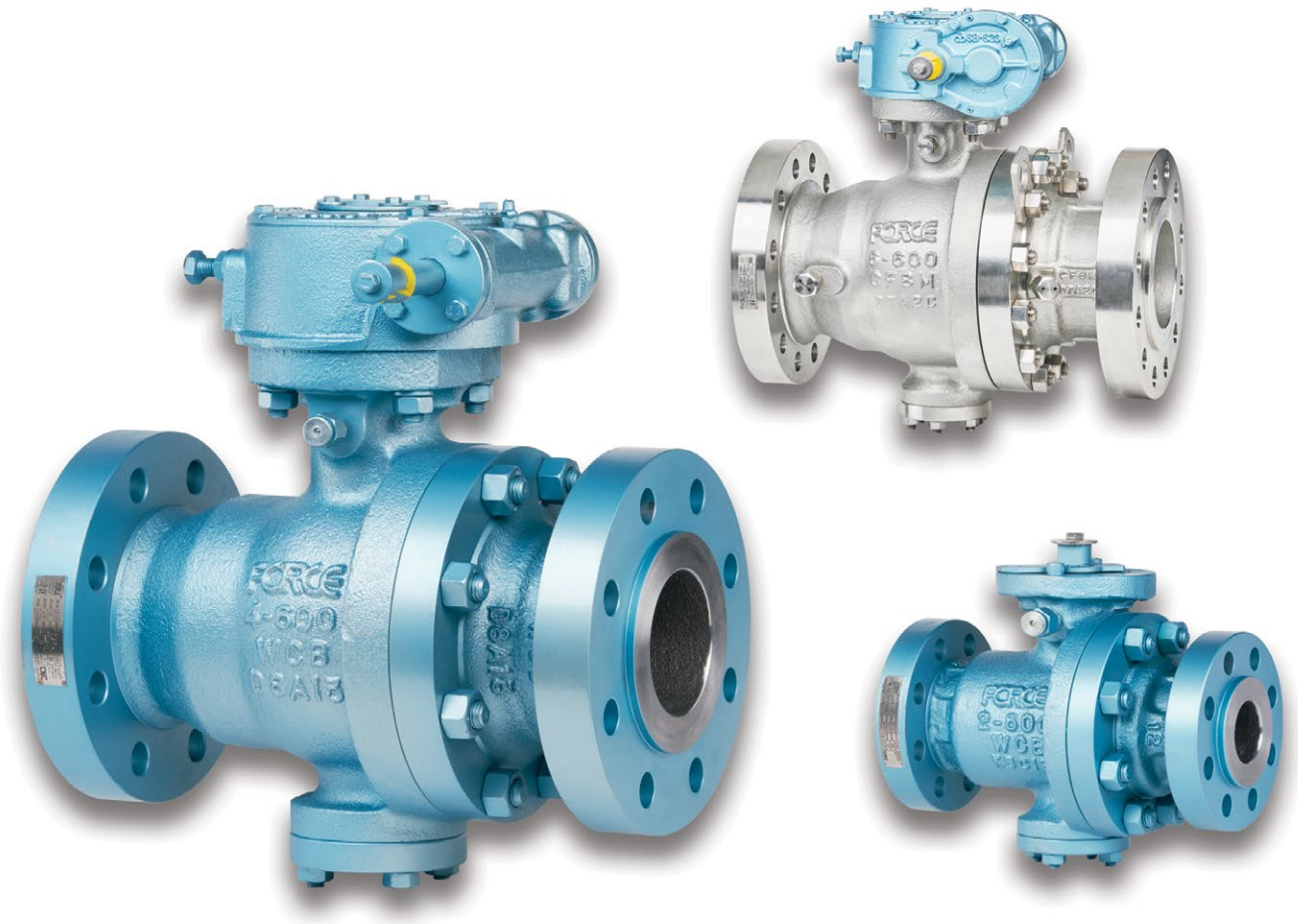
# FORCE

## Trunnion Mounted Ball Valves




FORCE®

*FORCE is a product brand of CNC Flow Control*

# ABOUT CNC FLOW CONTROL

Founded in 2017, CNC Flow Control is new only in name. Headquartered in Houston, this single business entity unifies several trusted valve and flow line brands from across industry, creating an experienced, collaborative and diverse team. From extensive, long range projects to same-day delivery of commodity valves, our team is dedicated to understanding customers' needs in order to ensure exceptional service and the best solutions.

A full service Valve Repair & Modification Shop is on site at the manufacturing facility as well as an in-house engineering team for technical assistance and expertise. CNC Flow Control product brands include Diamond Gear, SMITH, C&C, Econ and Force, all supported by technical expertise.

# ABOUT FORCE

**FORCE®** Valve quality is guaranteed by strictly adhering to ISO 9001 and API Q1 audited quality standards. Dedicated to providing the highest quality valve products to meet customers' expectations, **FORCE®** Valves are manufactured in strict accordance with all applicable ASME, API and other standards.

Every valve is tested and documented to API 6D testing requirements and manufactured to comply with NACE standards with complete MTR traceability.

# CONTENTS



FORCE®

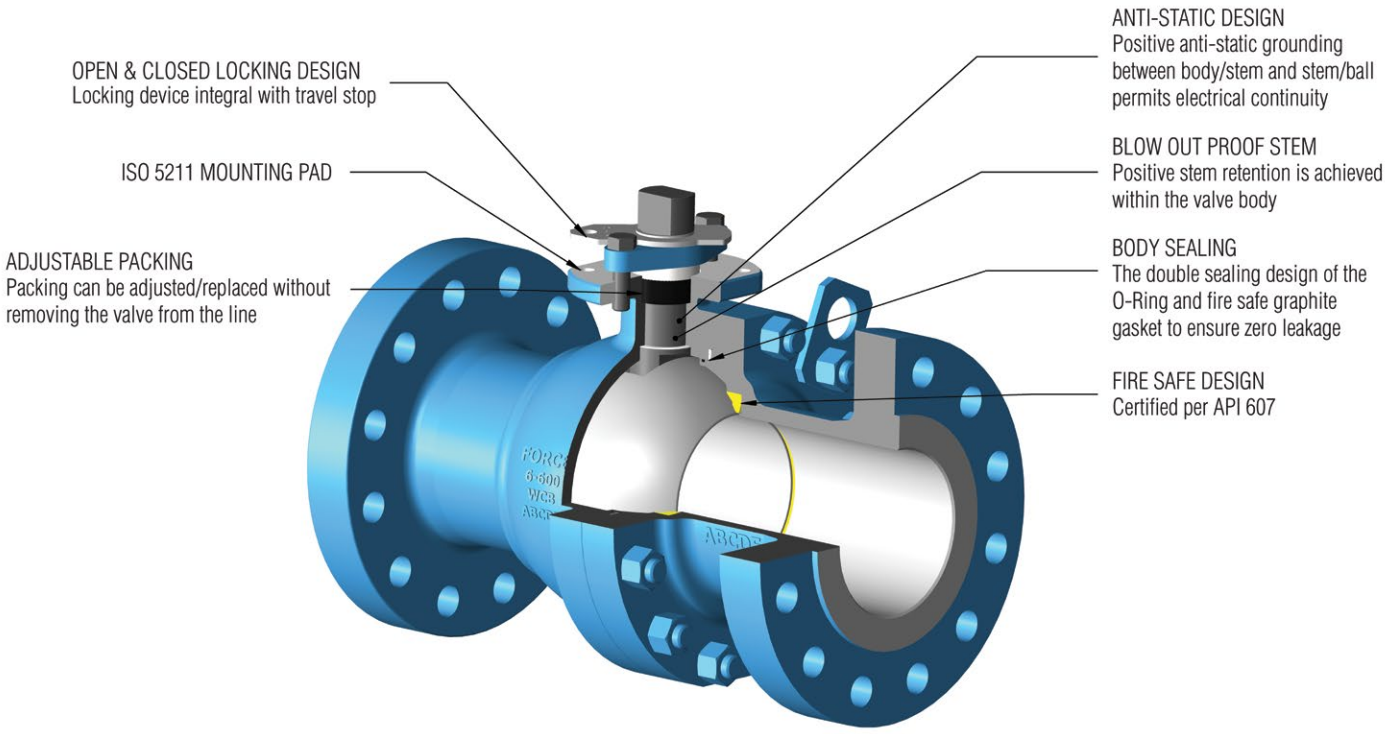
# DESIGN STANDARDS

| | |
|---|---|
| Shell Wall Thickness | |
| Class 150, 300, 60 | ASME B16.34 & API 6D |
| Pressure Temp Rating | ASME B16.34 |
| Pressure Test | API 6D |
| Face-to-Face Dimensions | ASME B16.10 |
| End Flange Dimensions | ASME B16.5 |
| Fire Safety Test | API 607 & API 6FA |
| General Design | ASME B16.34 / API 6D / API 608 |
| Material Requirements | NACE MR0175 150 15156-1 |
| Quality Control | API Q1 and ISO 9001 |

# CERTIFICATES

- ISO 9001-2008 Certificate of Conformance issued by ABS Quality Evaluations
- API 6D Monogram License Number 6D-0299 issued by API
- BS 6755 Part 2 (1987) Testing of Valves incorporating API 607, and API 6FA Fire Testing issued by Lloyd's Register
- BS 6755 Part 2 (1987) Testing of Valves incorporating API 607, 4th Edition, and API 6FA Fire Testing issued by Moody International LTD Korea
- Certificate of Witness of Fire Test number 123476-0310 issued by ABS Consulting
- Certificate of Quality System Approval No. CE-PED-H-KCI. 001-08-KOR covering Floating and Trunnion Ball Valves issued by BUREAU VERITAS

