Building connections that last™

ASC Engineered Solutions

# Series C80/FSC80 & C89/FSC89

## Cryogenic, Three-Piece Ball Valve Datasheet


SHARPE An ASC Engineered Solution

Lockable handle (standard) for padlocking valves in the open or closed position

Integral ISO 5211 mounting pad for mounting actuators and other accessories.

Extended bonnet, securely bolted to the valve's mounting pad, creates a gas column that maintains stem packing performance by separating stem seals from cryogenic fluid.

One-piece, cast bonnet (gas column)

- ☑ Not fabricated
- ☑ Not welded
- ☑ Not soldered

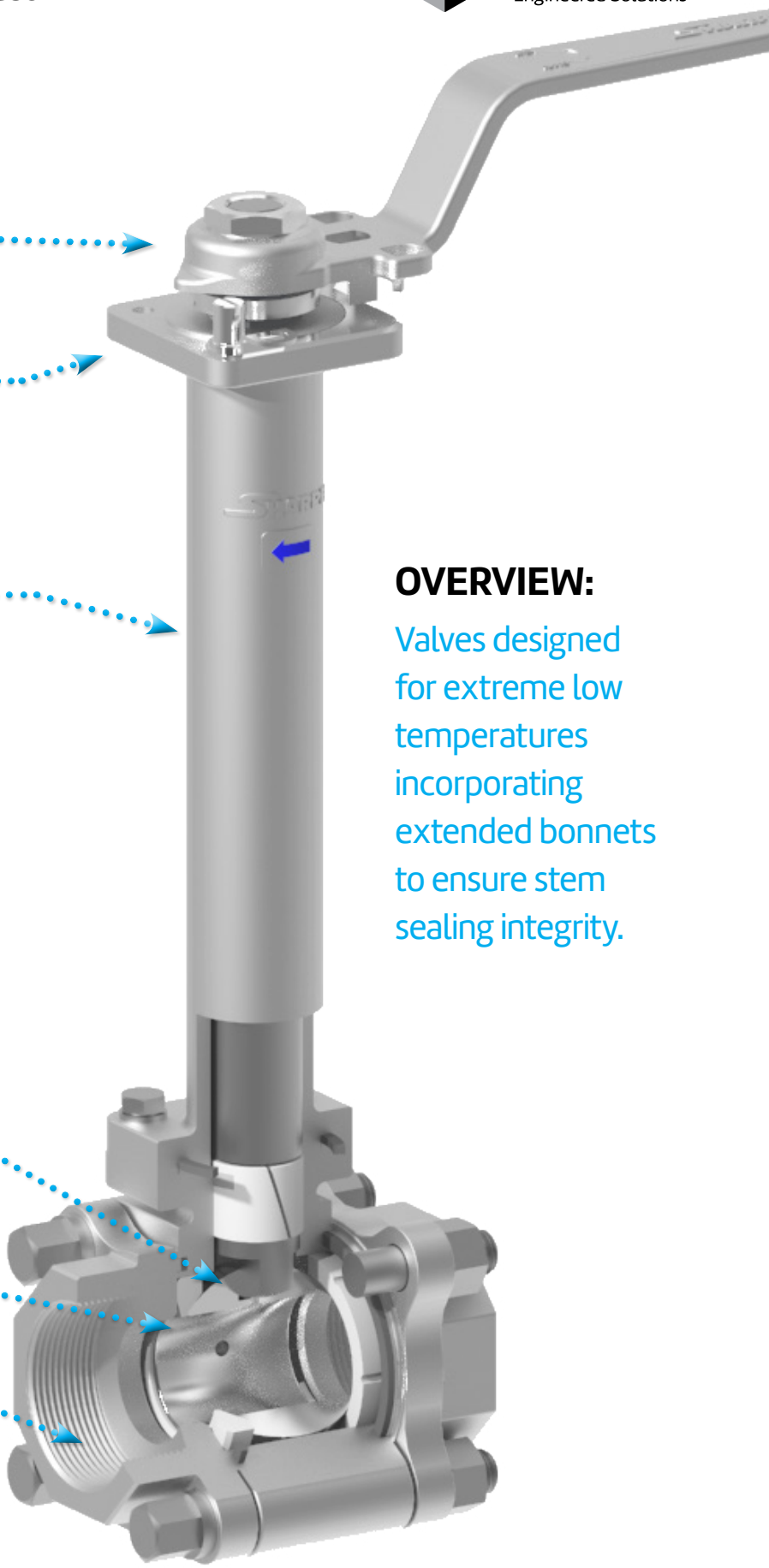
Extension length in accordance with BS 6364 and wall thickness complies with ASME B16.34.

Solid, one-piece, 316 SS stem.

Larger and wider stem-to-ball contact area, allows the valve to be used in higher torque applications.

Cryogenic seats for extreme low temperature fluids.

A variety of ends; threaded, socket weld and buttweld.



## OVERVIEW:

Valves designed for extreme low temperatures incorporating extended bonnets to ensure stem sealing integrity.

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# Design

The exceptional capabilities and superiority of Sharpe® cryogenic valves are highlighted in the demanding requirements of cryogenic applications. Continuous operation and sealing at temperatures down to -400 °F (-240 °C) require special attention to design, manufacturing and assembly.

**Series C80 & FSC80** (fire-safe)
Cryogenic, Three-Piece,
Floating Ball Valve
ASME Class 600
(3" & 4" ASME 300)
Standard Full Port, Uni-Directional
Valve Sizes:
½", ¾", 1", 1½", 2", 2½", 3", 4"

**Series C89 & FSC89** (fire-safe)
Cryogenic, Three-Piece,
Floating Ball Valve
ASME Class 600
(2½" & 3" ASME 300)
Full Port, Uni-Directional
Valve Sizes:
½", ⅜", ½", ¾", 1", 1¼", 2", 2½", 3"

## Extension Bonnet

The cryogenic extension bonnet is securely bolted to the valve's mounting pad.

