-343), page 468.

For additional information on selecting and sizing ISO 5211-compliant actuators, see the *Actuated Ball Valve Selection Guide—ISO 5211-Compliant Actuator Mounting Bracket Kits*, (MS-02-136), page 484.

⚠ Actuated assemblies must be properly aligned and supported. Improper alignment or inadequate support of the actuated assembly may result in shorter valve life.

Actuator Service Ratings

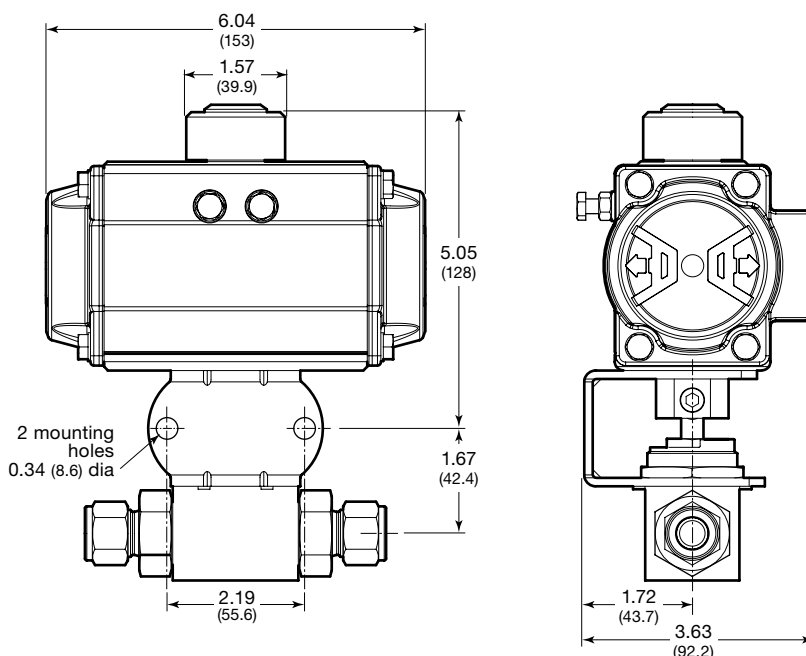
Actuator Service	Temperature Range °F (°C)	Maximum Actuator Pressure, psig (bar)
Standard	–40 to 176 (–40 to 80)	116 (7.9)
High temperature	5 to 302 (–15 to 150)	

Minimum Actuator Pressure

Actuator Model	Actuation Modes	
	Spring Return	Double Acting
	Minimum Actuator Pressure, psig (bar)	
A30	55 (3.8)	40 (2.8)

Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.



Ordering Information

Factory Assembly

Typical Ordering Number

SS-AFSS6 - A30 D HT
 Valve Ordering Number Actuator Model Actuator Service
 None = Standard
 HT = High temperature
 Actuation Mode
 D = Double acting
 C4 = Normally closed spring return
 O4 = Normally open spring return

Field Assembly

Order one actuator kit and one mounting bracket kit for each valve.

Mounting bracket kit ordering number:

SS-MB-45-F05-14DIN-M

Actuator Mode	Actuator Service	Kit Ordering Number
Spring return	Standard	MS-A30-4-DIN
	High temperature	MS-A30-4-DIN-HT
Double acting	Standard	MS-A30-DA-DIN
	High temperature	MS-A30-DA-DIN-HT

Options for ISO 5211-Compliant and Swagelok Pneumatic Actuators

Swagelok offers a range of accessories to enhance instrumentation and process ball valve performance and control, including solenoid valves, limit switches, and position sensors. Factory assemblies and kits for field assembly are available.

For more information, see the *Swagelok Ball Valve Actuation Options* catalog (MS-02-343), page 468.



Maintenance Kits

Kit components are of the same materials and grades listed in **Materials of Construction**, page 463.

Seat Seal Kits

The seat seal kit contains two seats, seat O-rings, seat backup rings, seat springs, end screw gaskets, lubricant with Material Safety Data Sheet (MSDS), and instructions.

Kit ordering number: **SS-9K-AFS**

Stem and Seat Seal Kits

The stem and seat seal kit contains a stem O-ring, two guide rings, stem backup ring, thrust washer, packing bolt gasket, two seats, seat O-rings, seat backup rings, seat springs, end screw gaskets, lubricant with Material Safety Data Sheet (MSDS), and instructions.

Kit ordering number: **SS-91K-AFS**

To order a kit with a stem O-ring of optional ultralow-temperature nitrile (Buna C) material, use kit ordering number: **SS-91K-AFS-BCS**

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Caution: Do not mix or interchange valve components 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
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MAC—TM MAC Valves Inc.
Microsoft, Windows—TM Microsoft Corp.
NACE—TM NACE International
picofast—TM HansTurck KG
Pillar—TM Nippon Pillar Packing Company, Ltd.
15-7 PH, 17-7 PH—TM AK Steel Corp.
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