

# Swagelok® Alternative Fuel Service (AFS) Ball Valves

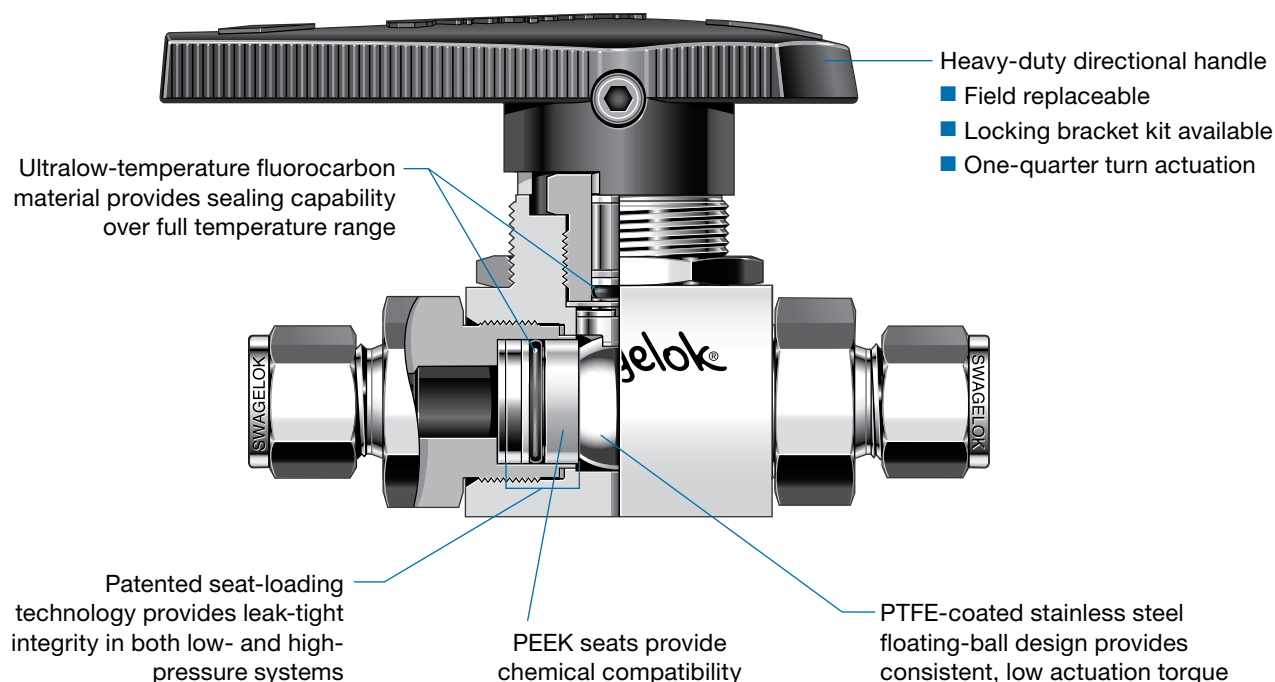
For High-Pressure, High-Flow Applications



## 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  $250^\circ\text{F}$  ( $-40$  to  $121^\circ\text{C}$ )
- Low operating torque
- No packing adjustment required
- Field repairable with seal kit

### 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.**

### Low Fugitive Emissions

The American Petroleum Institute's API 641 tests for fugitive emissions to atmosphere for quarter-turn ball valves. The tests are conducted at a third party lab and certify that at no point in the test did the valve leak in excess of 100 ppm of methane. Certificates stating that the valve is certified for Low Emissions are available for valves with standard Fluorocarbon Stem O-rings. For more information, contact your authorized Swagelok sales and service representative.