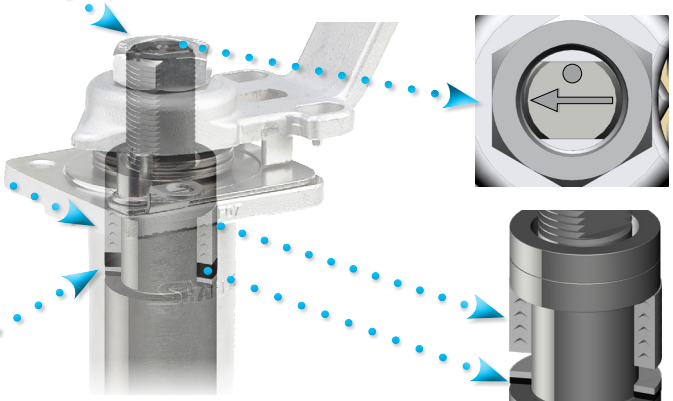
C80/C89
FSC80/FSC89

## Visual Indication on Stem

Visual position indicator on the top of the stem provides easy identification of ball position and location of upstream vent in ball.

## Stem Sealing

Increased stem sealing area assures tight sealing in the toughest applications.



## Blow-Out Proof Stem (Safety)

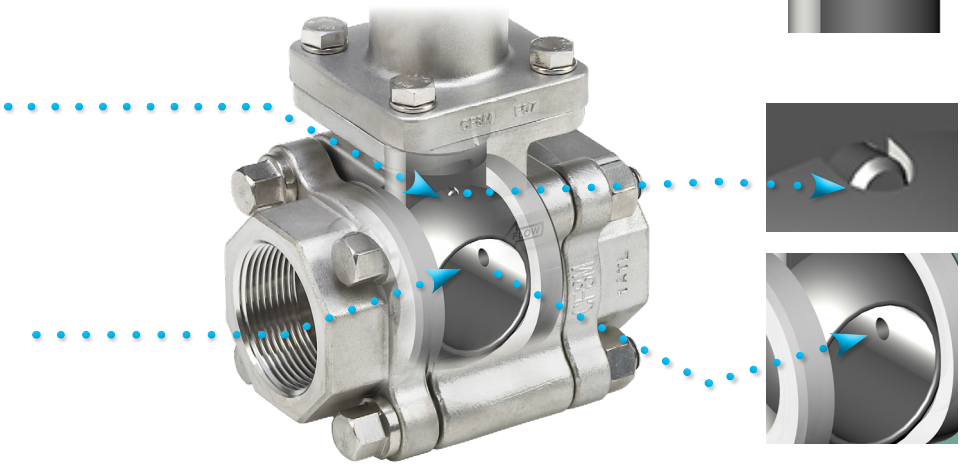
One-piece blow-out proof stem design.

## Reliable Installation and Repair

Alignment pin between the ball and stem assures proper orientation of the ball.

## Upstream Vented Ball (Safety)

Upstream vent hole in the ball prevents excessive body cavity pressure build-up in closed position due to thermal expansion.



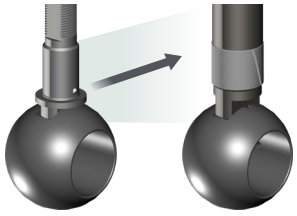
# Features

### Heavy Duty Stem Design

Enlarged stem diameters to meet the higher torque requirements of the most demanding applications.

Larger and wider stem-to-ball contact area allows the valve to be used in higher torque applications.

Design for 316 stainless steel stem material, rather than 17-4PH, for superior corrosion resistance.

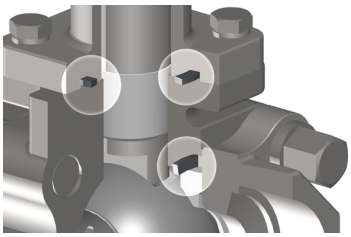


### Tongue and Groove Design

Fully encapsulated body seals, allowing ends to be welded in-line, without time consuming and labor intensive disassembly when installed per Sharpe® welding instructions.

Design compensates for bolt expansion and reduces the chance of external leakage.

Helps prevent seal ruptures in high pressure or cryogenic applications.



### Larger Bolt Design

Larger diameter body bolts to comply with Class 600.

# Stem Sealing

### Live-Loaded Stem

Concave and opposing spring washers provide additional compensation for seal wear.

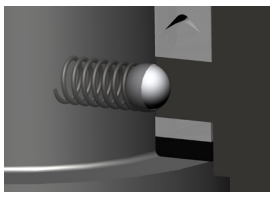

### Wear Resistance

The thrust washers are PEEK and/or nova for use in lower temperature applications.

### ISO 5211 Top-Works Compatability

The top-works offer compatibility for mounting a wide range of accessories.

Sharpe® actuators and accessories may be retrofitted on existing valves without disruption of line integrity.



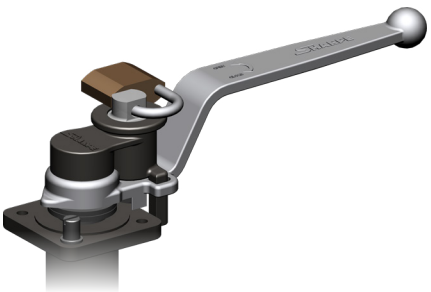
# Available Options

### Anti-Static (standard with FS, fire-safe valves)

Static build-up is dissipated with an optional anti-static device in the stem.

