



# HIGH TEMP. VALVES

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# HIGH TEMP. VALVES

## General



Habonim's Habonim High Temp. product line valves are subject to the general Habonim valves design, materials, practices, methodologies and certifications – for more information, see Valves General chapter.



Habonim Control valves are equipped (in some series) with the Total HermetiX integrity package for superior sealing, safety and environmental care.

## High Temperature - Metal Seated Ball Valve

Habonim's extended line of High Temperature - metal seated valves perform and excels in the harshest industrial environments, where valve durability is critical to ensure safety, minimize failures and promote efficiency. These meticulously engineered metal seated ball valves are designed to withstand the harshest applications and process conditions, including extreme high temperature, high pressure and abrasive medium.

Careful metallurgical selection of all valve parts, special surface treatments including hard coatings, thorough analyses of mechanical strength and thermal expansion and vast experience of successful installations ensure that Habonim High temperature – metal seated valve line is the best choice for industry's toughest applications.

## Metal Selection and Surface Treatments

### LTPN (Low Temperature Plasma carbo-Nitriding):

LTPN is a cost effective hardening system for austenitic stainless steel, which provides a minimum thickness of 40 microns and more than triple (>68HRC) the natural hardness of the base material. Is used for applications up to 400°C (752°F) in valves up to 2-1/2".

### HVOF (High Velocity Oxygen Fuel):

Various HVOF spray solutions based on chromium and tungsten carbides. Is used for applications up to 538°C (1000°F).

### ASME B16.34 listed forged bar materials:

For the even higher temperature range up to 650°C (1200°F) Habonim uses ASME B16.34 listed forged bar material for the construction of the valve pressure-containing elements.

### Stellite welding:

For severe abrasive conditions such as pulp and paper processing, Habonim uses a minimum of 1.5 mm thick, hard stellite coating. These coatings are specifically engineered to meet the customer's application to provide outstanding resistance to abrasion and corrosion for a lifetime of effective operation in harsh applications.

### Lapping:

Each ball and seat sub-assembly is accurately machined, ground and then mate-lapped for a perfect match. The complete valve assembly demonstrates high repeatability in terms of sealing (Rate B - factory tested), low torque and smooth operation at various temperatures and pressures.



### Quick Selection Table

Total Hermetix™ | **Port:**  Standard Port  Full Port  Tube Size | **End Connections:**  Threaded  Flanged  Welded  
 Ordering Code

| Ball Valve Style      |                | Design Type                         | Ordering Code | Series | Temperature range -60°C (-76°F) up to: |               |                |                | Valve Size (Inches)              |                                  |                                     |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|-----------------------|----------------|-------------------------------------|---------------|--------|--|---------------|----------------|----------------|----------------------------------|----------------------------------|-------------------------------------|--|-----|-----|-----|---|-------|-------|---|-------|---|---|---|---|----|----|
|                       |                |                                     |               |        | 260°C (500°F)                          | 400°C (752°F) | 538°C (1000°F) | 650°C (1200°F) | TH                               | Port                             | End Con.                            | 1/4  | 3/8 | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 | 2 | 2 1/2 | 3 | 4 | 6 | 8 | 10 | 12 |
|                       |                |                                     |               |        | W                                      | P             | T              | M              |                                  |                                  |                                     | MWP (ANSI Class / DIN PN)                                      |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
| Trunnion Mounted Ball | 3 Piece        | <input checked="" type="checkbox"/> | Z91           | W      | P                                      | T             |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> | 150<br>300<br>600<br>900<br>1500<br>2500<br>150<br>300<br>600w |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z92           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z93           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z94           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z95           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z96           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
| Trunnion Mounted Ball | 2 Piece        | <input checked="" type="checkbox"/> | Z81           |        | P                                      | T             |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> | 150<br>300<br>600w   |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z82           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z83           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
| Flouting Ball         | 3 Pcs. 2 Piece | <input checked="" type="checkbox"/> | Z47           | W      | P                                      | T             | M              |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> | 600<br>2500<br>150<br>300<br>16<br>40                          |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z28           | W      | P                                      |               | M              |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z73           | W      | P                                      | T             |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z74           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z77           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |
|                       |                | <input checked="" type="checkbox"/> | Z78           |        |  |               |                |                | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="checkbox"/> |  |     |     |     |   |       |       |   |       |   |   |   |   |    |    |

| ASME Class   | 150 300 600 900 1500 2500 6000 |   |     |     |     |      |      |      |      |       |
|--------------|--------------------------------|---|-----|-----|-----|------|------|------|------|-------|
| Pressure Bar | -1                             | 0 | 16  | 20  | 50  | 100  | 150  | 250  | 400  | 1000  |
| Pressure psi | -14                            | 0 | 290 | 290 | 725 | 1450 | 2175 | 3600 | 5800 | 15000 |

## High Temperature – Metal Seated Designs:

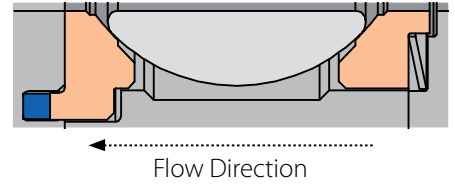
| Design Code | Working Temperature range        | Remarks  |
|-------------|----------------------------------|--|
| W           | -60°C to 260°C (-76°F to 500°F)  |  |
| P           | -60°C to 400°C (-76°F to 752°F)  | Trunnion valves only -46°C to 327°C (-40°F to 620°F) |
| T           | -60°C to 538°C (-76°F to 1000°F) |  |
| M           | -60°C to 650°C (-76°F to 1200°F) | only with body & ends material code H/J              |

# HIGH TEMP. VALVES

## Seats Design Options

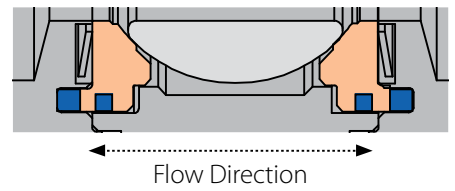
### Standard seat design

**Description** Spring loaded uni-directional  
**Temperature**  $-60^{\circ}\text{C} + 650^{\circ}\text{C}$  ( $-76^{\circ}\text{F} + 1200^{\circ}\text{F}$ )  
**Shutoff class** BS-EN 12266-1 Rate C, FCI 70-2 Class V (Rate B, Class VI upon request)  
**Service** Steam, Thermal oil, clean gases, Filtered fluids



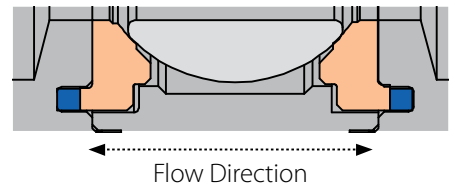
### Type B

**Description** Bi-directional, Spring loaded, solid proof  
**Temperature**  $-60^{\circ}\text{C} + 650^{\circ}\text{C}$  ( $-76^{\circ}\text{F} + 1200^{\circ}\text{F}$ )  
**Shutoff class** BS-EN 12266-1 Rate C, FCI 70-2 Class V  
**Service** Steam, Thermal oil, clean gases, Filtered fluids



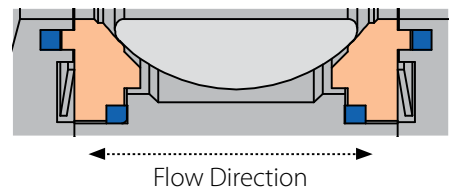
### Type C

**Description** Bi-directional, solid proof  
**Temperature**  $-60^{\circ}\text{C} + 235^{\circ}\text{C}$  ( $-76^{\circ}\text{F} + 455^{\circ}\text{F}$ )  
**Shutoff class** BS-EN 12266-1 Rate D, FCI 70-2 Class IV  
**Service** Pulp & paper, slurries, catalyst



### Type D

**Description** Bi-directional shutoff, Spring loaded, solid proof  
**Temperature**  $-60^{\circ}\text{C} + 538^{\circ}\text{C}$  ( $-76^{\circ}\text{F} + 1000^{\circ}\text{F}$ )  
**Shutoff class** BS-EN 12266-1 Rate C, FCI 70-2 Class V  
**Service** Pulp & paper, slurries, catalyst





## Maximal Working Pressure Per Class / Temperature

### Temperature vs Pressure (bar) - Standard class rating

| ASME B16.34 | Material     | Temperature (°C) |       |       |       |       |       |       |       |       |       |       |
|-------------|--------------|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|             |              | -29 to 38        | 50    | 100   | 200   | 300   | 400   | 450   | 500   | 538   | 600   | 650   |
| Class 150   | 316/316L     | 15.9             | 15.3  | 13.3  | 11.2  | 10.0  | 6.5   | 4.6   |       |       |       |       |
|             | CF8M/CF3M    | 19.0             | 18.4  | 16.2  | 13.7  | 10.2  | 6.5   | 4.6   | 2.8   | 1.4   |       |       |
|             | WCB/A105/LF2 | 19.6             | 19.2  | 17.7  | 13.8  | 10.2  | 6.5   | 4.6   | 2.8   | 1.4   |       |       |
|             | F22          | 19.8             | 19.5  | 17.7  | 13.8  | 10.2  | 6.5   | 4.6   | 2.8   | 1.4   | 1.4   | 1.4   |
|             | 321/321H     | 19.0             | 18.6  | 17.0  | 13.8  | 10.2  | 6.5   | 4.6   | 2.8   | 1.4   | 1.4   | 1.4   |
| Class 300   | 316/316L     | 41.4             | 40.0  | 34.8  | 29.2  | 26.1  | 24.3  | 23.4  |       |       |       |       |
|             | CF8M/CF3M    | 49.6             | 48.1  | 42.2  | 35.7  | 31.6  | 29.4  | 28.8  | 28.2  | 25.2  |       |       |
|             | WCB/A105/LF2 | 51.1             | 50.1  | 46.6  | 43.8  | 39.8  | 34.7  | 23.0  | 11.8  | 5.9   |       |       |
|             | F22          | 51.7             | 51.7  | 51.5  | 48.6  | 42.9  | 36.5  | 33.7  | 28.2  | 18.4  | 6.9   | 2.8   |
|             | 321/321H     | 49.6             | 48.6  | 44.2  | 38.3  | 34.1  | 31.6  | 30.8  | 28.2  | 25.2  | 20.3  | 12.6  |
| Class 600   | 316/316L     | 82.7             | 80.0  | 69.6  | 58.1  | 52.1  | 48.6  | 46.8  |       |       |       |       |
|             | CF8M/CF3M    | 99.3             | 96.2  | 84.4  | 71.3  | 63.2  | 58.9  | 57.7  | 56.5  | 50.0  |       |       |
|             | WCB/A105/LF2 | 102.1            | 100.2 | 93.2  | 87.6  | 79.6  | 69.4  | 46.0  | 23.5  | 11.8  |       |       |
|             | F22          | 103.4            | 103.4 | 103.0 | 97.2  | 85.7  | 73.3  | 67.7  | 56.5  | 36.9  | 13.8  | 5.7   |
|             | 321/321H     | 99.3             | 97.1  | 88.5  | 76.6  | 68.3  | 63.2  | 61.7  | 56.5  | 50.0  | 40.5  | 25.3  |
| Class 900   | 316/316L     | 124.1            | 120.1 | 104.4 | 87.5  | 78.2  | 72.9  | 70.2  |       |       |       |       |
|             | A105/LF2     | 153.2            | 150.4 | 139.8 | 131.4 | 119.5 | 104.2 | 69.0  | 35.3  | 17.7  |       |       |
|             | F22          | 155.1            | 155.1 | 154.6 | 145.8 | 128.6 | 109.8 | 101.4 | 84.7  | 55.3  | 20.7  | 8.5   |
|             | 321/321H     | 148.9            | 145.7 | 132.7 | 114.9 | 102.4 | 94.8  | 92.5  | 84.7  | 75.2  | 60.8  | 37.9  |
|             | 316/316L     | 206.8            | 200.1 | 173.9 | 145.8 | 130.3 | 121.5 | 117.1 |       |       |       |       |
| Class 1500  | A105/LF2     | 255.3            | 250.6 | 223.0 | 219.0 | 199.1 | 173.6 | 115.0 | 58.8  | 29.5  |       |       |
|             | F22          | 258.6            | 258.6 | 257.6 | 243.4 | 214.4 | 183.1 | 169.0 | 140.9 | 92.2  | 34.4  | 14.2  |
|             | 321/321H     | 248.2            | 242.8 | 221.2 | 191.5 | 170.7 | 157.9 | 154.2 | 140.9 | 125.5 | 101.3 | 63.2  |
|             | 316/316L     | 344.7            | 333.5 | 289.9 | 243.0 | 217.2 | 202.5 | 195.1 |       |       |       |       |
|             | A105/LF2     | 425.5            | 417.7 | 388.3 | 365.0 | 331.8 | 289.3 | 191.7 | 97.9  | 49.2  |       |       |
| Class 2500  | F22          | 430.9            | 430.9 | 429.4 | 405.4 | 357.1 | 304.9 | 281.8 | 235.0 | 153.7 | 57.4  | 23.6  |
|             | 321/321H     | 413.7            | 404.6 | 368.7 | 319.1 | 284.6 | 263.2 | 256.9 | 235.0 | 208.9 | 168.9 | 105.4 |

### Temperature vs Pressure (Psi) - Standard class rating

| ASME B16.34 | Material     | Temperature (°F) |      |      |      |      |      |      |      |      |      |      |
|-------------|--------------|------------------|------|------|------|------|------|------|------|------|------|------|
|             |              | -20 to 100       | 122  | 212  | 392  | 572  | 752  | 842  | 932  | 1000 | 1112 | 1200 |
| Class 150   | 316/316L     | 231              | 222  | 193  | 162  | 145  | 94   | 67   |      |      |      |      |
|             | CF8M/CF3M    | 276              | 267  | 235  | 199  | 148  | 94   | 67   | 41   | 20   |      |      |
|             | WCB/A105/LF2 | 284              | 278  | 257  | 200  | 148  | 94   | 67   | 41   | 20   |      |      |
|             | F22          | 287              | 283  | 257  | 200  | 148  | 94   | 67   | 41   | 20   | 20   | 20   |
|             | 321/321H     | 276              | 270  | 247  | 200  | 148  | 94   | 67   | 41   | 20   | 20   | 20   |
| Class 300   | 316/316L     | 600              | 580  | 505  | 423  | 378  | 352  | 339  |      |      |      |      |
|             | CF8M/CF3M    | 719              | 697  | 612  | 518  | 458  | 426  | 418  | 409  | 365  |      |      |
|             | WCB/A105/LF2 | 741              | 726  | 676  | 635  | 577  | 503  | 334  | 171  | 86   |      |      |
|             | F22          | 750              | 750  | 747  | 705  | 622  | 529  | 489  | 409  | 267  | 100  | 41   |
|             | 321/321H     | 719              | 705  | 641  | 555  | 494  | 458  | 447  | 409  | 365  | 294  | 183  |
| Class 600   | 316/316L     | 1199             | 1160 | 1009 | 842  | 755  | 705  | 679  |      |      |      |      |
|             | CF8M/CF3M    | 1440             | 1395 | 1224 | 1034 | 916  | 854  | 837  | 819  | 725  |      |      |
|             | WCB/A105/LF2 | 1480             | 1453 | 1351 | 1270 | 1154 | 1006 | 667  | 341  | 171  |      |      |
|             | F22          | 1499             | 1499 | 1494 | 1409 | 1243 | 1063 | 982  | 819  | 535  | 200  | 83   |
|             | 321/321H     | 1440             | 1408 | 1283 | 1111 | 990  | 916  | 895  | 819  | 725  | 587  | 367  |
| Class 900   | 316/316L     | 1799             | 1741 | 1514 | 1269 | 1134 | 1057 | 1018 |      |      |      |      |
|             | A105/LF2     | 2221             | 2181 | 2027 | 1905 | 1733 | 1511 | 1001 | 512  | 257  |      |      |
|             | F22          | 2249             | 2249 | 2242 | 2114 | 1865 | 1592 | 1470 | 1228 | 802  | 300  | 123  |
|             | 321/321H     | 2159             | 2113 | 1924 | 1666 | 1485 | 1375 | 1341 | 1228 | 1090 | 882  | 550  |
|             | 316/316L     | 2999             | 2901 | 2522 | 2114 | 1889 | 1762 | 1698 |      |      |      |      |
| Class 1500  | A105/LF2     | 3702             | 3634 | 3234 | 3176 | 2887 | 2517 | 1668 | 853  | 428  |      |      |
|             | F22          | 3750             | 3750 | 3735 | 3529 | 3109 | 2655 | 2451 | 2043 | 1337 | 499  | 206  |
|             | 321/321H     | 3599             | 3521 | 3207 | 2777 | 2475 | 2290 | 2236 | 2043 | 1820 | 1469 | 916  |
|             | 316/316L     | 4998             | 4836 | 4204 | 3524 | 3149 | 2936 | 2829 |      |      |      |      |
|             | A105/LF2     | 6170             | 6057 | 5630 | 5293 | 4811 | 4195 | 2780 | 1420 | 713  |      |      |
| Class 2500  | F22          | 6248             | 6248 | 6226 | 5878 | 5178 | 4421 | 4086 | 3408 | 2229 | 832  | 342  |
|             | 321/321H     | 5999             | 5867 | 5346 | 4627 | 4127 | 3816 | 3725 | 3408 | 3029 | 2449 | 1528 |

\* It is totally forbidden to use a material when pressure rating is missing

\* F22 316L material is not recommended for prolonged use above 595 °C/1100 °F

\* A105, WCB and LF2 materials are not recommended for prolonged use above 425 °C/800 °F

\* 316L and CF3M materials are not to be used above 455 °C/850 °F

# HIGH TEMP. VALVES

## Ltpn Technology

### Low Temperature Plasma carboNitriding (LTPN) technology

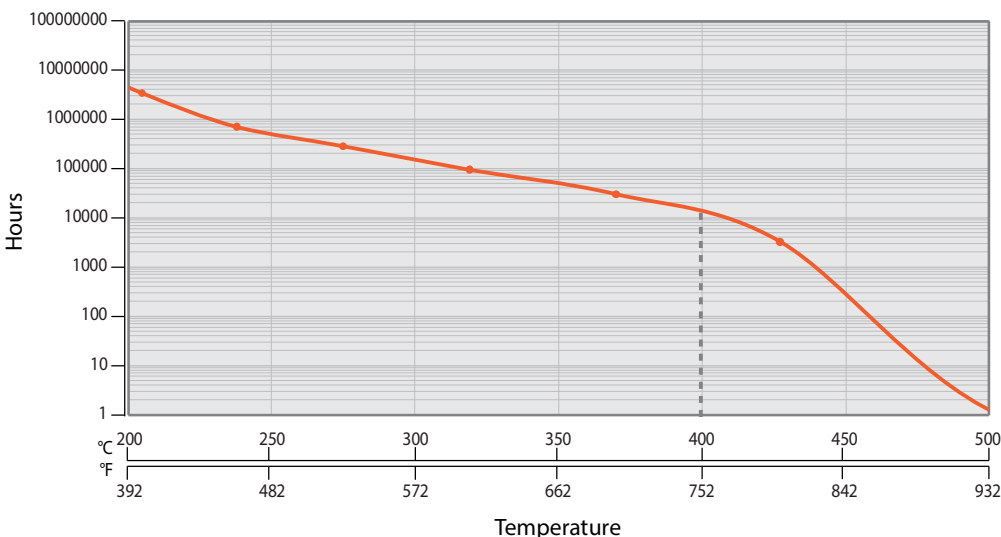
Austenitic stainless steels (304, 316) have excellent chemical resistance to corrosion and are used extensively in a variety of environments and industries including oil & gas, marine, medical, chemical and petrochemical. The use of these steels is limited, however, due to their low wear resistance, low hardness and sensitivity to galling. Conventional surface treatments, such as nitriding, are very effective in providing metallic surfaces with high wear resistance. However, high temperature processes will cause chrome carbide and nitride formation, thereby lowering the free chromium percentage of the part exposed to the high temperature and decreasing its corrosion resistance.

Limiting the temperature of the heat treatments to less than 450 °C / 842 °F forms a supersaturated layer with excellent wear resistance, while at the same time preserving the corrosion resistant properties of the stainless steel. Special, parametric processes of plasma nitriding for austenitic stainless steel have been successfully developed. These processes yield a gradual hardness profile, to give an optimal stress distribution within the treated depth. A micro-hardness of over 1000HV (equivalent to 72 HRC) is achieved on the surface of the parts, imparting the steel with a high degree of scratch and wear resistance.

### The ideal solution for severe applications up to 400 °C / 752 °F

Habonim's unique LTPN surface treatment improves mechanical wear properties of austenitic stainless steels without affecting their corrosion resistance. LTPN provides austenitic stainless steel, ball and seats with the additional hardness necessary to operate without galling at elevated temperatures. For example, at 400 °C / 752 °F the LTPN layer retains its hardness for 15,000 hours of continuous operation, which typically translates into an in-service life-expectancy of 20 months. The rate at which the LTPN layer decomposes decreases exponentially with temperature reduction. Figure 1 shows the life-expectancy for the LTPN layer at different application temperature levels.

Figure 1 - Life-expectancy for the LTPN layer at different application temperature levels





## LTPN technology

The quality of each LTPN batch is approved for hardness profile, thickness, and uniformity of the hard layer. An effective testing process of the hardened layer has been established, which includes: cutting a sample, bakelite embedding, grinding and polishing of the metallographic specimens, and finally a micro-hardness test. Upon request Habonim QA will generate a copy of the metallurgical test report as part of the complete QA documentation for the product.

