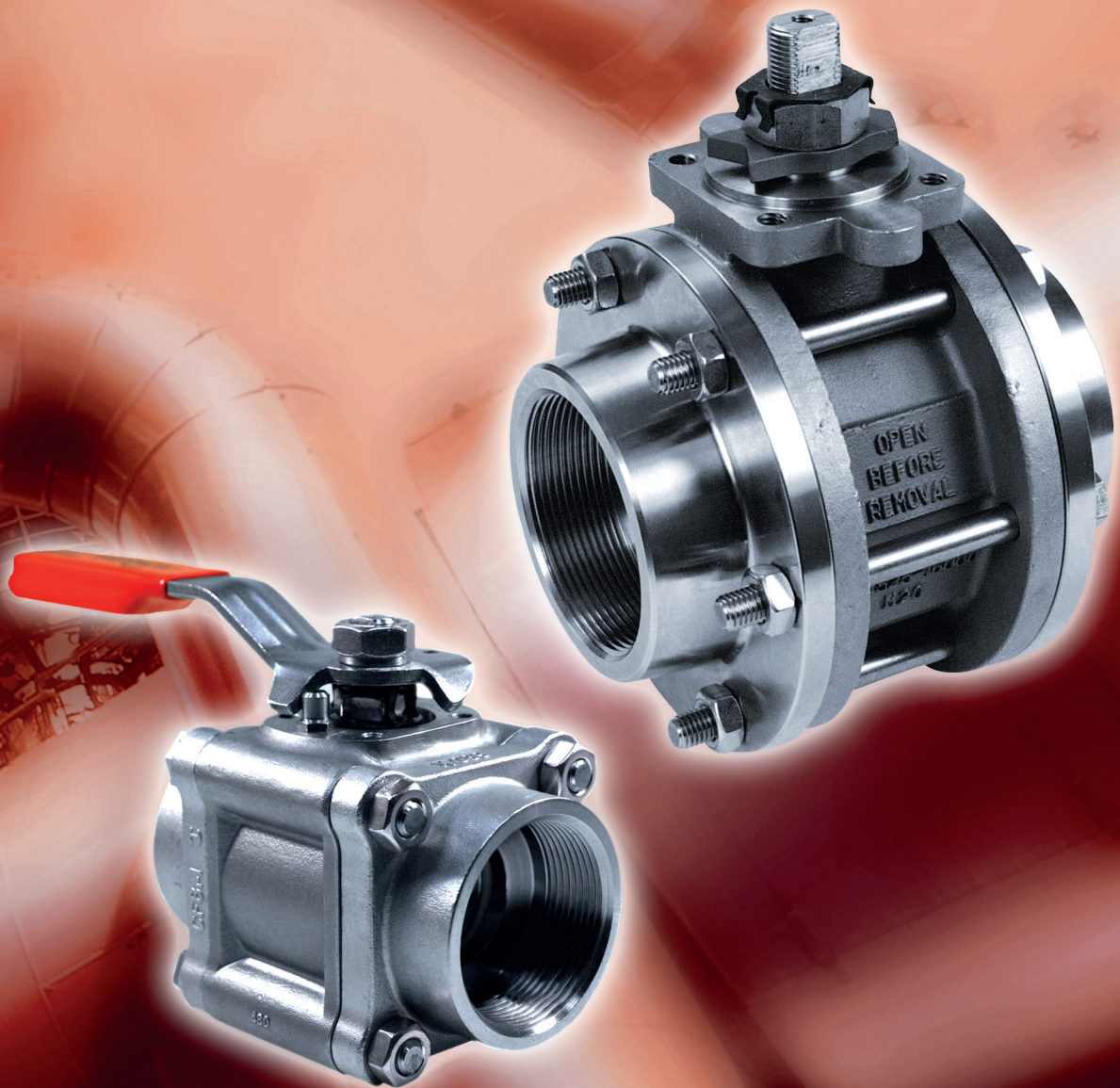




Worcester Controls

Standard 3-Piece Ball Valves



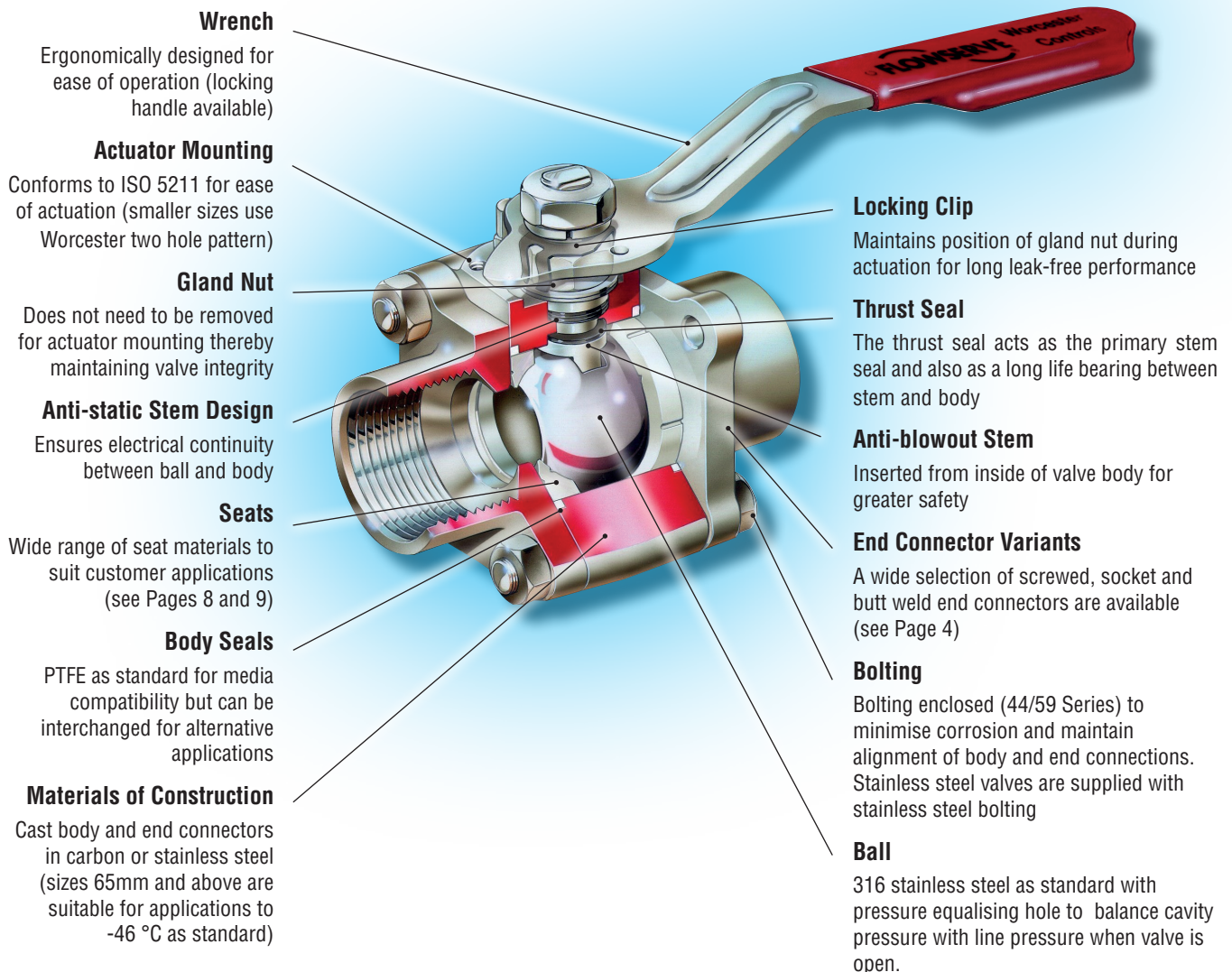
Experience In Motion



The Flowserve Worcester Controls three-piece ball valve delivers rugged, high performance reliability for a range of applications, all in an easy-to-maintain design.

A variety of pipe ends, including socket weld, screwed or butt weld ends enables these valves to be adapted to fit both standard and more unusual piping specifications while the range of seat materials handles steam, chemicals, cryogenic gases, petroleum products, caustics, abrasive materials or fluids containing solids.

As you would expect, Worcester has developed and improved the Series 44/459 over the years to maintain its position as the 8-150mm valve design which others strive to equal. The 59 and 599 series full bore versions complete the range of 3-piece valves.



Standards of Compliance

Worchester have always taken the lead when it comes to standards of compliance and the 3-piece valve is no exception, meeting all the mandatory requirements along with a number of others relating to product for use in the process industry.

PED 2014/68/EU

The Pressure Equipment Directive was introduced to ensure the safety and integrity of pressure containing equipment used within Europe. The Directive requires design files including calculations to ASME BPVC Sect. VIII, risk assessments, Product testing, Pressure containing components with 3.1 Certification along with supporting QA certification validated by a Notified Body. CE marking for PED only applies to valves greater than DN25 nominal bore. Below that design files are still maintained but classified as SEP.