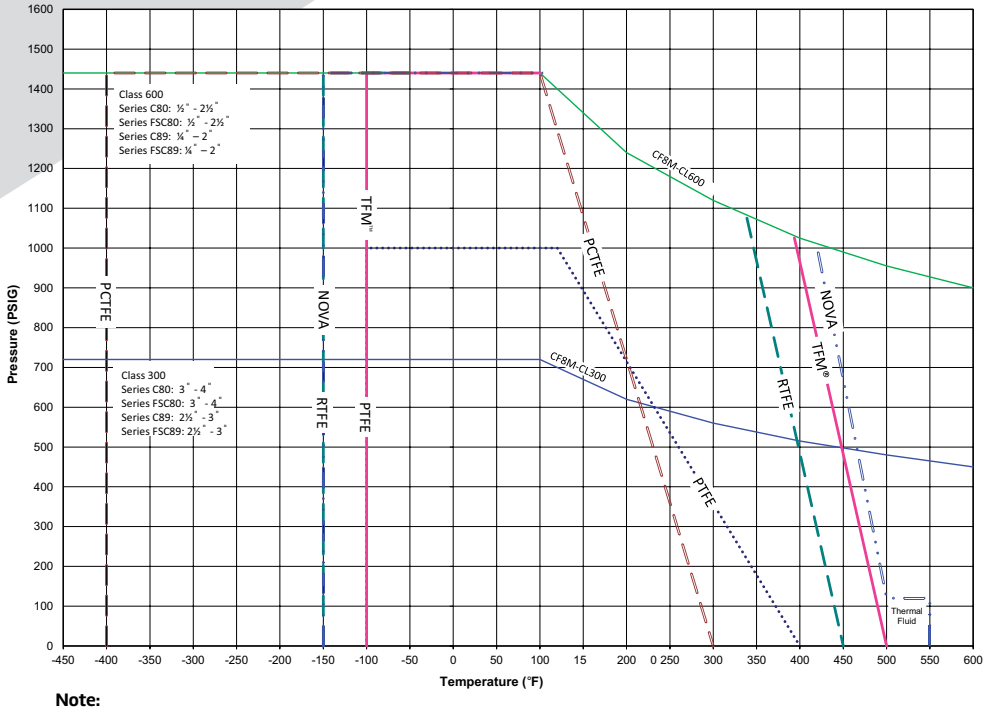
### Tamper Proof Locking Device

Cryogenic three-piece ball valves come standard with a lockable handle. The optional, Sharpe® exclusive, tamper proof locking device cannot be removed with a lock in place. When not being used with a lock its spring ensures the locking device snaps into place in the open or closed position to prevent unintended operation.



# Cryogenic, Three-Piece Ball Valve
# Sharpe® Series C80/FSC80 & C89/FSC89

**Pressure-Temperature Ratings Series C80/C89 & FSC80/FSC89**




**Note:**

The practical pressure-temperature rating of a valve is determined by the limitations of the body material and seat/seal material. The valve body ratings are based on ASME B16.34 rating for materials. The graphs are based on laboratory testing and our experience in the field. The seat ratings depend on the material, design, application, and function.

## Sharpe® Seat Material

**T – Virgin PTFE**
Polytetrafluoroethylene is a Fluorocarbon-based polymer. This seating material has excellent chemical resistance and low coefficient of friction. Its temperature range is -100°F to 400°F (-73°C to 204°C). Color: white.

**M – TFM™ PTFE**
3M Dyneon TFM™ PTFE is a second generation PTFE with improved chemical and heat resistant properties over first generation PTFE and exhibits better stress recovery. Its temperature range is -100°F to 500°F (-73°C to 260°C) Color: white.

**R – Reinforced Polytetrafluoroethylene** (RTFE 15% Glass Filled). PTFE's mechanical properties are enhanced by adding filler material to provide improved strength, stability and wear resistance. Its temperature range is from -320°F to 450°F (-196°C to 204°C). Color: off-white

**N – Nova**
This is a Teflon base filled with glass amorphous carbon powder and graphite. It has a lower thermal contraction- expansion than PTFE, and is ideal for steam or thermal fluid applications. Its temperature range is from -50°F to 550°F (-45°C to 288°C). Color: black.

**K – PCTFE**
PCTFE is a fluorocarbon based polymer. It offers a unique combination of physical and mechanical properties: non-flammability, chemical resistance, and near zero moisture absorption. It has a temperature range of -400°F to 300°F (-240°C to 177°C). Note: PCTFE is frequently referred to as 3M's discontinued KEL-F® Brand.

## Applications

Many processes are using cryogenic gases in different sectors of the industry.

| | |
|---|---|
| Terminal Unloading Stations | High Purity Cryogenic / Gas Systems |
| LNG Storage and Distribution | $CO_2$ and Nitrogen Injection |
| Air Separation Plants | Liquid and Gaseous Oxygen For Steel Production |
| Gas Liquefaction | Transfer Lines |
| Food processing | Cryogenic Transportation Trailers |