### 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:

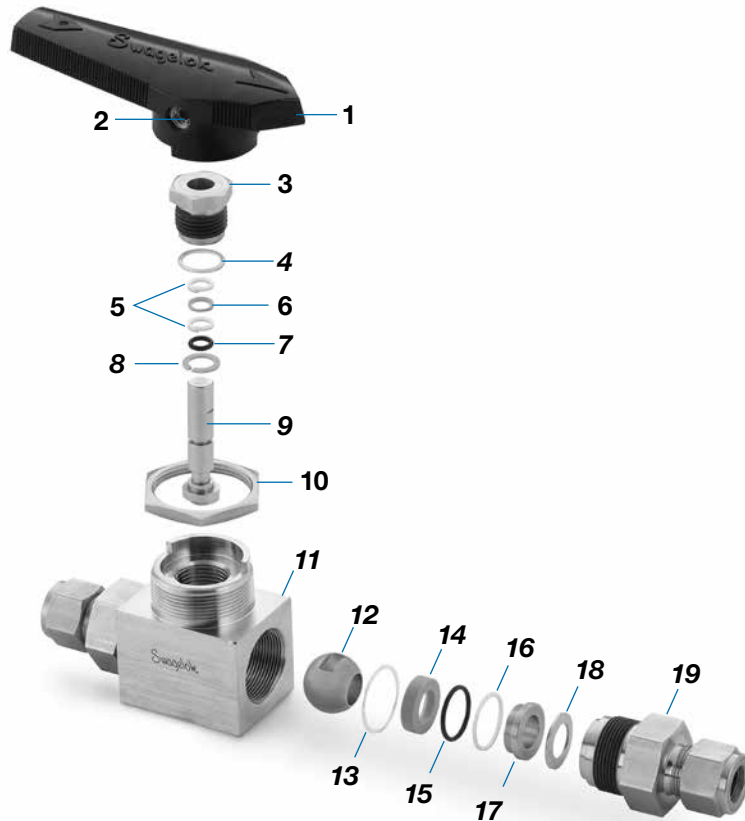
- 0.86 for temperatures from  $100$  to  $200^\circ\text{F}$  ( $37$  to  $93^\circ\text{C}$ ).
- 0.82 for temperatures up to  $250^\circ\text{F}$  ( $121^\circ\text{C}$ ).

### Certifications

- ANSI / NGV 3.1-2014 / CSA 12.3-2014, Classification: Manual valve  
Pressure: 3600 psig (248 bar)  
Temperature:  $-40$  to  $250^\circ\text{F}$  ( $-40$  to  $121^\circ\text{C}$ )
- ANSI / IAS NGV 4.6-1999 / CSA 12.56-M99, Classification: Class A  
Pressure: 4500 psig (310 bar)  
Temperature:  $-40$  to  $185^\circ\text{F}$  ( $-40$  to  $85^\circ\text{C}$ )
- ECE R110 Manual Service Valve Type Approval  
Classification: Class 0  
Pressure: 3770 psig (260 bar)  
Temperature:  $-40$  to  $248^\circ\text{F}$  ( $-40$  to  $120^\circ\text{C}$ )
- Certifications do not include attachments to the valve, such as actuators or a different handle mechanism.

## Materials of Construction

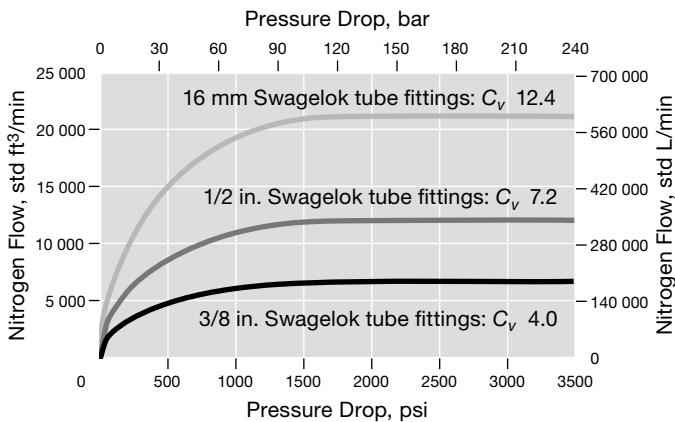
Component	Material Grade/ ASTM Specification
1 Handle	Nylon with stainless steel insert
2 Set screw	S17400 SS
3 Packing bolt	316 SS / A479
4 Packing bolt gasket	Silver-plated 316 SS / A240
5 Guide ring (2)	PTFE / D1710
6 Stem backup ring	PEEK
7 Stem O-ring	Ultralow-temperature fluorocarbon / D2000
8 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



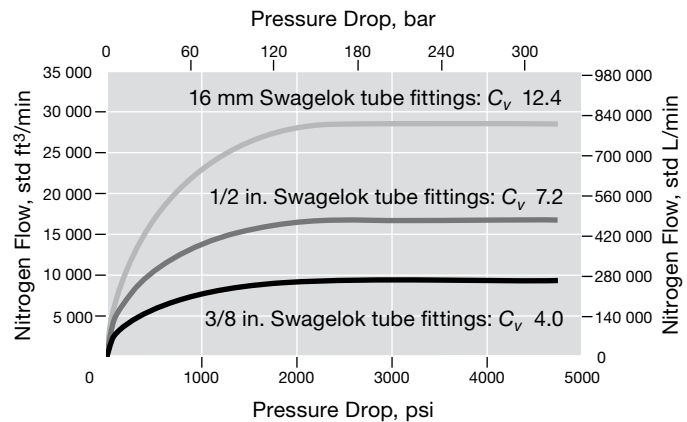
Wetted components listed in *italics*.