# TRUNNION MOUNTED BALL VALVE CUTAWAY




# FEATURES

- Full Bore & Reduced Bore
- Floating Ball Design
- Locking Device
- Blow-Out Proof Stem
- Flexible Cavity Relief Seats
- Anti-Static Grounding Device
- ISO Mounting Pad
- Metal to Metal Construction
- Lip Seal or Plate Seal
- NACE Standard
- Fire Safe Design
- Two Radius of Ball Edge for Long Life Cycle
- Double “D” Stem

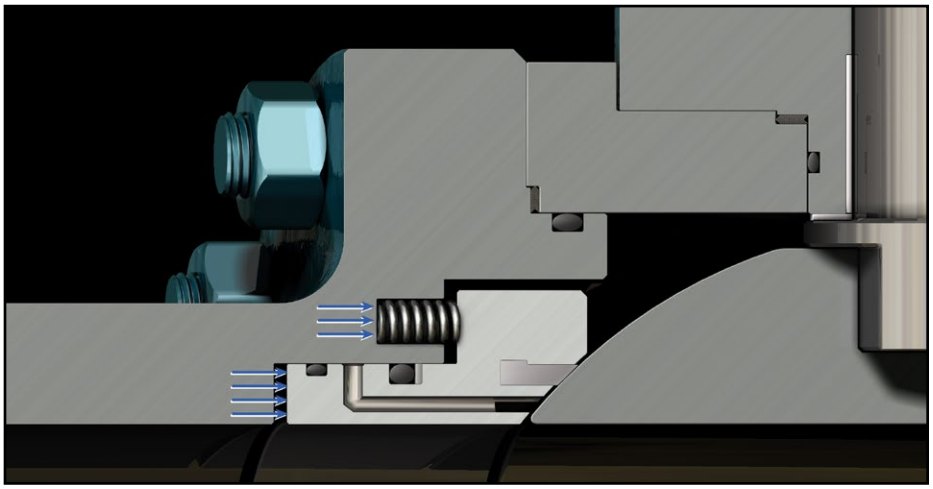
# APPLICABLE SEAT MATERIALS

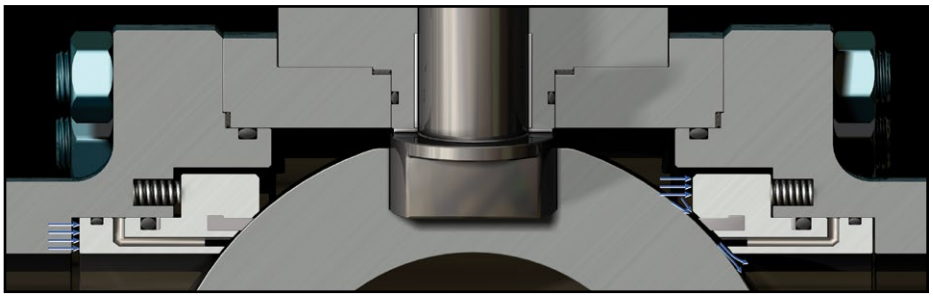
- TFM1600
- PEEK Seat
- Devlon®
- Other materials can be supplied upon request

# TRUNNION BALL VALVE FEATURES

## Seat To Ball Sealing

Soft seats are standard. Seat inserts of synthetic material such as RTFE, Devlon, or PEEK are contained within a one-piece metal seat ring. With no, or very low line pressure, sealing between the seats and ball is achieved by the seat springs. As line pressure increases, it begins to work in conjunction with the seat springs to assure the integrity of the seal.

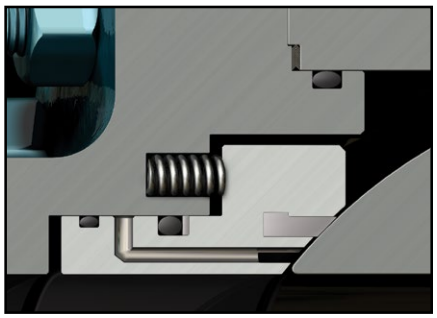




## Self Relieving Seat

This standard feature is designed to prevent excessive pressure buildup within the valve by automatically relieving pressure when body cavity pressure exceeds 133% of pressure rating.

Double Piston Seat is also available as an option.

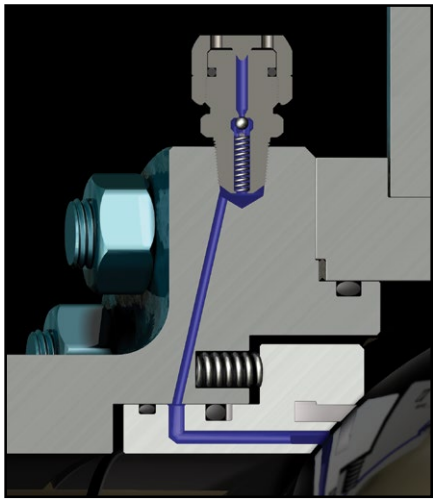


## Seat To Body Sealing

Two different types of seals are used to isolate the line pressure from the body cavity. Primary sealing is accomplished by an elastometric seal such as Viton® or HNBR, and secondary firesafe sealing is accomplished by a graphite seal ring.

## Sealant Injection Fittings

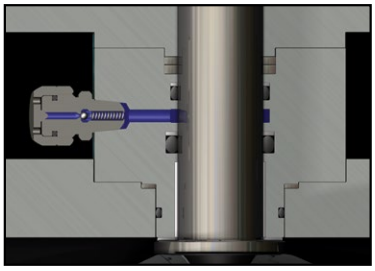
Sealant injection fittings are standard on all Force Trunnion ball valves. If the seat ring becomes damaged, this feature provides the user with an easy way to inject an emergency sealant to restore a tight seal. It also allows for the sealing surfaces of the ball and seat to be periodically flushed to clear away debris which may impair sealing.

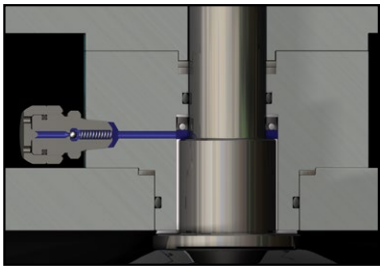


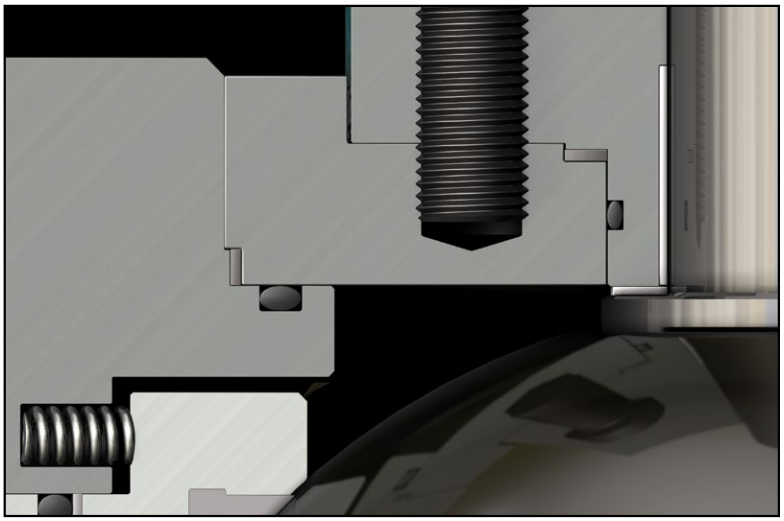
# TRUNNION BALL VALVE FEATURES

## Stem Sealing and Sealant Injection Fitting

ASME Class 150 through 2500 utilize two “O” Rings and a graphite seal ring to effect a tight stem to body seal. In case of damage to the soft seals, stem seal integrity can be restored by injecting sealant into the sealant injection fitting.







## Double Seals at all Joints

All connecting parts employ a double sealing design incorporating a spiral wound 316 SS/graphite gasket and o-ring to ensure positive sealing.

## Double Block and Bleed

Force Trunnion ball valves incorporate an independent positive seal at both the upstream and downstream ends. In the fully closed position, the body cavity is isolated from upstream/downstream pressure. The body cavity may be vented by use of the body bleed plug to confirm the integrity of the seats.