## Boiling Point of Cryogenic liquids

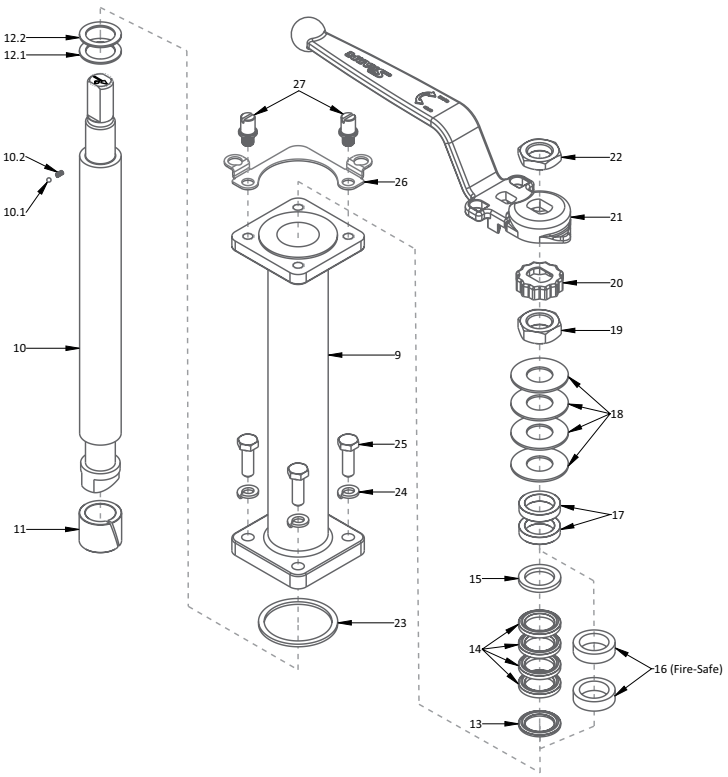
| Gas | Formula | Boiling Point | | Liquid Density (lb/ft3) |
|---|---|---|---|---|
| | | F° | C° | |
| Carbon Dioxide | $CO_2$ | -109 | -78 | 50.6 |
| Methane | $CH_4$ | -258 | -161 | 26.2 |
| Natural Gas | LNG | -270 | -168 | 26 |
| Oxygen | $O_2$ | -297 | -183 | 71.2 |
| Argon | Ar | -303 | -186 | 87.4 |
| Air | | -318 | -194 | 57.87 |
| Nitrogen | $N_2$ | -320 | -196 | 50.45 |
| Hydrogen | $H_2$ | -423 | -253 | 4.43 |
| Helium | He | -452 | -269 | 7.82 |
| Absolute Zero | | -460 | -273 | |

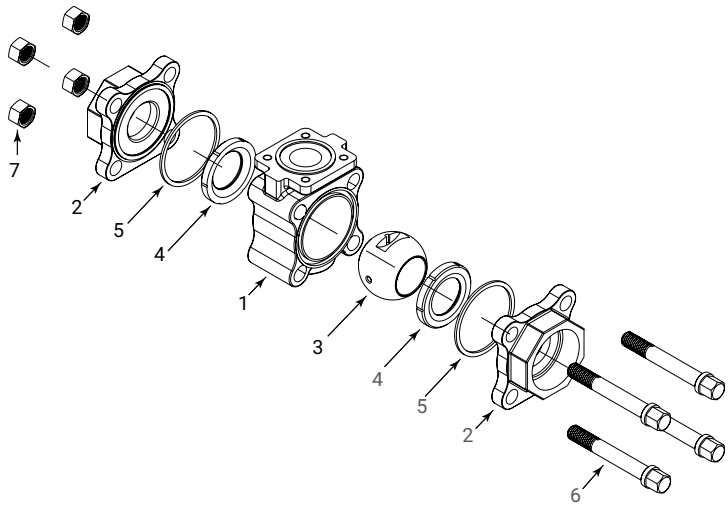
Cryogenic, Three-Piece Ball Valve

# Sharpe® Series C80/FSC80 & C89/FSC89

## Parts & Materials

**Series C80** Sizes ½" to 2"
**Series FSC80** Sizes ½" to 2"
**Series C89** Sizes ¼" to 1½"
**Series FSC89** Sizes ¼" to 1½"




| Item | Description | Material | Qty. |
|---|---|---|---|
| 1 | Body | ASTM A351 CF8M (~ 316 SS) | 1 |
| 2 | End Piece | ASTM A351 CF8M (~ 316 SS)<br>ASTM A351 CF3M (~ 316L SS) for weld connections | 2 |
| 3 | Ball (vented) | 316 Stainless Steel | 1 |
| 4* | Seat | PCTFE, TFM™, NOVA, RTFE or PTFE<br>FSC80/FSC89 (fire-safe): PCTFE | 2 |
| 5* | Body Seal | Graphite | 2 |
| 6 | Body Bolt | A193 Gr. B8 | 4 |
| 7 | Body Nut | 300 Series Stainless | 4 |
| Tags | Flow Direction & ID Nameplate | 300 Series Stainless Steel | 1 Each |