Atex 94/9/EC

The Atex Directive was established to prevent explosive atmospheres forming, prevent ignition and control the effect of explosions. Valves complying with the Atex requirement are CE marked with the standard designation. Worchester valves carry a rating Ex II2GDcX due to the anti-static devices used in the build.

| | | | |
|---------------------------------|--------------------|-------------------|------|
| FLOWSERVE WORCESTER (UK) | | | |
| 20 | A44-6666TT | T | |
| | DN50 | | |
| | 69 BAR -30°C | 0 BAR -230°C | |
| | BALL 316 | SEAT PTFE | |
| CE | 2014/68/EU | 9000012345/1000 | |
| | 0086 2014/34/EU | Ex II2GDcX | 2016 |

SIL (Safety Integrity Level) IEC61508

Safety Integrity is now an essential part of many process plants allowing assessments to be made based on the reliability of the equipment used within it. Worchester valves have been independently reviewed and assessed and given the rating of SIL 'SC 3'. This allows an assembly utilising a Worchester valve to carry a maximum overall rating of SIL 3 or less if other equipment has a lower rating

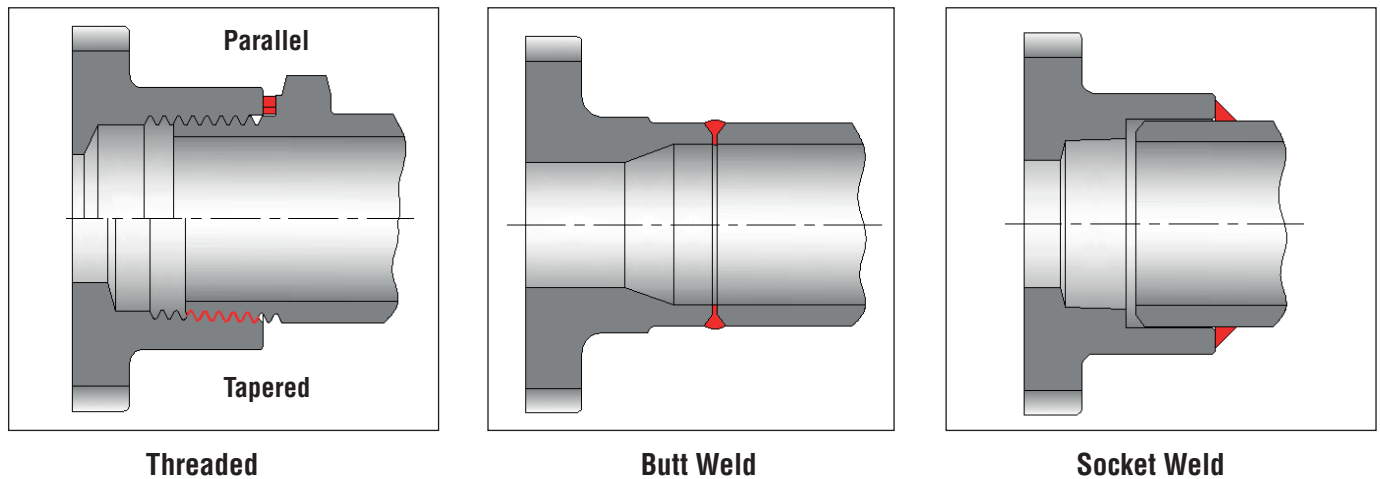
Fugitive Emission ISO15848

Introduced to ensure that product used in process plants can maintain a specified level of integrity based on service conditions. The Worchester 44 Series now has a combined class rating as follows;

Tightness Class: BH (Helium)
 Endurance Class: C01 (500 cycles)
 Test Pressure: 69 Bar
 Test temperature: Ambient 20 °C & 120 °C
 Stem seal Adjustments (SSA): 0 (No adjustments)
 ISO FE BH-C01-SSA 0-t(-29 °C to 120 °C)-69 bar

End Connector Variants

Worcester offers a wide range of end connector variants to meet international, European and regional standards. The variety of connectors is shown below with their reference standard against the Worcester 3-digit product code designation.



| Type | Code | Reference | Standard of Compliance |
|-------------|----------|--------------------|--|
| Threaded | SEP | BSPP / G | BS EN ISO 228-1 |
| | SET | BSPT / Rc | BS EN ISO 10226-1 / ISO 7-1 |
| | SEN | NPT | ASME B1.20.1 |
| Butt Weld | BW5 | Schedule 5 | Pipe to BS1600, ASME B36.10/B36.19 Butt weld preparation to ASME B16.25 |
| | BWE | Schedule 10 | |
| | BWA | Schedule 40 | |
| | BWC | Schedule 80 | |
| | BW6 | Schedule 160 | |
| | BOD | Hygienic Tube | Inch series O/D pipe, 16 swg wall |
| | BWG | ISO Pipe (special) | ISO 4200 Series 1 O/D with Wall thickness to EN 1092-1 PN16/40 |
| | BWJ | ISO Pipe (special) | ISO 4200 Series 1 O/D with 2.6mm Wall thickness |
| | BWH | ISO Pipe (special) | ISO 4200 Series 1 O/D with I/D as per valve DN size |
| | BWK | DIN Pipe | DIN 2463 Row 1 |
| | BWL | DIN Pipe | DIN 11850 Row 2 |
| | BWM | Swedish Std | SSG7837 (Pulp and Paper) |
| | BWR | DIN Pipe | DIN 11850 Row 1 |
| | BX* | ISO Pipe | ISO 4200 Series 1 |
| BY* | ISO Pipe | ISO 4200 Series 2 | |
| BZ* | ISO Pipe | ISO 4200 Series 3 | |
| Socket Weld | SWA | Schedule 40 | Pipe to BS1600, ASME B36.10/B36.19 |
| | SWC | Schedule 80 | Pipe to BS1600, ASME B36.10/B36.19 (Not available on A44) |

Alternative end connectors such as extended or Tri-clamp are available upon request.

Application Variants



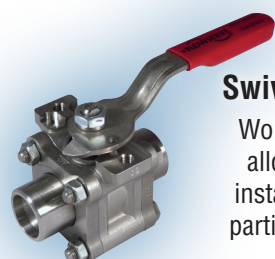
EC 1935 Food Contact Valve

This special variation of the 44/459 series fully complies with the requirements of Regulation EC 1935, enabling it to be safely installed on applications involving direct food contact.



Cryogenic Valves C44/59/459/599

The cryogenic valve is suitable for low temperature applications, including CO₂, N₂, Ar, O₂, LNG and other liquid gases. It is available in stainless steel or brass.



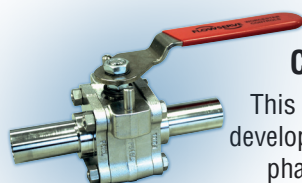
Swivel Ended Valves AS44/59

Worcesters swivel-end connector allows for simple orientation and installation of butt welded valves, particularly when long, complicated sections of pre-fabricated pipework are used.



High Integrity Valve E44

The unique dual stem sealing design of the Worcesters Enviro-Safe valve makes it ideal for toxic media and high cycling applications.



Clean Valves WK70

This valve has been specifically developed for use in semi-conductor, pharmaceutical and bio-tech applications.



Control Valves V44/459

Worcesters versatile rotary V-Flow control valve offers accurate control through a range of V-ported, characterized seats, providing a compact control valve for a variety of applications (Also available in firesafe version).



High Pressure Valves 5HP44

The 5HP44 is Worcesters three-piece ball valve for high pressure hydraulic systems up to 345 Bar (5000 psi).



Steam and Thermal Fluid Valves AW44/59

Specifically designed for on/off steam applications in conditions up to 250 psi (continuous saturated steam) or 1500 psi (thermal fluids), the AW44 is available in stainless or carbon steel.



Firesafe Valves F44/59/459/599

This firesafe design is particularly suitable for hazardous areas in hydrocarbon and chemical process lines.

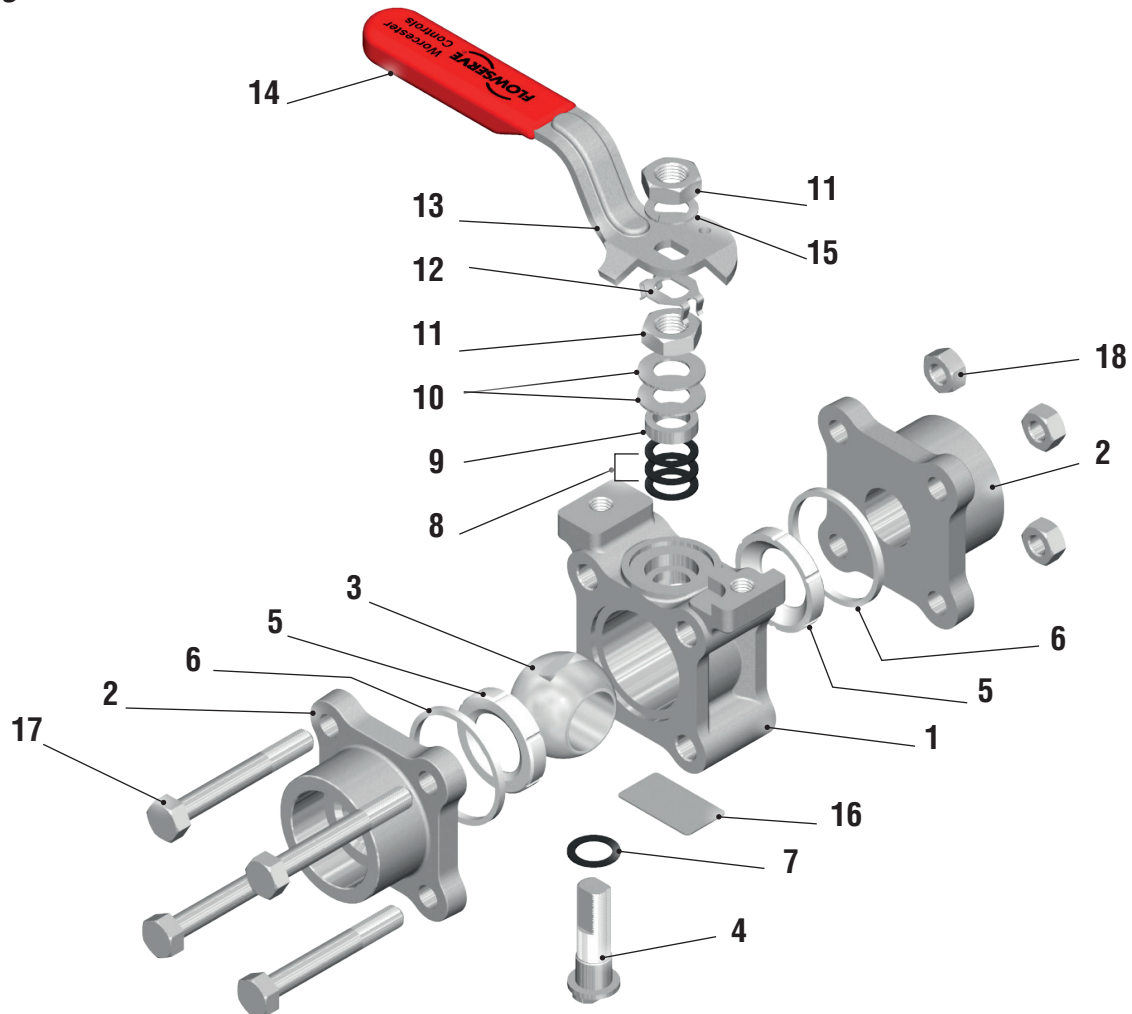


Diverter Valves 13/14

Worcesters Series 13/14 range of three-way valves has been designed for diverting and mixing process media, and features a number of variants which provide a range of operational solutions. Available in bottom entry and side entry configurations