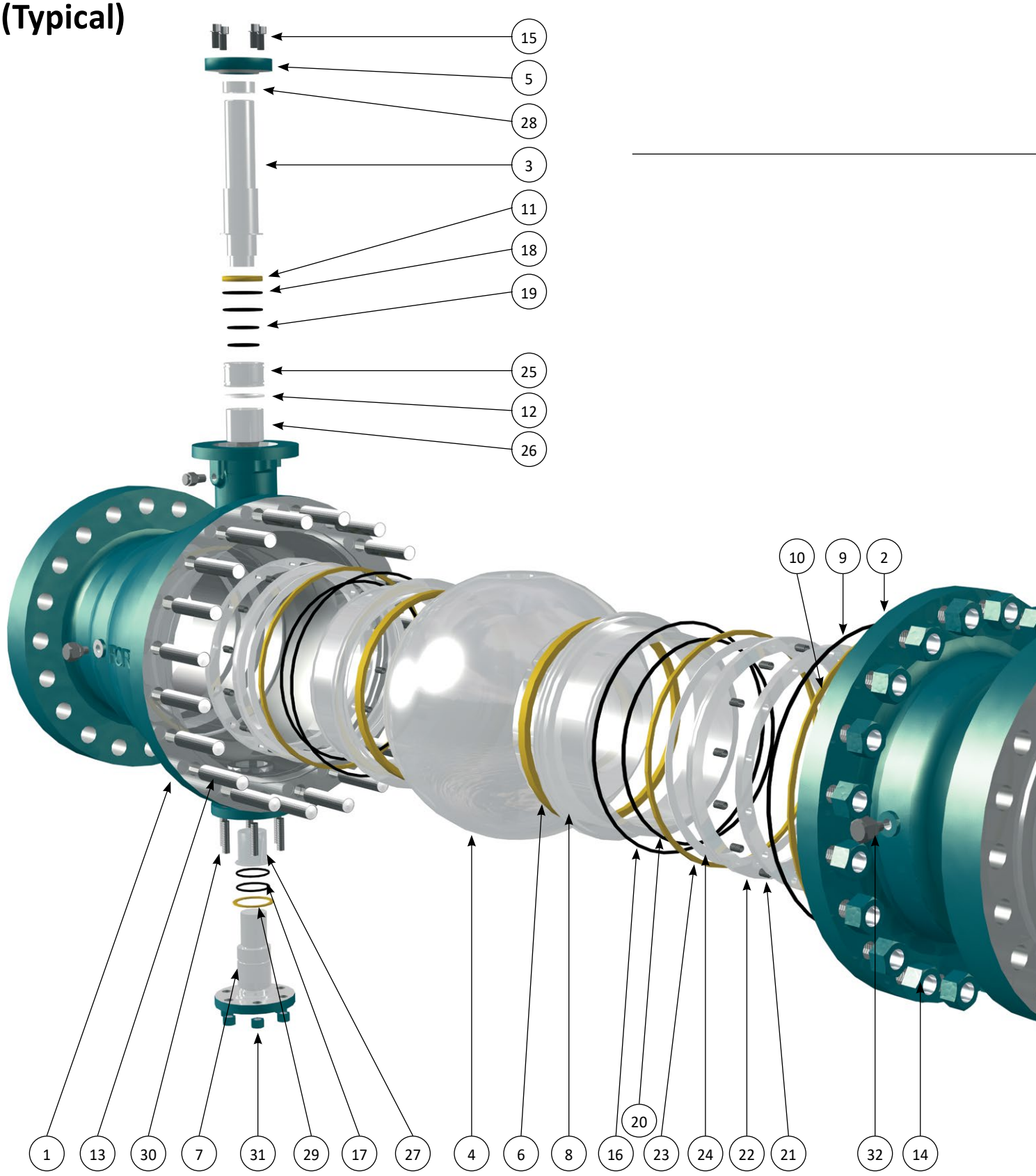
## Low Friction Stem/Trunnion Bearings and Thrust Washers

Heavy duty PTFE lined carbon or stainless steel bearing and thrust washers ensure durable and low torque operation.

## Other Features

- Anti Static Device
- Blow-out proof stem
- Compliance with NACE MR-0175 latest edition
- Fire safe design certified to API 6FA and API 607
- ISO 5211 Mounting dimensions
- Stem Extensions available

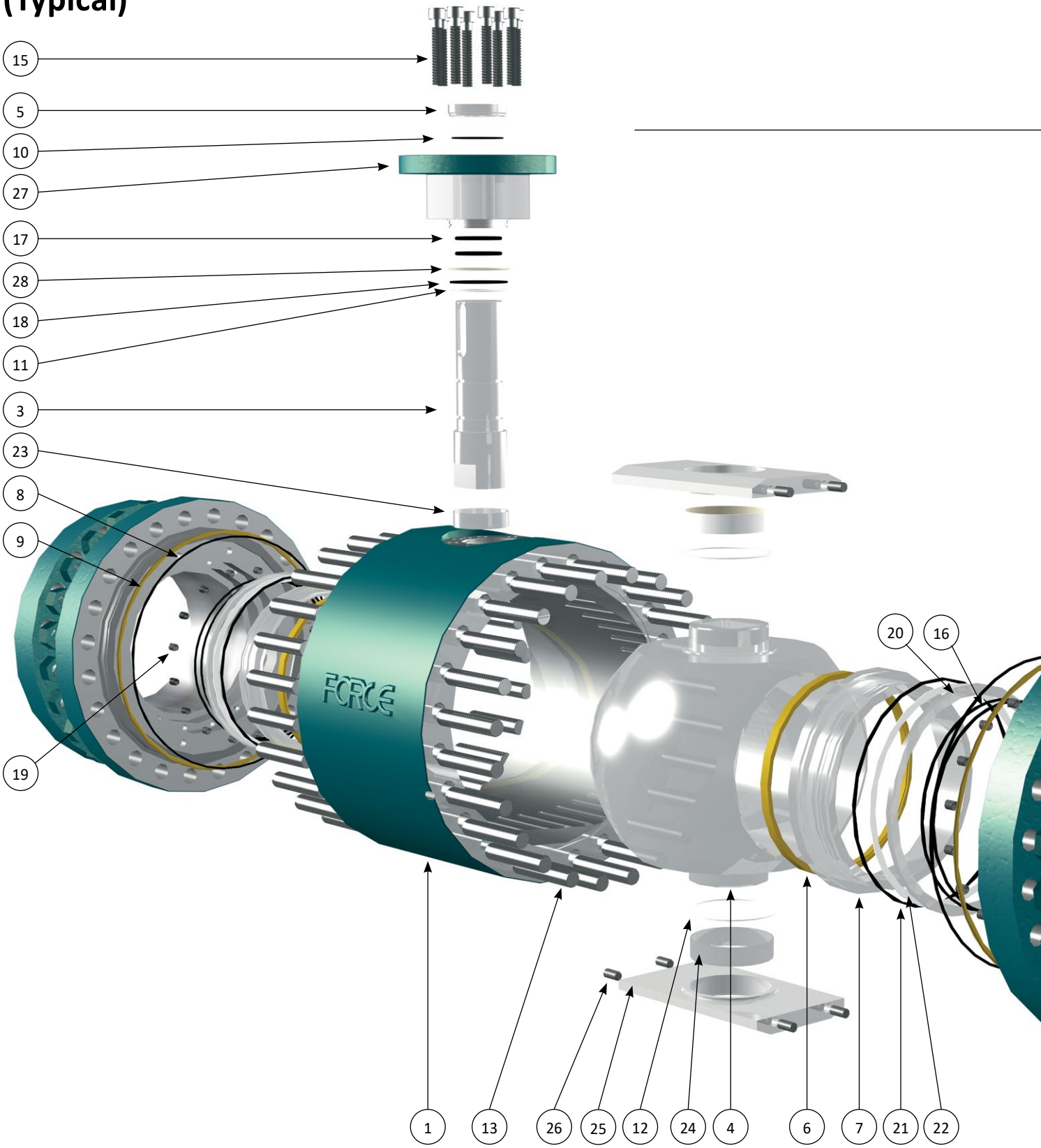
# FORCE 2-PIECE TRUNNION PARTS LIST AND BILL OF MATERIAL (Typical)

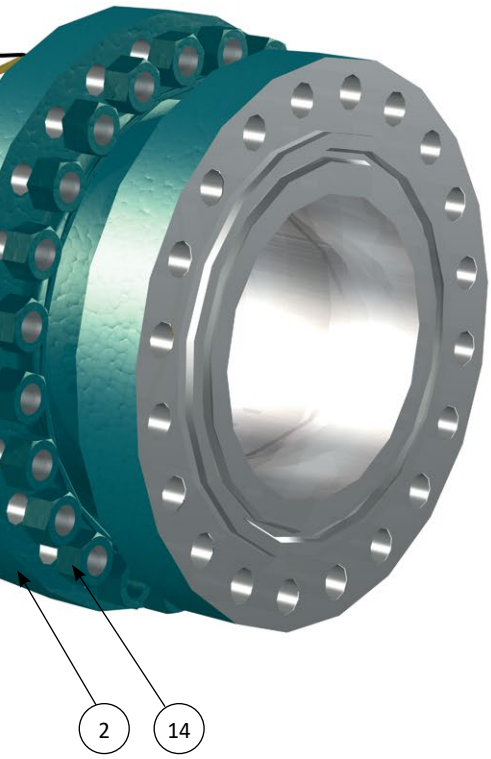


| NO | PART NAME | QTY | CARBON STEEL | STAINLESS STEEL | LOW TEMP CARBON STEEL |
|---|---|---|---|---|---|
| 1 | Body | 1 | A216 WCB | A351 CF8M | A352 LCC |
| 2 | Cap | 1 | A216 WCB | A351 CF8M | A352 LCC |
| 3 | Stem | 1 | 410SS/ENP | 316SS | 410SS/ENP |
| 4 | Ball | 1 | A216 WCB/ENP | A351 CF8M | A352 LCC/ENP |
| 5 | Gland Flange | 1 | AISI 1020 | A276 304 | AISI 1020 |
| 6 | Seat Ring | 2 | DEVLON | | |
| 7 | Bottom Cover | 1 | A216 WCB/ENP | A351 CF8M | A352 LCC/ENP |
| 8 | Seat Retainer | 2 | WCB or A105/ ENP | 316SS | A352 LCC/ENP |
| 9 | O-Ring | 1 | VITON | | |
| 10 | Gasket | 1 | SPW 316 + Graphite | | |
| 11 | Stem Seal | 1 | Graphite | | |
| 12 | Thrust Washer | 1 | A240-316 Teflon Coated | | |
| 13 | Cap Bolt | 1 set | A193 B7M | A193 B8 | A320 L7M |
| 14 | Cap Bolt Nut | 1 set | A194 2HM | A193 B8 | A320 L7M |
| 15 | Gland Bolt | 1 set | AISI 4140 | A193-B8 | AISI 4140 |
| 16 | O-Ring | 2 | VITON | | |
| 17 | O-Ring | 2 | VITON | | |
| 18 | O-Ring | 2 | VITON | | |
| 19 | O-Ring | 2 | VITON | | |
| 20 | O-Ring | 2 | VITON | | |
| 21 | Spring | 1 set | INCONEL X-750 | | |
| 22 | Seat Insert | 2 | A216 WCB/ENP | A351 CF8M | A352 LCC/ENP |
| 23 | Retainer Seat | 2 | Graphite | | |
| 24 | Retainer Seat | 2 | PTFE | | |
| 25 | Stem Bushing | 1 | AISI 1020/ENP | A276 316 | AISI 1020/ENP |
| 26 | Du-Bush | 1 | Commercial Teflon Coated | | |
| 27 | Du-Bush | 1 | Commercial Teflon Coated | | |
| 28 | Du-Bush | 1 | Commercial Teflon Coated | | |
| 29 | Bottom Gasket | 1 | SPW 316 + Graphite | | |
| 30 | Bottom Bolt | 1 set | A193 B7M | A193 B8 | A320 L7M |
| 31 | Bottom Nut | 1 set | A194 2HM | A194 8 | A194 7M |
| 32 | Sealant | 1 set | AISI 1020 Zn Plated | 316SS | AISI 1020 Zn Plated |

*Variations may occur based on size and pressure class.