### Cryogenic Extension

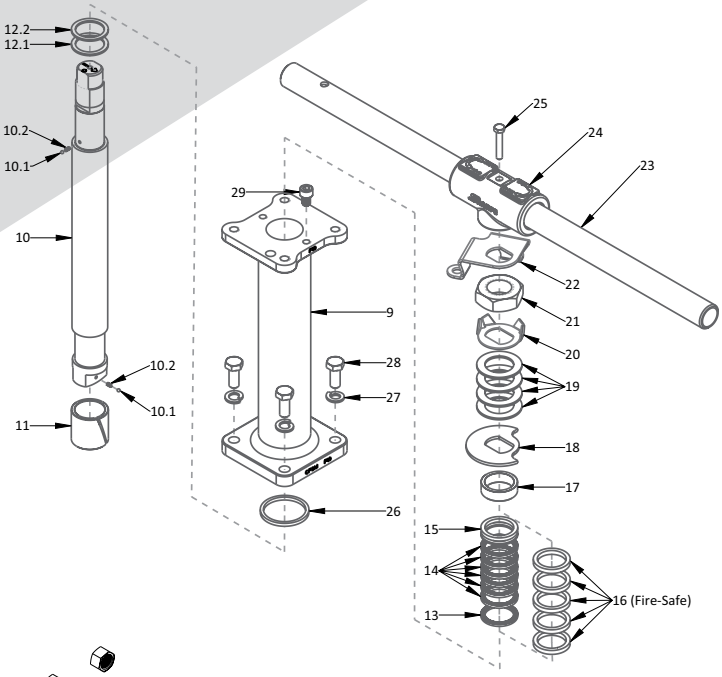
| Item | Description | Material | Qty. |
|---|---|---|---|
| 9 | Bonnet Extension | ASTM A351 CF8M (~ 316 SS) | 1 |
| 10 | Stem | 316 Stainless Steel | 1 |
| 10.1** | Anti-Static mini-Ball | 300 Series Stainless | 0 - 1 |
| 10.2** | Anti-Static Spring | Hard Drawn Stainless | 0 - 1 |
| 11* | Bearing | PTFE | 1 |
| 12.1* | Thrust Bearing Bottom | PEEK FSC80/FSC89 (fire-safe): Nova | 1 |
| 12.2* | Thrust Bearing Top | Nova | 1 |
| 13* | Bottom Packing | PCTFE, TFM™, NOVA | 1 |
| 14* | Middle Packing | PCTFE, TFM™, NOVA | 3 - 4 |
| 15* | Top Packing | PCTFE, TFM™, NOVA | 1 |
| 16* | Stem Packing | FSC80/FSC89 (fire-safe): Graphite | 2 |
| 17 | Gland | 300 Series Stainless | 1 - 2 |
| 18* | Belleville Washer | Stainless Steel FSC80/FSC89 (fire-safe): Inconel | 2 or 4 |
| 19 | Packing Nut | 300 Series Stainless | 1 |
| 20 | Nut Lock | 300 Series Stainless | 1 |
| 21 | Handle | ASTM A351 CF8 (~304 SS) | 1 |
| 22 | Handle Nut | 300 Series Stainless | 1 |
| 23* | Bonnet Seal | Graphite | 1 |
| 24 | Lock Washer | 300 Series Stainless | 4 |
| 25 | Bonnet Bolt | 304 Stainless Steel A2-70 | 4 |
| 26 | Lock Plate | 300 Series Stainless | 1 |
| 27 | Stop Pin | 300 Series Stainless | 2 |

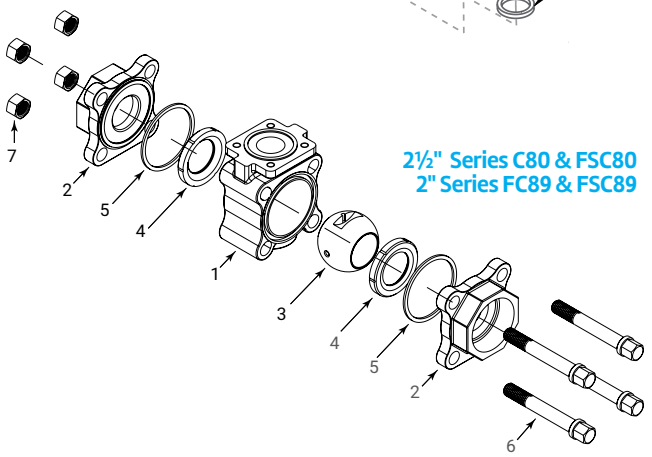
**Notes:**

*Parts used in repair kits.

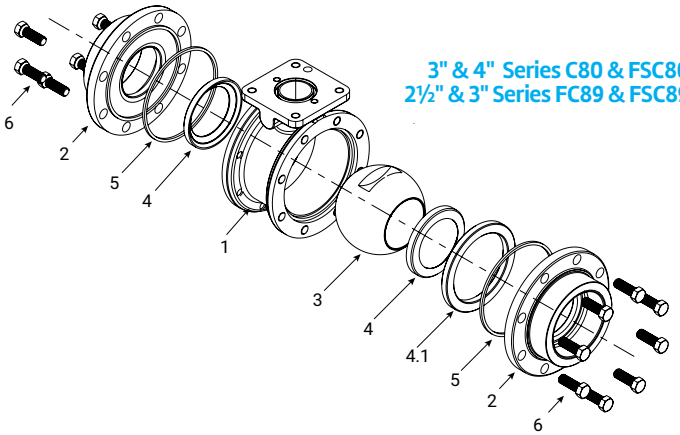
**Parts used with NS, Anti-Static option. NS suffix required with FS (fire-safe) valves.