Figure 2

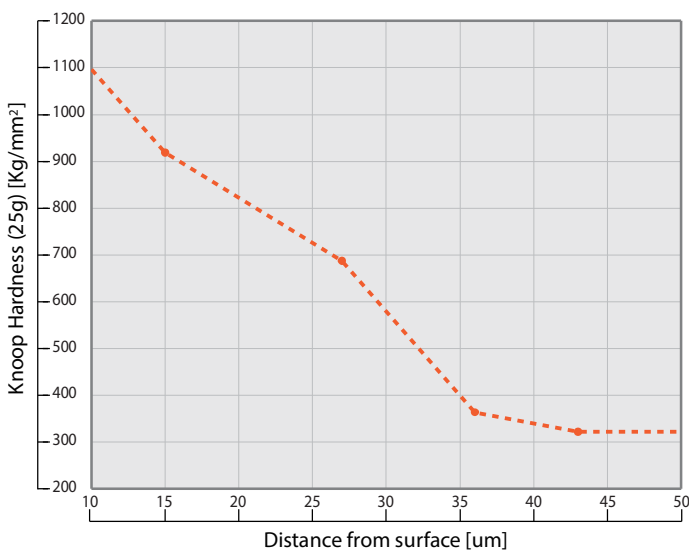


Figure 3

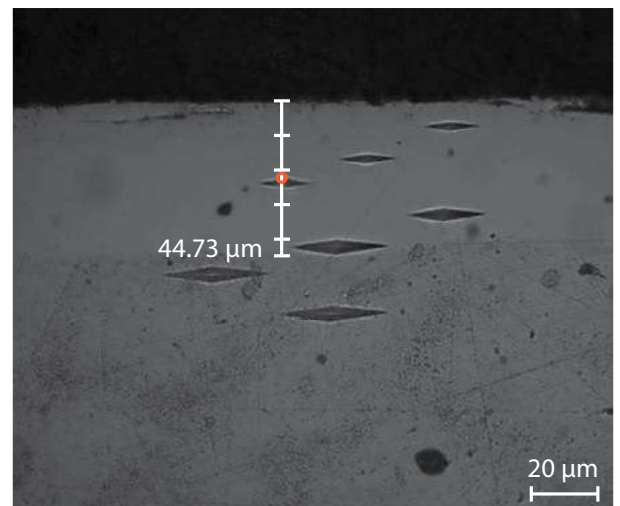


Figure 4 - Comparison of wear rates between untreated 316L, LTPN treated AISI 316L, Cr3C2 spray coat (HVOF), and Stellite 6 overlay

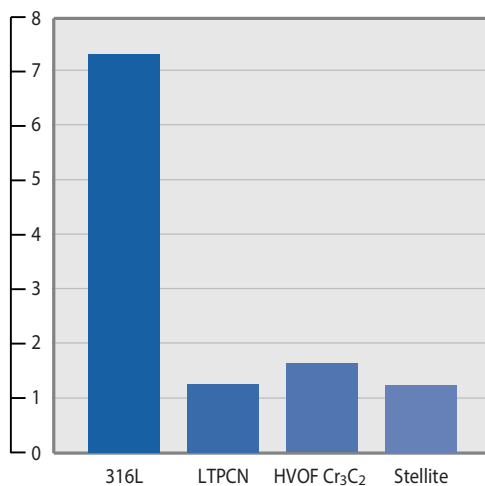


Figure 5 - Hard coating done by HVOF technology



# HIGH TEMP. VALVES

## Coatings

Surface coating applies an outer layer of new material on the body. The following types of surface coating methods are available in the Habonim metal seated series: chromium carbide with nickel chrome binder ( $Cr_3C_2$ ), tungsten carbide with cobalt binder (WC-Co), and stellite welding.

### $Cr_3C_2$ (Chromium Carbide)

Chromium carbide with a nickel chrome binder is applied by a High Velocity Oxygen Fuel (HVOF) creating a 0.3mm hard outer layer. The  $Cr_3C_2$  coating that is applied to high strength steels, results in a micro-hardness of up to 68HRC. This coating resists cryogenic temperatures down to  $-196\text{ }^{\circ}C / -320\text{ }^{\circ}F$  and high temperatures up to  $815\text{ }^{\circ}C / 1500\text{ }^{\circ}F$ . This multipurpose wear resistance coating is used extensively in power generation, refining and hot catalyst handling services. Its corrosive limitations are in wet sulfur or chloride environments, where sulfuric acid can form and attack the coating.

### WC-Co (Tungsten Carbide)

Tungsten Carbide with a cobalt binder coating is applied by HVOF techniques similar to  $Cr_3C_2$ . The WC-Co coating is applied mainly to 400 series martensitic stainless steel to provide micro-hardness that reaches 72HRC. This coating resists cryogenic temperatures down to  $-196\text{ }^{\circ}C / -320\text{ }^{\circ}F$  and high temperatures up to  $538\text{ }^{\circ}C / 1000\text{ }^{\circ}F$ . WC-Co is a coating that consists of a hard metal alloy based on a Tungsten Carbide + Cobalt composition.

### Stellite

A cobalt-based stellite coating provides excellent mechanical wear resistance, with good corrosion resistance at temperatures up to  $538\text{ }^{\circ}C / 1000\text{ }^{\circ}F$ . The stellite is applied by a Plasma Thermal Arc (PTA) method. Most stellite alloys are cobalt based with elements of chromium (Cr), carbon(C), tungsten (W) and nickel (Ni). Stellite 6 is broadly used in the pulp and paper industry, as well as in refining applications, such as catalyst handling and hydrocracker processes.

| Surface Treatments/ Coatings | Process Method           | Process Material        | Coating Thickness | Min. Hardness | Max Temp*                                      | Corrosion Resistance |
|------------------------------|--------------------------|-------------------------|-------------------|---------------|--|----------------------|
| LTPN                         | Plasma carboNitriding    | Nitrogen, Carbon        | 25-80 $\mu m$     | 72HRC         | See fig.1                                      | Excellent            |
| $Cr_3C_2$                    | HVOF spray               | Chromium, Carbon Nickel | 0.3 mm            | 68HRC         | $815\text{ }^{\circ}C / 1500\text{ }^{\circ}F$ | Good                 |
| DN WC-Co 40                  | HVOF spray               | Tungsten, Carbon Cobalt | 0.3 mm            | 72HRC         | $538\text{ }^{\circ}C / 1000\text{ }^{\circ}F$ | Excellent            |
| Stellite                     | PTA (Plasma Thermal Arc) | Cobalt-Ni               | 3 mm              | 36HRC         | $538\text{ }^{\circ}C / 1000\text{ }^{\circ}F$ | Good                 |

\*All temperatures above  $650\text{ }^{\circ}C / 1200\text{ }^{\circ}F$  refer to the coating performance only and not to the valve design



Z91

Z92

Z93

Z94

Z95

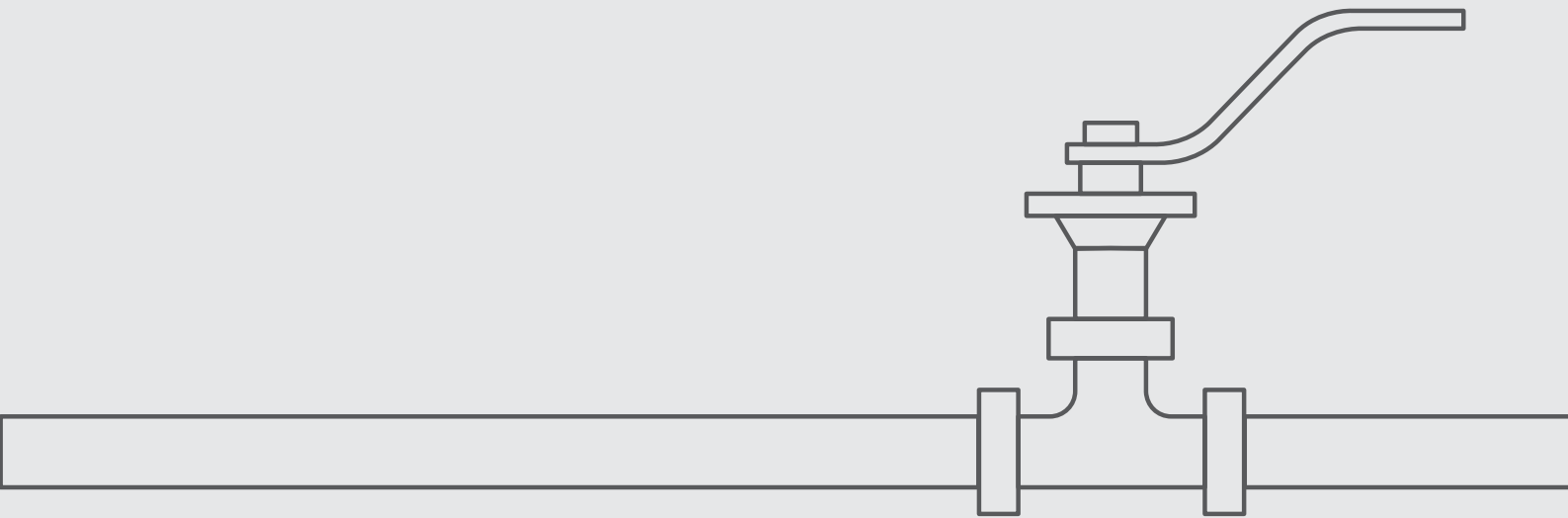
Z96



High Temp. Valves

# TRUNNIION

3 PIECE



Z91W

Z92W

Z91P

Z92P

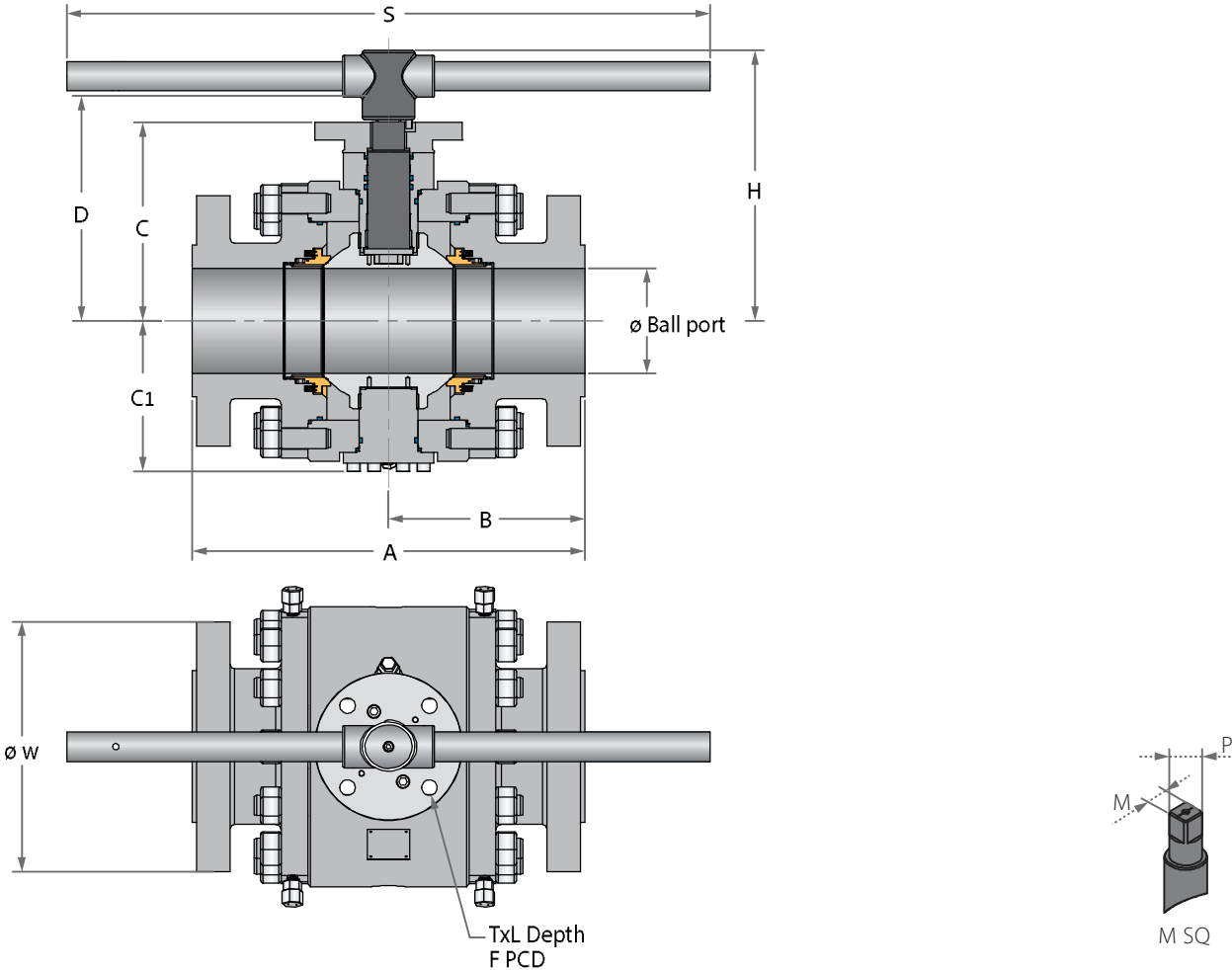
2"-6" | DN150-DN300

CLASS 150/300

## High Temperature Trunnion Ball 3 Piece Up to

**W** 200°C (400°F) | **P** 327°C (620°F)

### Valve dimensions



| Full port | Unit | Ball port | A      |        | B      |        | C      | C1     | D      | W      |        | M SQ  | P SQ  | H      | S      | F     | TxL       | Weight kg/lb |     | Kv/Cv |      |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------|-------|-----------|--------------|-----|-------|------|------|
|           |      |           | 150    | 300    | 150    | 300    |        |        |        | 150    | 300    |       |       |        |        |       |           | 150          | 300 | 150   | 300  |      |
| DN50      | mm   | 49.00     | 178.00 | 216.00 | 89.00  | 108.00 | 127.00 | 91.50  | 144.50 | 150.00 | 165.00 | 17.00 | 22.00 | 196.00 | 401.00 | (F10) | 102.00    | 11X15        | 27  | 31    | 400  | 363  |
| 2"        | inch | 1.93      | 7.01   | 8.50   | 3.50   | 4.25   | 5.00   | 3.60   | 5.69   | 5.91   | 6.50   | 0.67  | 0.87  | 7.72   | 15.79  | 4.02  | (4 holes) | 60           | 68  | 463   | 420  |      |
| DN80      | mm   | 74.00     | 203.00 | 283.00 | 101.50 | 128.00 | 148.00 | 117.00 | 172.00 | 190.00 | 210.00 | 22.00 | 32.00 | 223.00 | 610.00 | (F12) | 125.00    | 13X15        | 44  | 61    | 1125 | 952  |
| 3"        | inch | 2.91      | 7.99   | 11.14  | 4.00   | 5.04   | 5.83   | 4.61   | 6.77   | 7.48   | 8.27   | 0.87  | 1.26  | 8.78   | 24.02  | 4.92  | (4 holes) | 97           | 134 | 1300  | 1100 |      |
| DN100     | mm   | 100.00    | 229.00 | 305.00 | 114.50 | 140.50 | 171.00 | 139.00 | 198.50 | 230.00 | 255.00 | 27.00 | 35.00 | 247.50 | 610.00 | (F14) | 140.00    | 18X15        | 66  | 100   | 2154 | 1860 |
| 4"        | inch | 3.94      | 9.02   | 12.00  | 4.51   | 5.53   | 6.73   | 5.47   | 7.81   | 9.06   | 10.04  | 1.06  | 1.38  | 9.74   | 24.02  | 5.51  | (4 holes) | 146          | 220 | 2490  | 2150 |      |
| DN150     | mm   | 150.00    | 394.00 | 403.00 | 185.00 | 230.40 | 254.00 | 191.00 | 290.50 | 280.00 | 320.00 | 36.00 | 46.20 | 356.50 | 916.00 | (F16) | 165.00    | 22X25        | 180 | 216   | 4723 | 4628 |
| 6"        | inch | 5.91      | 15.51  | 15.87  | 7.28   | 9.07   | 10.00  | 7.52   | 11.44  | 11.02  | 12.60  | 1.42  | 1.82  | 14.04  | 36.06  | 6.50  | (4 holes) | 397          | 476 | 5460  | 5350 |      |

Z91W

Z92W

Z91P

Z92P

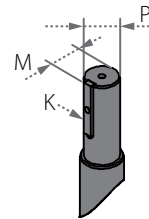
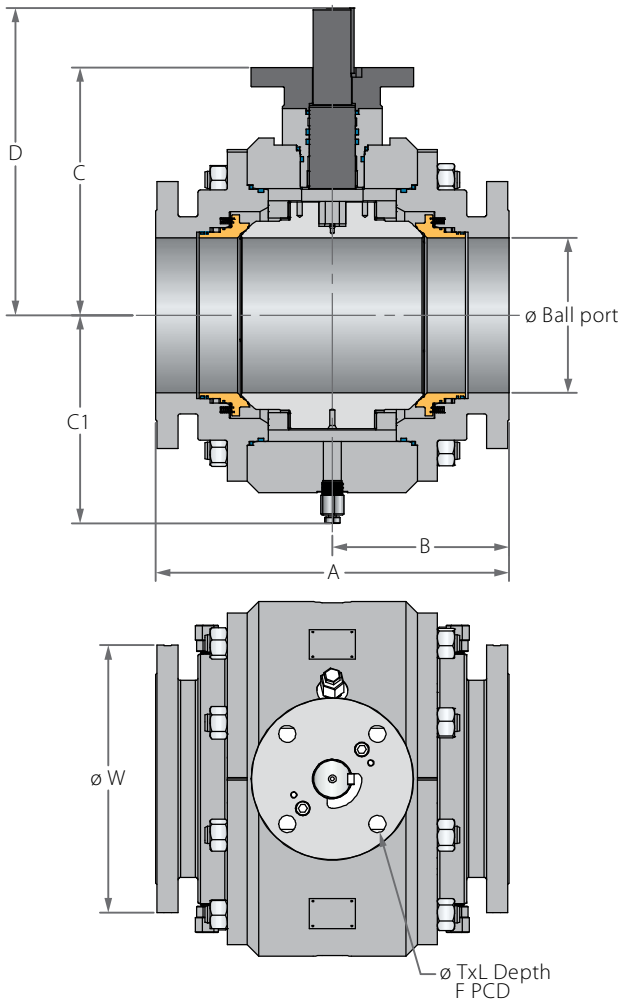
8"-12" | DN200-DN300  
CLASS 150/300



# High Temperature Trunnion Ball 3 Piece Up to

**W** 200°C (400°F) | **P** 327°C (620°F)

## Valve dimensions



| Full port    | Unit | Ball port | A      |        | B      |        | C      | C1     | D      | W      | P      | M      | K      | F              | TxL                | Weight kg/ib |      | Kv/Cv |       |
|--------------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------------|--------------------|--------------|------|-------|-------|
|              |      |           | 150    | 300    | 150    | 300    |        |        |        |        |        |        |        |                |                    | 150          | 300  | 150   | 300   |
| DN200<br>8"  | mm   | 201.00    | 457.00 | 502.00 | 228.50 | 251.00 | 325.00 | 305.00 | 247.00 | 232.00 | 405.50 | 379.50 | 345.00 | (F16)<br>6.50  | 22x25<br>(4 holes) | 346          | 378  | 9273  | 8737  |
|              | inch | 7.91      | 17.99  | 19.76  | 9.00   | 9.88   | 12.80  | 12.01  | 9.72   | 9.13   | 15.96  | 14.94  | 13.58  |                |                    | 763          | 833  | 10720 | 10100 |
| DN250<br>10" | mm   | 252.00    | 533.00 | 568.00 | 270.00 | 287.50 | 353.00 | 359.00 | 297.00 | 299.00 | 430.00 | 454    | 405.00 | (F25)<br>10.00 | 18x25<br>(8 holes) | 473          | 594  | 15224 | 14792 |
|              | inch | 9.92      | 20.98  | 22.36  | 10.63  | 11.32  | 13.90  | 14.13  | 11.69  | 11.77  | 16.93  | 17.87  | 15.94  |                |                    | 1043         | 1310 | 17600 | 17100 |
| DN300<br>12" | mm   | 303.00    | 610.00 | 648.00 | 298.00 | 313.00 | 388.00 | 368.00 | 324.00 | 305.00 | 468.50 | 464    | 485.00 | (F25)<br>10.00 | 18x25<br>(8 holes) | 723          | 833  | 23096 | 22404 |
|              | inch | 11.93     | 24.02  | 25.51  | 11.73  | 12.32  | 15.28  | 14.49  | 12.76  | 12.01  | 18.44  | 18.27  | 19.09  |                |                    | 1594         | 1836 | 26700 | 25900 |