# FORCE 3-PIECE TRUNNION PARTS LIST AND BILL OF MATERIAL (Typical)



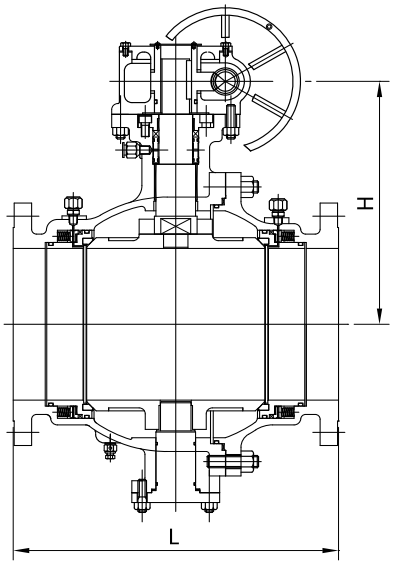



| NO | PART NAME | QTY | CARBON STEEL | STAINLESS STEEL | LOW TEMP CARBON STEEL |
|---|---|---|---|---|---|
| 1 | Body | 1 | A105 | A182 F316 | A350 LF2 |
| 1 | Cap | 2 | A216 WCB | A351 CF8M | A352 LCC |
| 3 | Stem | 1 | 410SS/ENP | 316SS | 410SS/ENP |
| 4 | Ball | 1 | WCB or A105/ ENP | CF8M or F316 | LCC or LF2/ENP |
| 5 | Gland Flange | 1 | AISI 1020 | A276 304 | AISI 1020 |
| 6 | Seat Ring | 2 | DEVLON* | | |
| 7 | Seat Retainer | 2 | WCB or A105/ ENP | CF8M or F316 | LCC or LF2/ENP |
| 8 | O-Ring | 2 | VITON | | |
| 9 | Gasket | 2 | SPW 316 + Graphite | | |
| 10 | Stem Seal | 1 | Graphite | | |
| 11 | Thrust Washer | 1 | A240 316 Teflon Coated | | |
| 12 | Thrust Washer | 2 | A240 316 Teflon Coated | | |
| 13 | Cap Bolt | 1 set | A193 B7M | A193 B8 | A320 L7M |
| 14 | Cap Bolt Nut | 1 set | A194 2HM | A193 8 | A194 7M |
| 15 | Gland Bolt | 1 set | AISI 4140 | A193 B8 | AISI 4140 |
| 16 | O-Ring | 4 | VITON | | |
| 17 | O-Ring | 1 | VITON | | |
| 18 | O-Ring | 2 | VITON | | |
| 19 | Spring | 1 set | Inconel X-750 | | |
| 20 | Seat Insert | 2 | A216 WCB/ENP | A351 CF8M | A350 LF2/ENP |
| 21 | Retainer Seat | 2 | Graphite | | |
| 22 | Retainer Seat | 2 | PTFE | | |
| 23 | Du-Bush | 1 | Commercial Teflon Coated | | |
| 24 | Du-Bush | 2 | Commercial Teflon Coated | | |
| 25 | Ball Guide | 2 | AISI 1020 | A240 316 | AISI 1020 |
| 26 | Pin | 1 set | A276 304 | A276 316 | A276 304 |
| 27 | Mounting Flange | 1 | A216 WCB | A351 CF8M | A352 LCC |
| 28 | M/Flange Gasket | 1 | SPW 316 + Graphite | | |
| 29 | Sealant (Not Pictured) | 1 set | AISI 1020 Zn Plated | 316SS | AISI 1020 Zn Plated |

*Variations may occur based on size and pressure class.

# ANSI 150 Weights And Dimensions

Full Bore: Sizes 2” to 24”
Reduced Bore: Sizes 2” to 24”




## Standard Materials

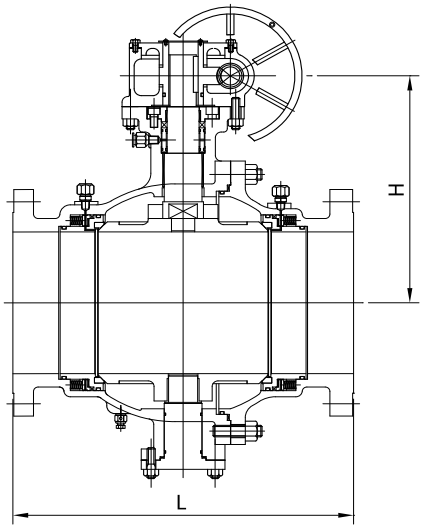
Body: A216-Gr. WCB
Trim: Carbon Steel/E.N.P.
Seats: Glass Filled Teflon®
Seals: HNBR

*(Special materials available on request)*

| NPS | L | | H | | Weight | |
|---|---|---|---|---|---|---|
| | in | mm | in | mm | lb | Kg |
| **2 x 1.5** | 7.0 | 177.8 | 6.2 | 157.0 | 26.5 | 12 |
| **2 x 2** | 7.0 | 177.8 | 6.5 | 165.0 | 35 | 16 |
| **3 x 2** | 8.0 | 203.2 | 6.5 | 165.0 | 49 | 22 |
| **3 x 3** | 8.0 | 203.2 | 7.3 | 186.0 | 57 | 26 |
| **4 x 3** | 9.0 | 228.6 | 7.3 | 186.0 | 88 | 40 |
| **4 x 4** | 9.0 | 228.6 | 9.3 | 237.0 | 123 | 56 |
| **6 x 4** | 15.50 | 393.70 | 9.3 | 237.0 | 264 | 120 |
| **6 x 6** | 15.50 | 393.70 | 11.4 | 290.0 | 275 | 125 |
| **8 x 6** | 18.00 | 457.20 | 11.4 | 290.0 | 330 | 150 |
| **8 x 8** | 18.00 | 457.20 | 13.2 | 335.0 | 429 | 195 |
| **10 x 8** | 21.00 | 533.40 | 13.2 | 335.0 | 506 | 230 |
| **10 x 10** | 21.00 | 533.40 | 16.4 | 417.0 | 594 | 270 |
| **12 x 10** | 24.00 | 609.60 | 16.4 | 417.0 | 653 | 296 |
| **12 x 12** | 24.00 | 609.60 | 17.9 | 455.0 | 1014 | 460 |
| **14 x 12** | 27.00 | 685.80 | 17.9 | 455.0 | 1036 | 470 |
| **14 x 14** | 27.00 | 685.80 | 19.1 | 486.0 | 1742 | 790 |
| **16 x 14** | 30.00 | 762.00 | 19.1 | 486.0 | 1418 | 643 |
| **16 x 16** | 30.00 | 762.00 | 20.6 | 524.0 | 2271 | 1030 |
| **18 x 16** | 34.00 | 863.60 | 20.6 | 524.0 | 2408 | 1092 |
| **18 x 18** | 34.00 | 863.60 | 23.1 | 586.0 | 3043 | 1380 |
| **20 x 18** | 36.00 | 914.40 | 23.1 | 586.0 | 3308 | 1500 |
| **20 x 20** | 36.00 | 914.40 | 25.4 | 646.0 | 4653 | 2110 |
| **24 x 20** | 42.00 | 1,066.80 | 25.4 | 646.0 | 5332 | 2418 |
| **24 x 24** | 42.00 | 1,066.80 | 27.9 | 708.0 | 6196 | 2810 |

# ANSI 300 Weights And Dimensions

Full Bore: Sizes 2” to 24”
Reduced Bore: Sizes 2” to 24”




## Standard Materials

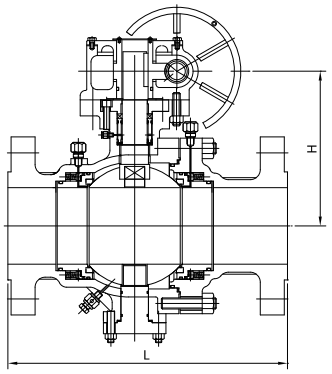
Body: A216-Gr.WCB
Trim: Carbon Steel/E.N.P.
Seats: Glass Filled Teflon
Seals: HNBR