Construction

A44/A59



| Item | Description | Carbon Steel | Stainless Steel | Item | Description | Carbon Steel | Stainless Steel |
|------|-------------------|--|---------------------------|------|----------------------|-----------------------------------|--|
| 1 | Body | ASTM A216 WCB UNS J03002 | ASTM A351 CF8M UNS J92900 | 11 | Gland/Wrench Nut* | | Stainless Steel |
| 2 | End Connector | ASTM A216 WCB UNS J03002 | ASTM A351 CF3M UNS J92800 | 12 | Locking Clip* | | Stainless Steel |
| 3 | Ball | ASTM A479 316 UNS S31600 ASTM A351 CF8M UNS J92900 | | 13 | Wrench | Carbon Steel | Stainless Steel |
| 4 | Stem | Stainless Steel AISI Type 316 | | 14 | Wrench Sleeve | | Vinyl Plastisol |
| 5 | Seats* | T PTFE, Virgin R PTFE, 15% Glass Filled H PTFE, 25% Glass Filled P Fluorofill (10% Glass, 15% Carbon Filled) Also Acetal, PEEK, UHMWPE & Metal Seats | | 15 | Spring Washer | | Stainless Steel |
| 6 | Body Seal* | PTFE, Virgin | | 16 | Identification Plate | | Stainless Steel |
| 7 | Stem Thrust Seal* | PTFE, 35% Carbon Filled | | 17 | Body Bolts | BS3692 Gr.8.8 ASTM A193M Gr.B7 | BS EN 3506-1 A4-80 BS6105 Gr.A4-80 BS1506 Gr.MB8MX ASTM A193M Gr.B8M Cl.2 |
| 8 | Gland Packing* | PTFE, 35% Carbon Filled | | 18 | Body Nuts | BS3692 Gr.8 ASTM A194M Gr.2H | BS EN 3506-2 A4-80 BS6105 Gr.A4-80 BS1506 Gr.M8MX ASTM A194M Gr.8M |
| 9 | Gland Follower | Stainless Steel | | | | | |
| 10 | Disc Springs* | Stainless Steel | | | | | |

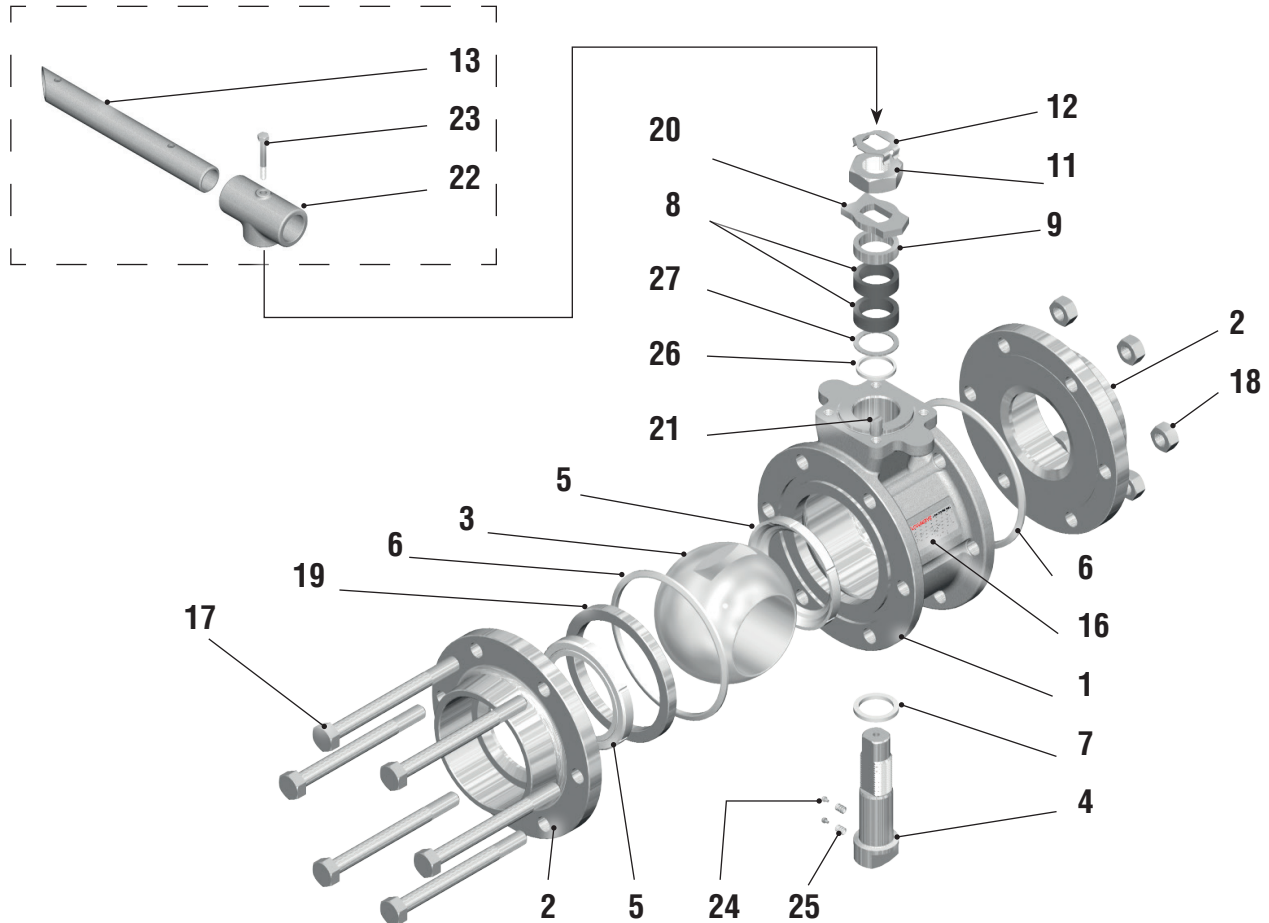
1 Items marked with * denote components supplied in repair kits.

2 All material grades stated are known to be correct at the time of issue but may be subject to change. Customers are advised to contact Flowserve when exact materials of construction are required.

3 Stainless steel stop pin fitted on 1¼" - 2" A44 and 1" - 1½" A59

Construction A459/A599

Wrench kit supplied separately. To be ordered at time of valve Purchase Order.



| Item | Description | Carbon Steel | Stainless Steel | Item | Description | Carbon Steel | Stainless Steel |
|------|-------------------|--|---------------------------|------|-----------------------|---|--|
| 1 | Body | ASTM A352 LCB UNS J03003 | ASTM A351 CF8M UNS J92900 | 16 | Identification Plate | Stainless Steel | |
| 2 | End Connector | ASTM A352 LCB UNS J03003 | ASTM A351 CF3M UNS J92800 | 17 | Body Bolts | ASTM A193M Gr.B7 BS3692 Gr.8.8 | ASTM A193M Gr.B8M Cl.2 BS EN 3506-1 A4-80 BS1506 Gr.MB8MX |
| 3 | Ball | Stainless Steel ASTM A351 CF8M UNS J92900 | | 18 | Body Nuts | ASTM A194M Gr.2H | ASTM A194M Gr.8M |
| 4 | Stem | Stainless Steel AISI Type 316 | | 19 | Seat Ring Retainer | BS3692 Gr.8 ASTM A352 LCB UNS J03003 | BS EN ISO 3506-2 Gr.A4-80 BS1506 Gr.M8MX ASTM A351 CF8M UNS J92900 |
| 5 | Seats* | T PTFE, Virgin R PTFE, 15% Glass Filled H PTFE, 25% Glass Filled P Fluorofill (10% Glass, 15% Carbon Filled) Also Acetal, PEEK, UHMWPE & Metal Seats | | 20 | Stop Indicator | Carbon Steel | Stainless Steel |
| 6 | Body Seal* | PTFE, Virgin | | 21 | Stop Pin | Carbon Steel | Stainless Steel |
| 7 | Stem Thrust Seal* | PTFE, 25% Glass Filled | | 22 | Wrench Head | Cast Iron / Stainless Steel | |
| 8 | Gland Packing* | Graphite | | 23 | Wrench Bolt | Stainless Steel | |
| 9 | Gland Follower | Stainless Steel | | 24 | Anti-static Plunger | Stainless Steel | |
| 11 | Gland/Wrench Nut* | Carbon Steel | Stainless Steel | 25 | Anti-static Spring | Stainless Steel | |
| 12 | Locking Clip* | Stainless Steel | | 26 | Stem Location Ring | Stainless Steel | |
| 13 | Wrench | Carbon Steel | | 27 | Stem Seal (Secondary) | PTFE, Virgin | |

1 Items marked with * denote components supplied in repair kits.

2 Material selection may alter the valves operating pressure/temperature range. Customers are advised to contact Flowserve on ratings for special valve builds.