**Z93W****Z94W****Z93P****Z94P**

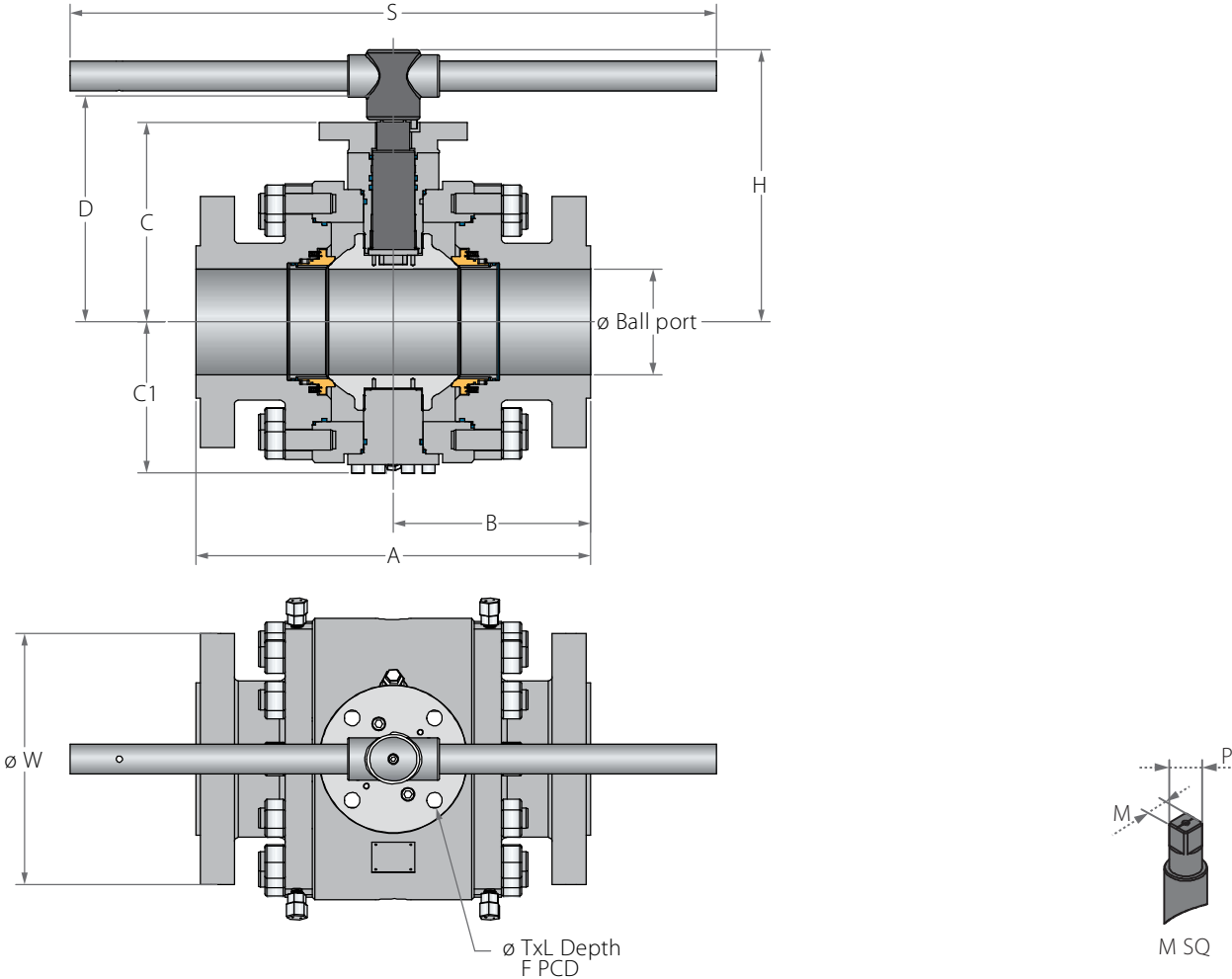
2"-6" | DN50-DN150

CLASS 600/900

## High Temperature Trunnion Ball 3 Piece Up to

**W** 200°C (400°F) | **P** 327°C (620°F)

## Valve dimensions



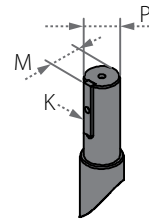
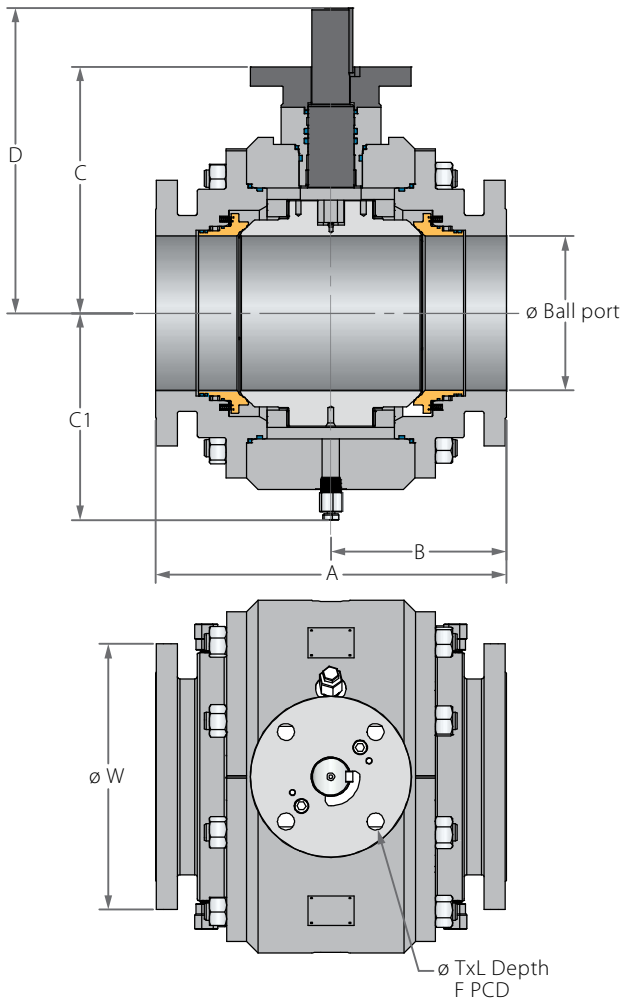
| Full port | Unit | Ball port | A      |        | B      |        | C      |        | C1     |        | D      |        | W      |        | M SQ  | P SQ  | H      | S      | F     |        | TxL       | Weight kg/lb |     | Kv/Cv |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------|-------|--------|-----------|--------------|-----|-------|------|
|           |      |           | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    |       |       |        |        | 600   | 900    |           | 600          | 900 |       |      |
| DN50      | mm   | 49.00     | 292.00 | 368.00 | 131.00 | 184.00 | 144.00 | 148.50 | 119.00 | 263.00 | 168.50 | 182.50 | 165.00 | 215.00 | 22.00 | 28.00 | 219.50 | 401.00 | (F12) | 125.00 | 13X15     | 49           | 67  | 329   | 294  |
| 2"        | inch | 1.93      | 11.50  | 14.49  | 5.16   | 7.24   | 5.67   | 5.85   | 4.69   | 10.35  | 6.63   | 7.19   | 6.50   | 8.46   | 0.87  | 1.10  | 8.64   | 15.79  | (F12) | 4.92   | (4 holes) | 108          | 148 | 380   | 340  |
| DN80      | mm   | 74.00     | 356.00 | 381.00 | 161.00 | 190.50 | 191.00 | 214.00 | 160.00 | 152.70 | 215.00 | 237.50 | 210.00 | 240.00 | 22.00 | 28.00 | 266.00 | 610.00 | (F14) | 140.00 | 18X24     | 103          | 114 | 874   | 822  |
| 3"        | inch | 2.91      | 14.02  | 15.00  | 6.34   | 7.50   | 7.52   | 8.43   | 6.30   | 6.01   | 8.46   | 9.35   | 8.27   | 9.45   | 0.87  | 1.10  | 10.47  | 24.02  | (F14) | 5.51   | (4 holes) | 227          | 251 | 1010  | 950  |
| DN100     | mm   | 100.00    | 432.00 | 457.00 | 216.00 | 228.50 | 217.00 | 193.00 | 184.00 | 184.00 | 246.50 | 259.00 | 275.00 | 290.00 | 27.00 | 36.00 | 316.50 | 916.00 | (F16) | 165.00 | 22X25     | 166          | 186 | 1557  | 1471 |
| 4"        | inch | 3.94      | 17.01  | 17.99  | 8.50   | 9.00   | 8.54   | 7.60   | 7.24   | 7.24   | 9.70   | 10.20  | 10.83  | 11.42  | 1.06  | 1.42  | 12.46  | 36.06  | (F16) | 6.50   | (4 holes) | 366          | 410 | 1800  | 1700 |
| DN150     | mm   | 150.00    | 559.00 | 610.00 | 278.00 | 305.00 | 282.50 | 368.00 | 214.50 | 224.00 | 320.50 | 463.00 | 355.00 | 380.00 | 36.00 | 48.20 | 385.00 | 916.00 | (F16) | 165.00 | 22X25     | 342          | 418 | 3893  | 3823 |
| 6"        | inch | 5.91      | 22.01  | 24.02  | 10.94  | 12.01  | 11.12  | 14.49  | 8.44   | 8.82   | 12.62  | 18.23  | 13.98  | 14.96  | 1.42  | 1.90  | 15.16  | 36.06  | (F16) | 6.50   | (4 holes) | 754          | 922 | 4500  | 4420 |

**Z93W****Z94W****Z93P****Z94P**8"-12" | DN200-DN300  
CLASS 600/900

## High Temperature Trunnion Ball 3 Piece Up to

**W** 200°C (400°F) | **P** 327°C (620°F)

## Valve dimensions



| Full port    | Unit | Ball port | A      |        | B      |        | C      |        | C1     |        | D      |        | W      |        | P     | M     | K     | F               | TxL                | Weight kg/lb |      | Kv/Cv |       |
|--------------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-----------------|--------------------|--------------|------|-------|-------|
|              |      |           | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    |       |       |       |                 |                    | 600          | 900  | 600   | 900   |
| DN200<br>8"  | mm   | 201.00    | 660.00 | 737.00 | 330.00 | 368.50 | 312.00 | 307.00 | 263.00 | 263.00 | 409.00 | 403.00 | 420.00 | 470.00 | 72.00 | 76.50 | 20.00 | (F25)<br>254.00 | 18x25<br>(8 holes) | 577          | 836  | 7742  | 7344  |
|              | inch | 7.91      | 25.98  | 29.02  | 12.99  | 14.51  | 12.28  | 12.09  | 10.35  | 10.35  | 16.10  | 15.87  | 16.54  | 18.50  | 2.83  | 3.01  | 0.79  |                 |                    | 10.00        | 1272 | 1843  | 8950  |
| DN250<br>10" | mm   | 252.00    | 787.00 | 838.00 | 400.00 | 419.00 | 374.00 | 393.00 | 310.00 | 347.00 | 471.00 | 490.00 | 510.00 | 545.00 | 72.00 | 76.50 | 20.00 | (F25)<br>254.00 | 18x25<br>(8 holes) | 931          | 1301 | 12543 | 12110 |
|              | inch | 9.92      | 30.98  | 32.99  | 15.75  | 16.50  | 14.72  | 15.47  | 12.20  | 13.66  | 18.54  | 19.29  | 20.08  | 21.46  | 2.83  | 3.01  | 0.79  |                 |                    | 10.00        | 2052 | 2868  | 14500 |
| DN300<br>12" | mm   | 303.00    | 838.00 | 965.00 | 419.00 | 482.50 | 402.00 | 419.00 | 344.00 | 361.00 | 499.00 | 544.00 | 560.00 | 610.00 | 72.00 | 76.50 | 20.00 | (F25)<br>254.00 | 18x35<br>(8 holes) | 1126         | 1576 | 19809 | 18598 |
|              | inch | 11.93     | 32.99  | 37.99  | 16.50  | 19.00  | 15.83  | 16.50  | 13.54  | 14.21  | 19.65  | 21.42  | 22.05  | 24.02  | 2.83  | 3.01  | 0.79  |                 |                    | 10.00        | 2482 | 3474  | 22900 |

**Z95W****Z96W****Z95P****Z96P**

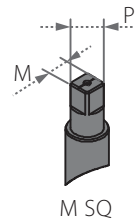
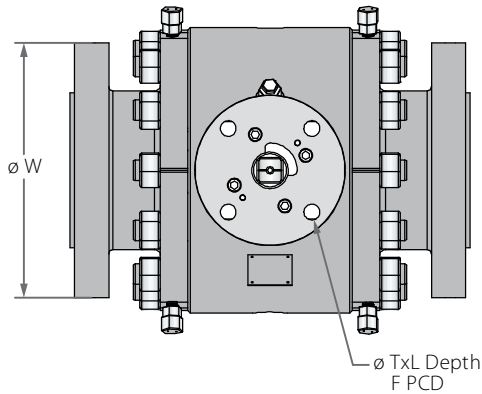
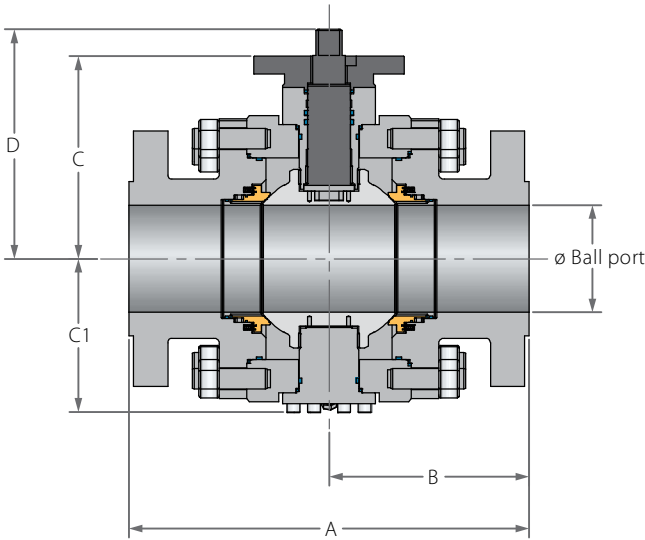
2"-6" | DN50-DN150

CLASS 1500/2500

## High Temperature Trunnion Ball 3 Piece Up to

**W** 200°C (400°F) | **P** 327°C (620°F)

## Valve dimensions



| Full port | Unit | Ball port | A      |        | B      |        | C      | C1     | D      | W      |        | M SQ  | P SQ  | F     | TxL    | Weight kg/ib |      | Kv/Cv |      |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|--------|--------------|------|-------|------|------|
|           |      |           | 1500   | 2500   | 1500   | 2500   |        |        |        | 1500   | 2500   |       |       |       |        |              |      |       |      |      |
| DN50      | mm   | 49.00     | 368.00 | 451.00 | 184.00 | 225.50 | 204.50 | 159.00 | 339.00 | 215.00 | 235.00 | 22.00 | 32.00 | (F14) | 140.00 | 18X12        | 90   | 179   | 281  | 260  |
| 2"        | inch | 1.93      | 14.49  | 17.76  | 7.24   | 8.88   | 8.05   | 6.26   | 13.35  | 8.46   | 9.25   | 0.87  | 1.26  |       | 5.51   | (4 holes)    | 198  | 395   | 325  | 300  |
| DN80      | mm   | 74.00     | 470.00 | 578.00 | 235.00 | 289.00 | 262.00 | 201.50 | 342.50 | 265.00 | 305.00 | 27.00 | 35.00 | (F14) | 140.00 | 18X22        | 175  | 340   | 735  | 649  |
| 3"        | inch | 2.91      | 18.50  | 22.76  | 9.25   | 11.38  | 10.31  | 7.93   | 13.48  | 10.43  | 12.01  | 1.06  | 1.38  |       | 5.51   | (4 holes)    | 386  | 750   | 850  | 750  |
| DN100     | mm   | 100.00    | 546.00 | 673.00 | 273.00 | 336.50 | 225.00 | 198.50 | 299.50 | 310.00 | 355.00 | 36.00 | 46.20 | (F16) | 165.00 | 22x25        | 330  | 646   | 1384 | 1228 |
| 4"        | inch | 3.94      | 21.50  | 26.50  | 10.75  | 13.25  | 8.86   | 7.81   | 11.79  | 12.20  | 13.98  | 1.42  | 1.82  |       | 6.50   | (4 holes)    | 728  | 1424  | 1600 | 1420 |
| DN150     | mm   | 150.00    | 705.00 | 914.00 | 352.50 | 457.00 | 310.00 | 272.00 | 425.00 | 395.00 | 485.00 | 46.00 | 59.00 | (F25) | 254.00 | 22x30        | 627  | 1227  | 3590 | 2206 |
| 6"        | inch | 5.91      | 27.76  | 35.98  | 13.88  | 17.99  | 12.20  | 10.71  | 16.73  | 15.55  | 19.09  | 1.81  | 2.32  |       | 10.00  | (8 holes)    | 1382 | 2705  | 4150 | 2550 |

Z95W

Z96W

Z95P

Z96P

8"-12" | DN200-DN300

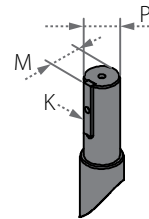
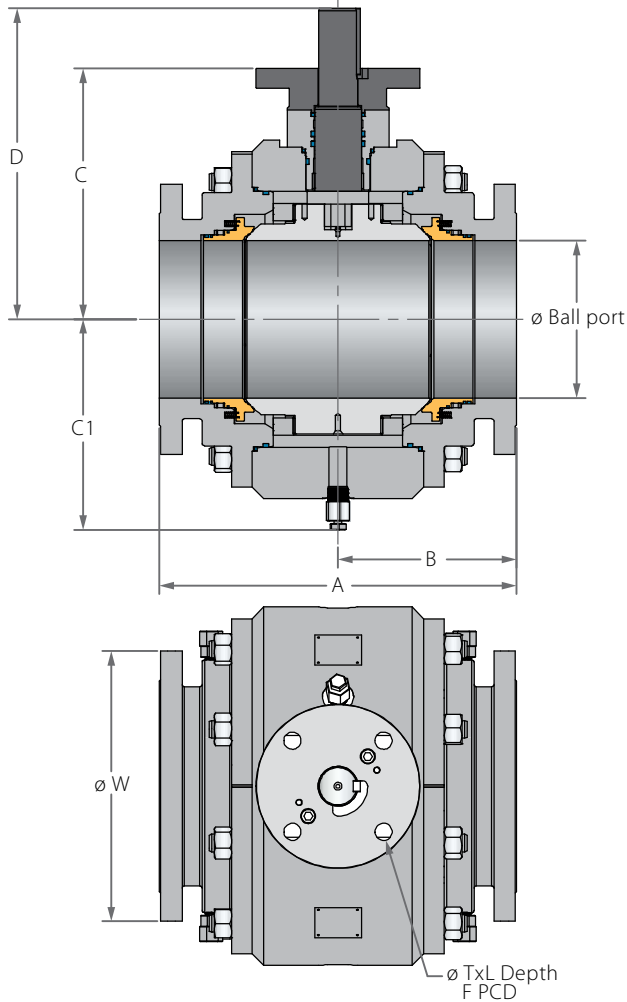
CLASS 1500/2500



# High Temperature Trunnion Ball 3 Piece Up to

**W** 200°C (400°F) | **P** 327°C (620°F)

## Valve dimensions



| Full port | Unit | Ball port | A       |         | B      |        | C      | C1     | D      | W      |        | P     | M     | K     | F     | TxL    | Weight kg/ib |      | Kv/Cv |       |       |
|-----------|------|-----------|---------|---------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|--------------|------|-------|-------|-------|
|           |      |           | 1500    | 2500    | 1500   | 2500   |        |        |        | 1500   | 2500   |       |       |       |       |        | 1500         | 2500 | 1500  | 2500  |       |
| DN200     | mm   | 201.00    | 832.00  | 1022.00 | 416.00 | 511.00 | 425.00 | 273.00 | 540.00 | 485.00 | 550.00 | 72.00 | 76.50 | 20.00 | (F25) | 254.00 | 18x25        | 1000 | 2330  | 6963  | 4758  |
| 8"        | inch | 7.91      | 32.76   | 40.24   | 16.38  | 20.12  | 16.73  | 10.75  | 21.26  | 19.09  | 21.65  | 2.83  | 3.01  | 0.79  |       | 10.00  | (8 holes)    | 2205 | 5137  | 8050  | 5500  |
| DN250     | mm   | 252.00    | 991.00  | 1270.00 | 495.50 | 635.00 | 582.00 | 374.00 | 712.00 | 585.00 | 675.00 | 80.00 | 87.00 | 22.00 | (F30) | 298.00 | 22x30        | 1900 | 4427  | 11418 | 7526  |
| 10"       | inch | 9.92      | 39.02   | 50.00   | 19.51  | 25.00  | 22.91  | 14.72  | 28.03  | 23.03  | 26.57  | 3.15  | 3.43  | 0.87  |       | 11.73  | (8 holes)    | 4189 | 9760  | 13200 | 8700  |
| DN300     | mm   | 303.00    | 1130.00 | 1422.00 | 565.00 | 711.00 | 797.00 | 512.00 | 927.00 | 675.00 | 760.00 | 80.00 | 87.00 | 22.00 | (F30) | 298.00 | 22x30        | 3610 | 8000  | 16868 | 10726 |
| 12"       | inch | 11.93     | 44.49   | 55.98   | 22.24  | 27.99  | 31.38  | 20.16  | 36.50  | 26.57  | 29.92  | 3.15  | 3.43  | 0.87  |       | 11.73  | (8 holes)    | 7959 | 17637 | 19500 | 12400 |

Z91W

Z92W

Z93W

Z94W

Z95W

Z96W

Z91P

Z92P

Z93P

Z94P

Z95P

Z96P

2"-6"