*(Special materials available on request)*

| NPS | L | | H | | Weight | |
|---|---|---|---|---|---|---|
| | in | mm | in | mm | lb | Kg |
| **2 x 1.5** | 8.5 | 215.9 | 6.2 | 157.0 | 39.7 | 18 |
| **2 x 2** | 8.5 | 215.9 | 6.5 | 165.0 | 79.37 | 36 |
| **3 x 2** | 11.12 | 282.4 | 6.5 | 165.0 | 92.60 | 42 |
| **3 x 3** | 11.12 | 282.4 | 7.3 | 186.0 | 127.87 | 58 |
| **4 x 3** | 12.0 | 304.8 | 7.3 | 186.0 | 136.60 | 62 |
| **4 x 4** | 12.0 | 304.8 | 9.3 | 237.0 | 165 | 75 |
| **6 x 4** | 15.88 | 403.35 | 9.3 | 237.0 | 297 | 135 |
| **6 x 6** | 15.88 | 403.35 | 11.4 | 290.0 | 334 | 152 |
| **8 x 6** | 19.75 | 501.65 | 11.4 | 290.0 | 440 | 200 |
| **8 x 8** | 19.75 | 501.65 | 13.2 | 335.0 | 517 | 235 |
| **10 x 8** | 22.38 | 568.45 | 13.2 | 335.0 | 616 | 280 |
| **10 x 10** | 22.38 | 568.45 | 16.4 | 417.0 | 660 | 300 |
| **12 x 10** | 25.50 | 647.70 | 16.4 | 417.0 | 860 | 390 |
| **12 x 12** | 25.50 | 647.70 | 17.9 | 455.0 | 1147 | 520 |
| **14 x 12** | 30.00 | 762.00 | 17.9 | 455.0 | 1323 | 600 |
| **14 x 14** | 30.00 | 762.00 | 19.1 | 486.0 | 2139 | 970 |
| **16 x 14** | 33.00 | 838.20 | 19.1 | 486.0 | 2271 | 1030 |
| **16 x 16** | 33.00 | 838.20 | 20.6 | 524.0 | 2646 | 1200 |
| **18 x 16** | 36.00 | 914.40 | 20.6 | 524.0 | 3021 | 1370 |
| **18 x 18** | 36.00 | 914.40 | 23.1 | 586.0 | 4190 | 1900 |
| **20 x 18** | 39.00 | 990.60 | 23.1 | 586.0 | 4322 | 1960 |
| **20 x 20** | 39.00 | 990.60 | 25.4 | 646.0 | 4763 | 2160 |
| **24 x 20** | 45.00 | 1,143.00 | 25.4 | 646.0 | 5858 | 2430 |
| **24 x 24** | 45.00 | 1,143.00 | 27.9 | 708.0 | 6637 | 3010 |

# ANSI 600 Weights And Dimensions

Full Bore: Sizes 2” to 24”
Reduced Bore: Sizes 2” to 24”




## Standard Materials

Body: A216-Gr. WCB
Trim: Carbon Steel/E.N.P.
Seats: Devlon®
Seals: HNBR

*(Special materials available on request)*

| NPS | Bore | | L | | | | H | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | RF/BW | | RTJ | | | | | |
| | in | mm | in | mm | in | mm | in | mm | lb | kg |
| **2 x 1.5** | 1.5 | 39.0 | 11.5 | 292.1 | 11.6 | 294.6 | 6.6 | 167.0 | 84 | 38 |
| **2 x 2** | 2.0 | 50.0 | 11.5 | 292.1 | 11.6 | 294.6 | 6.8 | 172.0 | 88 | 40 |
| **3 x 2** | 2.0 | 50.0 | 14.0 | 355.6 | 14.1 | 358.1 | 6.8 | 172.0 | 132 | 60 |
| **3 x 3** | 3.0 | 76.0 | 14.0 | 355.6 | 14.1 | 358.1 | 8.3 | 210.0 | 154 | 70 |
| **4 x 3** | 3.0 | 76.0 | 17.0 | 431.8 | 17.1 | 434.3 | 8.3 | 210.0 | 209 | 95 |
| **4 x 4** | 4.0 | 102.0 | 17.0 | 431.8 | 17.1 | 434.3 | 10.3 | 262.0 | 243 | 110 |
| **6 x 4** | 4.0 | 102.0 | 22.0 | 558.8 | 22.1 | 561.3 | 10.3 | 262.0 | 342 | 155 |
| **6 x 6** | 6.0 | 153.0 | 22.0 | 558.8 | 22.1 | 561.3 | 12.5 | 317.0 | 476 | 216 |
| **8 x 6** | 6.0 | 153.0 | 26.0 | 660.4 | 26.1 | 662.9 | 12.5 | 317.0 | 639 | 290 |
| **8 x 8** | 8.0 | 203.0 | 26.0 | 660.4 | 26.1 | 662.9 | 14.3 | 363.0 | 816 | 370 |
| **10 x 8** | 8.0 | 203.0 | 31.0 | 787.4 | 31.1 | 789.9 | 14.3 | 363.0 | 1080 | 490 |
| **10 x 10** | 10.0 | 254.0 | 31.0 | 787.4 | 31.1 | 789.9 | 16.9 | 428.0 | 1359 | 615 |
| **12 x 10** | 10.0 | 254.0 | 33.0 | 838.2 | 33.1 | 840.7 | 16.9 | 428.0 | 2156 | 980 |
| **12 x 12** | 12.0 | 305.0 | 33.0 | 838.2 | 33.1 | 840.7 | 18.4 | 468.0 | 2420 | 1100 |
| **14 x 10** | 10.0 | 254.0 | 35.0 | 889.0 | 35.1 | 891.5 | 16.9 | 428.0 | 2310 | 1050 |
| **14 x 14** | 13.2 | 336.5 | 35.0 | 889.0 | 35.1 | 891.5 | 16.1 | 408.0 | 2932 | 1330 |
| **16 x 12** | 12.0 | 305.0 | 39.0 | 990.6 | 39.1 | 993.1 | 18.4 | 468.0 | 2860 | 1300 |
| **16 x 16** | 15.2 | 386.0 | 39.0 | 990.6 | 39.1 | 993.1 | 22.7 | 576.0 | 3858 | 1750 |
| **18 x 14** | 13.2 | 336.5 | 43.0 | 1092.2 | 43.1 | 1094.7 | 16.1 | 408.0 | 3344 | 1520 |
| **18 x 18** | 17.2 | 438.0 | 43.0 | 1092.2 | 43.1 | 1094.7 | 23.9 | 606.0 | 5071 | 2300 |
| **20 x 16** | 15.2 | 386.0 | 47.0 | 1193.8 | 47.2 | 1198.9 | 22.7 | 576.0 | 4620 | 2100 |
| **20 x 20** | 19.3 | 489.0 | 47.0 | 1193.8 | 47.2 | 1198.9 | 26.9 | 682.0 | 6614 | 3000 |
| **22 x 18** | 17.2 | 438.0 | 51.0 | 1295.4 | 51.4 | 1305.6 | 23.9 | 606.0 | 5940 | 2700 |
| **22 x 22** | 21.1 | 538.0 | 51.0 | 1295.4 | 51.4 | 1305.6 | 28.7 | 728.0 | 7370 | 3350 |
| **24 x 20** | 19.3 | 489.0 | 55.0 | 1397.0 | 55.4 | 1407.2 | 26.9 | 682.0 | 7150 | 3250 |
| **24 x 24** | 23.2 | 590.0 | 55.0 | 1397.0 | 55.4 | 1407.2 | 30.4 | 773.0 | 7788 | 3540 |

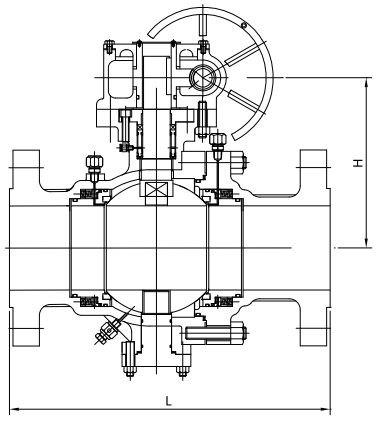
# ANSI 900 Weights And Dimensions

Full Bore: Sizes 2" to 24"
Reduced Bore: Sizes 2" to 24"

## Standard Materials

| | |
|---|---|
| Body: | ASTM A 105 or ASTM A216 – Gr. WCB |
| End Caps: | ASTM A216 – Gr. WCB |
| Trim: | Carbon Steel/E.N.P. |
| Seats: | Devlon® |
| Seals: | HNBR |

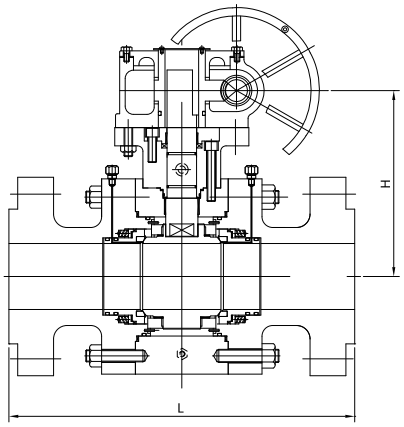
*(Special materials available on request)*