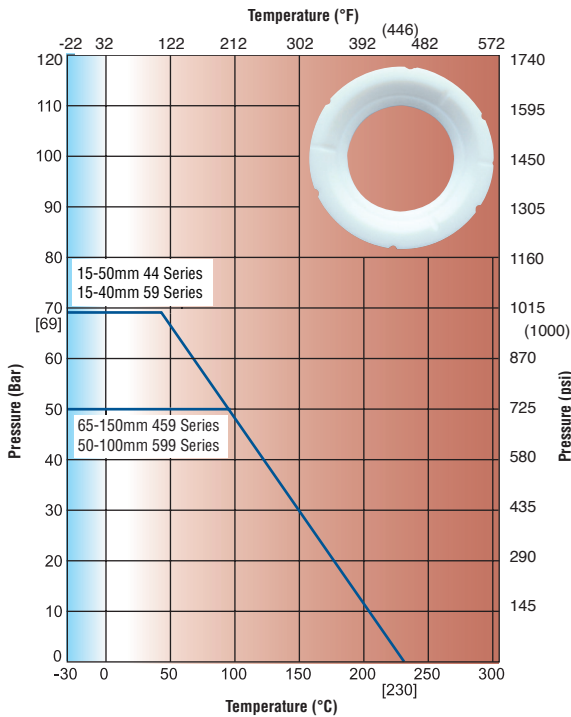
3 All material grades stated are known to be correct at the time of issue but may be subject to change. Customers are advised to contact Flowserve when exact materials of construction are required.

Pressure Temperature Ratings

PTFE based seats

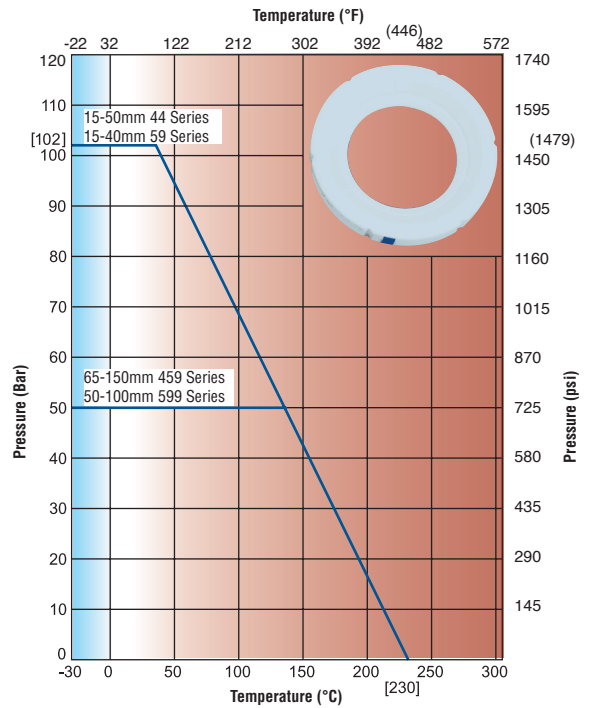
VIRGIN PTFE (T)

Virgin PTFE is the most common sealing material and is suitable for almost all media as it has excellent chemical resistance.



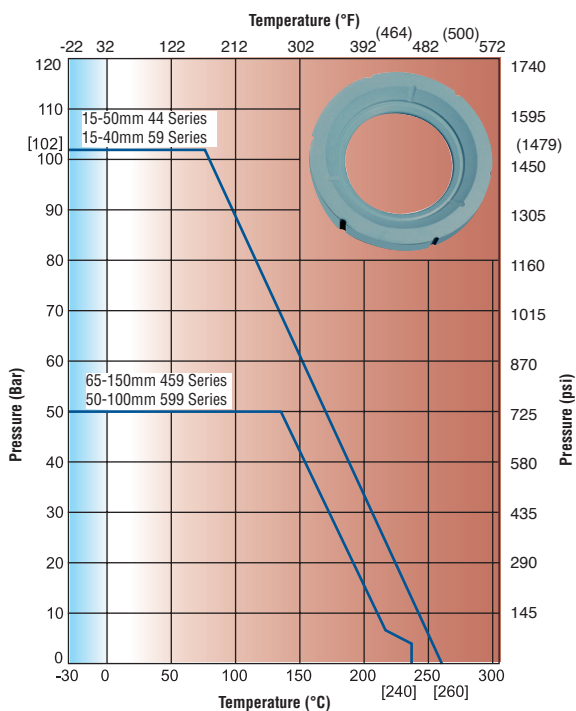
15% GLASS FILLED PTFE (R)

Glass re-inforced PTFE seats are stronger than virgin and have higher pressure/temperature ratings. Chemical resistance as per virgin PTFE.



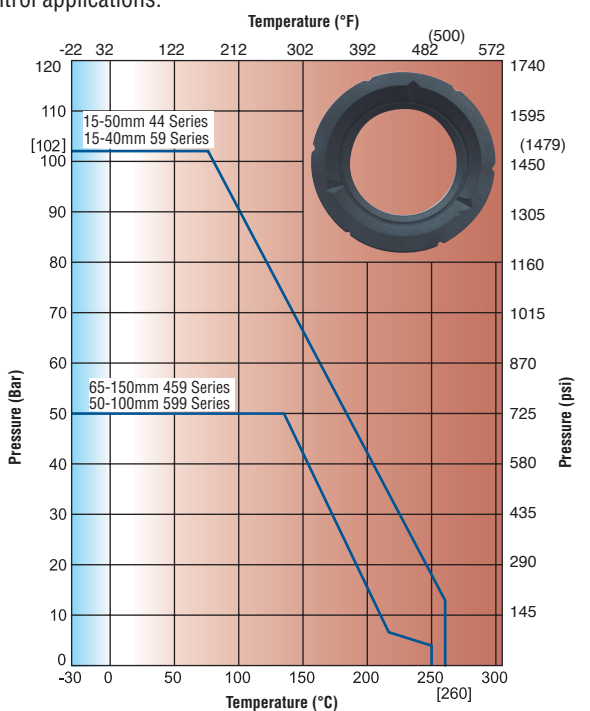
25% GLASS FILLED PTFE (H)

Glass re-inforced PTFE material offering a greater pressure / temperature capability than the R seat.



FLUOROFILL (P)

Carbon, glass and graphite filled PTFE material, an excellent seat material for steam and thermal services. Due to its high cycling capabilities, it is the recommended soft seat for modulating control applications.

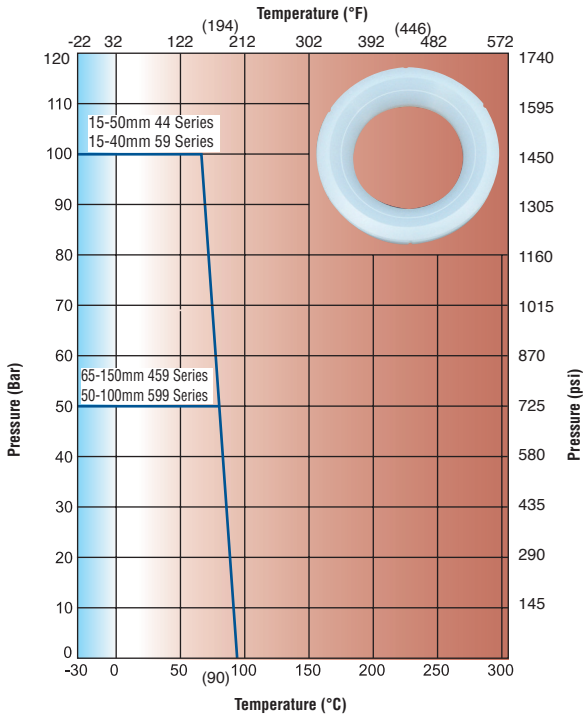


Pressure Temperature Ratings

Non PTFE seats

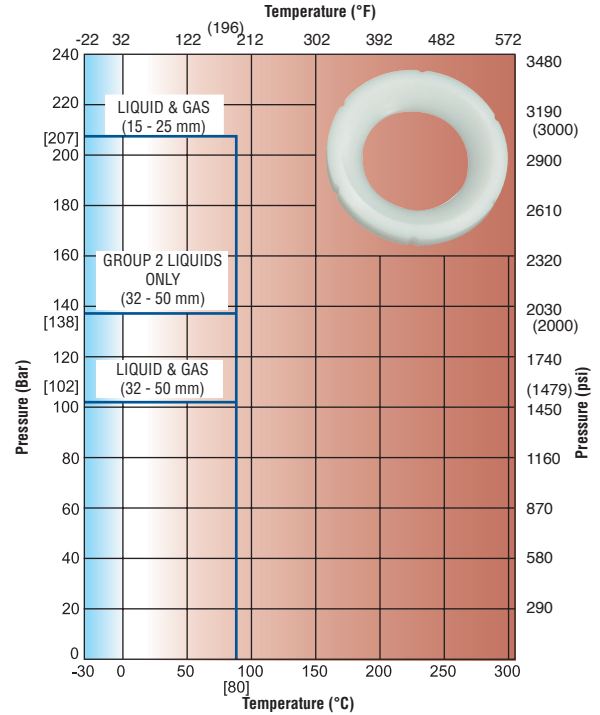
UHMWPE (U)

Ultra High Molecular Weight Polyethylene offers good performance characteristics in applications where PTFE is not suitable (for example on tobacco duty). It also has good abrasion resistance.