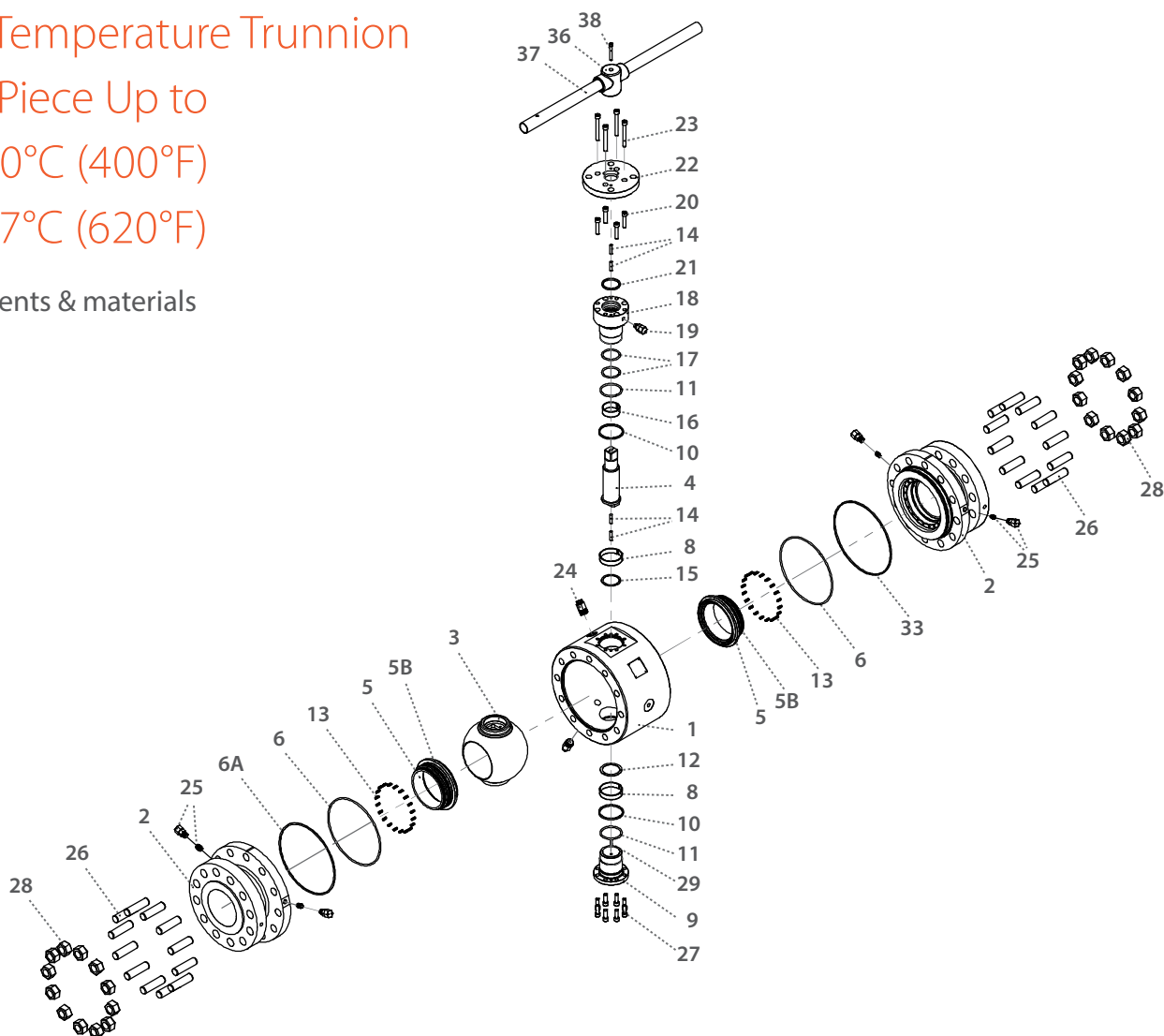
## High Temperature Trunnion

### Ball 3 Piece Up to

**W** 200°C (400°F)

**P** 327°C (620°F)

### Components & materials



| Item | Description                                    | Material Spec. ASTM | Qty.  |
|------|--|---------------------|-------|
| 1    | Body   | Acc. Ordering code  | 1     |
| 2    | Ends   | Acc. Ordering code  | 2     |
| 3    | Ball   | Acc. Ordering code  | 1     |
| 4    | Stem   | Acc. Ordering code  | 1     |
| 5*   | Seat   | Acc. Ordering code  | 2     |
| 5B*  | Seat seal                                      | Viton / HNBR        | 2-4   |
| 6*   | Body inner seal                                | Viton / HNBR        | 2     |
| 6A*  | Body outer seal                                | Graphite            | 2     |
| 8*   | Ball Bearing                                   | S.steel 316 + PTFE  | 2     |
| 9    | External Trunnion                              | S.steel / C.steel   | 1     |
| 10*  | Gland Plate & External trunnion Fire Safe Seal | Graphite            | 2     |
| 11*  | Gland Plate & External trunnion Seal           | Viton / HNBR        | 2     |
| 12*  | Lower thrust washer                            | S.steel 316 + PTFE  | 1     |
| 13   | Seat Spring                                    | Inconel X750        | 28-40 |
| 14   | Gland pin                                      | S.steel / C.steel   | 4     |
| 15*  | Stem Thrust Washer                             | S.steel 316 + PTFE  | 1     |
| 16*  | Gland plate bearing                            | S.steel 316 + PTFE  | 1     |

| Item | Description                       | Material Spec. ASTM          | Qty.  |
|------|-----------------------------------|------------------------------|-------|
| 17*  | Stem seal                         | Viton / HNBR                 | 2     |
| 18   | Gland Plate                       | S.steel / C.steel            | 1     |
| 19   | Stem grease fitting               | S.steel                      | 1     |
| 20   | Lower gland bolts                 | A193-B8M / A320 L7           | 4     |
| 21*  | Stem fire safe seal               | Graphite                     | 1     |
| 22   | Iso plate                         | S.steel / C.steel            | 1     |
| 23   | Upper gland bolts                 | A193-B8M / A320 L7           | 4     |
| 24   | Plug valve                        | S.steel                      | 2     |
| 25** | Seat grease fitting + check valve | S.steel                      | 4     |
| 26   | Body studs                        | A193-B8M / A320 L7           | 16-24 |
| 27   | External trunnion bolts           | A193-B8M / A320 L7           | 4     |
| 28   | Body nuts                         | A194-8M / A194 L7            | 16-24 |
| 29   | Antistatic spring                 | Inconel X750                 | 1     |
| 30   | Wrench head                       | S.steel / C.steel            | 1     |
| 31   | Wrench bolt                       | S.steel / C.steel            | 1     |
| 32   | Pipe handle                       | S.steel / C.steel Zink plate | 1     |

\* Repair kit components

\*\* Available from 6" size only



Z91W

Z92W

Z93W

Z94W

Z95W

Z96W



Z91P

Z92P

Z93P

Z94P

Z95P

Z96P

2"-6"

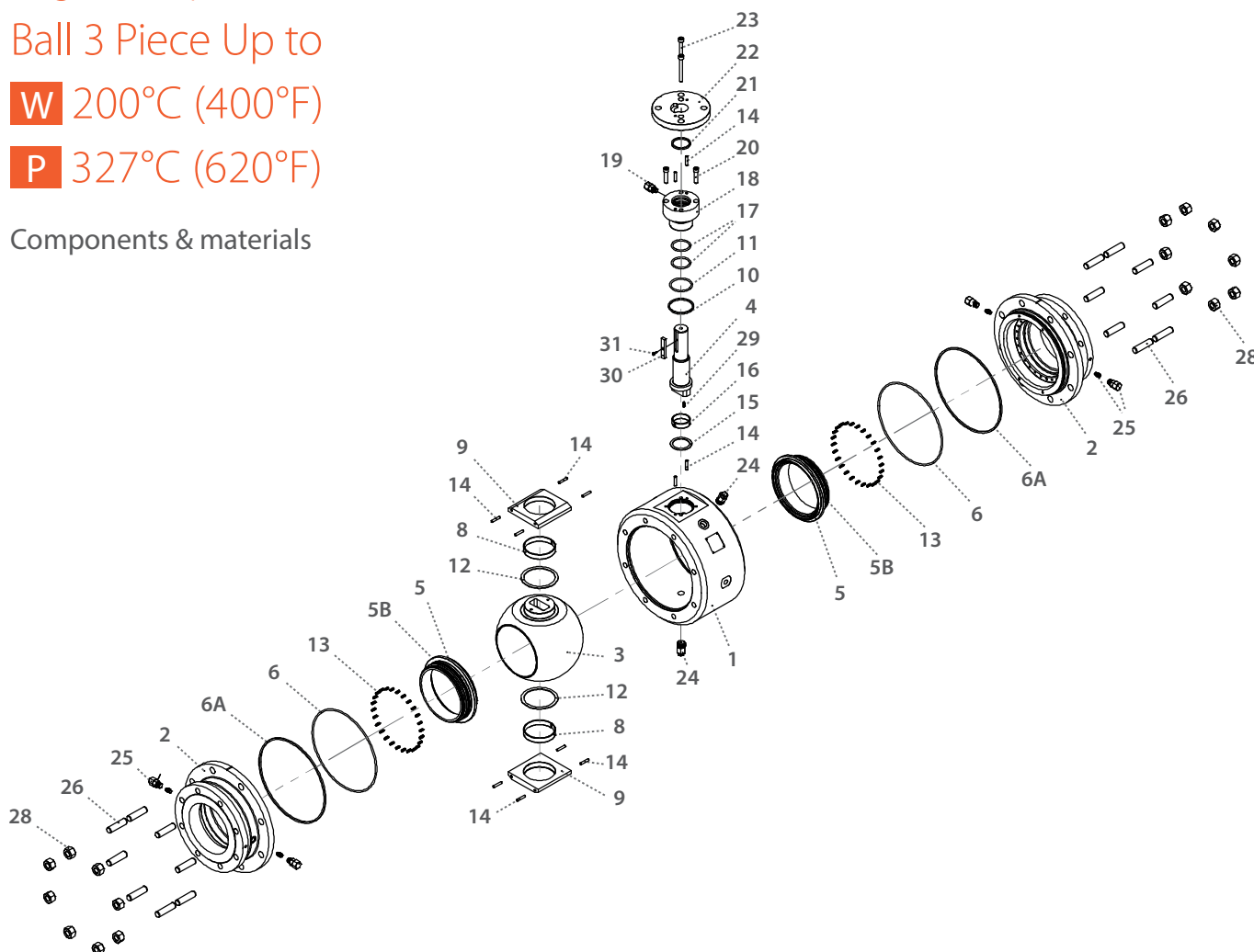
## High Temperature Trunnion

Ball 3 Piece Up to

**W** 200°C (400°F)

**P** 327°C (620°F)

Components & materials



| Item | Description                                    | Material Spec. ASTM | Qty.  |
|------|--|---------------------|-------|
| 1    | Body   | Acc. Ordering code  | 1     |
| 2    | Ends   | Acc. Ordering code  | 2     |
| 3    | Ball   | Acc. Ordering code  | 1     |
| 4    | Stem   | Acc. Ordering code  | 1     |
| 5*   | Seat   | Acc. Ordering code  | 2     |
| 5B*  | Seat seal                                      | Viton, HNBR         | 2-4   |
| 6*   | Body inner seal                                | Viton, HNBR         | 2     |
| 6A*  | Body outer seal                                | Graphite            | 2     |
| 8*   | Ball bearing                                   | S.steel 316 + PTFE  | 2     |
| 9    | Trunnion plate                                 | S.steel / C.steel   | 2     |
| 10*  | Gland plate & External Trunnion Fire Safe Seal | Graphite            | 1     |
| 11*  | Gland Plate & External Trunnion Seal           | Viton, HNBR         | 1     |
| 12*  | Ball thrust washer                             | S.steel 316 + PTFE  | 2     |
| 13   | Seat Spring                                    | Inconel X750        | 52-60 |
| 14   | Gland pin                                      | S.steel / C.steel   | 12    |
| 15*  | Stem Thrust Washer                             | S.steel 316 + PTFE  | 1     |
| 16*  | Stem Bearing                                   | S.steel 316 + PTFE  | 1     |

| Item | Description                       | Material Spec. ASTM | Qty.  |
|------|-----------------------------------|---------------------|-------|
| 17*  | Stem seal                         | Viton, HNBR         | 2     |
| 18   | Gland Plate                       | S.steel / C.steel   | 1     |
| 19   | Stem grease fitting               | S.steel             | 1     |
| 20   | Lower gland bolts                 | A193-B8M / A320 L7  | 2-6   |
| 21*  | Stem fire safe seal               | Graphite            | 1     |
| 22   | Iso plate                         | S.steel / C.steel   | 1     |
| 23   | Upper gland bolts                 | A193-B8M / A320 L7  | 2-6   |
| 24   | Plug valve                        | S.steel             | 2     |
| 25** | Seat grease fitting + check valve | S.steel             | 4     |
| 26   | Body studs                        | A193-B8M / A320 L7  | 16-32 |
| 28   | Body nuts                         | A194-8M / A194 L7   | 16-32 |
| 29   | Antistatic spring                 | Inconel X750        | 1     |
| 30   | Stem key                          | S.steel / C.steel   | 1     |
| 31   | Stem key bolt                     | S.steel / C.steel   | 1     |

\* Repair kit components

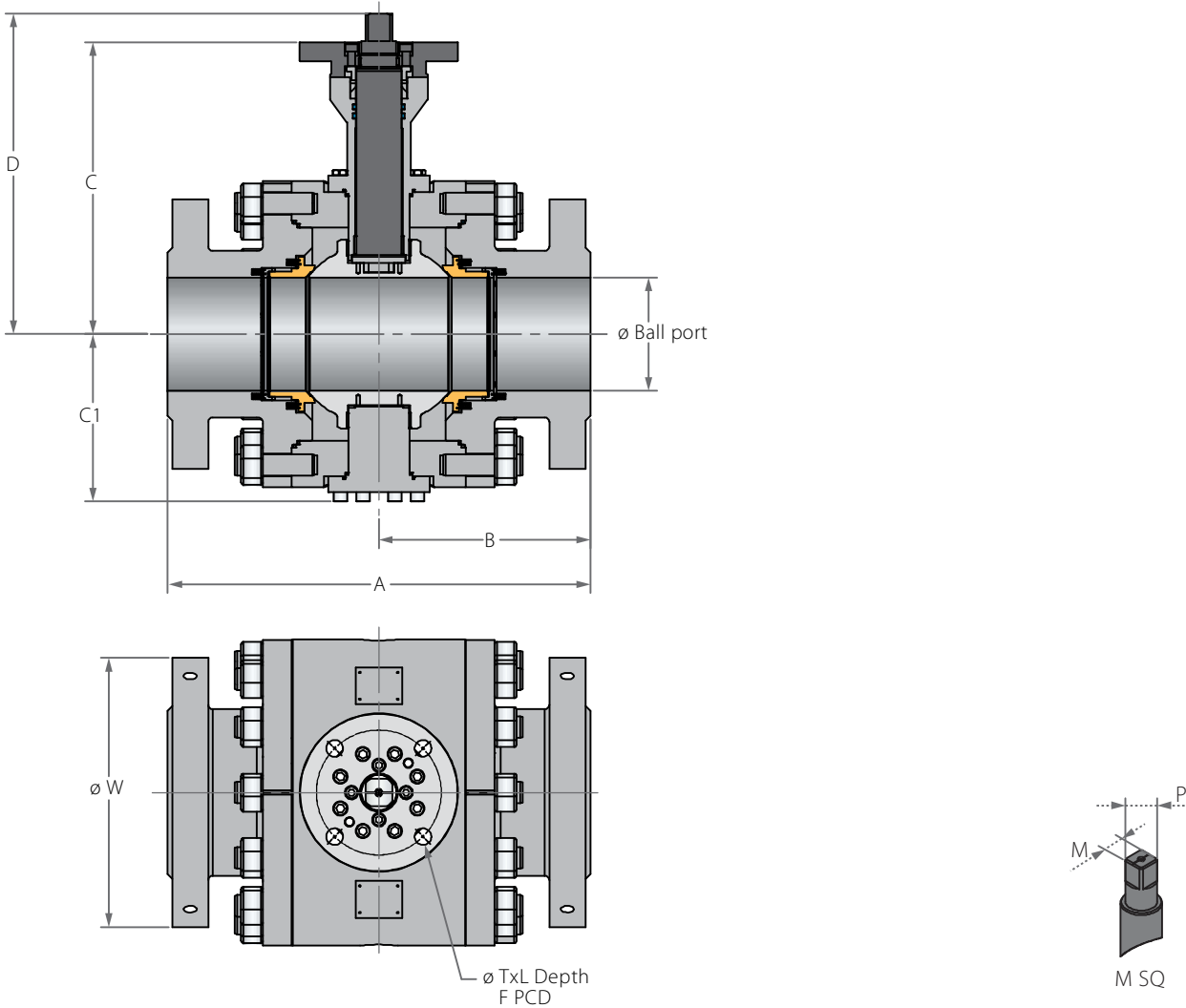
Z91T

Z92T

2"-6" | DN50-DN150 | CLASS 150/300

## High Temperature Trunnion Ball 3 Piece Up to 538°C (1000°F)

### Valve dimensions



| Full port | Unit | Ball port | A      |        | B      |        | C      | C1     | D      |        | M SQ   | P SQ  | F     | TxL    | Weight kg/ib |     | Kv/Cv |      |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------------|-----|-------|------|------|
|           |      |           | 150    | 300    | 150    | 300    |        |        | 150    | 300    |        |       |       |        | 150          | 300 | 150   | 300  |      |
| DN50      | mm   | 49.00     | 178.00 | 216.00 | 89.00  | 108.00 | 250.00 | 94.00  | 269.00 | 150.00 | 165.00 | 16.90 | (F10) | 102.00 | M10X15       | 27  | 31    | 400  | 363  |
| 2"        | inch | 1.93      | 7.01   | 8.50   | 3.50   | 4.25   | 9.84   | 3.70   | 10.59  | 5.91   | 6.50   | 0.67  |       | 4.02   | (4 holes)    | 60  | 68    | 463  | 420  |
| DN80      | mm   | 74.00     | 203.00 | 283.00 | 101.50 | 141.50 | 277.00 | 117.00 | 301.00 | 190.00 | 210.00 | 21.90 | (F12) | 125.00 | M12X15       | 49  | 63    | 1125 | 952  |
| 3"        | inch | 2.91      | 7.99   | 11.14  | 4.00   | 5.57   | 10.91  | 4.61   | 11.85  | 7.48   | 8.27   | 0.86  |       | 4.92   | (4 holes)    | 108 | 139   | 1300 | 1100 |
| DN100     | mm   | 100.00    | 229.00 | 305.00 | 114.50 | 152.50 | 293.00 | 139.00 | 322.00 | 230.00 | 255.00 | 26.90 | (F14) | 140.00 | M16X15       | 72  | 96    | 2154 | 1860 |
| 4"        | inch | 3.94      | 9.02   | 12.00  | 4.51   | 6.00   | 11.54  | 5.47   | 12.68  | 9.06   | 10.04  | 1.06  |       | 5.51   | (4 holes)    | 159 | 212   | 2490 | 2150 |
| DN150     | mm   | 150.00    | 394.00 | 403.00 | 197.00 | 201.50 | 362.00 | 191.00 | 400.00 | 280.00 | 320.00 | 35.90 | (F16) | 165.00 | M22X25       | 166 | 184   | 4723 | 4628 |
| 6"        | inch | 5.91      | 15.51  | 15.87  | 7.76   | 7.93   | 14.25  | 7.52   | 15.75  | 11.02  | 12.60  | 1.41  |       | 6.50   | (4 holes)    | 366 | 406   | 5460 | 5350 |

Z91T

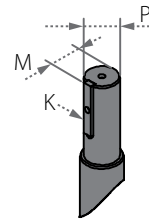
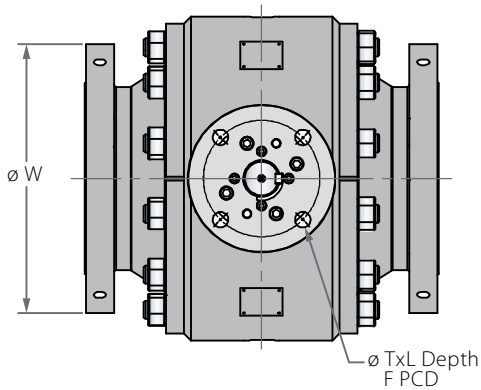
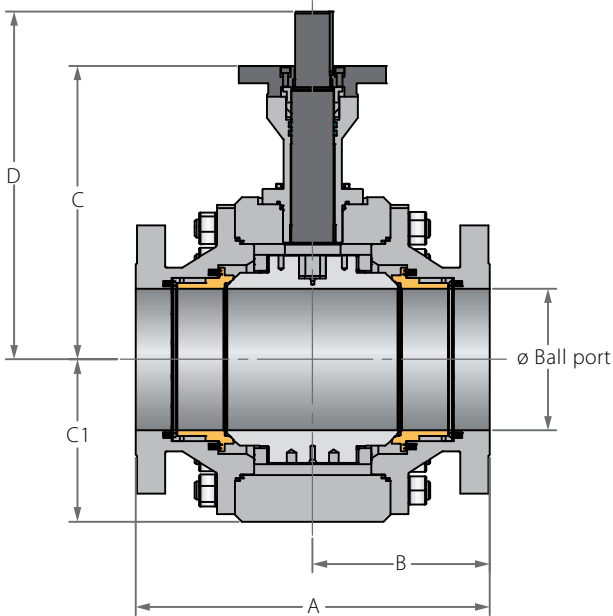
Z92T