| NPS | bore | | L | | | | H | | WEIGHT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | rf/bw | | rtj | | | | | |
| | in | mm | in | mm | in | mm | in | mm | lb | kg |
| **2 x 1.5** | 1.5 | 39.0 | 14.5 | 368.3 | 14.6 | 370.8 | 6.6 | 167.0 | 121 | 55 |
| **2 x 2** | 2.0 | 50.0 | 14.5 | 368.3 | 14.6 | 370.8 | 7.0 | 177.0 | 154 | 70 |
| **3 x 2** | 2.0 | 50.0 | 15.0 | 381.0 | 15.1 | 383.5 | 7.0 | 177.0 | 198 | 90 |
| **3 x 3** | 3.0 | 76.0 | 15.0 | 381.0 | 15.1 | 383.5 | 8.5 | 215.0 | 243 | 110 |
| **4 x 3** | 3.0 | 76.0 | 18.0 | 457.2 | 18.1 | 459.7 | 8.5 | 215.0 | 374 | 170 |
| **4 x 4** | 4.0 | 102.0 | 18.0 | 457.2 | 18.1 | 459.7 | 10.4 | 263.0 | 573 | 260 |
| **6 x 4** | 4.0 | 102.0 | 24.0 | 609.6 | 24.1 | 612.1 | 10.4 | 263.0 | 682 | 310 |
| **6 x 6** | 6.0 | 153.0 | 24.0 | 609.6 | 24.1 | 612.1 | 12.7 | 322.0 | 794 | 360 |
| **8 x 6** | 6.0 | 153.0 | 29.0 | 736.6 | 29.1 | 739.1 | 12.7 | 322.0 | 1166 | 530 |
| **8 x 8** | 8.0 | 203.0 | 29.0 | 736.6 | 29.1 | 739.1 | 15.9 | 403.0 | 1367 | 620 |
| **10 x 8** | 8.0 | 203.0 | 33.0 | 838.2 | 33.1 | 840.7 | 15.9 | 403.0 | 1562 | 710 |
| **10 x 10** | 10.0 | 254.0 | 33.0 | 838.2 | 33.1 | 840.7 | 18.1 | 460.0 | 2067 | 950 |
| **12 x 10** | 10.0 | 254.0 | 38.0 | 965.2 | 38.1 | 967.7 | 18.1 | 460.0 | 2244 | 1020 |
| **12 x 12** | 12.0 | 303.0 | 38.0 | 965.2 | 38.1 | 967.7 | 22.3 | 566.0 | 2866 | 1300 |
| **14 x 10** | 10.0 | 254.0 | 40.5 | 1028.7 | 40.9 | 1038.9 | 18.1 | 460.0 | 2574 | 1170 |
| **16 x 12** | 12.0 | 303.0 | 44.5 | 1130.3 | 40.9 | 1038.9 | 22.3 | 566.0 | 3256 | 1480 |

# ANSI 1500/2500 Weights And Dimensions

Full Bore: Sizes 2" to 12"
Reduced Bore: Sizes 2" to 12"




## Standard Materials

| | |
|---|---|
| Body: | ASTM A105 or ASTM A216 – Gr. WCB |
| End Caps: | ASTM A216 – Gr. WCB |
| Trim: | Carbon Steel/E.N.P. |
| Seats: | Devlon® |
| Seals: | HNBR |

*(Special materials available on request)*

| NPS | Bore | | L | | | | H | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | RF/BW | | RTJ | | | | | |
| | in | mm | in | mm | in | mm | in | mm | lb | Kg |
| **SME 1500:** | | | | | | | | | | |
| **2 x 1.5** | 1.50 | 39.0 | 14.5 | 368.3 | 14.6 | 370.8 | 6.6 | 167.0 | 121 | 55 |
| **2 x 2** | 2.00 | 50.0 | 14.5 | 368.3 | 14.6 | 370.8 | 7.0 | 177.0 | 154 | 70 |
| **3 x 2** | 2.00 | 50.0 | 18.5 | 469.9 | 18.6 | 472.4 | 7.0 | 177.0 | 242 | 110 |
| **3 x 3** | 3.00 | 76.0 | 18.5 | 469.9 | 18.6 | 472.4 | 8.5 | 215.0 | 287 | 130 |
| **4 x 3** | 3.00 | 76.0 | 21.5 | 546.1 | 21.6 | 548.6 | 8.5 | 215.0 | 418 | 190 |
| **4 x 4** | 4.00 | 102.0 | 21.5 | 546.1 | 21.6 | 548.6 | 10.6 | 268.0 | 617 | 280 |
| **6 x 4** | 4.00 | 102.0 | 27.8 | 704.9 | 28.0 | 711.2 | 10.6 | 268.0 | 748 | 340 |
| **6 x 6** | 5.67 | 144.0 | 27.8 | 704.9 | 28.0 | 711.2 | 12.7 | 323.0 | 1124 | 510 |
| **8 x 6** | 5.67 | 144.0 | 32.8 | 831.9 | 33.1 | 840.7 | 12.7 | 323.0 | 1408 | 640 |
| **8 x 8** | 7.56 | 192.0 | 32.8 | 831.9 | 33.1 | 840.7 | 18.2 | 463.0 | 1543 | 700 |
| **10 x 8** | 7.56 | 192.0 | 39.0 | 990.6 | 39.4 | 1001.0 | 18.2 | 463.0 | 2200 | 1000 |
| **10 x 10** | 9.45 | 245.0 | 39.0 | 990.6 | 39.4 | 1000.8 | 19.6 | 497.0 | 2646 | 1200 |
| **12 x 10** | 9.45 | 245.0 | 44.5 | 1130.3 | 45.1 | 1145.5 | 19.6 | 497.0 | 3190 | 1450 |
| **12 x 12** | 11.34 | 288.0 | 44.5 | 1130.3 | 45.1 | 1145.5 | 20.6 | 522.0 | 3968 | 1800 |
| **SME 2500:** | | | | | | | | | | |
| **2 x 2** | 1.75 | 44.0 | 17.8 | 450.9 | 17.9 | 454.2 | 7.5 | 191.0 | 220 | 100 |
| **3 x 2** | 1.75 | 44.0 | 22.8 | 577.9 | 23.0 | 584.2 | 7.5 | 191.0 | 330 | 150 |
| **3 x 3** | 2.52 | 64.0 | 22.8 | 577.9 | 23.0 | 584.2 | 10.1 | 256.0 | 550 | 250 |
| **4 x 3** | 2.52 | 64.0 | 26.5 | 673.1 | 26.9 | 682.8 | 10.1 | 256.0 | 726 | 330 |
| **4 x 4** | 3.50 | 89.0 | 26.5 | 673.1 | 26.9 | 682.8 | 11.7 | 298.0 | 814 | 370 |
| **6 x 4** | 3.50 | 89.0 | 36.0 | 914.4 | 36.5 | 927.1 | 11.7 | 298.0 | 1320 | 600 |
| **6 x 6** | 5.25 | 133.0 | 36.0 | 914.4 | 36.5 | 927.1 | 16.1 | 408.0 | 1870 | 850 |

# MATERIAL For Sealing and Seat Insert

| Material | General Temperature Range | USE / Characteristics | Not Recommended for | Properties |
|---|---|---|---|---|
| FM (Viton A) | -13° F - 400° F (- 25° C ~ 204° C) | aliphatic hydrocarbons (petroleum oil, mineral oil/grease, fuel oils, butane, propane, natural gas), aromatic hydrocarbons (benzene, toluene), chlorinated hydrocarbons, high vacuum, most acids/chemicals | brake fluid with glycol base, ammonia gas, amines, alkalis, acetone, skydrol, ethyl acetate, superheated steam, polar solvents (ketone, acetone, acetic acid, etc), low molecular esters and ethers | excellent resistance for wear, ozone, weather, aging, compression set, permeation |
| FKM (Viton GLT) | -50° F - 400° F (-45°C ~ 204° C ) | extended low temperature service over Viton A. Excellent for water, steam and mineral acids in addi-tion to use of Viton A | same as those of Viton A | similar to those of Viton A except a little inferior compression set and permeability |
| PTFE | -400° F - 450° F (-240° C ~ 232° F) | almost all chemicals and solvents including strong acid and alkali, high and very low temperature service | high mechanical loading | weather resistance, thermal stability, low friction |
| DEVLON® | -285°F - +350°F (-176°C ~ +176°C) | general purpose oil and gas applications, aliphatic and aromatic hydrocarbons,ketones, acetone, ethers, weak alkalis, and acids, inorganic salt solutions | chlorine, fluorine, hydrofluoric acid, phosphoric acid, nitric acid, hydrochloric acid, sulfuric acid, acetic acid, hydrogen peroxide | The particularly low moisture absorption of this grade provides high dimensional stability. This feature combines with excellent impact wear characteristics to make this material invaluable for offshore applications where weight saving and non-corrosion are imperative |
| PEEK | -40° F - 500° F (-40° C ~ 260° C) | superb chemical resistance in-cluding alcohols, acids, ammonia, esters, halogenated organics, hydrocarbons and inorganics | some strong acids - nitric, chromic, sulfuric, benzene sulfonic acids and aqua regia, etc., some inorganics - bromine, chlorine and fluorine, etc. | good high temperature performance, wear resistance, very low smoke and toxic gas emission, good hydrolysis resistance |
| HNBR | -50°F ~ +350°F (-46°C ~ +180°C) | dilute acids, weak alkalis, lower alcohols, amines, aliphatic hydrocarbons, kerosene, animal oils and fats, synthetic and mineral oils and lubricants, sweet or sour (H2S) oil & gas, amine corrosion inhibitors, explosive decompression resistant | aromatic phosphate esters, ethers, ketones, aromatic hydrocarbons, chlorine | These materials have the excellent oil/fuel resistance of traditional nitrile elastomers. They also have superior mechanical properties and can sustain higher service temperatures: e.g. up to 180°C in oil. In addition, they display superior resistance to aggressive fluids such as sour crude oil and have excellent resistance to ozone |

# TEMPERATURE Limits of Metal Parts

| Forging | Casting | Low Temperature | High Temperature |
|---|---|---|---|
| A105 | A216 WCB | -20° F (-29° C) | 800° F (426° C) |
| A350 LF2 | A352 LCB, LCC | -50° F (-46° C) | 650° F (343° C) |
| A182 F 316 | A351 CF8M | -425° F (-254° C) | 1500° F (815°C) |

# TYPICAL GASKET Specifications

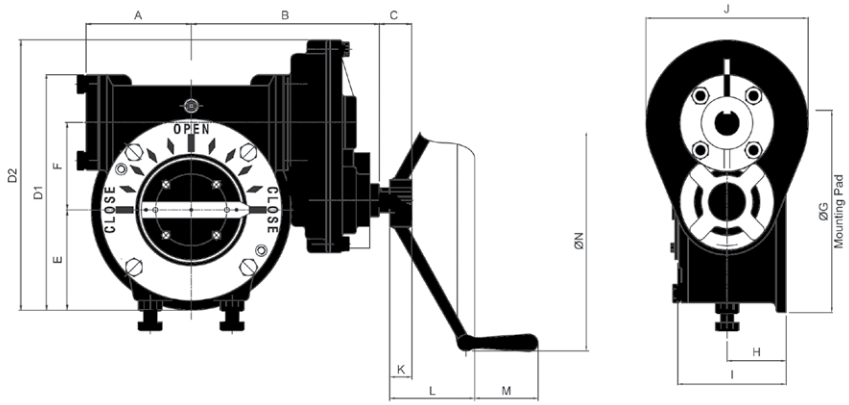
| Type | Material | Low Temperature | High Temperature | Max. Pressure |
|---|---|---|---|---|
| Spiral wound | 316 SS + Graphite | -420° F (-250° C) | 1500° F (815° C) | 6,250 psi (430bar) |
| Spiral wound | 316 SS + PTFE | -200° F (-129° C) | 450° F (232° C) | 6,000 psi (415bar) |

# GEAR ACTUATOR DATA

## Valve Automation

**FORCE**® is able to offer a comprehensive package of control equipment including actuators, switches, solenoids and positioners.