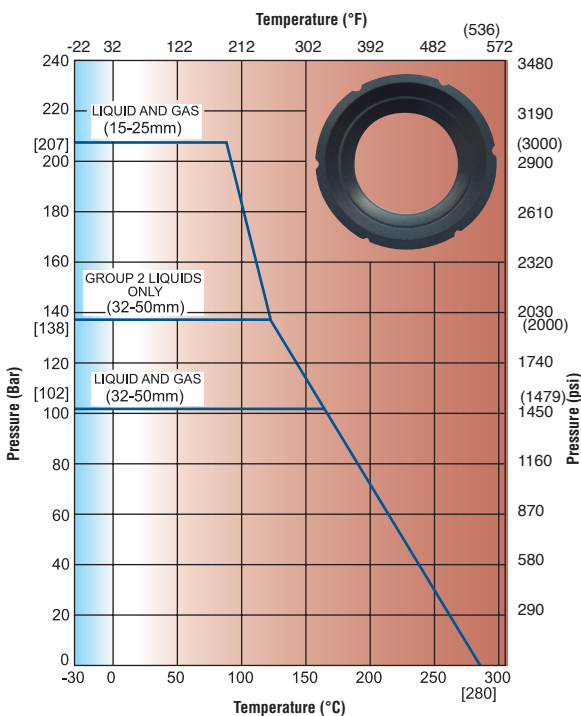
ACETAL (Y)

Machined from acetal homopolymer, these seats are capable of handling extremely high pressures.



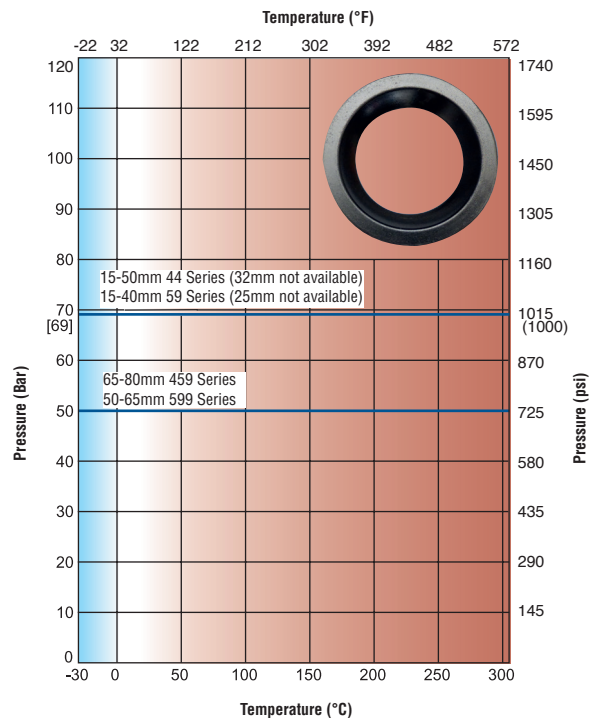
PEEK (A - DN15-25) (X - DN32-150)

PEEK is Poly Ether Ether Ketone, a material which demonstrates outstanding pressure capabilities at elevated temperatures. PEEK has excellent chemical and abrasion resistance.



METAL - ALPHA (N) / GAMMA (G)

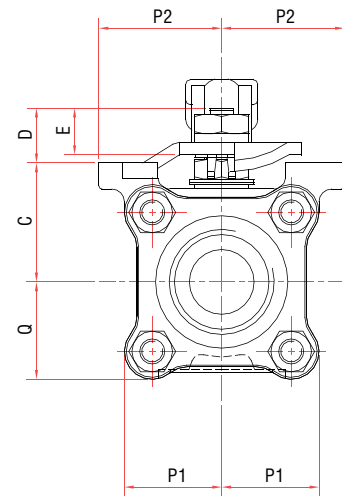
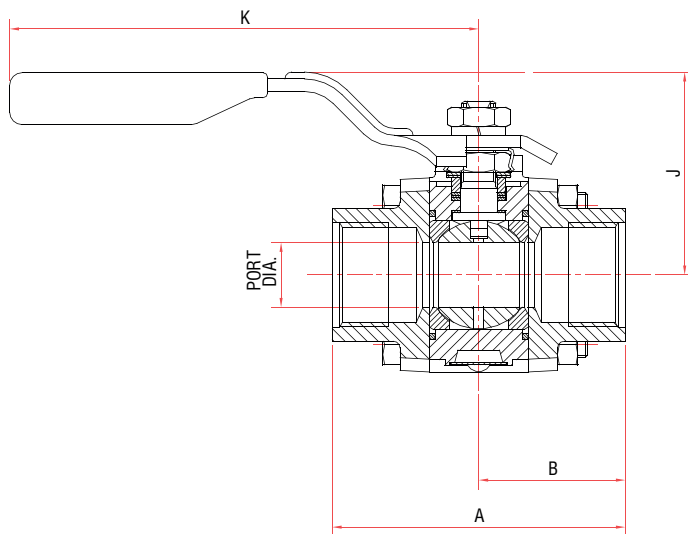
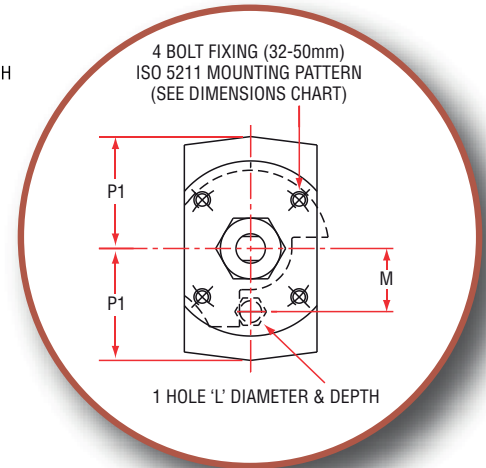
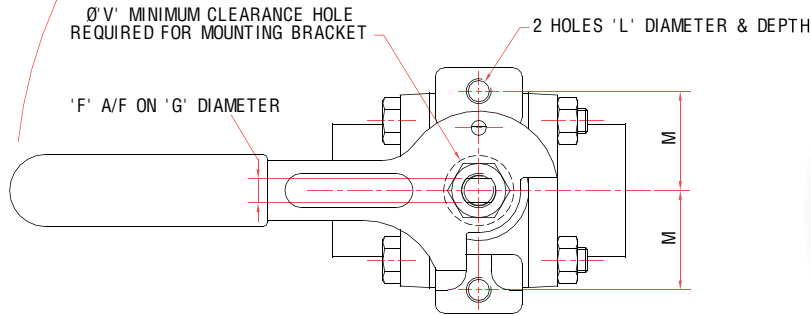
A 316L sintered metal seat impregnated with PTFE - Alpha (N) or graphite - Gamma (G) improves the strength and abrasion resistance of metal.



Dimensions (mm)