8"-12" | DN50-DN150 | CLASS 150/300



## High Temperature Trunnion Ball 3 Piece Up to 538°C (1000°F)

### Valve dimensions



| Full port    | Unit | Ball port | A      |        | B      |        | C      | C1     | D      | M      | K      | F     | TxL   | Weight kg/ib |      | Kv/Cv |       |       |
|--------------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|--------------|------|-------|-------|-------|
|              |      |           | 150    | 300    | 150    | 300    |        |        |        |        |        |       |       | 150          | 300  | 150   | 300   |       |
| DN200<br>8"  | mm   | 201.00    | 457.00 | 502.00 | 228.50 | 251.00 | 416.00 | 215.00 | 493.00 | 345.00 | 380.00 | 50.00 | 54.00 | 14.00        | 346  | 378   | 9273  | 8737  |
|              | inch | 7.91      | 17.99  | 19.76  | 9.00   | 9.88   | 16.38  | 8.46   | 19.41  | 13.58  | 14.96  |       |       |              | 2.13 | 0.55  | 10720 | 10100 |
| DN250<br>10" | mm   | 252.00    | 533.00 | 568.00 | 266.50 | 284.00 | 504.00 | 260.00 | 581.00 | 405.00 | 445.00 | 50.00 | 54.00 | 14.00        | 518  | 639   | 15224 | 14792 |
|              | inch | 9.92      | 20.98  | 22.36  | 10.49  | 11.18  | 19.84  | 10.24  | 22.87  | 15.94  | 17.52  |       |       |              | 2.13 | 0.55  | 17600 | 17100 |
| DN300<br>12" | mm   | 303.00    | 610.00 | 648.00 | 305.00 | 324.00 | 590.00 | 300.00 | 671.00 | 485.00 | 520.00 | 60.00 | 63.50 | 18.00        | 723  | 833   | 23096 | 22404 |
|              | inch | 11.93     | 24.02  | 25.51  | 12.01  | 12.76  | 23.23  | 11.81  | 26.42  | 19.09  | 20.47  |       |       |              | 2.36 | 0.71  | 26700 | 25900 |

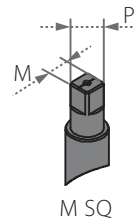
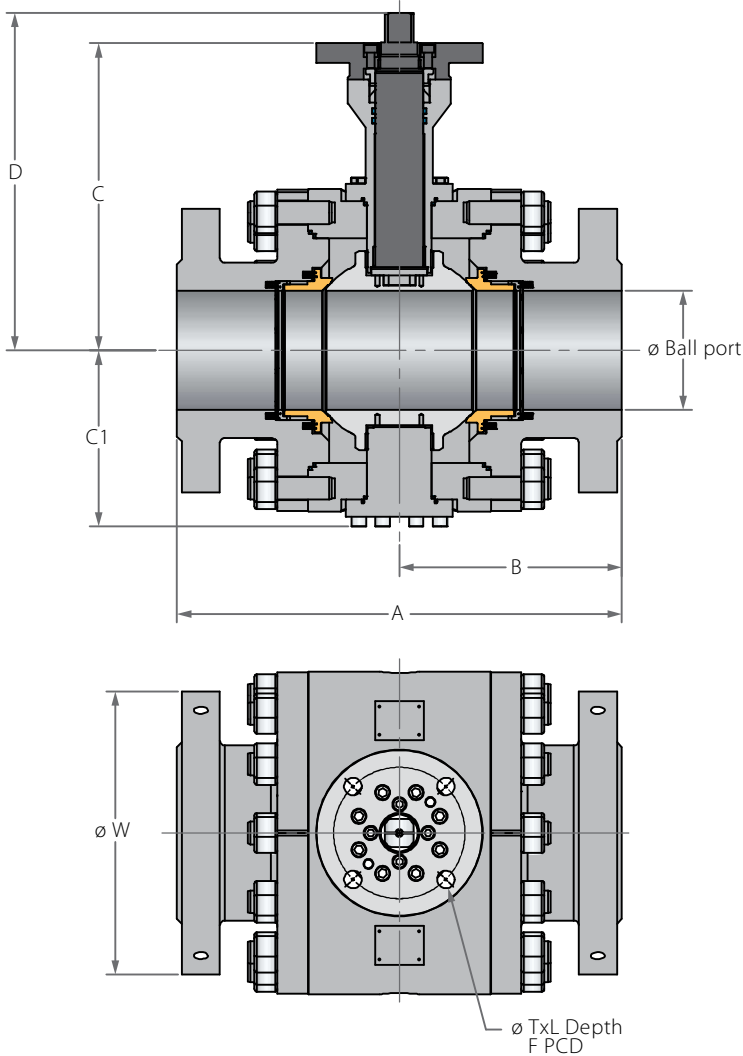
Z93T

Z94T

2"-6" | DN50-DN150 | CLASS 600/900

## High Temperature Trunnion Ball 3 Piece Up to 538°C (1000°F)

### Valve dimensions



| Full port | Unit | Ball port | A      |        | B      |        | C      |        | C1     |        | D      |        | W      |        | M SQ  | P SQ  | F     | TxL    | Weight kg/ib |     | Kv/Cv |      |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|--------|--------------|-----|-------|------|------|
|           |      |           | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    |       |       |       |        | 600          | 900 | 600   | 900  |      |
| DN50      | mm   | 49.00     | 292.00 | 368.00 | 146.00 | 184.00 | 272.00 | 272.00 | 119.00 | 119.00 | 291.00 | 291.00 | 165.00 | 215.00 | 16.90 | 21.30 | (F12) | 125.00 | M12X15       | 49  | 67    | 329  | 294  |
| 2"        | inch | 1.93      | 11.50  | 14.49  | 5.75   | 7.24   | 10.71  | 10.71  | 4.69   | 4.69   | 11.46  | 11.46  | 6.50   | 8.46   | 0.67  | 0.84  |       | 4.92   | (4 holes)    | 108 | 148   | 380  | 340  |
| DN80      | mm   | 74.00     | 356.00 | 381.00 | 178.00 | 190.50 | 306.00 | 306.00 | 160.00 | 160.00 | 330.00 | 330.00 | 210.00 | 240.00 | 21.90 | 26.90 | (F12) | 125.00 | M12X15       | 95  | 114   | 874  | 822  |
| 3"        | inch | 2.91      | 14.02  | 15.00  | 7.01   | 7.50   | 12.05  | 12.05  | 6.30   | 6.30   | 12.99  | 12.99  | 8.27   | 9.45   | 0.86  | 1.06  |       | 4.92   | (4 holes)    | 209 | 251   | 1010 | 950  |
| DN100     | mm   | 100.00    | 432.00 | 457.00 | 216.00 | 228.50 | 334.00 | 334.00 | 184.00 | 184.00 | 364.00 | 364.00 | 275.00 | 290.00 | 26.90 | 34.90 | (F16) | 165.00 | M22X25       | 165 | 186   | 1557 | 1471 |
| 4"        | inch | 3.94      | 17.01  | 17.99  | 8.50   | 9.00   | 13.15  | 13.15  | 7.24   | 7.24   | 14.33  | 14.33  | 10.83  | 11.42  | 1.06  | 1.37  |       | 6.50   | (4 holes)    | 364 | 410   | 1800 | 1700 |
| DN150     | mm   | 150.00    | 559.00 | 610.00 | 279.50 | 305.00 | 386.00 | 404.00 | 220.00 | 220.00 | 424.00 | 442.00 | 355.00 | 380.00 | 35.90 | 46.20 | (F16) | 165.00 | M22X25       | 340 | 418   | 3893 | 3823 |
| 6"        | inch | 5.91      | 22.01  | 24.02  | 11.00  | 12.01  | 15.20  | 15.91  | 8.66   | 8.66   | 16.69  | 17.40  | 13.98  | 14.96  | 1.41  | 1.82  |       | 6.50   | (4 holes)    | 750 | 922   | 4500 | 4420 |

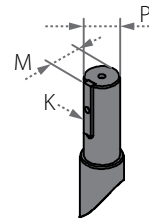
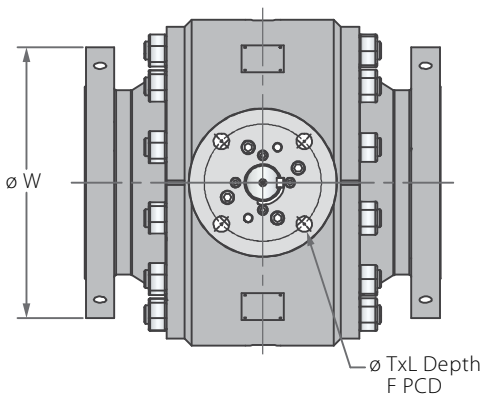
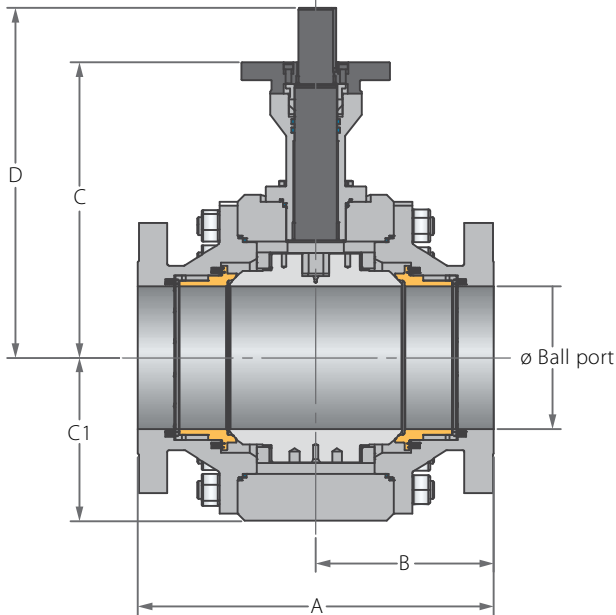
**Z93T****Z94T**

8"-12" | DN50-DN150 | CLASS 600/900



## High Temperature Trunnion Ball 3 Piece Up to 538°C (1000°F)

### Valve dimensions



| Full port    | Unit | Ball port | A      |        | B      |        | C      |        | C1     |        | D      |        | W      |        | P     | M     | K     | F     | TxL    | Weight kg/lb       |      | Kv/Cv |       |       |
|--------------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|--------------------|------|-------|-------|-------|
|              |      |           | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    | 600    | 900    |       |       |       |       |        | 600                | 900  | 600   | 900   |       |
| DN200<br>8"  | mm   | 201.00    | 660.00 | 737.00 | 330.00 | 368.50 | 418.00 | 418.00 | 263.00 | 263.00 | 515.00 | 515.00 | 420.00 | 470.00 | 72.00 | 76.50 | 20.00 | (F25) | 254.00 | 18x25<br>(8 holes) | 548  | 789   | 7742  | 7344  |
|              | inch | 7.91      | 25.98  | 29.02  | 12.99  | 14.51  | 16.46  | 16.46  | 10.35  | 10.35  | 20.28  | 20.28  | 16.54  | 18.50  | 2.83  | 3.01  | 0.79  |       | 10.00  |                    | 1208 | 1739  | 8950  | 8490  |
| DN250<br>10" | mm   | 252.00    | 787.00 | 838.00 | 393.50 | 419.00 | 519.00 | 537.00 | 310.00 | 326.00 | 616.00 | 634.00 | 510.00 | 545.00 | 72.00 | 76.50 | 20.00 | (F30) | 298.00 | 22x30<br>(8 holes) | 895  | 1274  | 12543 | 12110 |
|              | inch | 9.92      | 30.98  | 32.99  | 15.49  | 16.50  | 20.43  | 21.14  | 12.20  | 12.83  | 24.25  | 24.96  | 20.08  | 21.46  | 2.83  | 3.01  | 0.79  |       | 11.73  |                    | 1973 | 2809  | 14500 | 14000 |
| DN300<br>12" | mm   | 303.00    | 838.00 | 965.00 | 419.00 | 482.50 | 598.00 | 605.00 | 344.00 | 361.00 | 695.00 | 702.00 | 560.00 | 610.00 | 72.00 | 76.50 | 20.00 | (F30) | 298.00 | 22x30<br>(8 holes) | 1096 | 1546  | 19809 | 18598 |
|              | inch | 11.93     | 32.99  | 37.99  | 16.50  | 19.00  | 23.54  | 23.82  | 13.54  | 14.21  | 27.36  | 27.64  | 22.05  | 24.02  | 2.83  | 3.01  | 0.79  |       | 11.73  |                    | 2416 | 3408  | 22900 | 21500 |

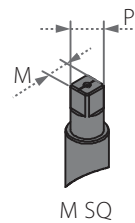
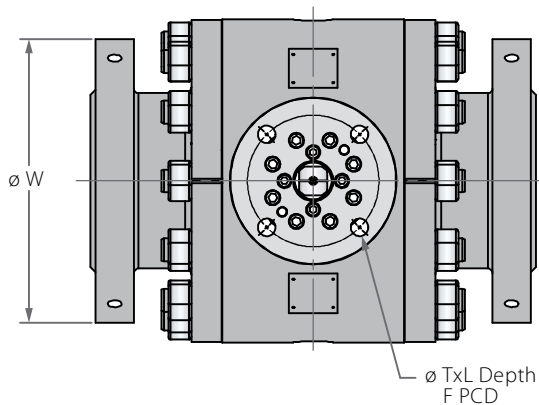
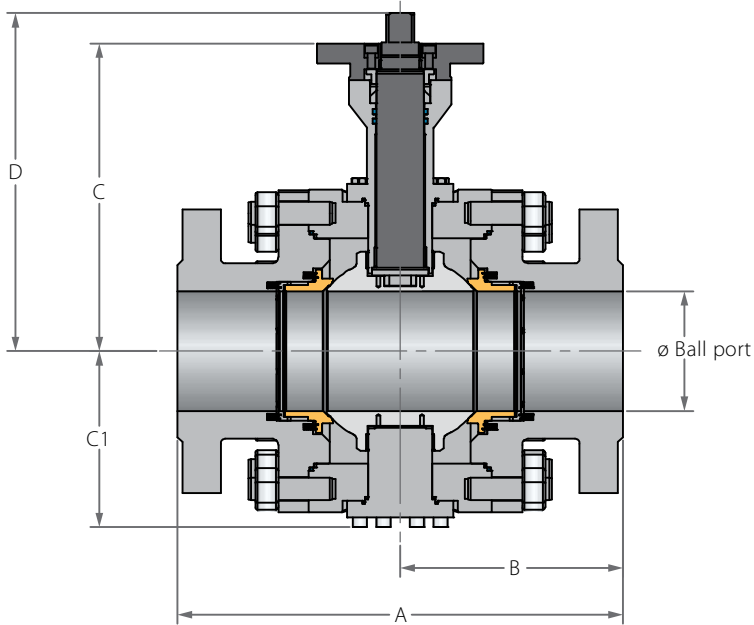
Z95T

Z96T

2"-6" | DN50-DN150 | CLASS 1500/2500

## High Temperature Trunnion Ball 3 Piece Up to 538°C (1000°F)

### Valve dimensions

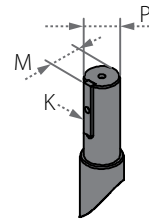
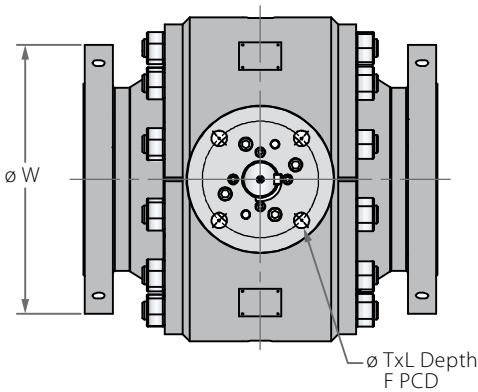
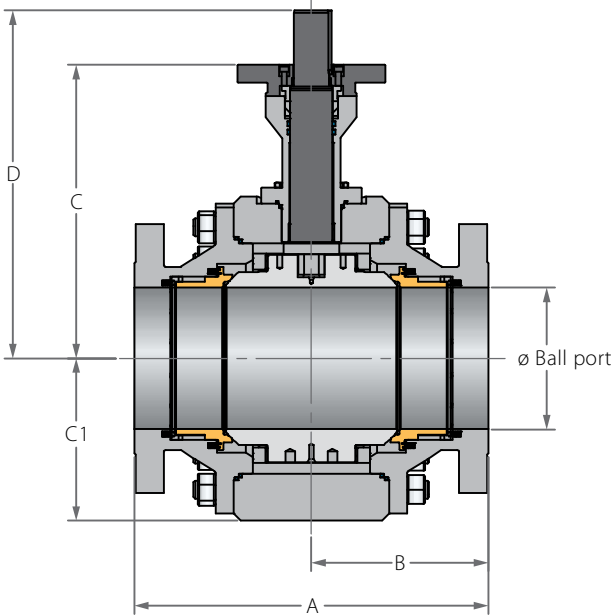


| Full port | Unit | Ball port |        | A      |        | B      |        | C      | C1     | D      | W      |        | M SQ  | P SQ  | F     | TxL    | Weight kg/ib |      | Kv/Cv |      |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|--------|--------------|------|-------|------|------|
|           |      | 1500      | 2500   | 1500   | 2500   | 1500   | 2500   |        |        |        | 1500   | 2500   |       |       |       |        | 1500         | 2500 | 1500  | 2500 |      |
| DN50      | mm   | 49.00     | 42.00  | 368.00 | 451.00 | 184.00 | 225.50 | 325.00 | 127.00 | 330.00 | 215.00 | 235.00 | 22.00 | 32.00 | (F14) | 140.00 | 18x12        | 90   | 179   | 281  | 260  |
| 2"        | inch | 1.93      | 1.65   | 14.49  | 17.76  | 7.24   | 8.88   | 12.80  | 5.00   | 12.99  | 8.46   | 9.25   | 0.87  | 1.26  |       | 5.51   | (4 holes)    | 198  | 395   | 325  | 300  |
| DN80      | mm   | 74.00     | 62.00  | 470.00 | 578.00 | 235.00 | 289.00 | 379.00 | 201.50 | 408.00 | 265.00 | 305.00 | 27.00 | 35.00 | (F14) | 140.00 | 18x22        | 175  | 340   | 735  | 649  |
| 3"        | inch | 2.91      | 2.44   | 18.50  | 22.76  | 9.25   | 11.38  | 14.92  | 7.93   | 16.06  | 10.43  | 12.01  | 1.06  | 1.38  |       | 5.51   | (4 holes)    | 386  | 750   | 850  | 750  |
| DN100     | mm   | 100.00    | 87.00  | 546.00 | 673.00 | 273.00 | 336.50 | 408.00 | 198.50 | 446.00 | 310.00 | 355.00 | 36.00 | 46.20 | (F16) | 165.00 | 22x25        | 330  | 646   | 1384 | 1228 |
| 4"        | inch | 3.94      | 3.43   | 21.50  | 26.50  | 10.75  | 13.25  | 16.06  | 7.81   | 17.56  | 12.20  | 13.98  | 1.42  | 1.82  |       | 6.50   | (4 holes)    | 728  | 1424  | 1600 | 1420 |
| DN150     | mm   | 144.00    | 131.00 | 705.00 | 914.00 | 352.50 | 457.00 | 538.00 | 272.00 | 586.00 | 395.00 | 485.00 | 46.00 | 59.00 | (F25) | 254.00 | 22x30        | 627  | 1227  | 3590 | 2206 |
| 6"        | inch | 5.67      | 5.16   | 27.76  | 35.98  | 13.88  | 17.99  | 21.18  | 10.71  | 23.07  | 15.55  | 19.09  | 1.81  | 2.32  |       | 10.00  | (8 holes)    | 1382 | 2705  | 4150 | 2550 |



## High Temperature Trunnion Ball 3 Piece Up to 538°C (1000°F)

### Valve dimensions



| Full port | Unit | Ball port |        | A       |         | B      |        | C      | C1     | D      | W      |        | P      | M      | K     | F     | TxL    | Weight kg/lb |      | Kv/Cv |       |       |
|-----------|------|-----------|--------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------------|------|-------|-------|-------|
|           |      | 1500      | 2500   | 1500    | 2500    | 1500   | 2500   |        |        |        | 1500   | 2500   |        |        |       |       |        | 1500         | 2500 | 1500  | 2500  |       |
| DN200     | mm   | 192.00    | 179.00 | 832.00  | 1022.00 | 416.00 | 511.00 | 498.00 | 273.00 | 628.00 | 485.00 | 550.00 | 98.00  | 104.40 | 28.00 | (F30) | 298.00 | 22x30        | 1000 | 2330  | 6963  | 4758  |
| 8"        | inch | 7.56      | 7.05   | 32.76   | 40.24   | 16.38  | 20.12  | 19.61  | 10.75  | 24.72  | 19.09  | 21.65  | 3.86   | 4.11   | 1.10  |       | 11.73  | (8 holes)    | 2205 | 5137  | 8050  | 5500  |
| DN250     | mm   | 239.00    | 223.00 | 991.00  | 1270.00 | 495.50 | 635.00 | 609.00 | 374.00 | 740.00 | 585.00 | 675.00 | 98.00  | 104.40 | 28.00 | (F35) | 356.00 | 32x45        | 1900 | 3623  | 11418 | 7389  |
| 10"       | inch | 9.41      | 8.78   | 39.02   | 50.00   | 19.51  | 25.00  | 23.98  | 14.72  | 29.13  | 23.03  | 26.57  | 3.86   | 4.11   | 1.10  |       | 14.02  | (8 holes)    | 4189 | 7987  | 13200 | 8542  |
| DN300     | mm   | 287.00    | 265.00 | 1130.00 | 1422.00 | 565.00 | 711.00 | 558.00 | 512.00 | 688.00 | 675.00 | 760.00 | 120.00 | 127.40 | 32.00 | (F40) | 406.00 | 38x55        | 2705 | 4875  | 16868 | 10508 |
| 12"       | inch | 11.30     | 10.43  | 44.49   | 55.98   | 22.24  | 27.99  | 21.97  | 20.16  | 27.09  | 26.57  | 29.92  | 4.72   | 5.02   | 1.26  |       | 15.98  | (8 holes)    | 5963 | 10747 | 19500 | 12148 |