# Parts & Materials




**2½" Series C80 & FSC80**
**2" Series FC89 & FSC89**




**3" & 4" Series C80 & FSC80**
**2½" & 3" Series FC89 & FSC89**

**Series C80** Sizes 2½" to 4"
**Series FSC80** Sizes 2½" to 4"
**Series C89** Sizes 2" to 3"
**Series FSC89** Sizes 2" to 3"

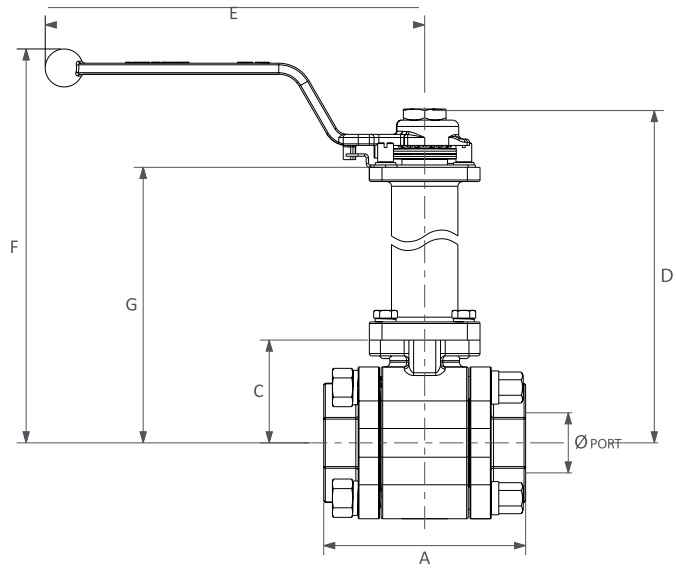
| Item | Description | Material | Qty. |
|---|---|---|---|
| 1 | Body | ASTM A351 CF8M (~ 316 SS) | 1 |
| 2 | End Piece | ASTM A351 CF8M (~ 316 SS),<br>ASTM A351 CF3M (~ 316L SS)<br>for welded connections | 2 |
| 3 | Ball (Vented) | 316 Stainless Steel | 1 |
| 4* | Seat | PCTFE, TFM™, NOVA, RTFE or PTFE<br>FSC80/FSC89 (fire-safe): PCTFE | 2 |
| 4.1 | Seat Ring (C80 & FSC80) | ASTM A351 CF8M (~ 316 SS) | 0 - 1 |
| 5* | Body Seal | Graphite | 2 |
| 6 | Body Bolt/Stud | A193 Gr. B8 | 4 or 16 |
| 7 | Body Nut | 300 Series Stainless Steel | 4 |
| Tags | Flow Direction &<br>ID Nameplate | 300 Series Stainless Steel | 1 Each |

## Cryogenic Extension

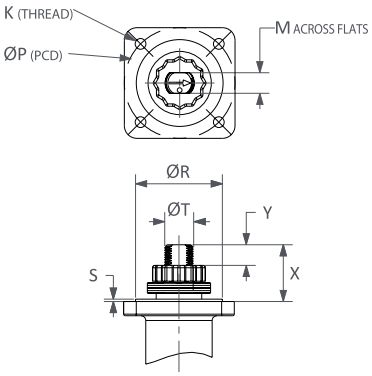
| Item | Description | Material | Qty. |
|---|---|---|---|
| 9 | Bonnet Extension | ASTM A351 CF8M (~ 316 SS) | 1 |
| 10 | Stem | 316 Stainless Steel | 1 |
| 10.1** | Anti-Static mini-Ball | 300 Series Stainless | 0 - 2 |
| 10.2** | Anti-Static Spring | Hard Drawn Stainless | 0 - 2 |
| 11* | Bearing | PTFE | 1 |
| 12.1* | Thrust Bearing Bottom | PEEK<br>FSC80/FSC89 (fire-safe): Nova | 1 |
| 12.2* | Thrust Bearing Top | Nova | 1 |
| 13* | Bottom Packing | PCTFE, TFM™, NOVA | 1 |
| 14* | Middle Packing | PCTFE, TFM™, NOVA | 4 - 6 |
| 15* | Top Packing | PCTFE, TFM™, NOVA | 1 |
| 16* | Stem Packing | FSC80/FSC89 (fire-safe): Graphite | 4 - 5 |
| 17 | Gland | 300 Series Stainless | 1 |
| 18 | Stop Plate | 300 Series Stainless | 1 |
| 19* | Belleville Washer | Stainless Steel<br>FSC80/FSC89 (fire-safe): Inconel | 4 |
| 20 | Lock Tab | 300 Series Stainless | 1 |
| 21 | Packing Nut | 300 Series Stainless | 1 |
| 22 | Lock Plate | 300 Series Stainless | 1 |
| 23 | Handle Pipe | 300 Series Stainless | 1 |
| 24 | Wrench Block | ASTM A351 CF8 (~ 304 SS) | 1 |
| 25 | Wrench Bolt | 300 Series Stainless | 1 |
| 26* | Bonnet Seal | Graphite | 1 |
| 27 | Lock Washer | 300 Series Stainless | 4 |
| 28 | Bonnet Bolt | 300 Series Stainless | 4 |
| 29 | Stop Pin | 300 Series Stainless | 1 |

**Notes:**
*Parts used in repair kits.
**Parts used with NS, Anti-Static option. NS suffix required with FS (fire-safe) valves.

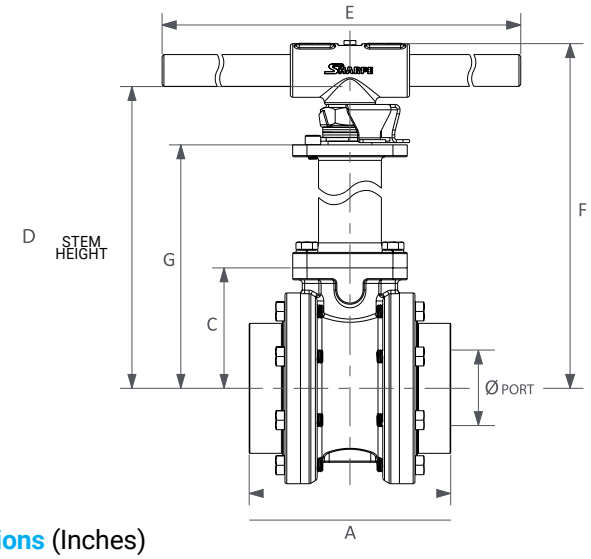
**Series C80/FSC80** Sizes ½" – 2"
**Series C89/FSC89** Sizes ¼" – 1½"