A44 8-50 mm Reduced Bore

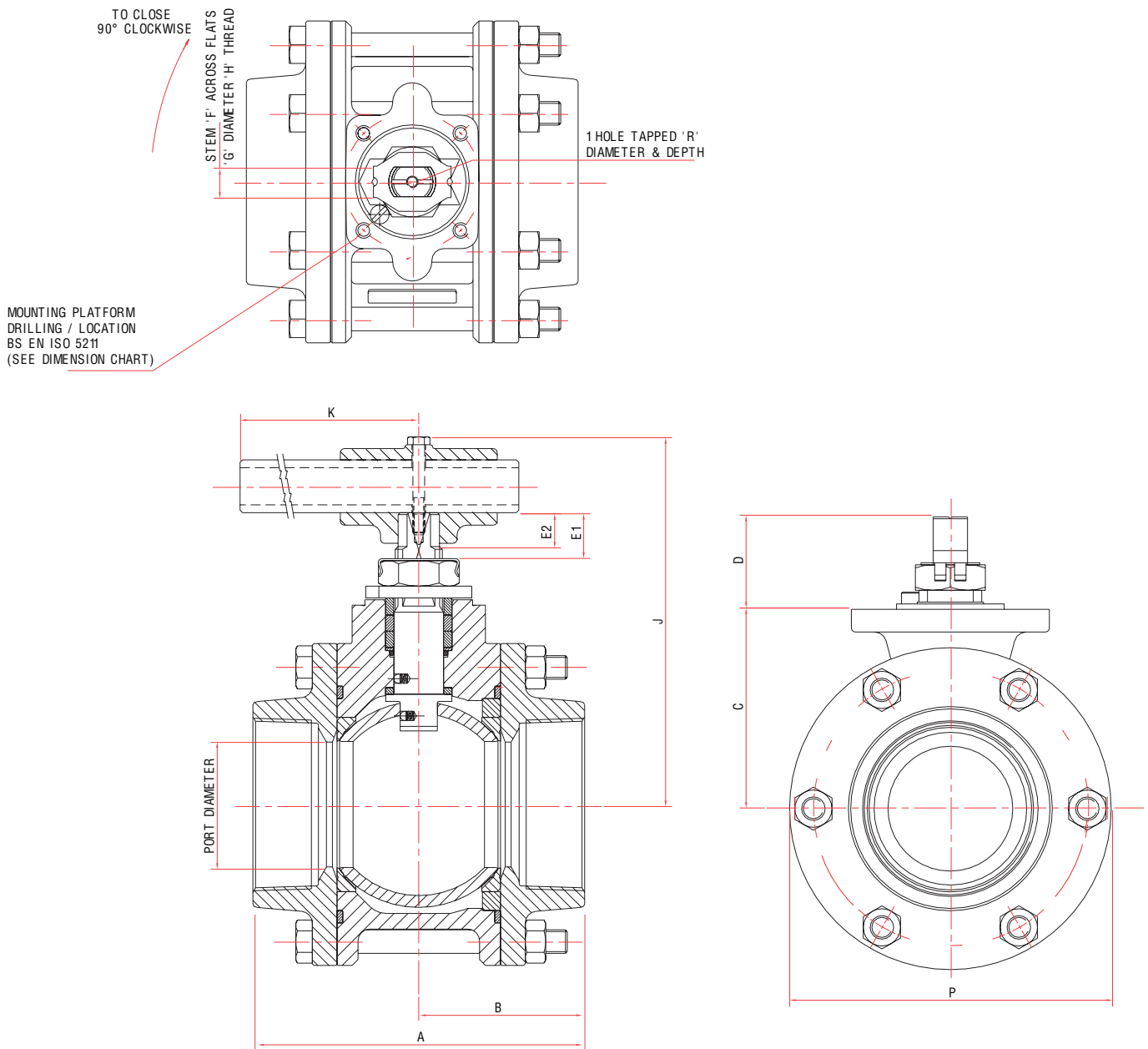
TO CLOSE
90° CLOCKWISE



| Valve Size (mm) | Port Ø Min | A | B | C | D | E | Stem | | J | K | L Thread & Depth | M | P1 | P2 | Q | V Ø | Mounting Platform (ISO 5211) | | | Weight Kg |
|-----------------|------------|------------------|-------|----------------|----------------|----------------|--------------|-----------------|------|-------|-------------------------|-------|------|------|------|------|------------------------------|---|----------------------------------|-----------|
| | | | | | | | F A/F | G Ø Thread | | | | | | | | | ISO Size | Mounting Holes | Platform Recess | |
| 15 | 10.9 | 66.25 64.52 | 32.69 | 26.7 26.5 | 11.68 11.04 | 10.69 10.19 | 5.54 5.46 | 3/8"-24 UNF | 57.9 | 136.0 | M6 x1.0p 9.5 Min | 24.0 | 23.8 | 30.4 | 23.8 | 19.5 | | | | 0.7 |
| 20 | 14.0 | 71.81 70.09 | 35.48 | 29.1 28.9 | 11.68 11.04 | 10.69 10.19 | 5.54 5.46 | 3/8"-24 UNF | 60.3 | 136.0 | M6 x1.0p 9.5 Min | 27.0 | 27.2 | 33.4 | 27.2 | 19.5 | | | | 0.9 |
| 25 | 20.4 | 94.55 92.82 | 46.84 | 38.1 37.9 | 17.94 17.16 | 15.19 14.69 | 7.54 7.47 | 7/16"-20 UNF | 64.8 | 149.0 | M8 x1.25p 9.7 Min | 31.75 | 32.7 | 40.5 | 32.7 | 22.5 | | | | 1.6 |
| 32 | 25.1 | 106.90 105.17 | 53.02 | 37.10 36.85 | 23.74 22.91 | 15.19 14.69 | 7.54 7.47 | 7/16"-20 UNF | 69.6 | 149.0 | M5 x0.8p 6.0 Min | 19.5 | 36.3 | | 36.3 | 22.5 | F04 | 4 OFF M5 x0.8p x7.5 Deep Min ON 42.0 P.C.D. | Ø 30.15/30.02 x4.29/3.52 Deep | 2.2 |
| 40 | 31.3 | 115.41 113.6 | 57.28 | 44.0 43.75 | 29.55 28.73 | 18.39 17.89 | 8.71 8.64 | 9/16"-18 UNF | 77.9 | 181.0 | M6 x1.0p 7.5 Min | 23.0 | 42.3 | | 42.3 | 29.5 | F05 | 4 OFF M6 x1.0p x8.7 Deep Min ON 50.0 P.C.D. | Ø 35.15/35.02 x4.01/3.26 Deep | 3.2 |
| 50 | 37.7 | 127.94 126.21 | 63.54 | 48.75 48.50 | 29.55 28.73 | 18.39 17.89 | 8.71 8.64 | 9/16"-18 UNF | 82.6 | 181.0 | M6 x1.0p 8.7 Min | 23.0 | 47.4 | | 47.4 | 29.5 | F05 | 4 OFF M6 x1.0p x8.7 Deep Min ON 50.0 P.C.D. | Ø 35.15/35.02 x4.01/3.26 Deep | 4.3 |

Dimensions (mm)

A459 65-150 mm Reduced Bore

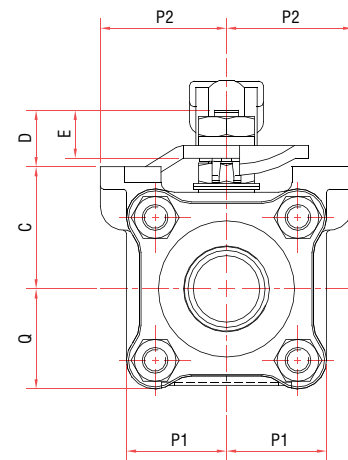
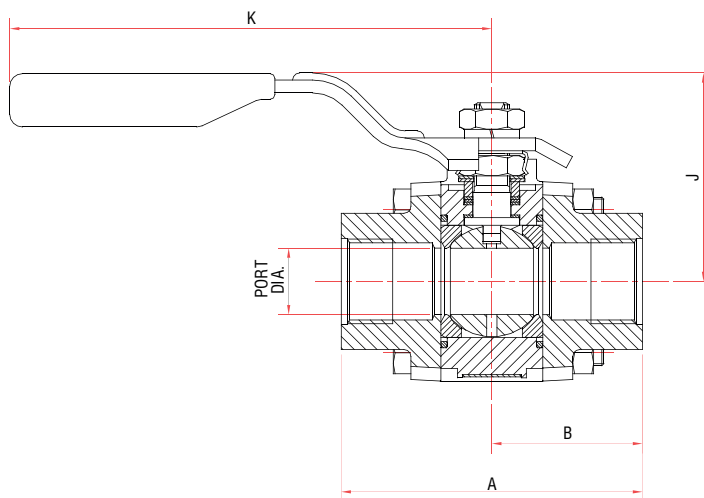
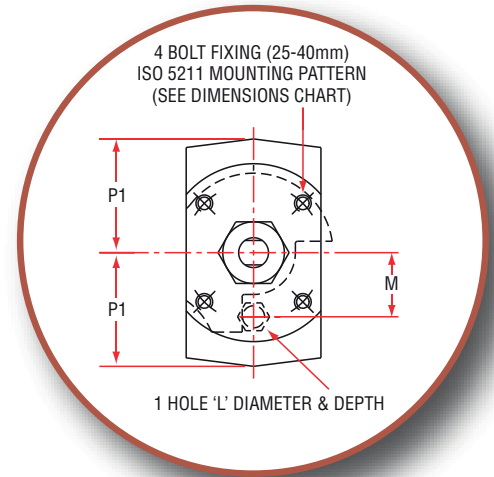
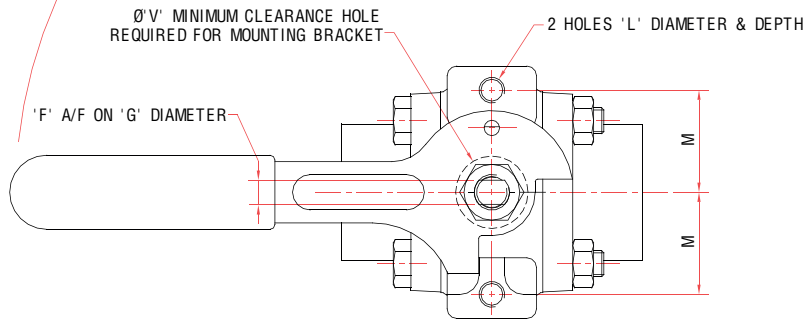


| Valve Size (mm) | Port Ø Min | A | B | C | D | E1 Min | E2 Min | F A/F | Stem GØ | H Thread | J | K | P Ø | R Thread & Depth | Mounting Platform (ISO 5211) | | | Weight Kg |
|-----------------|------------|------------------|--------|------------------|----------------|--------|--------|--------------|--------------|--------------|-------|-------|-------|-----------------------|------------------------------|-------------------------------------|--------------------------------|-----------|
| | | | | | | | | | | | | | | | ISO Size | Mounting Holes | Platform Recess | |
| 65 | 50.8 | 149.74 148.11 | 74.46 | 87.57 86.87 | 43.83 41.50 | 13.15 | - | 14.0 13.9 | - | M20 x1.5p | 156.1 | 225.0 | 148.0 | M6 x1.0p 10.0 MIN | F07 | 4 OFF M8 x1.25p ON 70.0 P.C.D. | Ø 54.97/54.90 x3.0/2.6 HIGH | 9.0 |
| 80 | 63.55 | 170.04 168.31 | 84.59 | 101.90 101.10 | 51.10 48.44 | 19.37 | 16.80 | 15.1 15.0 | 21.2 21.0 | M24 x2.0p | 190.0 | 350.0 | 168.0 | M6 x1.0p 12.0 MIN | F07 | 4 OFF M8 x1.25p ON 70.0 P.C.D. | Ø 54.97/54.90 x3.0/2.6 HIGH | 13.3 |
| 100 | 76.2 | 214.67 212.94 | 106.9 | 119.90 119.10 | 55.70 53.04 | 21.67 | 21.00 | 19.3 19.2 | 27.2 27.0 | M30 x2.0p | 213.5 | 557.0 | 196.0 | M6 x1.0p 12.0 MIN | F10 | 4 OFF M10 x1.5p ON 102.0 P.C.D. | Ø 69.97/69.85 x3.0/2.6 HIGH | 23.0 |
| 150 | 102.0 | 299.26 297.54 | 149.20 | 147.10 146.30 | 73.05 70.39 | 30.27 | 28.20 | 26.6 26.5 | 33.2 33.0 | M36 x2.0p | 274.8 | 850.0 | 256.0 | M8 x1.25p 12.0 MIN | F12 | 4 OFF M12 x1.75p ON 125.0 P.C.D. | Ø 84.97/84.85 x3.0/2.6 HIGH | 51.0 |