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Z93T

Z94T

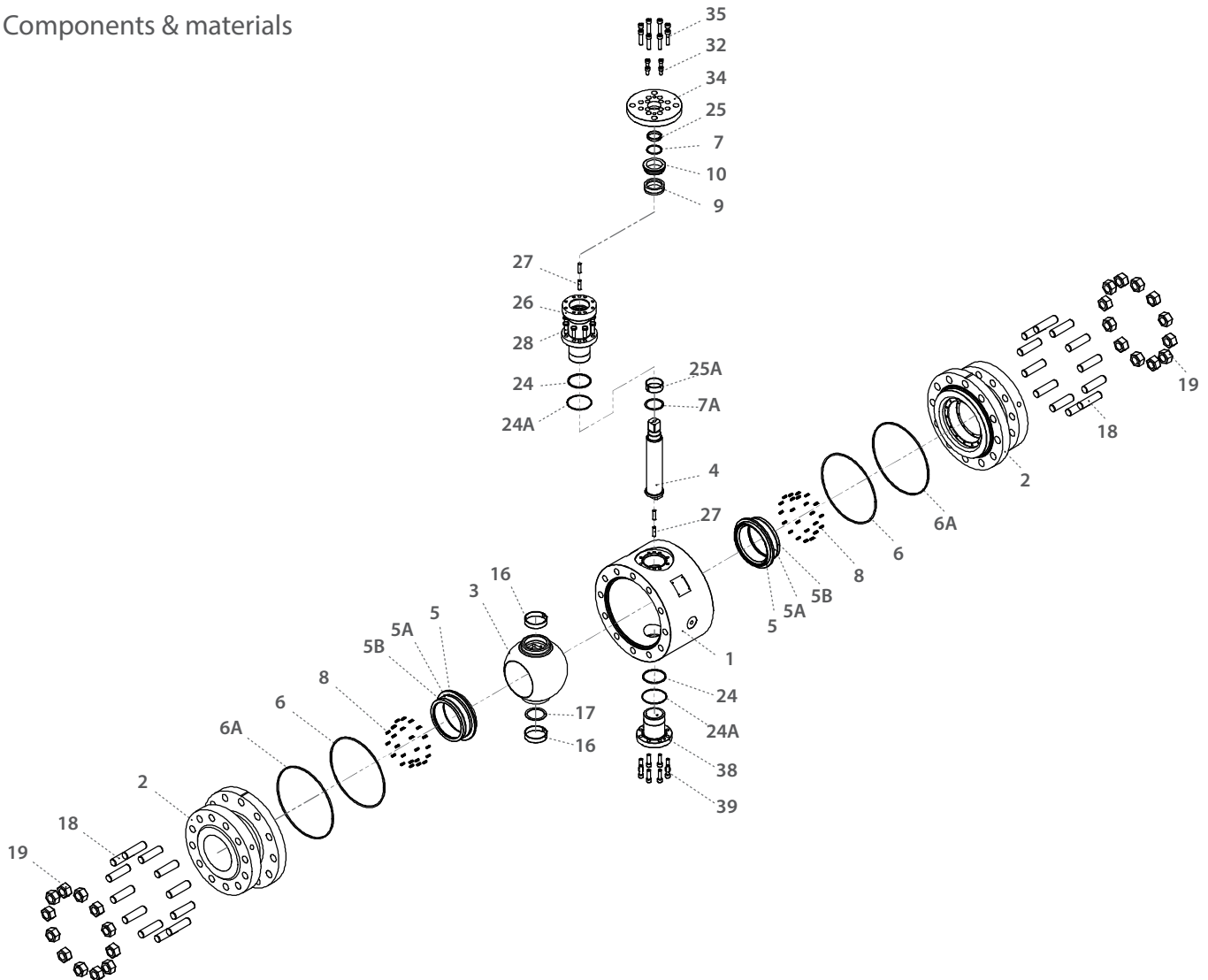
Z95T

Z96T

2"-6"

## High Temperature Trunnion Ball 3 Piece Up to 538°C (1000°F)

### Components & materials



| Item | Description       | Material Spec. ASTM       | Qty.  |
|------|-------------------|---------------------------|-------|
| 1    | Body              | Acc. Ordering Code        | 1     |
| 2    | End               | Acc. Ordering Code        | 2     |
| 3    | Ball              | Acc. Ordering Code        | 1     |
| 4    | Stem              | Acc. Ordering Code        | 1     |
| 5*   | Seat              | Acc. Ordering Code        | 2     |
| 5A*  | Seat seal         | Graphite                  | 2     |
| 5B*  | Seat ring         | Acc. Ordering Code        | 2     |
| 6*   | Body inner seal   | Graphite                  | 2     |
| 6A*  | Body outer seal   | Graphite                  | 2     |
| 7    | Upper thrust seal | S.steel 316 / Inconel 625 | 1     |
| 7A   | Lower thrust seal | S.steel 316 / Inconel 625 | 1     |
| 8    | Seat Spring       | Inconel X750              | 16-48 |
| 9*   | Stem seal         | Graphite                  | 1     |
| 10   | Follower          | S.steel                   | 1     |
| 16   | Ball bearing      | S.steel 316 / Inconel 625 | 2     |
| 17   | Ball thrust seal  | S.steel 316 / Inconel 625 | 1     |

| Item | Description             | Material Spec. ASTM       | Qty. |
|------|-------------------------|---------------------------|------|
| 18   | Body stud               | A193-B8M / A320 L7        | 8-24 |
| 19   | Body nuts               | A194 8M / A194 L7         | 8-24 |
| 24*  | Bonnet inner seal       | Graphite                  | 2    |
| 24A* | Bonnet outer seal       | Graphite                  | 2    |
| 25   | Upper stem bearing      | S.steel 316 / Inconel 625 | 1    |
| 25A  | Lower stem bearing      | S.steel 316 / Inconel 625 | 1    |
| 26   | Bonnet                  | S. steel / C. steel       | 1    |
| 27   | Bonnet pin              | S. steel / C. steel       | 4    |
| 28   | Bonnet bolts            | A193-B8M / A320 L7        | 4-8  |
| 32   | Follower drive bolts    | A193-B8M / A320 L7        | 4-8  |
| 34   | Iso plate               | S. steel / C. steel       | 1    |
| 35   | Iso plate bolts         | A193-B8M / A320 L7        | 4-8  |
| 38   | External trunnion       | S. steel / C. steel       | 1    |
| 39   | External trunnion bolts | A193-B8M / A320 L7        | 4-8  |

\* Repair kit components



Z91T

Z92T

Z93T

Z94T

Z95T

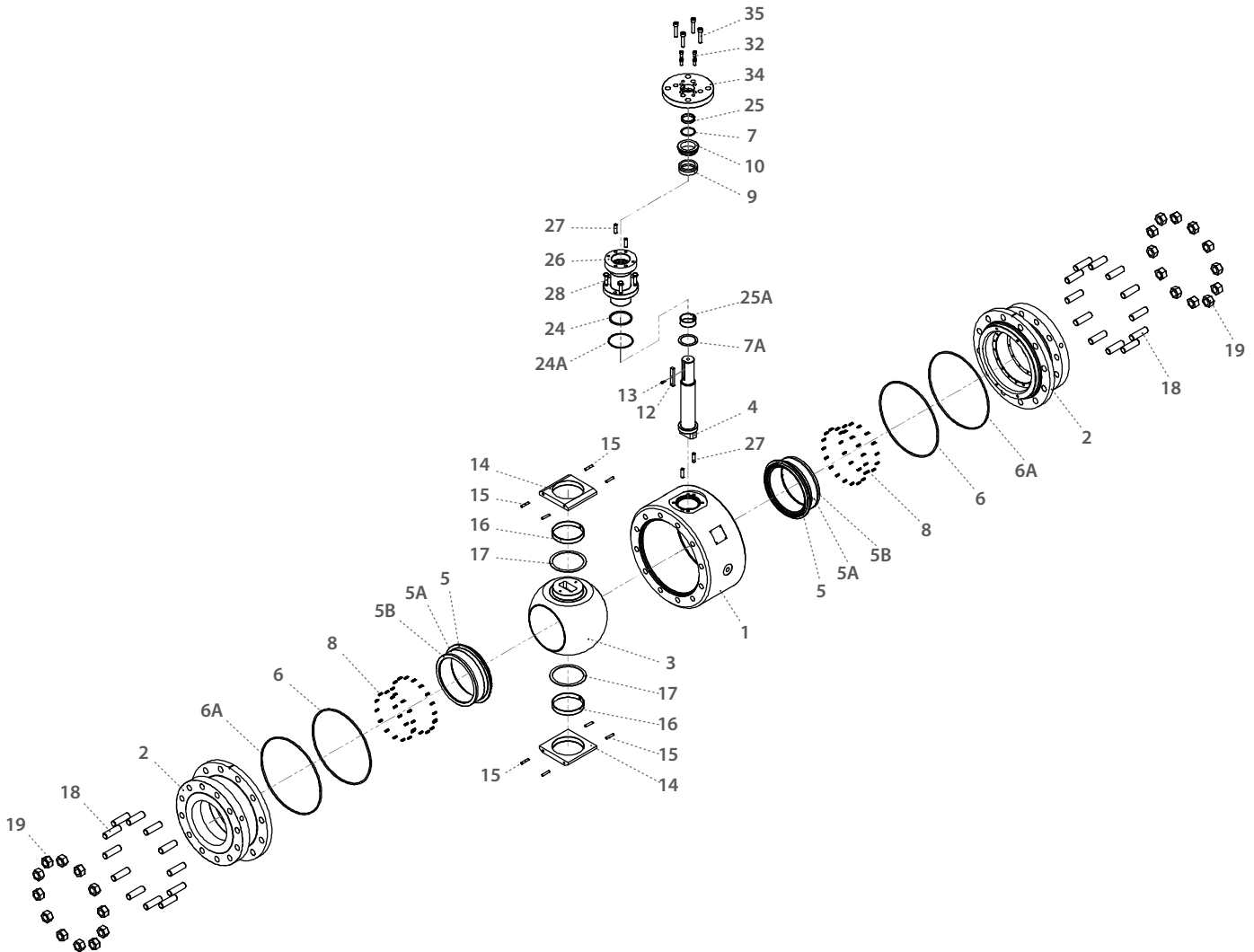
Z96T

8"-12"



## High Temperature Trunnion Ball 3 Piece Up to 538°C (1000°F)

### Components & materials



| Item | Description       | Material Spec. ASTM       | Qty.  |
|------|-------------------|---------------------------|-------|
| 1    | Body              | Acc. Ordering code        | 1     |
| 2    | End               | Acc. Ordering code        | 2     |
| 3    | Ball              | Acc. Ordering code        | 1     |
| 4    | Stem              | Acc. Ordering code        | 1     |
| 5*   | Seat              | Acc. Ordering code        | 2     |
| 5A*  | Seat seal         | Graphite                  | 2     |
| 5B*  | Seat ring         | Acc. Ordering code        | 2     |
| 6*   | Body inner seal   | Graphite                  | 2     |
| 6A*  | Body outer seal   | Graphite                  | 2     |
| 7    | Upper thrust seal | S.steel 316 / Inconel 625 | 1     |
| 7A   | Lower thrust seal | S.steel 316 / Inconel 625 | 1     |
| 8    | Seat Spring       | Inconel X750              | 68-76 |
| 9*   | Stem seal         | Graphite                  | 1     |
| 10   | Follower          | S.steel                   | 1     |
| 12   | Stem key          | S.steel / C.steel         | 1     |
| 13   | Stem key bolt     | S.steel / C.steel         | 1     |
| 14   | Trunnion plate    | S.steel / C.steel         | 2     |

| Item | Description          | Material Spec. ASTM       | Qty.  |
|------|----------------------|---------------------------|-------|
| 15   | Trunnion plate pin   | S.steel / C.steel         | 8     |
| 16   | Ball bearing         | S.steel 316 / Inconel 625 | 2     |
| 17   | Ball thrust washer   | S.steel 316 / Inconel 625 | 2     |
| 18   | Body stud            | A193-B8M / A320 L7        | 16-40 |
| 19   | Body nuts            | A194 8M / A194 L7         | 16-40 |
| 24*  | Bonnet inner seal    | Graphite                  | 1     |
| 24A* | Bonnet outer seal    | Graphite                  | 1     |
| 25   | Upper stem bearing   | S.steel 316 / Inconel 625 | 1     |
| 25A  | Lower stem bearing   | S.steel 316 / Inconel 625 | 1     |
| 26   | Bonnet               | S.steel / C.steel         | 1     |
| 27   | Bonnet pin           | S.steel / C.steel         | 4     |
| 28   | Bonnet bolts         | ASTM A320-B8M             | 4-8   |
| 32   | Follower drive bolts | ASTM A320-B8M             | 4-8   |
| 34   | Iso plate            | S.steel / C.steel         | 1     |
| 35   | Iso plate bolts      | A193-B8M / A320 L7        | 4-8   |

\* Repair kit components

Z91

Z92

Z93

Z94

Z95

Z96



## High Temperature Trunnion Ball 3 Piece - Ordering Code System

"Mandatory option" options are marked with **green background** | "Standard offer" options are marked with **light green background**

|      |   |          |   |   |        |   |        |                      |    |    |               |               |              |           |            |            |                |    |    |                  |    |    |    |     |    |
|------|---|----------|---|---|--------|---|--------|----------------------|----|----|---------------|---------------|--------------|-----------|------------|------------|----------------|----|----|------------------|----|----|----|-----|----|
| 1    | 2 | 3        | 4 | 5 | 6      | 7 | 8      | 9                    | 10 | 11 | 12            | 13            | 14           | 15        | 16         | 17         | 18             | 19 | 20 | 21               | 22 | 23 | 24 | ... | 30 |
| 4    | 0 |          |   | Z | B      | 9 | 4      | P                    | -  | 6  | M             | 6             | D            | I         | V          | G          | /              | 9  | 0  | 0                |    | 0  |    |     |    |
| Size |   | Features |   |   | Series |   | Design | Body & ends material |    |    | Stem material | Ball material | Seat feature | Hardening | Inner Seal | Outer Seal | End Connection |    |    | Special features |    |    |    |     |    |

| Size (1-2) |      |     |
|------------|------|-----|
| Code       | inch | mm  |
| 20*        | 2"   | 50  |
| 30         | 3"   | 80  |
| 40         | 4"   | 100 |
| 60         | 6"   | 150 |
| 80         | 8"   | 200 |
| A0         | 10"  | 250 |
| A2         | 12"  | 300 |

\* Full port only

| Features (3-6) |             |
|----------------|-------------|
| Z              | Metal seats |
| B              | Full port   |

| Series - 3 Piece (7-8) |                  |
|------------------------|------------------|
| 91                     | ASME B16.5 #150  |
| 92                     | ASME B16.5 #300  |
| 93                     | ASME B16.5 #600  |
| 94                     | ASME B16.5 #900  |
| 95                     | ASME B16.5 #1500 |
| 96                     | ASME B16.5 #2500 |

| Design (9) |                                     |
|------------|-------------------------------------|
| W          | -46°C to 200°C<br>(-50°F to 400°F)  |
| P          | -46°C to 327°C<br>(-40°F to 620°F)  |
| T          | -60°C to 538°C<br>(-76°F to 1000°F) |

| Body & ends (11) |                   |
|------------------|-------------------|
| 4*               | C. Steel A105     |
| 6                | S. Steel A479 316 |
| J**              | F22               |

\* -29°C to 425°C  
(-20°F to 800°F)

\*\* For T design only

| Stem (12) |                        |
|-----------|------------------------|
| M         | High Strength S. Steel |
| Z         | Inconel 718            |

| Ball material(13) |                             |
|-------------------|-----------------------------|
| 6                 | S. Steel A182 316           |
| Q                 | ASTM A182 F6A (S.Steel 410) |

| Seat feature (14) |  |
|-------------------|--|
| D                 | Double Piston Effect (DPE)<br>(API 6D DIB-1) |
| S                 | Single Piston Effect (SPE)<br>(API 6D DBB)   |

| Hardening (15) |  |
|----------------|--|
| I              | Cr3C2- Chromium Carbide<br>with Nickel Chrome binder -<br>HVOF technique |
| O              | WC-Co- Tungsten Carbide<br>with Cobalt binder HVO<br>technique           |

| Inner Seal material (16) |  |
|--------------------------|--|
| V                        | Viton (-20°C to 200°C<br>[-4°F to 400°F])  |
| H                        | HNBR (-46°C to 150°C<br>[-50°F to 300°F])  |
| K                        | Kalrez (-20°C to 327°C<br>[-4°F to 620°F]) |
| G                        | Graphite                                   |

| Outer Seal material (17) |          |
|--------------------------|----------|
| G                        | Graphite |

| End connections (19-22) |                     |
|-------------------------|---------------------|
| Flanged                 |                     |
| 150                     | ASME B16.5 #150     |
| 300                     | ASME B16.5 #300     |
| 600                     | ASME B16.5 #600     |
| 900                     | ASME B16.5 #900     |
| 1500                    | ASME B16.5 #1500    |
| 2500                    | ASME B16.5 #2500    |
| PN16                    | DIN EN 1092-1 PN16  |
| PN40                    | DIN EN 1092-1 PN40  |
| PN63                    | DIN EN 1092-1 PN63  |
| PN100                   | DIN EN 1092-1 PN100 |
| PN160                   | DIN EN 1092-1 PN160 |
| PN250                   | DIN EN 1092-1 PN250 |
| PN320                   | DIN EN 1092-1 PN320 |
| PN400                   | DIN EN 1092-1 PN400 |

| Flanged RTJ |                      |
|-------------|----------------------|
| 600RTJ      | ASME B16.5 #600 RTJ  |
| 900RTJ      | ASME B16.5 #900 RTJ  |
| 1500RTJ     | ASME B16.5 #1500 RTJ |
| 2500RTJ     | ASME B16.5 #2500 RTJ |

| Welded |                            |
|--------|----------------------------|
| XBW    | Extended butt weld sch 40  |
| XBW80  | Extended butt weld sch 80  |
| XBW160 | Extended butt weld sch 160 |

| Special features (23-30) |  |
|--------------------------|--|
| L*                       | Seat greasing point                          |
| D**                      | Drain & Vent                                 |
| Blank                    | Drain & vent is capped                       |
| H**                      | Drain ball valve & vent                      |
| PT***                    | Basic paint system                           |
| P1                       | Offshore,<br>Temp Ambient up to 93°C (200°F) |
| P2                       | Offshore, up to 537°C (998°F)                |

\* for 6" up not for -T design

\*\* for 6" up

\*\*\* colors RAL 1018 or 7036  
(other colors upon request)