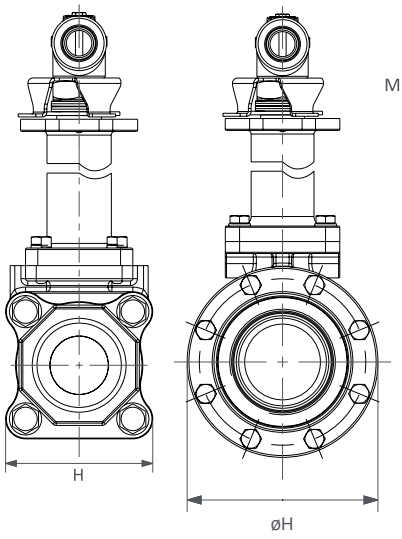

**Dimensions for Actuator Mounting**



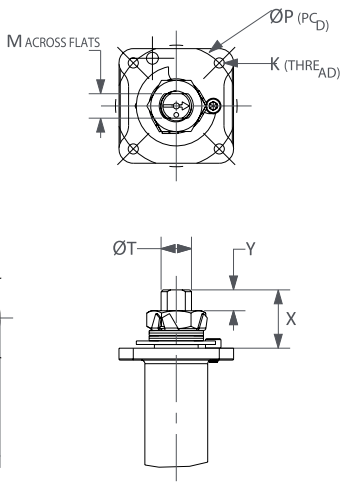

**Series C80/FSC80** Sizes 2½" – 4"
**Series C89/FSC89** Sizes 2" – 3"




**2½" C80/FSC80 3" – 4"**
**2" C89/FSC89 2½" – 3"**




**Dimensions for Actuator Mounting**




## Dimensions (Inches)

| Standard Port | Full Port | | TE/SW BW | Ext BW Full Port | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C80/ FSC80 | C89/FSC89 | ØPORT | A | A | C | D | E | F | G | H | K (Thread) | M | ØP (PCD) | ØR | S | ØT | X | Y |
| ½" | ¼", ⅜" | 0.44 | 2.91 | - | 1.27 | 12.30 | 6.42 | 13.97 | 11.57 | 1.81 | M5-P0.8 | 0.264 | F04 (1.65) | 1.18 | 0.051 | 0.394 | 0.74 | 0.33 |
| ¾" | ½" | 0.56 | 3.07 | - | 1.42 | 12.44 | 6.42 | 14.11 | 11.73 | 1.95 | M5-P0.8 | 0.264 | F04 (1.65) | 1.18 | 0.051 | 0.394 | 0.74 | 0.33 |
| 1" | ¾" | 0.81 | 3.72 | 13.10 | 1.74 | 12.91 | 7.28 | 14.54 | 12.09 | 2.39 | M6-P1.0 | 0.343 | F05 (1.97) | 1.38 | 0.059 | 0.472 | 0.83 | 0.37 |
| 1¼" | 1" | 1.00 | 4.25 | 13.25 | 1.91 | 13.07 | 7.28 | 14.71 | 12.24 | 2.85 | M6-P1.0 | 0.343 | F05 (1.97) | 1.38 | 0.059 | 0.472 | 0.83 | 0.37 |
| 1½" | 1¼" | 1.24 | 4.57 | 13.61 | 2.40 | 14.37 | 9.45 | 16.29 | 12.99 | 3.15 | M8-P1.25 | 0.512 | F07 (2.76) | 2.17 | 0.059 | 0.709 | 1.41 | 0.54 |
| 2" | 1½" | 1.50 | 5.04 | 13.90 | 2.56 | 14.57 | 9.45 | 16.45 | 13.15 | 3.78 | M8-P1.25 | 0.512 | F07 (2.76) | 2.17 | 0.059 | 0.709 | 1.41 | 0.54 |
| 2½" | 2" | 2.00 | 6.34 | 14.21 | 3.58 | 16.02 | 15.75 | 17.15 | 14.33 | 4.92 | M10-P1.5 | 0.630 | F10 (4.02) | - | - | 0.886 | 1.70 | 0.59 |
| 3" | 2½" | 2.50 | 6.65 | 14.87 | 3.98 | 16.65 | 23.62 | 18.17 | 14.72 | 6.30 | M10-P1.5 | 0.807 | F10 (4.02) | - | - | 1.024 | 1.93 | 0.68 |
| 4" | 3" | 3.25 | 8.43 | - | 4.57 | 17.20 | 23.62 | 18.78 | 15.35 | 7.99 | M10-P1.5 | 0.807 | F10 (4.02) | - | - | 1.024 | 1.93 | 0.68 |

**Note:** The dimensions above are for informational purposes only. Please refer to Sharpe® Valves if you need dimensions for construction.

## Flow Data and Weight

| Valve Size | | $C_V$ | Approx. Weight (lbs.) |
|---|---|---|---|
| C80/FCS80 | C89/FCS89 | | |
| ½" | ¼",¾" | 8 | 4 |
| ¾" | ½" | 12 | 4 |
| 1" | ¾" | 32 | 6 |
| 1¼" | 1" | 46 | 8 |
| 1½" | 1¼" | 80 | 13 |
| 2" | 1½" | 120 | 16 |
| 2½" | 2" | 240 | 33 |
| 3" | 2½" | 350 | 38 |
| 4" | 3" | 720 | 59 |

**Note:**

$C_V$ values represent the flow of water at +60˚F through the valve in U.S. gallons per minute at a pressure drop of 1 psi. The metric equivalent, $K_V$, is the flow of water at 16˚C through the valve in cubic meters per hour at a pressure drop of 1 kg/cm². To convert $C_V$ to $K_V$, multiply by 0.8569.