Dimensions (mm)

A59 8-40 mm Full Bore

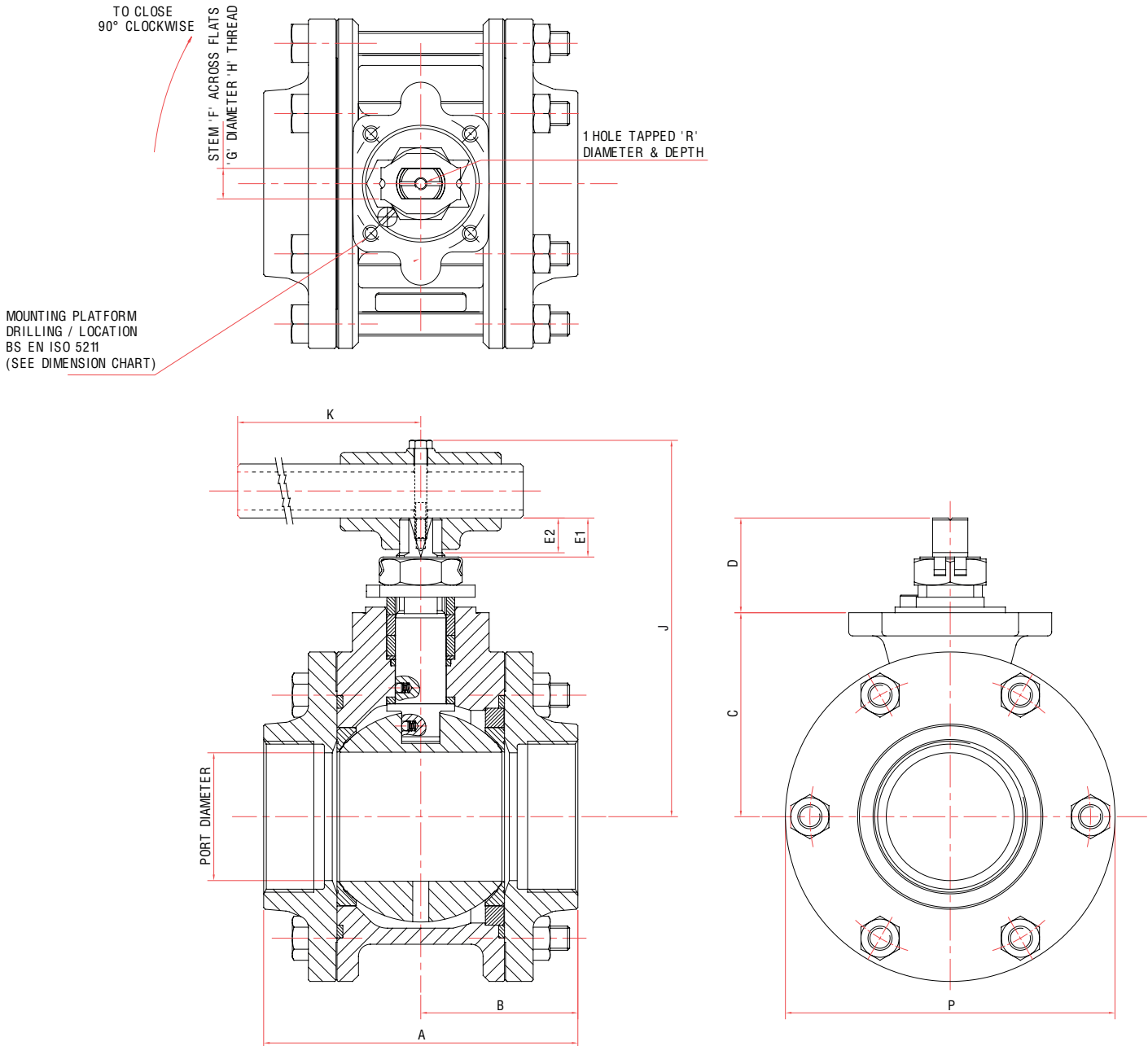
TO CLOSE
90° CLOCKWISE



| Valve Size (mm) | Port Ø Min | A | B | C | D | E | Stem | | J | K | L Thread & Depth | M | P1 | P2 | Q | V Ø | Mounting Platform (ISO 5211) | | Weight Kg | |
|-----------------|------------|------------------|-------|----------------|----------------|----------------|--------------|-----------------|------|-------|-------------------------|-------|------|------|------|------|------------------------------|---|----------------------------------|-----------------|
| | | | | | | | F A/F | G Ø Thread | | | | | | | | | ISO Size | Mounting Holes | | Platform Recess |
| 8-15 | 14.0 | 71.81 70.09 | 35.48 | 29.1 28.9 | 11.68 11.04 | 10.69 10.19 | 5.54 5.46 | 3/8"-24 UNF | 60.3 | 136.0 | M6 x1.0p 9.5 MIN | 27.0 | 27.2 | 33.4 | 27.2 | 19.5 | | | 0.9 | |
| 20 | 20.4 | 94.55 92.82 | 46.84 | 38.1 37.9 | 17.94 17.16 | 15.19 14.69 | 7.54 7.47 | 7/16"-20 UNF | 64.8 | 149.0 | M8 x1.25p 9.7 MIN | 31.75 | 32.7 | 40.5 | 32.7 | 22.5 | | | 1.6 | |
| 25 | 25.1 | 106.90 105.17 | 53.02 | 37.10 36.85 | 23.74 22.91 | 15.19 14.69 | 7.54 7.47 | 7/16"-20 UNF | 69.6 | 149.0 | M5 x0.8p 6.0 MIN | 19.5 | 36.3 | | 36.3 | 22.5 | F04 | 4 OFF M5 x0.8p x7.5 DEEP MIN ON 42.0 P.C.D. | Ø 30.15/30.02 x4.29/3.52 DEEP | 2.2 |
| 32 | 31.3 | 115.41 113.69 | 57.28 | 44.0 43.75 | 29.55 28.73 | 18.39 17.89 | 8.71 8.64 | 9/16"-18 UNF | 77.9 | 181.0 | M6 x1.0p 7.5 MIN | 23.0 | 42.3 | | 42.3 | 29.5 | F05 | 4 OFF M6 x1.0p x8.7 DEEP MIN ON 50.0 P.C.D. | Ø 35.15/35.02 x4.0/3.26 DEEP | 3.2 |
| 40 | 37.7 | 127.94 126.21 | 63.54 | 48.75 48.50 | 29.55 28.73 | 18.39 17.89 | 8.71 8.64 | 9/16"-18 UNF | 82.6 | 181.0 | M6 x1.0p 8.7 MIN | 23.0 | 47.4 | | 47.4 | 29.5 | F05 | 4 OFF M6 x1.0p x8.7 DEEP MIN ON 50.0 P.C.D. | Ø 35.15/35.02 x4.0/3.26 DEEP | 4.3 |

Dimensions (mm)

A599 50-100 mm Full Bore



| Valve Size (mm) | Port Ø Min | A | B | C | D | E1 Min | E2 Min | F A/F | Stem GØ | H Thread | J | K | P Ø | R Thread & Depth | Mounting Platform (ISO 5211) | | | Weight Kg |
|-----------------|------------|------------------|--------|------------------|----------------|--------|--------|--------------|--------------|--------------|-------|-------|-------|-----------------------|------------------------------|-------------------------------------|--------------------------------|-----------|
| | | | | | | | | | | | | | | | ISO Size | Mounting Holes | Platform Recess | |
| 50 | 50.8 | 149.74 148.11 | 74.46 | 87.57 86.87 | 43.83 41.50 | 13.15 | - | 14.0 13.9 | - | M20 x1.5p | 156.1 | 225.0 | 148.0 | M6 x1.0p 10.0 MIN | F07 | 4 OFF M8 x1.25p ON 70.0 P.C.D. | Ø 54.97/54.90 x3.0/2.6 HIGH | 9.0 |
| 65 | 63.55 | 157.24 155.51 | 78.19 | 101.90 101.10 | 51.10 48.44 | 19.37 | 16.80 | 15.1 15.0 | 21.2 21.0 | M24 x2.0p | 190.0 | 350.0 | 168.0 | M6 x1.0p 12.0 MIN | F07 | 4 OFF M8 x1.25p ON 70.0 P.C.D. | Ø 54.97/54.90 x3.0/2.6 HIGH | 13.3 |
| 80 | 76.2 | 192.27 190.77 | 95.75 | 119.90 119.10 | 55.70 53.04 | 21.67 | 21.00 | 19.3 19.2 | 27.2 27.0 | M30 x2.0p | 213.5 | 557.0 | 196.0 | M6 x1.0p 12.0 MIN | F10 | 4 OFF M10 x1.5p ON 102.0 P.C.D. | Ø 69.97/69.85 x3.0/2.6 HIGH | 23.0 |
| 100 | 102.0 | 299.26 297.54 | 149.20 | 147.10 146.30 | 73.05 70.39 | 30.27 | 28.20 | 26.6 26.5 | 33.2 33.0 | M36 x2.0p | 274.8 | 850.0 | 256.0 | M8 x1.25p 12.0 MIN | F12 | 4 OFF M12 x1.75p ON 125.0 P.C.D. | Ø 84.97/84.85 x3.0/2.6 HIGH | 51.0 |

