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

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Swagelok Alternative Fuel Service (AFS) Ball Valves

Features
- High flow—Cv 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

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.

Certifications
- ANSI / NGV 3.1-2014 / CSA 12.3-2014,
  Classification: Manual valve
  Pressure: 3600 psig (248 bar)
  Temperature: –40 to 250°F (–40 to 121°C)
- ANSI / IAS NGV 4.6-1999 / 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.

Pressure-Temperature Ratings

<table>
<thead>
<tr>
<th>Temperature, °F (°C)</th>
<th>Working Pressure, psig (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>–40 (–40) to 200 (93)</td>
<td>6000 (413) 6800 (473)</td>
</tr>
<tr>
<td>250 (121)</td>
<td>6000 (413) 5742 (395)</td>
</tr>
</tbody>
</table>

Ratings are based on ASME Code for Pressure Piping B31.1, Power Piping. To determine working pressure ratings in accordance with ASME 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).
Materials of Construction

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

Wetted components listed in italics.

Flow Data at 70°F (20°C)

### Inlet Pressure 3600 psig (248 bar)

![Flow Data Graph 1](image1)

- 16 mm Swagelok tube fittings: $C_v = 12.4$
- 1/2 in. Swagelok tube fittings: $C_v = 7.2$
- 3/8 in. Swagelok tube fittings: $C_v = 4.0$

### Inlet Pressure 5000 psig (344 bar)

![Flow Data Graph 2](image2)

- 16 mm Swagelok tube fittings: $C_v = 12.4$
- 1/2 in. Swagelok tube fittings: $C_v = 7.2$
- 3/8 in. Swagelok tube fittings: $C_v = 4.0$

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) 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.

<table>
<thead>
<tr>
<th>End Connections</th>
<th>Ordering Number</th>
<th>C_v</th>
<th>Orifice in. (mm)</th>
<th>Dimensions in. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
<td>Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fractional</td>
<td>3/8 in.</td>
<td>SS-AFSS6</td>
<td>4.0</td>
<td>0.281 (7.1)</td>
</tr>
<tr>
<td>Swagelok tube</td>
<td>1/2 in.</td>
<td>SS-AFSS8</td>
<td>7.2</td>
<td>0.406 (10.3)</td>
</tr>
<tr>
<td>fitting</td>
<td>3/4 in.</td>
<td>SS-AFSS12</td>
<td>7.1</td>
<td>0.472 (12.0)</td>
</tr>
<tr>
<td>Metric</td>
<td>1 in.</td>
<td>SS-AFSS16</td>
<td>6.5</td>
<td>0.472 (12.0)</td>
</tr>
<tr>
<td>Swagelok tube</td>
<td>12 mm</td>
<td>SS-AFSS12MM</td>
<td>5.2</td>
<td>0.406 (10.3)</td>
</tr>
<tr>
<td>fitting</td>
<td>16 mm</td>
<td>SS-AFSS16MM</td>
<td>12.4</td>
<td>0.472 (12.0)</td>
</tr>
<tr>
<td>Female NPT</td>
<td>3/8 in.</td>
<td>SS-AFSSF6</td>
<td>11.0</td>
<td>4.00 (102)</td>
</tr>
<tr>
<td></td>
<td>1/2 in.</td>
<td>SS-AFSSF8</td>
<td>13.8</td>
<td>0.472 (12.0)</td>
</tr>
<tr>
<td></td>
<td>3/4 in.</td>
<td>SS-AFSSF12</td>
<td>7.8</td>
<td>4.12 (105)</td>
</tr>
<tr>
<td>Female ISO</td>
<td>1/2 in.</td>
<td>SS-AFSSF8RT</td>
<td>13.8</td>
<td>0.472 (12.0)</td>
</tr>
<tr>
<td>tapered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dimensions shown with Swagelok tube fitting nuts finger-tight.

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

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

➌ 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.

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 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.

Ordering Information

Factory Assembly

Typical Ordering Number

Valve Ordering Number

Actuator Model

Actuation Mode

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

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: MS-MB-AFS-133

Actuator Service Ratings

<table>
<thead>
<tr>
<th>Actuator Service</th>
<th>Temperature °F (°C)</th>
<th>Maximum Actuator Pressure, psig (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At 100°F (37°C)</td>
<td>At Maximum Temperature</td>
</tr>
<tr>
<td>Standard</td>
<td>–20 to 200 (–28 to 93)</td>
<td>200 (13.7)</td>
</tr>
<tr>
<td>High temperature</td>
<td>0 to 400 (–17 to 204)</td>
<td>100 (6.8)</td>
</tr>
<tr>
<td>Low temperature</td>
<td>–40 to 200 (–49 to 93)</td>
<td>165 (11.3)</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Actuator Model</th>
<th>Actuation Modes</th>
<th>Spring Return</th>
<th>Double Acting</th>
</tr>
</thead>
<tbody>
<tr>
<td>133</td>
<td>Minimum Actuator Pressure, psig (bar)</td>
<td>Single</td>
<td>Double</td>
</tr>
<tr>
<td></td>
<td>At 100°F (37°C)</td>
<td>Single</td>
<td>Dual</td>
</tr>
</tbody>
</table>

1/8 in. NPT

Dimensions

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

### Ordering Information

#### Factory Assembly

**Typical Ordering Number**

<table>
<thead>
<tr>
<th>SS-AFSS6</th>
<th>A30</th>
<th>D</th>
<th>HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve Ordering Number</td>
<td>Actuator Model</td>
<td>Actuation Mode</td>
<td>Actuator Service</td>
</tr>
</tbody>
</table>

*Actuation Mode*

- **D** = Double acting
- **C4** = Normally closed spring return
- **O4** = Normally open spring return

*Actuator Service*

- **None** = Standard
- **HT** = High temperature

### 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**

<table>
<thead>
<tr>
<th>Actuator Mode</th>
<th>Actuator Service</th>
<th>Kit Ordering Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring return</td>
<td>Standard</td>
<td>MS-A30-4-DIN</td>
</tr>
<tr>
<td></td>
<td>High temperature</td>
<td>MS-A30-4-DIN-HT</td>
</tr>
<tr>
<td>Double acting</td>
<td>Standard</td>
<td>MS-A30-DA-DIN</td>
</tr>
<tr>
<td></td>
<td>High temperature</td>
<td>MS-A30-DA-DIN-HT</td>
</tr>
</tbody>
</table>
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.

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**Warranty Information**

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

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**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.

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⚠️ **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.