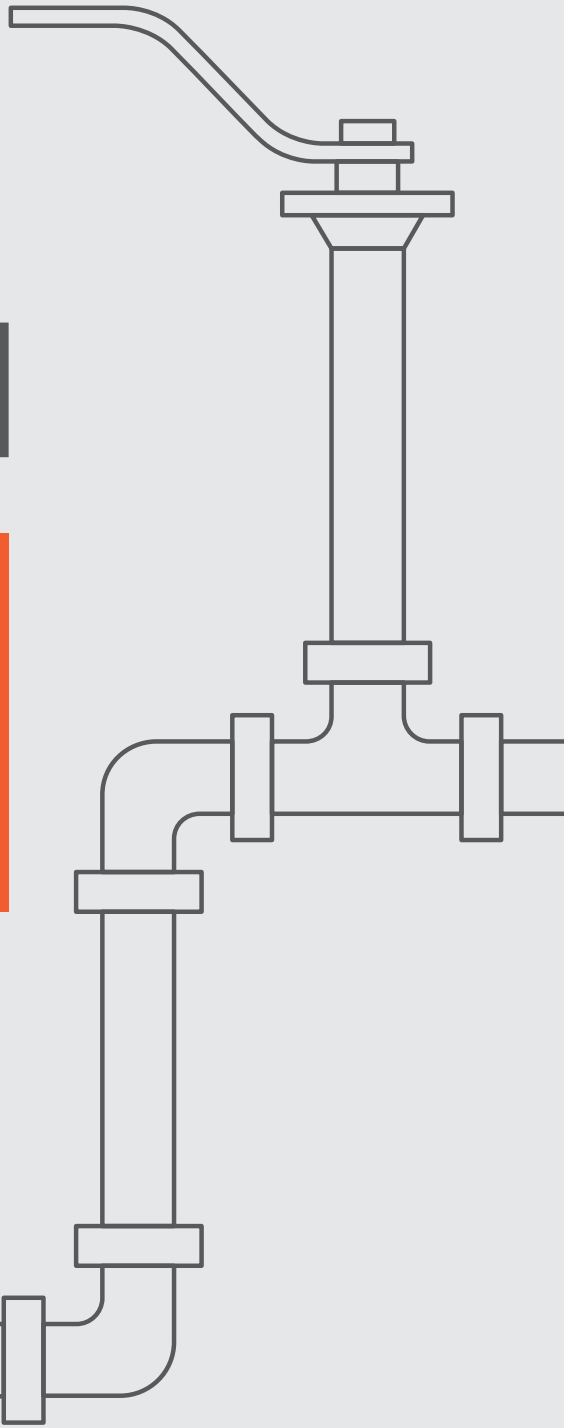
Z81 Z82 Z83



High Temp. Valves

# TRUNNIION

2 PIECE



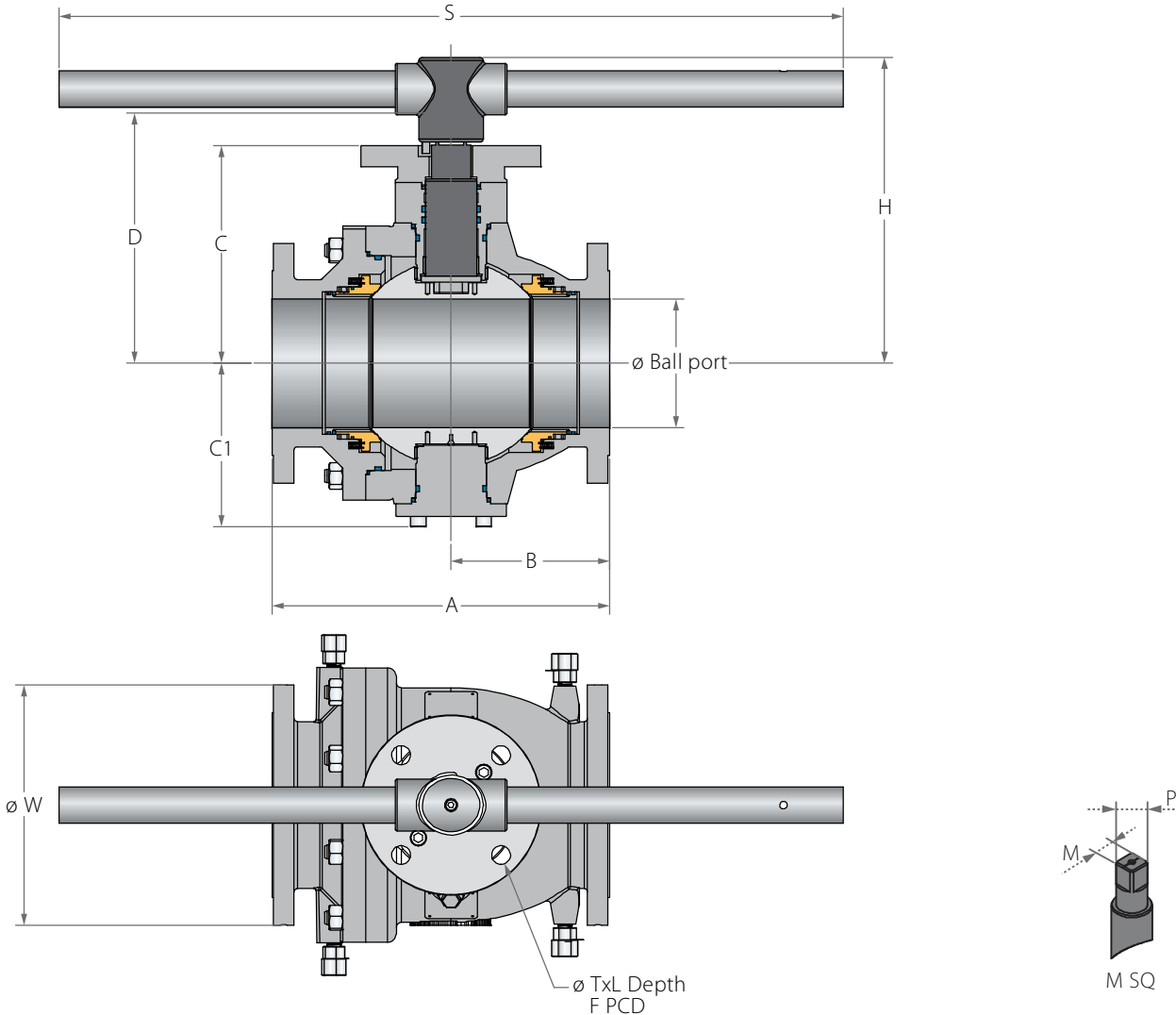
Z81P

Z82P

2"-6" | DN50-DN150 | CLASS 150/300

## High Temperature Trunnion Ball 2 Piece Up to 327°C (620°F)

Valve dimensions

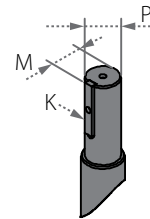
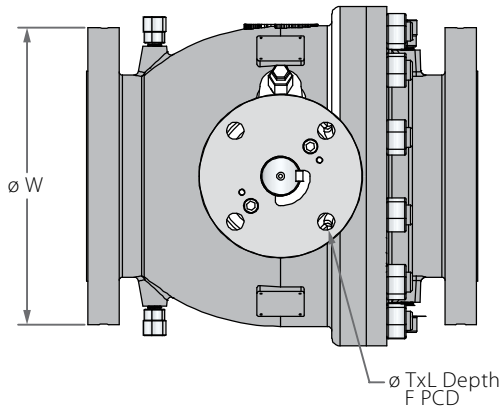
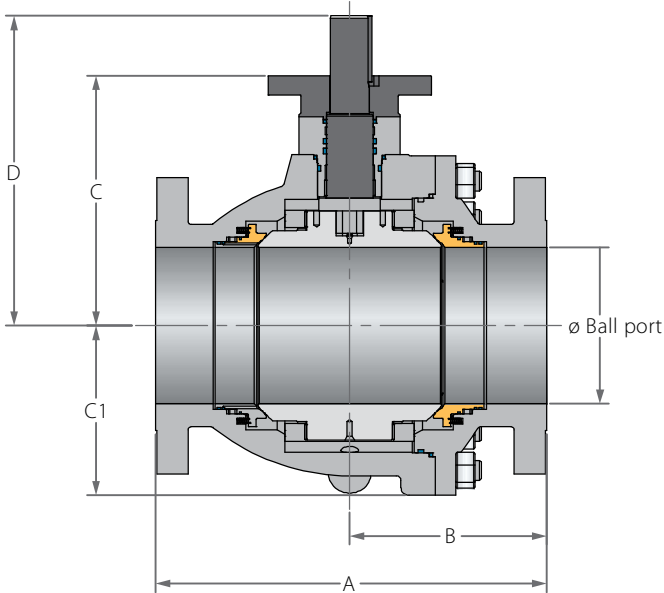


| Full port | Unit | Ball port | A      |        | B      |        | C      | C1     | D      | W      |        | M SQ  | P SQ  | H      | S      | F     | TxL       | Weight kg/ib |     | Kv/Cv |      |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------|-------|-----------|--------------|-----|-------|------|------|
|           |      |           | 150    | 300    | 150    | 300    |        |        |        | 150    | 300    |       |       |        |        |       |           | 150          | 300 | 150   | 300  |      |
| DN50      | mm   | 49.00     | 178.00 | 216.00 | 89.00  | 108.00 | 127.00 | 91.50  | 144.50 | 150.00 | 165.00 | 17.00 | 22.00 | 196.00 | 401.00 | (F10) | 102.00    | 11X15        | 19  | 23    | 400  | 363  |
| 2"        | inch | 1.93      | 7.01   | 8.50   | 3.50   | 4.25   | 5.00   | 3.60   | 5.69   | 5.91   | 6.50   | 0.67  | 0.87  | 7.72   | 15.79  | 4.02  | (4 holes) | 42           | 51  | 463   | 420  |      |
| DN80      | mm   | 74.00     | 203.00 | 283.00 | 101.50 | 128.00 | 148.00 | 117.00 | 172.00 | 190.00 | 210.00 | 22.00 | 32.00 | 223.00 | 610.00 | (F12) | 125.00    | 13X15        | 33  | 44    | 1125 | 952  |
| 3"        | inch | 2.91      | 7.99   | 11.14  | 4.00   | 5.04   | 5.83   | 4.61   | 6.77   | 7.48   | 8.27   | 0.87  | 1.26  | 8.78   | 24.02  | 4.92  | (4 holes) | 73           | 97  | 1300  | 1100 |      |
| DN100     | mm   | 100.00    | 229.00 | 305.00 | 114.50 | 140.50 | 171.00 | 139.00 | 198.50 | 230.00 | 255.00 | 27.00 | 35.00 | 247.50 | 610.00 | (F14) | 140.00    | 18X15        | 49  | 69    | 2154 | 1860 |
| 4"        | inch | 3.94      | 9.02   | 12.00  | 4.51   | 5.53   | 6.73   | 5.47   | 7.81   | 9.06   | 10.04  | 1.06  | 1.38  | 9.74   | 24.02  | 5.51  | (4 holes) | 108          | 152 | 2490  | 2150 |      |
| DN150     | mm   | 150.00    | 394.00 | 403.00 | 185.00 | 230.40 | 254.00 | 191.00 | 290.50 | 280.00 | 320.00 | 36.00 | 46.20 | 356.50 | 916.00 | (F16) | 165.00    | 22X25        | 133 | 166   | 4723 | 4628 |
| 6"        | inch | 5.91      | 15.51  | 15.87  | 7.28   | 9.07   | 10.00  | 7.52   | 11.44  | 11.02  | 12.60  | 1.42  | 1.82  | 14.04  | 36.06  | 6.50  | (4 holes) | 293          | 366 | 5460  | 5350 |      |



## High Temperature Trunnion Ball 2 Piece Up to 327°C (620°F)

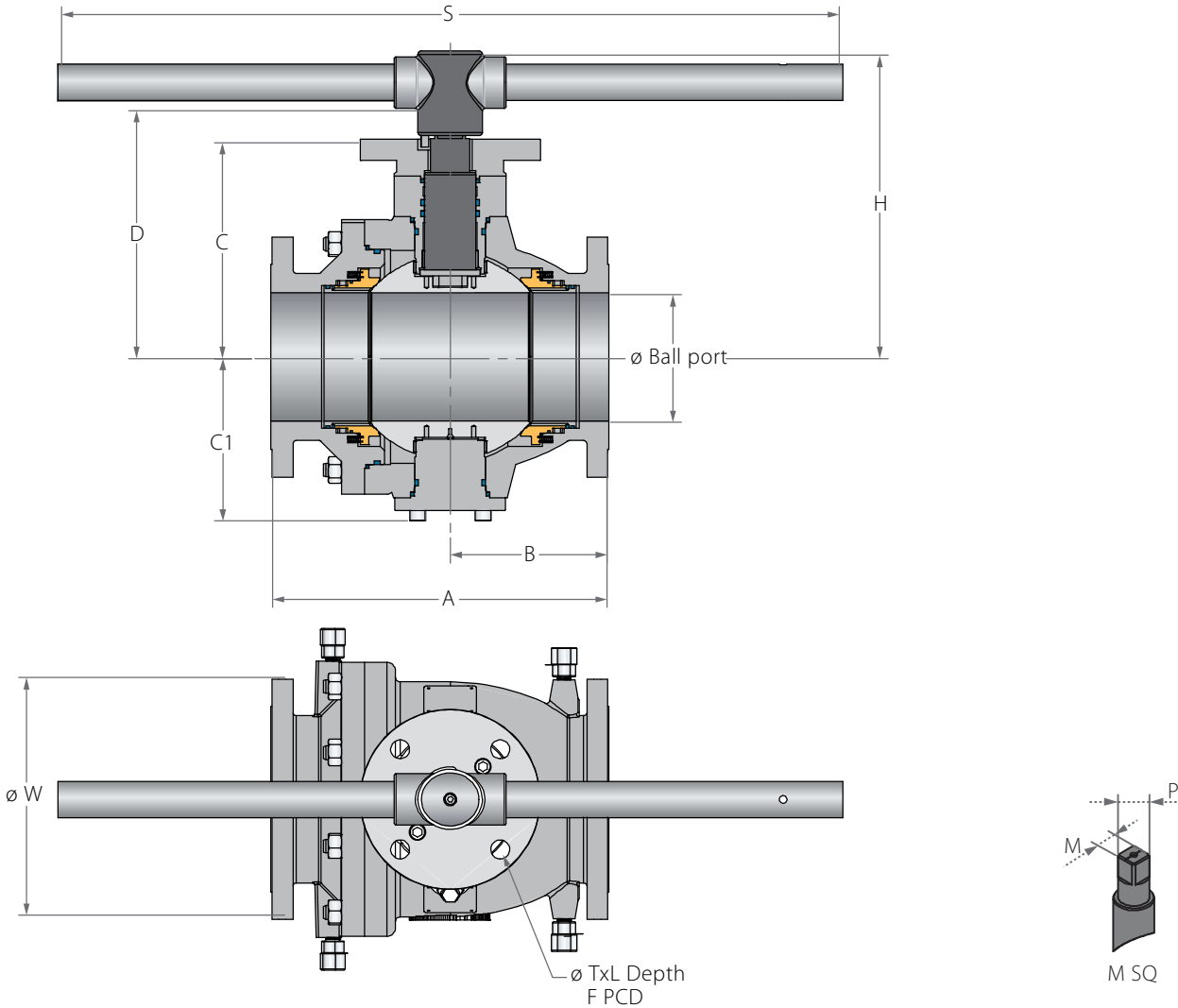
### Valve dimensions



| Full port    | Unit | Ball port | A      |        | B      |        | C      | C1     | D      | W      |        | P     | M     | K     | F     | TxL    | Weight kg/ib |      | Kv/Cv |       |       |
|--------------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|--------------|------|-------|-------|-------|
|              |      |           | 150    | 300    | 150    | 300    |        |        |        | 150    | 300    |       |       |       |       |        | 150          | 300  |       |       |       |
| DN200<br>8"  | mm   | 201.00    | 457.00 | 502.00 | 228.50 | 253.00 | 325.00 | 247.00 | 405.50 | 345.00 | 380.00 | 50.00 | 54.00 | 14.00 | (F16) | 165.00 | 22x25        | 222  | 262   | 9273  | 8737  |
|              | inch | 7.91      | 17.99  | 19.76  | 9.00   | 9.96   | 12.80  | 9.72   | 15.96  | 13.58  | 14.96  | 1.97  | 2.13  | 0.55  |       | 6.50   | (4 holes)    | 489  | 578   | 10720 | 10100 |
| DN250<br>10" | mm   | 252.00    | 533.00 | 568.00 | 270.00 | 287.50 | 353.00 | 297.00 | 430.00 | 405.00 | 445.00 | 50.00 | 54.00 | 14.00 | (F25) | 254.00 | 18x25        | 358  | 424   | 15224 | 14792 |
|              | inch | 9.92      | 20.98  | 22.36  | 10.63  | 11.32  | 13.90  | 11.69  | 16.93  | 15.94  | 17.52  | 1.97  | 2.13  | 0.55  |       | 10.00  | (8 holes)    | 789  | 935   | 17600 | 17100 |
| DN300<br>12" | mm   | 303.00    | 610.00 | 648.00 | 298.00 | 313.00 | 388.00 | 324.00 | 468.50 | 485.00 | 520.00 | 60.00 | 63.50 | 18.00 | (F25) | 254.00 | 18x25        | 527  | 613   | 23096 | 22404 |
|              | inch | 11.93     | 24.02  | 25.51  | 11.73  | 12.32  | 15.28  | 12.76  | 18.44  | 19.09  | 20.47  | 2.36  | 2.50  | 0.71  |       | 10.00  | (8 holes)    | 1162 | 1351  | 26700 | 25900 |

## High Temperature Trunnion Ball 2 Piece Up to 327°C (620°F)

Valve dimensions

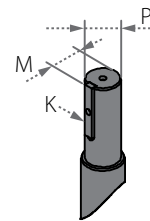
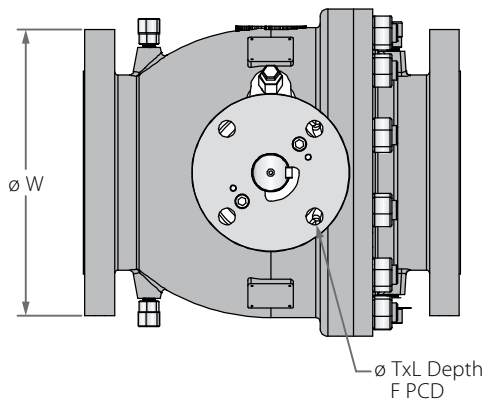
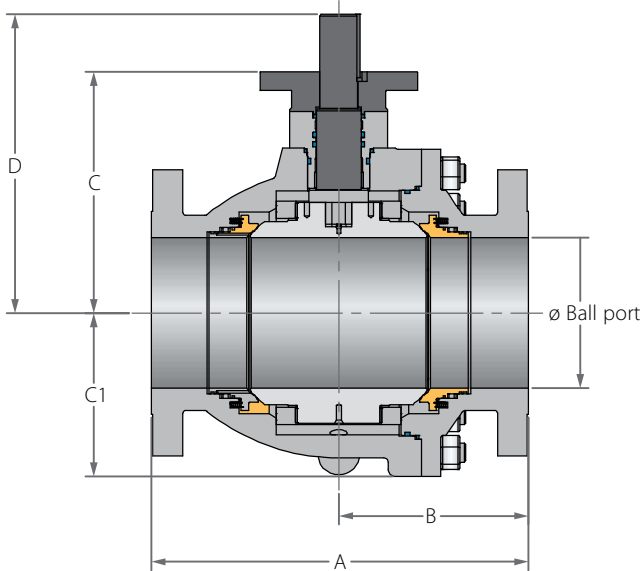


| Full port | Unit | Ball port | A      | B      | C      | C1     | D      | W      | M SQ  | P SQ  | H      | S      | F     | TxL    | Weight kg/ib | Kv/Cv |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------|-------|--------|--------------|-------|------|
| DN50      | mm   | 49.00     | 292.00 | 131.00 | 144.00 | 119.00 | 168.50 | 165.00 | 22.00 | 28.00 | 219.50 | 401.00 | (F12) | 125.00 | 13X15        | 35    | 329  |
| 2"        | inch | 1.93      | 11.50  | 5.16   | 5.67   | 4.69   | 6.63   | 6.50   | 0.87  | 1.10  | 8.64   | 15.79  |       | 4.92   | (4 holes)    | 77    | 380  |
| DN80      | mm   | 74.00     | 356.00 | 161.00 | 191.00 | 160.00 | 215.00 | 210.00 | 22.00 | 28.00 | 266.00 | 610.00 | (F12) | 140.00 | 18X24        | 71    | 874  |
| 3"        | inch | 2.91      | 14.02  | 6.34   | 7.52   | 6.30   | 8.46   | 8.27   | 0.87  | 1.10  | 10.47  | 24.02  |       | 5.51   | (4 holes)    | 157   | 1010 |
| DN100     | mm   | 100.00    | 432.00 | 216.00 | 217.00 | 184.00 | 246.50 | 275.00 | 27.00 | 36.00 | 316.50 | 916.00 | (F16) | 165.00 | 22X25        | 123   | 1557 |
| 4"        | inch | 3.94      | 17.01  | 8.50   | 8.54   | 7.24   | 9.70   | 10.83  | 1.06  | 1.42  | 12.46  | 36.06  |       | 6.50   | (4 holes)    | 271   | 1800 |
| DN150     | mm   | 150.00    | 559.00 | 278.00 | 282.50 | 214.50 | 320.50 | 355.00 | 36.00 | 48.20 | 385.00 | 916.00 | (F16) | 165.00 | 22X25        | 244   | 3893 |
| 6"        | inch | 5.91      | 22.01  | 10.94  | 11.12  | 8.44   | 12.62  | 13.98  | 1.42  | 1.90  | 15.16  | 36.06  |       | 6.50   | (4 holes)    | 538   | 4500 |



## High Temperature Trunnion Ball 2 Piece Up to 327°C (620°F)

### Valve dimensions



| Full port | Unit | Ball port | A      | B      | C      | C1     | D      | W      | P     | M     | K     | F     | TxL    | Weight kg/ib | Kv/Cv |       |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|--------------|-------|-------|
| DN50      | mm   | 201.00    | 660.00 | 330.00 | 312.00 | 263.00 | 409.00 | 420.00 | 72.00 | 76.50 | 20.00 | (F25) | 254.00 | 18x25        | 412   | 7742  |
| 2"        | inch | 7.91      | 25.98  | 12.99  | 12.28  | 10.35  | 16.10  | 16.54  | 2.83  | 3.01  | 0.79  |       | 10.00  | (8 holes)    | 908   | 8950  |
| DN80      | mm   | 252.00    | 787.00 | 400.00 | 374.00 | 310.00 | 471.00 | 510.00 | 72.00 | 76.50 | 20.00 | (F25) | 254.00 | 18x25        | 665   | 12543 |
| 3"        | inch | 9.92      | 30.98  | 15.75  | 14.72  | 12.20  | 18.54  | 20.08  | 2.83  | 3.01  | 0.79  |       | 10.00  | (8 holes)    | 1466  | 14500 |
| DN100     | mm   | 303.00    | 838.00 | 419.00 | 402.00 | 344.00 | 499.00 | 560.00 | 72.00 | 76.50 | 20.00 | (F25) | 254.00 | 18x35        | 804   | 19809 |
| 4"        | inch | 11.93     | 32.99  | 16.50  | 15.83  | 13.54  | 19.65  | 22.05  | 2.83  | 3.01  | 0.79  |       | 10.00  | (8 holes)    | 1772  | 22900 |