Details of actuator are available on request.




### Gear Operated

The gear operator can be furnished upon request.

| Part No. | Units | A | B | C | D1 | D2 | E | F | G | H | I | J | K | L | M | N | Max Output Torque (ft-lb) | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | lbs. | Kg |
| G-SBWG-BF | in | 2.28 | 2.28 | 2.24 | 4.84 | N/A | 1.87 | 1.59 | 3.74 | 1.57 | 3.03 | N/A | 0.98 | 5.12 | 3.94 | 15.75 | 229 | 8.8 | 4 |
| | mm | 58 | 58 | 57 | 123 | N/A | 47.5 | 40.5 | 95 | 40 | 77 | N/A | 25 | 130 | 100 | 400 | | | |
| G-SBWG-0 | in | 2.81 | 2.81 | 2.24 | 5.94 | N/A | 2.46 | 2.09 | 4.92 | 1.69 | 3.23 | N/A | 0.98 | 5.12 | 3.94 | 15.75 | 443 | 13.2 | 6 |
| | mm | 71.5 | 71.5 | 57 | 151 | N/A | 62.5 | 53 | 125 | 43 | 82 | N/A | 25 | 130 | 100 | 400 | | | |
| G-SBWG-00 | in | 3.29 | 3.29 | 3.19 | 7.01 | N/A | 2.95 | 2.46 | 5.91 | 2.05 | 3.78 | N/A | 1.18 | 5.91 | 3.94 | 19.69 | 738 | 19.8 | 9 |
| | mm | 83.5 | 83.5 | 81 | 178 | N/A | 75 | 62.5 | 150 | 52 | 96 | N/A | 30 | 150 | 100 | 500 | | | |
| G-SBWG-00-SPUR | in | 3.29 | 5.93 | 1.54 | 6.93 | 7.70 | 2.95 | 2.46 | 5.91 | 2.05 | 3.78 | 4.57 | 1.18 | 5.91 | 3.94 | 19.69 | 738 | 28.6 | 13 |
| | mm | 83.5 | 150.5 | 39 | 176 | 195.5 | 75 | 62.5 | 150 | 52 | 96 | 116 | 30 | 150 | 100 | 500 | | | |
| G-SBWG-01 | in | 3.64 | 3.64 | 3.19 | 7.99 | N/A | 3.44 | 2.95 | 6.89 | 2.13 | 3.82 | N/A | 1.18 | 5.91 | 3.94 | 19.69 | 1143 | 28.6 | 13 |
| | mm | 92.5 | 92.5 | 81 | 203 | N/A | 87.5 | 75 | 175 | 54 | 97 | N/A | 30 | 150 | 100 | 500 | | | |
| G-SBWG-01-SPUR | in | 3.64 | 6.28 | 1.54 | 8.70 | 8.68 | 3.44 | 2.95 | 6.89 | 2.13 | 3.82 | 4.57 | 1.18 | 5.91 | 3.94 | 19.69 | 1143 | 37.4 | 17 |
| | mm | 92.5 | 159.5 | 39 | 221 | 220.5 | 87.5 | 75 | 175 | 54 | 97 | 116 | 30 | 150 | 100 | 500 | | | |
| G-SBWG-02 | in | 4.35 | 4.35 | 3.62 | 9.72 | N/A | 4.13 | 3.60 | 8.27 | 2.48 | 4.55 | N/A | 1.38 | 8.27 | 3.94 | 27.95 | 1770 | 46.2 | 21 |
| | mm | 110.5 | 110.5 | 92 | 247 | N/A | 105 | 91.5 | 210 | 63 | 115.5 | N/A | 35 | 210 | 100 | 710 | | | |
| G-SBWG-02-SPUR | in | 4.35 | 7.38 | 1.73 | 10.71 | 11.38 | 4.13 | 3.6 | 8.27 | 2.48 | 4.55 | 6.81 | 1.38 | 8.27 | 3.94 | 27.95 | 1770 | 59.4 | 27 |
| | mm | 110.5 | 187.5 | 44 | 272 | 289 | 105 | 91.5 | 210 | 63 | 115.5 | 173 | 35 | 210 | 100 | 710 | | | |
| G-SBWG-03-SPUR | in | 4.88 | 7.91 | 1.73 | 12.32 | 11.34 | 4.92 | 4.45 | 9.84 | 2.48 | 4.61 | 6.81 | 1.38 | 8.27 | 3.94 | 27.95 | 3172 | 79.2 | 36 |
| | mm | 124 | 201 | 44 | 313 | 288 | 125 | 113 | 250 | 63 | 117 | 173 | 35 | 210 | 100 | 710 | | | |
| G-SBWG-04-SPUR | in | 6.1 | 9.53 | 1.65 | 16.46 | 16.44 | 6.4 | 6.02 | 11.81 | 2.87 | 5.79 | 8.03 | 1.38 | 9.06 | 3.94 | 31.5 | 6820 | 154.3 | 70 |
| | mm | 155 | 242 | 42 | 418 | 417.5 | 162.5 | 153 | 300 | 73 | 147 | 204 | 35 | 230 | 100 | 800 | | | |
| G-SBWG-05-SPUR | in | 6.5 | 9.92 | 1.65 | 18.50 | 18.48 | 7.38 | 7.09 | 13.78 | 3.07 | 6.10 | 8.03 | 1.38 | 9.06 | 3.94 | 31.5 | 10916 | 224.4 | 102 |
| | mm | 165 | 252 | 42 | 470 | 469.5 | 187.5 | 180 | 350 | 78 | 155 | 204 | 35 | 230 | 100 | 800 | | | |

# METAL SEATED BALL VALVES

## BTM Series

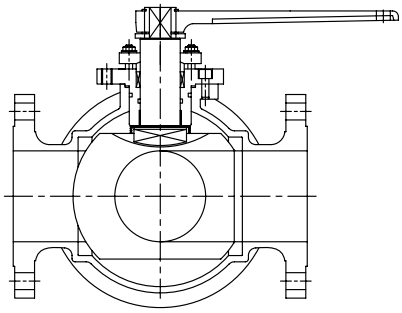
- Full Bore & Reduced Bore
- Applicable Standards ANSI B16.34, BS5351 & API 6D
- Face to Face: ANSI B16.10
- End Flange Dimensions: ANSI B16.5

## FORCE Metal Seated Ball Valve Features:

- 2-Piece or 3-Piece split body construction
- Manufactured to exact customer specifications / requirements
- Provide excellent service in high temperature / high operational frequency applications
- Standard ISO Mounting Pad
- Manufactured to meet ANSI B16.104 Class V and MSS SP-61 sealing requirements
- Standard Fire Safe design

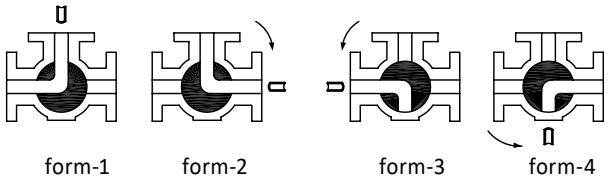
# 3-WAY 4-SEAT BALL VALVES

- T-Port or L-Port
- Side Entry and Top Entry
- 4-Seat Design
- Face to Face: manufacturer standard
- End Flange Dimensions: ANSI B16.5
- Full Bore