Technical Information

Valve Pressure and Temperature Ratings

| Body / Connector Material | Temperature Range °C | Standard Material | |
|----------------------------|----------------------|--------------------|------------|
| | | 44 Series | 459 Series |
| (4) Carbon Steel | -29 to 300 | ● | – |
| (5) Low temp Carbon Steel | -46 to 300 | – | ● |
| (6) Stainless Steel | -196 to 300 | ● | ● |
| Body Seal Material | Temperature Range °C | Max Pressure (Bar) | |
| | | 44 Series | 459 Series |
| (T) PTFE | -50 to 260 | 102 | 50 |
| (Z) Graphite | -196 to 300 | 102 | 50 |
| (M) S-Gasket, 316+PTFE | -196 to 260 | 90 | 50 |
| (G) S-Gasket, 316+Graphite | -196 to 300 | 90 | 50 |
| (B) Buna Nitrile | -40 to 110 | 102* | 50 |
| (V) Viton | -20 to 250 | 102* | 50 |
| (E) EPDM | -50 to 125 | 102* | 50 |
| (S) Silicon | -65 to 200 | 102* | 50 |
| Seat Material | Temperature Range °C | Max Pressure (Bar) | |
| | | 44 Series | 459 Series |
| (T) PTFE | -30 to 230 | 69 | 50 |
| (R) PTFE, 15% GF | -50 to 230 | 102 | 50 |
| (H) PTFE, 25% GF | -80 to 260 | 102 | 50 |
| (P) PTFE, Fluorofill | -80 to 260 | 102 | 50 |
| (A) or (X) PEEK | -80 to 280 | 102 | 50 |
| (Y) Delrin | -80 to 80 | 102 | 50 |
| (U) UHMWPE | -80 to 80 | 102 | 50 |
| (N) Alpha, 316+PTFE | -80 to 300 | 69 | 50 |
| (G) Gamma, 316+Graphite | -80 to 300 | 69 | 50 |

The valve pressure and temperature ratings are made up from a combination of the body/end connector material, seat material and body seal material. The seat ratings are shown graphically on pages 8 and 9 but they need to be used in conjunction with the maximum and minimum ratings shown opposite.

- *The maximum pressure ratings of 44 series valves with O-ring seals and PED SEP are: DN8 to DN25 = 207 bar, DN32 to DN50 = 138 bar
- Note:** All 459 series seals have a limit of 250 °C max even though the body rating is 300 °C.

Flow Coefficients / Limiting Stem Input Torque (reduced bore)

| Valve Size | | Flow Coefficients | | Equivalent Length of pipe | | Limiting Stem Input torque Nm | |
|------------|-----|-------------------|------|---------------------------|--------|-------------------------------|--------|
| mm | in | Cv | Kv | Feet | Metres | 316S16 | 17/4pH |
| 8-15 | ¼-½ | 8.3 | 7.2 | 1.8 | 0.58 | 13.2 | 90 |
| 20 | ¾ | 13.6 | 11.8 | 5.5 | 1.67 | | |
| 25 | 1 | 37.5 | 32.6 | 3 | 0.91 | 24.4 | 165 |
| 32 | 1¼ | 57 | 49.3 | 3.1 | 0.94 | | |
| 40 | 1½ | 79.7 | 69.1 | 3.9 | 1.19 | 48.6 | 268 |
| 50 | 2 | 106 | 91.8 | 7.5 | 2.28 | | |
| 65 | 2½ | 188 | 163 | 150 | 1.52 | 192 | 1187 |
| 80 | 3 | 435 | 377 | 7 | 2.13 | 336 | 1677 |
| 100 | 4 | 638 | 553 | 27 | 8.21 | 620 | 3540 |
| 150 | 6 | 675 | 585 | 41 | 12.47 | 1138 | 7758 |

Notes:

- When wrench is not fitted the flats on the stem, when parallel to the pipeline axis, denote ball open
- All 44/59 weld end valves are assembled with Buna O-ring body seals with the correct body seals supplied loose. See IOM
- For temperatures below -50 °C consult Flowserve
- Alternative materials are available on request. These include NAB, Duplex, Monel, Hastelloy, 254 SMO for either body, connector, ball or stem
- Valves containing PEEK, Delrin, or Metal seats are fitted with 17/4-PH stems as standard

Product Coding

Series A44/A59

| A | | B | | | C | | - | D | | | | E | | F | | | | G | | | | H | | |
|------|---|------------------|---|---|--------|---|---|------|-----|------|------|------|------|-------|----|-------|----|---------|----|----|----|----------|----|----|
| Size | | Standard Variant | | | Series | | | Body | End | Ball | Stem | Seat | Seal | End 1 | | End 2 | | Special | | | | Revision | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |

| A - Size Digits 1, 2 | | B - Std Variant Digits 3, 4, 5 | | | C - Series Digits 6, 7 | | D - Main Parts Digits 9, 10, 11, 12 | | E - Seat and Seals Digits 13, 14, 15, 16, 17 | | | F - End Connector Variants Digits 18, 19, 20 | | | G - Special Build Digits 21, 22, 23, 24 | | | H - Revision Digit 25 |
|----------------------|----|--------------------------------|---|-----------|------------------------|---------------|-------------------------------------|----------------|--|-------------------------|-----|--|------|-------------------------------------|---|--|--|-----------------------|
| 1/4" 08mm | 02 | Antistatic | A | 44 Series | 44 | Brass | 1 | PEEK | A | Screwed NPT | SEN | Vacuum | PO43 | Denotes the revision of the product | | | | |
| 3/8" 10mm | 03 | | | 59 Series | 59 | Carbon St. | 4 | Buna | B | Screwed BSPT | SET | Oxygen | Q822 | | | | | |
| 1/2" 15mm | 05 | | | | | Stainless St. | 6 | EPDM | E | Screwed BSPP | SEP | Tobacco | P669 | | | | | |
| 3/4" 20mm | 07 | | | | | Special | M | Metal Gamma | G | Socket Weld Schedule 40 | SWA | Ammonia | Q797 | | | | | |
| 1" 25mm | 10 | | | | | | | 25% Glass PTFE | H | Socket Weld Schedule 80 | SWC | Press. Relief Ball | Q190 | | | | | |
| 1 1/4" 32mm | 12 | | | | | | | Metal Alpha | N | Butt Weld Schedule 5 | BW5 | Std. de-grease | P854 | | | | | |
| 1 1/2" 40mm | 15 | | | | | | | Fluorofill | P | Butt Weld Schedule 10 | BWE | Shrouded seats | P225 | | | | | |
| 2" 50mm | 20 | | | | | | | 15% Glass PTFE | R | Butt Weld Schedule 40 | BWA | O-Ring build | P882 | | | | | |
| | | | | | | | | Virgin PTFE | T | Butt Weld Schedule 80 | BWC | | | | | | | |
| | | | | | | | | UHMWPE | U | | BWG | | | | | | | |
| | | | | | | | | Viton | V | | BWK | | | | | | | |
| | | | | | | | | PolyPeek | X | | BWM | | | | | | | |
| | | | | | | | | Delrin | Y | | | | | | | | | |

Series A459/A599

| A | | B | | | C | | - | D | | | | E | | F | | | | G | | | | H | | |
|------|---|------------------|---|---|--------|---|---|--------------|------|------|------|-----------|-------------|-----------|---------------|-----|----|---------|----|----|----|----------|----|----|
| Size | | Standard Variant | | | Series | | | Body and End | Ball | Stem | Seat | Body Seal | Thrust Seal | Stem Seal | Gland Packing | End | | Special | | | | Revision | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |

| A - Size Digits 1, 2 | | B - Std Variant Digits 3, 4, 5 | | | C - Series Digits 6, 7, 8 | | D - Main Parts Digits 10, 11, 12 | | E - Seat and Seals Digits 13, 14, 15, 16, 17 | | | F - End Connector Variants Digits 18, 19, 20 | | | G - Special Build Digits 21, 22, 23, 24 | | | H - Revision Digit 25 |
|----------------------|----|--------------------------------|---|------------|---------------------------|---------------|----------------------------------|-----------------|--|-------------------------|-----|--|------|-------------------------------------|---|--|--|-----------------------|
| 2" 50mm | 20 | Antistatic | A | 459 Series | 459 | Carbon St. | 5 | PEEK | A | Screwed NPT | SEN | Vacuum | PO43 | Denotes the revision of the product | | | | |
| 2 1/2" 65mm | 25 | | | 599 Series | 599 | Stainless St. | 6 | Buna | B | Screwed BSPT | SET | Oxygen | Q822 | | | | | |
| 3" 80mm | 30 | | | | | Special | M | 35% Carbon PTFE | C | Screwed BSPP | SEP | Tobacco | P669 | | | | | |
| 4" 100mm | 40 | | | | | | | EPDM | E | Socket Weld Schedule 40 | SWA | Ammonia | Q797 | | | | | |
| 6" 150mm | 60 | | | | | | | Metal Gamma | G | Socket Weld Schedule 80 | SWC | Press. Relief Ball | Q190 | | | | | |
| | | | | | | | | 25% Glass PTFE | H | Butt Weld Schedule 5 | BW5 | Std. de-grease | P854 | | | | | |
| | | | | | | | | Metal Alpha | N | Butt Weld Schedule 10 | BWE | Shrouded seats | P225 | | | | | |
| | | | | | | | | Fluorofill | P | Butt Weld Schedule 40 | BWA | O-Ring build | P882 | | | | | |
| | | | | | | | | 15% Glass PTFE | R | Butt Weld Schedule 80 | BWC | | | | | | | |
| | | | | | | | | Virgin PTFE | T | | BWG | | | | | | | |
| | | | | | | | | UHMWPE | U | | BWK | | | | | | | |
| | | | | | | | | Viton | V | | BWM | | | | | | | |
| | | | | | | | | PolyPeek | X | | | | | | | | | |
| | | | | | | | | Delrin | Y | | | | | | | | | |
| | | | | | | | | Graphite | Z | | | | | | | | | |
| | | | | | | | | 25% Glass PTFE | 7 | | | | | | | | | |

Ancillaries

Flowserve can supply a range of ancillary equipment such as lockable wrenches, stem extensions, spring return handles etc.



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