## Applicable Standards

| | |
|---|---|
| Basic Design | ASME B16.34, BS 6364 |
| Body Wall Thickness | ASME B16.34 |
| Butt-Weld Ends | ASME B16.25 |
| SW & Threaded Ends | ASME B16.11 |
| Mounting Dimensions | ISO 5211 |
| Marking | MSS-SP 25 |
| Pressure Test | API 598, MSS-SP 72 |
| Fire Safe (FS Series) | API 607 7th Edition |

## Cryogenic Valve Preparation

All cryogenic valves are shell tested, then completely disassembled. All parts are cleaned and degreased, per Sharpe Standard, in our clean room. The dry parts are then assembled. The assembled valve undergoes a seat and seal pressure test with nitrogen. The completed tested valve is packaged in polyethylene bags before leaving the clean room.

## Traceability

Heat numbers are provided on all valve bodies and ends. CMTR's (certified mill test reports) are available upon request.

## Automated Assemblies

Valves, actuators, and accessories are designed to work together; delivering exceptional performance.

Visit our website to select pneumatic actuators, electric actuators, positioners, limit switches, and other accessories.

Cryogenic, Three-Piece Ball Valve

# Sharpe® Series C80/FSC80 & C89/FSC89

## How to order Series C80/FSC80 & C89/FSC89

| 1.5" | FSC89 | 6 | 6 | 6 | 6 | K | I | G | – | SW/TE | – | NSTP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | Series | Body Material | End Material | Ball Material | Stem Material | Seat Material | Body Seal | Stem Packing | | End Style | | Suffixes & Options |

### Size

| C80 FSC80 | C89 FSC89 | Class |
|---|---|---|
| - | ¼" | 600 |
| - | ⅜" | 600 |
| ½" | ½" | 600 |
| ¾" | ¾" | 600 |
| 1" | 1" | 600 |
| 1¼" | 1¼" | 600 |
| 1½" | 1½" | 600 |
| 2" | 2" | 600 |
| 2½" | - | 600 |
| - | 2½" | 300 |
| 3" | 3" | 300 |
| 4" | - | 300 |

### Valve Series

| | |
|---|---|
| C80 | Standard Port |
| FSC80 | Standard Port Fire Safe |
| C89 | Full Port |
| FSC89 | Full Port Fire Safe |

### Body Material

| | |
|---|---|
| 6 | A351 CF8M (~316SS) |

### End Material

| | |
|---|---|
| 6 | A351 CF8M (~316 SS)<br>Weld Connections: A351 CF3M (~316 SS) |

### Ball Material

| | |
|---|---|
| 6 | 316 Stainless Steel |

### Stem Material

| | |
|---|---|
| 6 | 316 Stainless Steel |

### Seat Material

**C80, C89**

| | |
|---|---|
| K | PCTFE (Note 1) |
| M | TFM™ |
| N | NOVA |
| R | RTFE |
| T | PTFE |

**FSC80, FSC89**

| | |
|---|---|
| K | PCTFE (Note 1) |

### Body Seal

| | |
|---|---|
| I | Graphite |

### Stem Packing

**C80, C89**

| | |
|---|---|
| M | TFM™ |
| N | NOVA |
| T | PTFE |

**FSC80, FSC89**

| | |
|---|---|
| G | Graphite |

### End Style

| | |
|---|---|
| TE | Threaded Ends |
| SW | Socketweld |
| BW10 | Buttweld SCH 10* |
| BW40 | Buttweld SCH 40 |

### Additonal Ends

**C89 & FSC89 Only**

| | |
|---|---|
| BW80 | Buttweld SCH 80 |
| EBW | Buttweld SCH 80 Extended |

### Suffixes & Options

**For C80, C89**

| | |
|---|---|
| HC | High Cycle Stem* |
| NS | Anti-Static* |
| TP | Tamper Proof ** Locking Device |

Ball with upstream vent (standard)

**For FSC80, FSC89 Fire-safe Valves**

| | |
|---|---|
| NS | Required - add code Anti-Static |
| TP | Tamper Proof Locking Device ** |

Ball with upstream vent (standard)

**Note:**

*Price On Application

**Series C80/FSC80: 2" & Smaller. Series C89/FSC89: 1½" & Smaller.

PCTFE is frequently referred to as 3M's discontinued KEL-F® Brand.

**Note:**

Other materials & options available, please contact us with your requirement.

Responsibility for proper selection, use and maintenance of any product remains solely with the purchaser and end user.

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**About ASC Engineered Solutions**

ASC Engineered Solutions is defined by quality—in its products, services and support. With more than 1,400 employees, the company's portfolio of precision-engineered piping support, valves and connections provides products to more than 4,000 customers across industries, such as mechanical, industrial, fire protection, oil and gas, and commercial and residential construction. Its portfolio of leading brands includes ABZ Valve®, AFCON®, Anvil®, Anvil EPS, Anvil Services, Basic-PSA, Beck®, Catawissa, Cooplet®, FlexHead®, FPPI®, Gruvlok®, J.B. Smith, Merit®, North Alabama Pipe, Quadrant®, SCI®, Sharpe®, SlideLOK®, SPF® and SprinkFLEX®. With headquarters in Commerce, CA, and Exeter, NH, ASC also has ISO 9001:2015 certified production facilities in PA, TN, IL, TX, AL, LA, KS, and RI.

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