## 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 cm<sup>3</sup>/min. Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

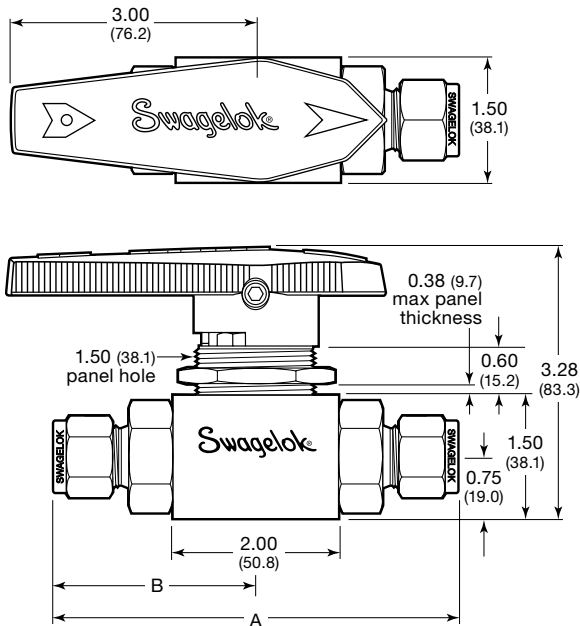
## Cleaning and Packaging

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

## Ordering Information and Dimensions

Select an ordering number.

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



End Connections <sup>①</sup>		Ordering Number	C <sub>v</sub>	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 <sup>②</sup>	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)	2.40 (61.0)
	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 <sup>②</sup>	7.8	4.12 (105)	2.06 (52.3)	
Female ISO tapered <sup>③</sup>	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, refer to *Ball Valve Actuation Options* catalog, [MS-02-343](#).

**⚠ 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 °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 <sup>①</sup>	-40 to 200 (-40 to 93)		165 (11.3)

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

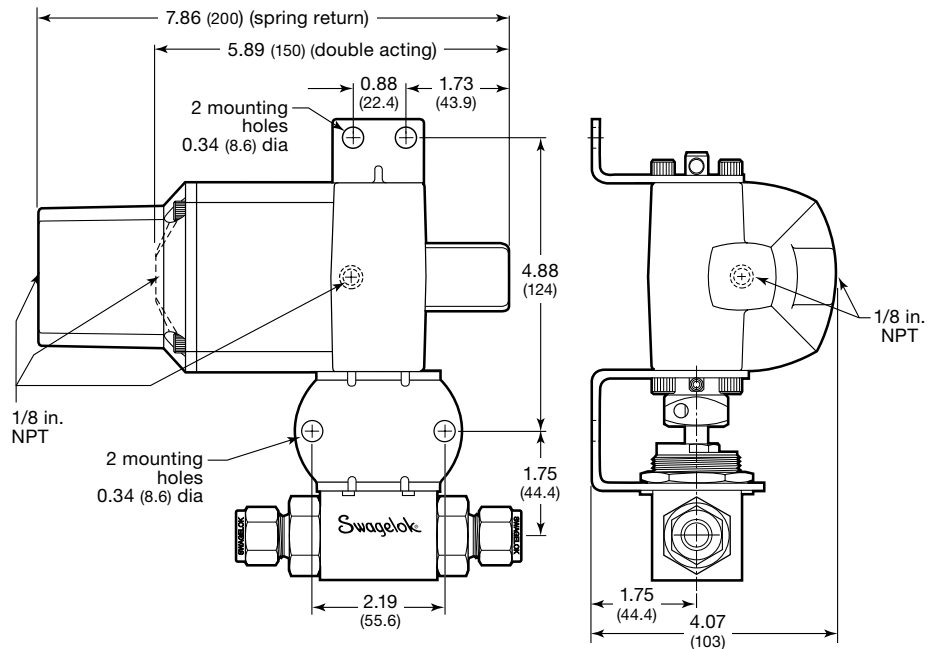
## Actuator Pressure at Maximum System Pressure

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

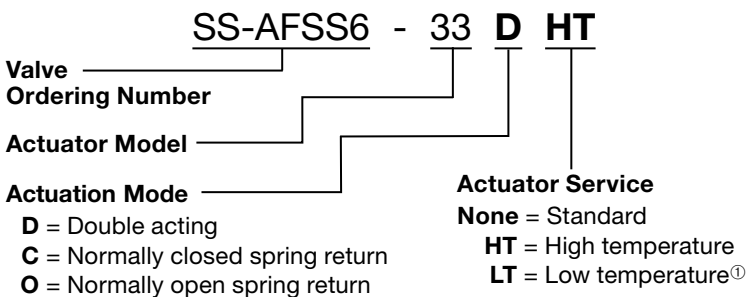
Dimensions, in inches (millimeters), are for reference only and are subject to change.