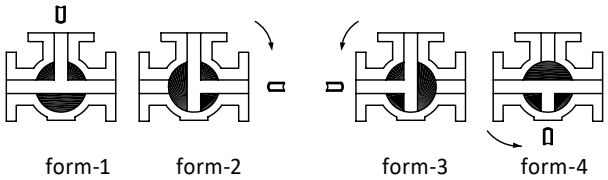


## Operating Forms

3-way L-Port

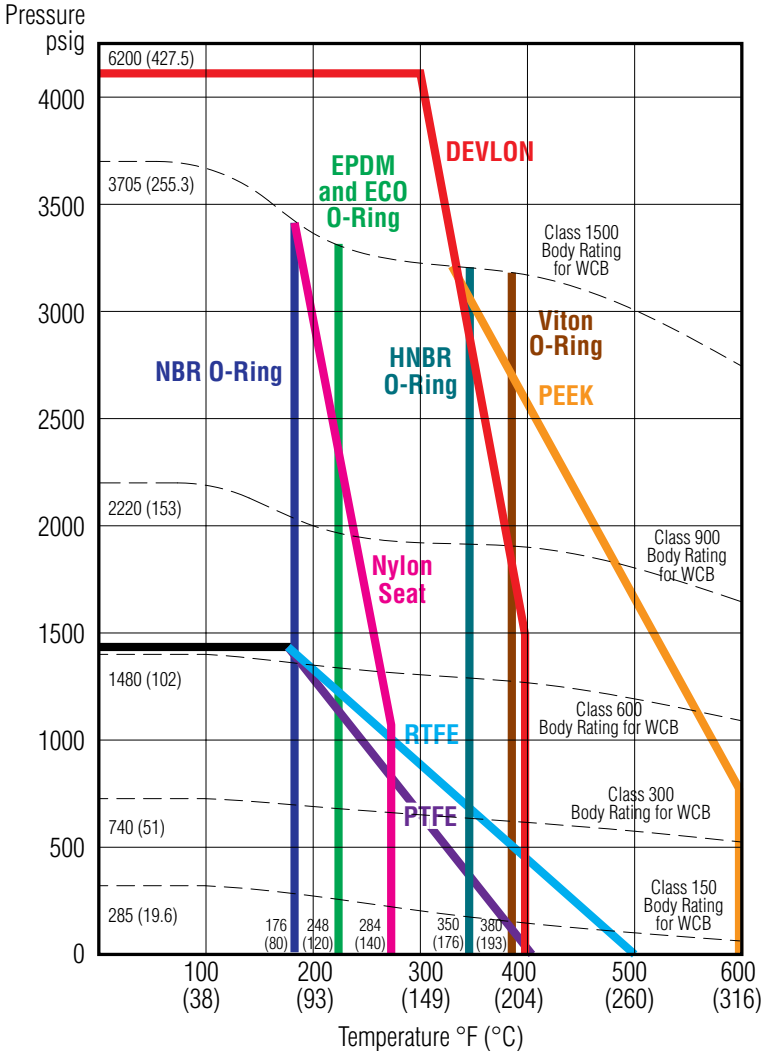



3-way T-Port



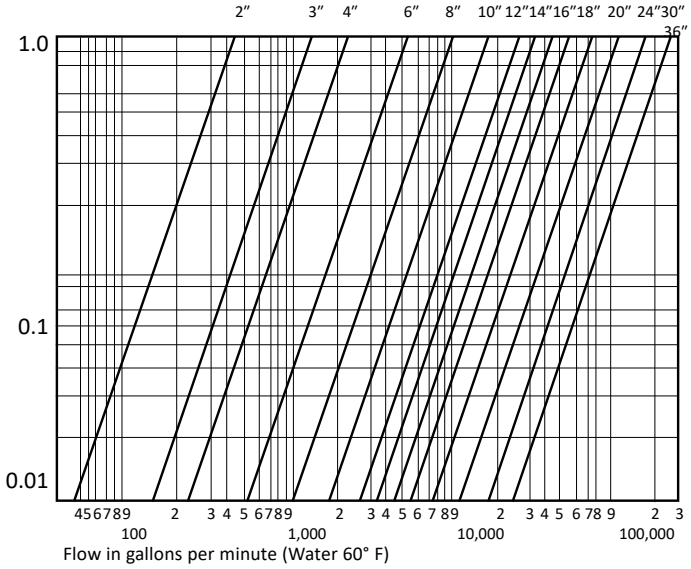

Flow direction is marked on top of stem

# PRESSURE/TEMPERATURE RATING

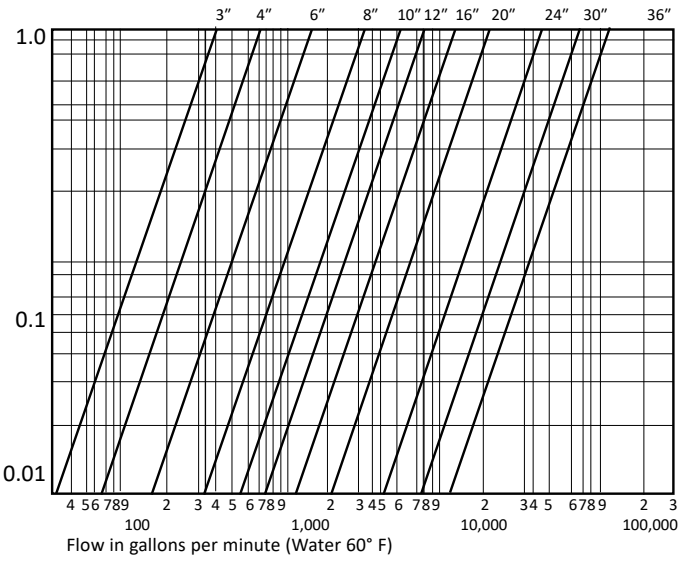



## Pressure Loss Vs. Flow Rate

Full Port Ball Valves




Reduced Port Ball Valves



# HOW TO ORDER A Force® Trunnion Mounted Ball Valve

**Example:** A 1", Class 150, 2 Piece, Full Port Trunnion Mounted Ball Valve with Raised Face Flanged End Connections, Carbon Steel Body, Carbon Steel+ ENP Ball and 410 SS + ENP Stem with PTFE Seats, Viton® O-Rings, and Lever is written as 1-BTN11-AAA1L-1.

| A | | B | C | D | | E | F | G | H | I | | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | – | BTN | 1 | 1 | – | A | A | A | 1 | L | – | 1 |

| A | SIZE |
|---|---|
| 0.5 | 1/2" |
| 0.75 | 3/4" |
| 1 | 1" |
| 1.5 | 1-1/2" |
| 2 | 2" |
| 3 | 3" |
| 4 | 4" |
| 5 | 5" |
| 6 | 6" |
| 8 | 8" |
| 10 | 10" |
| 12 | 12" |
| 14 | 14" |
| 16 | 16" |
| 18 | 18" |
| 20 | 20" |
| 24 | 24" |
| 30 | 30" |
| 36 | 36" |

| B | BALL VALVE TYPE |
|---|---|
| BU | 1 PC Floating BV |
| BF | 2 PC Floating BV w/ Bolted Body |
| BN | 3-Way BV w/ 90° V-Ball |
| BV | 3-Way BV w/ 120° V-Ball |
| BT | 2 PC Trunnion BV w/o Grease Fitting |
| BTN | 2 PC Trunnion BV w/ Grease Fitting |
| BUM | 1 PC Metal Seated Floating BV |
| BFM | 2 PC Metal Seated Floating BV w/ Bolted Body |
| BTM | 2 PC Metal Seated Trunnion BV w/ Grease Fitting |
| BUC | Cryo. 1 PC Floating BV |
| BFC | Cryo. 2 PC Floating BV w/ Bolted Body |
| BTC | Cryo. 2 PC Trunnion BV w/ Grease Fitting |
| BP | Pocketless BV |
| BJ | Jacketed BV |

| C | PORT |
|---|---|
| 1 | Full Port |
| 2 | Reduced Port |

| D | PRESSURE CLASS |
|---|---|
| 1 | Class 150 |
| 2 | Class 300 |
| 3 | Class 600 |
| 4 | Class 900 |
| 5 | Class 1500 |
| 6 | Class 2500 |
| 7 | Other |

| E | BODY MATERIAL |
|---|---|
| A | A216-WCB (A105) |
| B | A351-CF8 (F304) |
| C | A351-CF8M (F316) |
| D | A351-CF3 (F304L) |
| E | A351-CF3M (F316L) |
| F | A351-CN7M (Alloy 20) |
| G | A217-WC1 |
| H | A217-WC6 (F11) |
| J | A217-WC9 (F22) |
| K | A352-LCC |
| L | A352-LC2 |
| M | A352-LC3 |
| N | A352-LCB (LF2) |
| P | A217-C5 |
| Q | Duplex |
| R | Monel |
| S | Hastelloy® |
| T | Titanium |
| U | Inconel |
| V | Super Duplex |
| X | Other |

| F | TRIM MATERIAL |
|---|---|
| A | WCB+ENP Ball & 410 SS + ENP Stem |
| B | 304 SS |
| C | 316 SS |
| D | 304L SS |
| E | 316L SS |
| F | Alloy 20 |
| G | 410 SS |
| Q | Duplex |
| R | Monel |
| S | Hastelloy® |
| T | Titanium |
| U | Inconel |
| V | Super Duplex |
| X | Other |

| G | SEAT MATERIAL |
|---|---|
| A | PTFE |
| B | RTFE (Glass) |
| C | RTFE (Carbon) |
| D | TFM 1600 |
| E | PFA |
| F | PEEK |
| G | Nylon |
| H | Metal |
| I | PCTFE |
| J | Devlon® |
| K | Graphite |
| X | Other |

| H | END CONNECTION |
|---|---|
| 1 | Raised Face Flange (RF) |
| 2 | Ring Type Joint Flange (RTJ) |
| 3 | Welded End (WE) |
| 4 | RF x WE |
| 5 | RTJ x WE |
| 6 | Socket Weld (SW) |
| 7 | SW x Threaded |
| 8 | Special |

| I | OPERATOR |
|---|---|
| E | Electric Actuator |
| P | Pneumatic Actuator |
| G | Gear Operator |
| B | Bare Stem |
| L | Lever |

| J | O-RINGS (FOR BTN SERIES) |
|---|---|
| 1 | Viton® |
| 2 | Viton® AED |
| 3 | HNBR 90 |
| 9 | Other |

BV - Ball Valve
PC - Piece
Cryo. - Cryogenic
BU Series - Standard O-Rings are Viton
BF Series - Valves do NOT have O-Rings
BTN Series - O-Rings require dash number designation (J)

# NOTES

# NOTES


**U.S. - Headquarters**
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Fax: 713.466.1715

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Fax: 713.590.1319

U.S. Website: www.cncflowcontrol.com

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Main: 780.462.9166

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