## Ordering Information

### Factory Assembly

#### Typical Ordering Number



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

### Field Assembly

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

Mounting bracket kit ordering number: **SS-MB-AFS-133**

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

<sup>①</sup> 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, refer to *Ball Valve Actuation Options* catalog, [MS-02-343](#).

For additional information on selecting and sizing ISO 5211-compliant actuators, refer to *Actuated Ball Valve Selection Guide—ISO 5211-Compliant Actuator Mounting Bracket Kits* catalog, [MS-02-136](#).

**⚠ 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

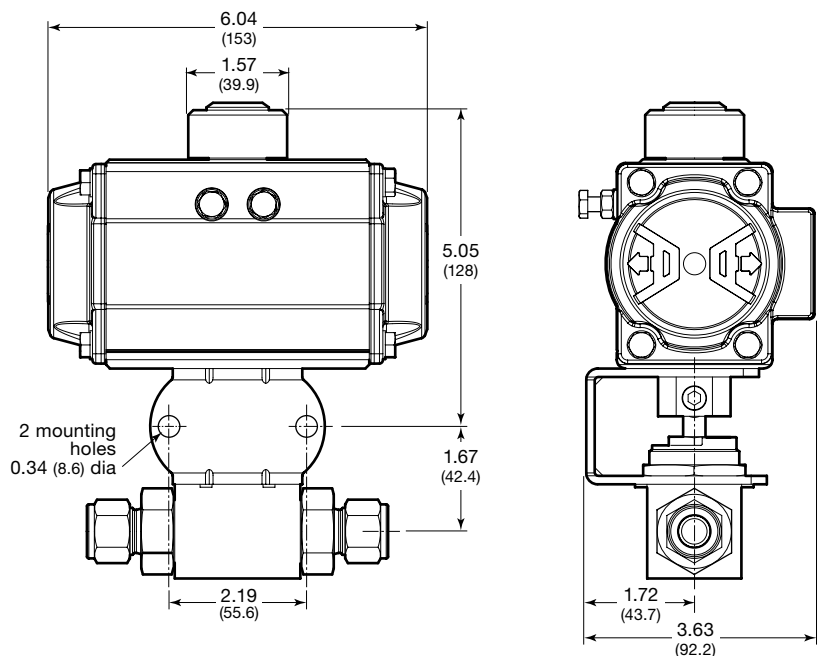
Actuator Service	Temperature Range °F (°C)	Maximum Actuator Pressure, psig (bar)
Standard	-40 to 176 (-40 to 80)	116 (7.9)
High temperature	5 to 302 (-15 to 150)	

## Minimum Actuator Pressure

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

## Dimensions

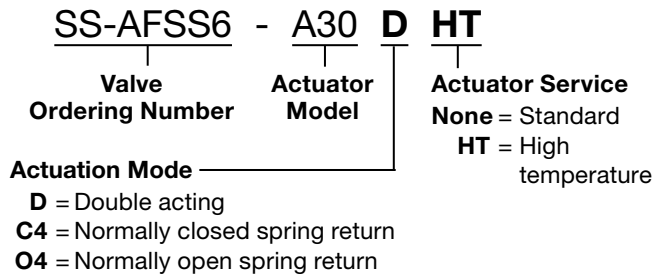
Dimensions, in inches (millimeters), are for reference only and are subject to change.



## Ordering Information

### Factory Assembly

#### Typical Ordering Number



### Field Assembly

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

Mounting bracket kit ordering number:

**SS-MB-AFS-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.

Refer to *Ball Valve Actuation Options* catalog, [MS-02-343](#), for additional information.



## Maintenance Kits

Kit components are of the same materials and grades listed in **Materials of Construction**, page 3.

### 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**

#### **⚠ 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.**

## Introduction

Since 1947, Swagelok has designed, developed, and manufactured high-quality, general-purpose and specialty fluid system products to meet the evolving needs of global industries. Our focus is on understanding our customers' needs, finding timely solutions, and adding value with our products and services.

We are pleased to provide this global edition of the book-bound *Swagelok Product Catalog*, which compiles more than 100 separate product catalogs, technical bulletins, and reference documents into one convenient, easy-to-use volume. Each product catalog is up to date at the time of printing, with its revision number shown on the last page of the individual catalog. Subsequent revisions will supersede the printed version and will be posted on the Swagelok website and in the Swagelok electronic Desktop Technical Reference (eDTR) tool.

For more information, visit your Swagelok website or contact your authorized Swagelok sales and service representative.

## Warranty Information

Swagelok products are backed by The Swagelok Limited Life-time Warranty. For a copy, visit [swagelok.com](http://swagelok.com) or contact your authorized Swagelok representative.

### 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.**

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15-7 PH—TM AK Steel Corp.  
AccuTrak, Beacon, Westlock—TM Tyco International Services  
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