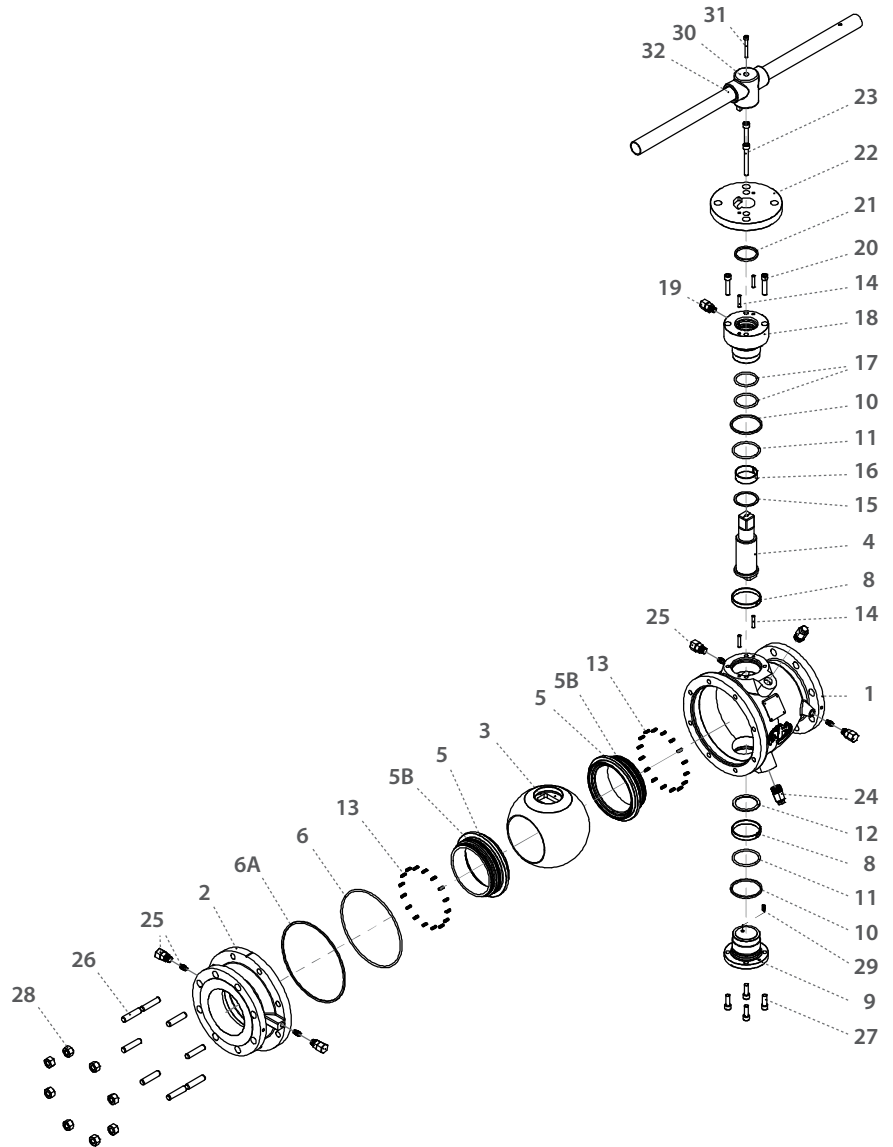
Z81P

Z82P

2"-6"

## High Temperature Trunnion Ball 2 Piece Up to 327°C (620°F)

### Components & materials



| Item | Description                                    | Material Spec. ASTM | Qty.  |
|------|--|---------------------|-------|
| 1    | Body   | Acc. Ordering code  | 1     |
| 2    | Ends   | Acc. Ordering code  | 1     |
| 3    | Ball   | Acc. Ordering code  | 1     |
| 4    | Stem   | Acc. Ordering code  | 1     |
| 5*   | Seat   | Acc. Ordering code  | 2     |
| 5B*  | Seat seal                                      | Viton / HNBR        | 2-4   |
| 6*   | Body inner seal                                | Viton / HNBR        | 1     |
| 6A*  | Body outer seal                                | Graphite            | 1     |
| 8*   | Ball Bearing                                   | S.steel 316 + PTFE  | 2     |
| 9    | External Trunnion                              | S.steel / C.steel   | 1     |
| 10*  | Gland Plate & External trunnion Fire Safe Seal | Graphite            | 2     |
| 11*  | Gland Plate & External trunnion Seal           | Viton / HNBR        | 2     |
| 12*  | Lower thrust washer                            | S.steel 316 + PTFE  | 1     |
| 13   | Seat Spring                                    | Inconel X750        | 28-40 |
| 14   | Gland pin                                      | S.steel / C.steel   | 4     |
| 15*  | Stem Thrust Washer                             | S.steel 316 + PTFE  | 1     |
| 16*  | Gland plate bearing                            | S.steel 316 + PTFE  | 1     |

| Item | Description                       | Material Spec. ASTM          | Qty. |
|------|-----------------------------------|------------------------------|------|
| 17*  | Stem seal                         | Viton / HNBR                 | 2    |
| 18   | Gland Plate                       | S.steel / C.steel            | 1    |
| 19   | Stem grease fitting               | S.steel                      | 1    |
| 20   | Lower gland bolts                 | A193-B8M / A320 L7           | 4    |
| 21*  | Stem fire safe seal               | Graphite                     | 1    |
| 22   | Iso plate                         | S.steel / C.steel            | 1    |
| 23   | Upper gland bolts                 | A193-B8M / A320 L7           | 4    |
| 24   | Plug valve                        | S.steel                      | 2    |
| 25** | Seat grease fitting + check valve | S.steel                      | 4    |
| 26   | Body studs                        | A193-B8M / A320 L7           | 8-12 |
| 27   | External trunnion bolts           | A193-B8M / A320 L7           | 4    |
| 28   | Body nuts                         | A194-8M / A194 L7            | 8-12 |
| 29   | Antistatic spring                 | Inconel X750                 | 1    |
| 30   | Wrench head                       | S.steel / C.steel            | 1    |
| 31   | Wrench bolt                       | S.steel / C.steel            | 1    |
| 32   | Pipe handle                       | S.steel / C.steel Zink plate | 1    |

\* Repair kit components

\*\* Available from 6" size only



Z81P

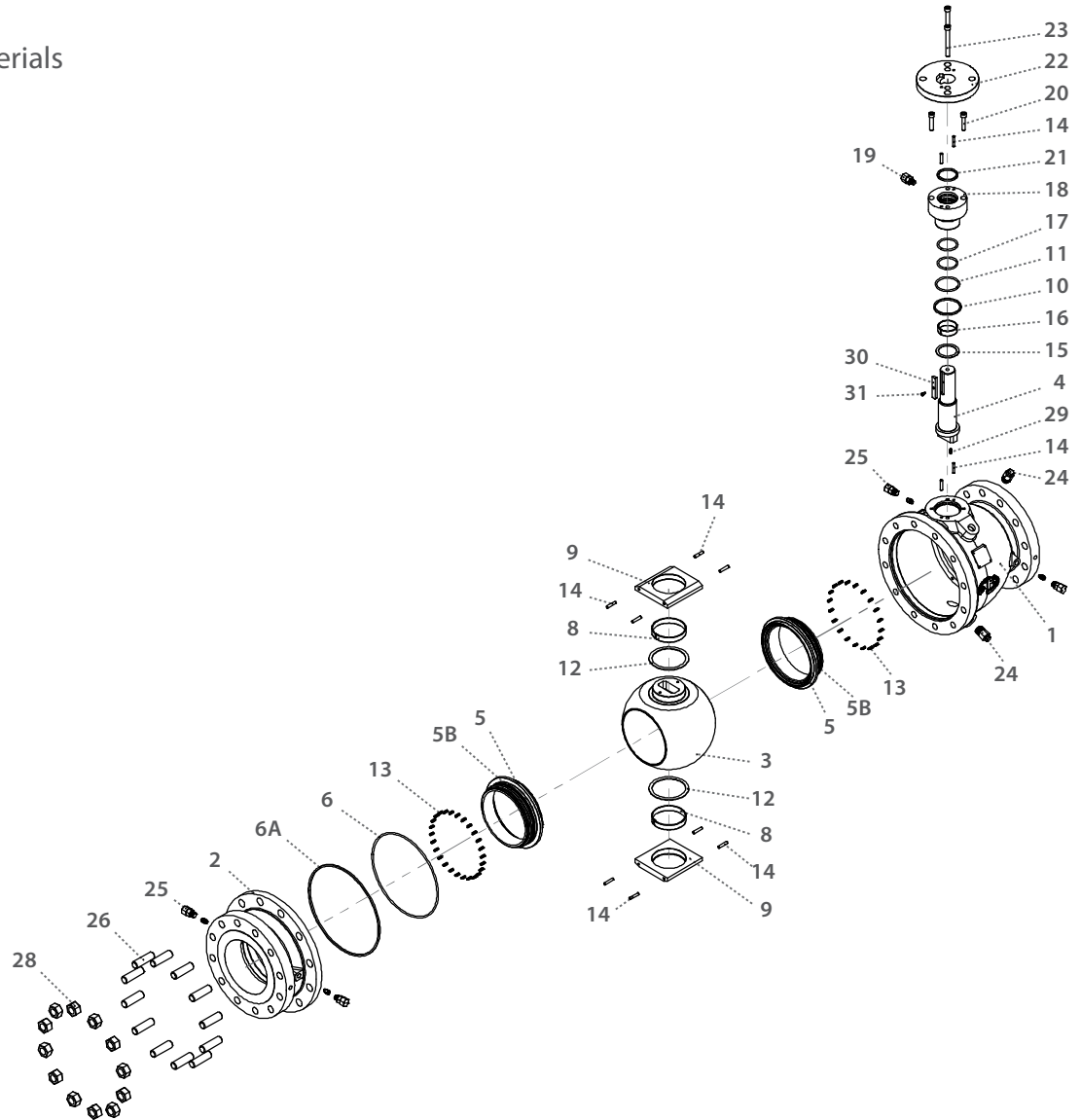
Z82P

8"-12"



## High Temperature Trunnion Ball 2 Piece Up to 327°C (620°F)

### Components & materials



| Item | Description                                    | Material Spec. ASTM | Qty.  |
|------|--|---------------------|-------|
| 1    | Body   | Acc. Ordering code  | 1     |
| 2    | Ends   | Acc. Ordering code  | 1     |
| 3    | Ball   | Acc. Ordering code  | 1     |
| 4    | Stem   | Acc. Ordering code  | 1     |
| 5*   | Seat   | Acc. Ordering code  | 2     |
| 5B*  | Seat seal                                      | Viton / HNBR        | 2     |
| 6*   | Body inner seal                                | Viton / HNBR        | 2     |
| 6A*  | Body outer seal                                | Graphite            | 2     |
| 8*   | Ball bearing                                   | S.steel 316 + PTFE  | 2     |
| 9    | Trunnion plate                                 | S.steel / C.steel   | 2     |
| 10*  | Gland plate & External Trunnion Fire Safe Seal | Graphite            | 1     |
| 11*  | Gland Plate & External Trunnion Seal           | Viton / HNBR        | 1     |
| 12*  | Ball thrust washer                             | S.steel 316 + PTFE  | 2     |
| 13   | Seat Spring                                    | Inconel X750        | 52-60 |
| 14   | Gland pin                                      | S.steel / C.steel   | 12    |
| 15*  | Stem Thrust Washer                             | S.steel 316 + PTFE  | 1     |

| Item | Description                        | Material Spec. ASTM | Qty. |
|------|------------------------------------|---------------------|------|
| 16*  | Stem Bearing                       | S.steel 316 + PTFE  | 1    |
| 17*  | Stem seal                          | Viton / HNBR        | 2    |
| 18   | Gland Plate                        | S.steel / C.steel   | 1    |
| 19   | Stem grease fitting                | S.steel             | 1    |
| 20   | Lower gland bolts                  | A193-B8M / A320 L7  | 6    |
| 21*  | Stem fire safe seal                | Graphite            | 1    |
| 22   | Iso plate                          | S.steel / C.steel   | 1    |
| 23   | Upper gland bolts                  | A193-B8M / A320 L7  | 6    |
| 24   | Plug valve                         | S.steel             | 2    |
| 25   | Seat grease fitting + check valve" | S.steel             | 4    |
| 26   | Body studs                         | A193-B8M / A320 L7  | 8-16 |
| 28   | Body nuts                          | A194-8M / A194 L7   | 8-16 |
| 29   | Antistatic spring                  | Inconel X750        | 1    |
| 30   | Stem key                           | S.steel / C.steel   | 1    |
| 31   | Stem key bolt                      | S.steel / C.steel   | 1    |

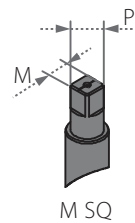
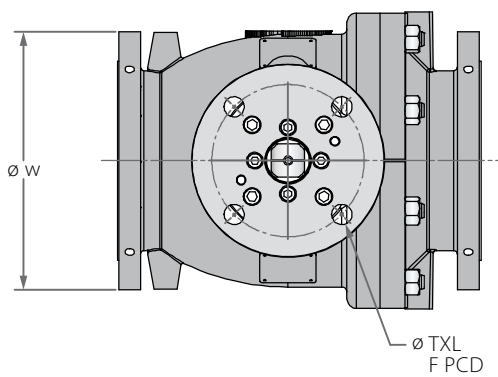
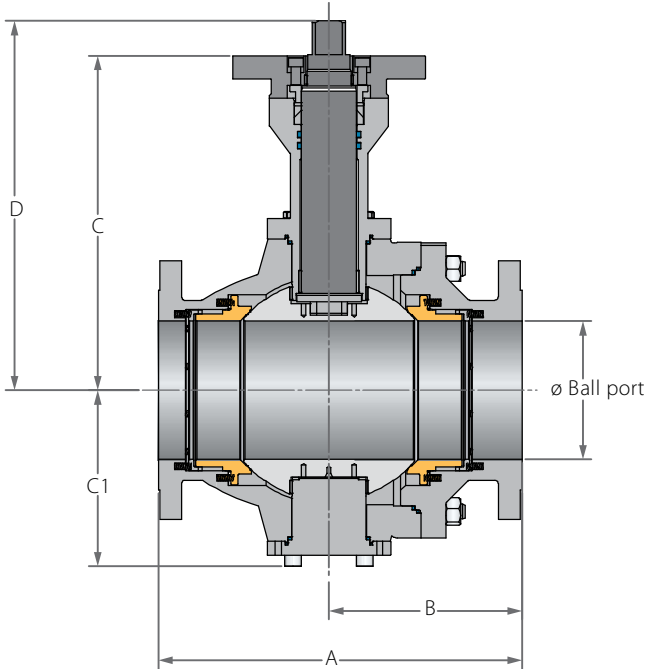
\* Repair kit components

**Z81T****Z82T**

2"-6" | DN50-DN150 | CLASS 150/300

## High Temperature Trunnion Ball 2 Piece Up to 538°C (1000°F)

### Valve dimensions



| Full port | Unit | Ball port | A      |        | B      |        | C      | C1     | D      | W      |        | M SQ  | P SQ  | F     | TxL    | Weight kg/ib |     | Kv/Cv |      |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|--------|--------------|-----|-------|------|------|
|           |      |           | 150    | 300    | 150    | 300    |        |        |        | 150    | 300    |       |       |       |        | 150          | 300 | 150   | 300  |      |
| DN50      | mm   | 49.00     | 178.00 | 216.00 | 89.00  | 113.50 | 250.00 | 94.00  | 269.00 | 150.00 | 165.00 | 16.90 | 21.30 | (F10) | 102.00 | M10X15       | 22  | 25    | 400  | 363  |
| 2"        | inch | 1.93      | 7.01   | 8.50   | 3.50   | 4.47   | 9.84   | 3.70   | 10.59  | 5.91   | 6.50   | 0.67  | 0.84  |       | 4.02   | (4 holes)    | 49  | 55    | 463  | 420  |
| DN80      | mm   | 74.00     | 203.00 | 283.00 | 101.50 | 154.00 | 277.00 | 117.00 | 301.00 | 190.00 | 210.00 | 21.90 | 26.90 | (F12) | 125.00 | M12X15       | 40  | 51    | 1125 | 952  |
| 3"        | inch | 2.91      | 7.99   | 11.14  | 4.00   | 6.06   | 10.91  | 4.61   | 11.85  | 7.48   | 8.27   | 0.86  | 1.06  |       | 4.92   | (4 holes)    | 88  | 112   | 1300 | 1100 |
| DN100     | mm   | 100.00    | 229.00 | 305.00 | 114.50 | 164.50 | 293.00 | 139.00 | 322.00 | 230.00 | 255.00 | 26.90 | 34.90 | (F14) | 140.00 | M16X15       | 61  | 73    | 2154 | 1860 |
| 4"        | inch | 3.94      | 9.02   | 12.00  | 4.51   | 6.48   | 11.54  | 5.47   | 12.68  | 9.06   | 10.04  | 1.06  | 1.37  |       | 5.51   | (4 holes)    | 134 | 161   | 2490 | 2150 |
| DN150     | mm   | 150.00    | 394.00 | 403.00 | 209.10 | 207.60 | 362.00 | 191.00 | 400.00 | 280.00 | 320.00 | 35.90 | 46.20 | (F16) | 165.00 | M22X25       | 133 | 145   | 4723 | 4628 |
| 6"        | inch | 5.91      | 15.51  | 15.87  | 8.23   | 8.17   | 14.25  | 7.52   | 15.75  | 11.02  | 12.60  | 1.41  | 1.82  |       | 6.50   | (4 holes)    | 293 | 320   | 5460 | 5350 |

Z81T

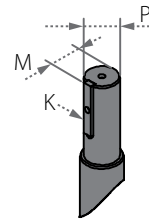
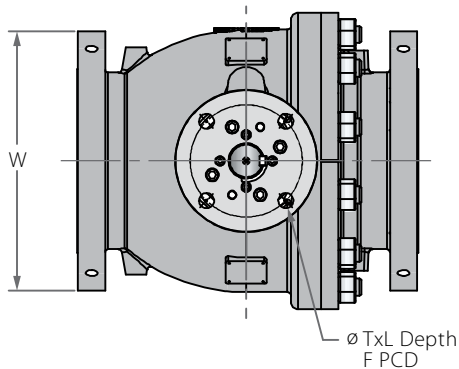
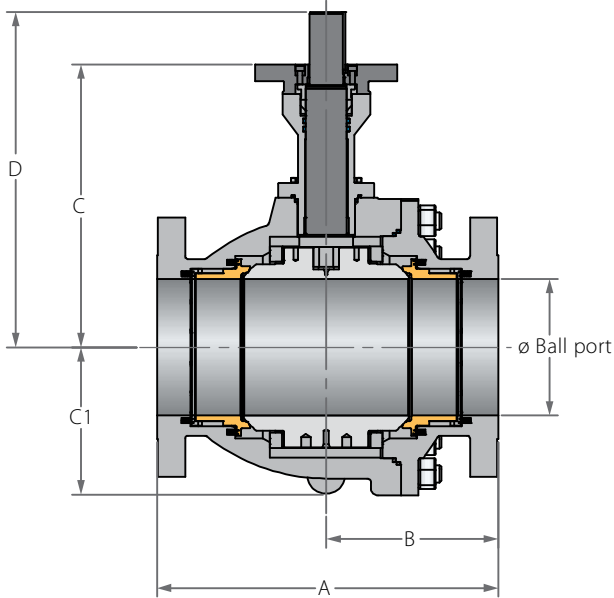
Z82T

8"-12" | DN200-DN300 | CLASS 150/300



## High Temperature Trunnion Ball 2 Piece Up to 538°C (1000°F)

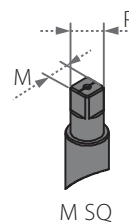
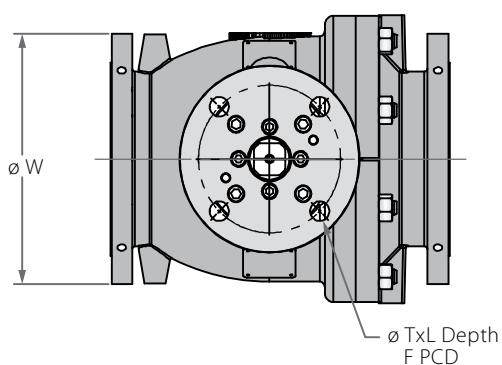
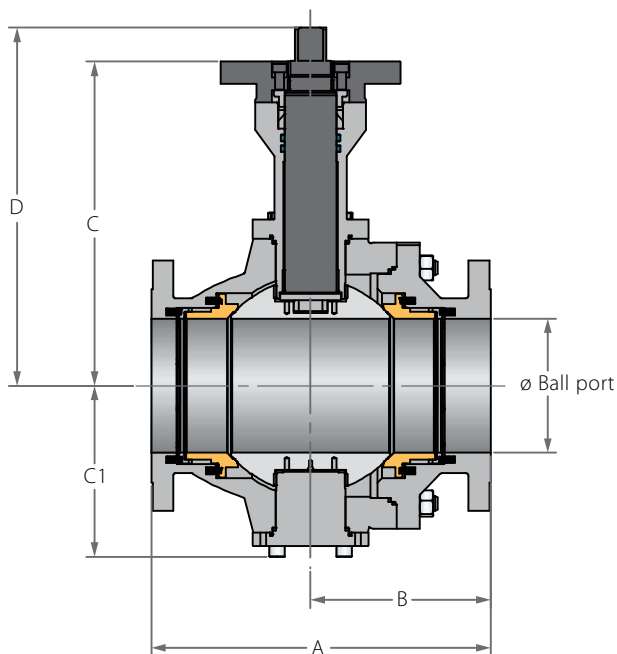
### Valve dimensions



| Full port    | Unit | Ball port | A      |        | B      |        | C      | C1     | D      | W      |        | P     | M     | K     | F     | TxL    | Weight kg/ib |      | Kv/Cv |       |       |
|--------------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|--------------|------|-------|-------|-------|
|              |      |           | 150    | 300    | 150    | 300    |        |        |        | 150    | 300    |       |       |       |       |        | 150          | 300  | 150   | 300   |       |
| DN200<br>8"  | mm   | 201.00    | 457.00 | 502.00 | 228.50 | 253.00 | 416.00 | 215.00 | 493.00 | 345.00 | 380.00 | 50.00 | 54.00 | 14.00 | (F16) | 165.00 | 22x25        | 250  | 288   | 9273  | 8737  |
|              | inch | 7.91      | 17.99  | 19.76  | 9.00   | 9.96   | 16.38  | 8.46   | 19.41  | 13.58  | 14.96  | 1.97  | 2.13  | 0.55  |       | 6.50   | (4 holes)    | 551  | 635   | 10720 | 10100 |
| DN250<br>10" | mm   | 252.00    | 533.00 | 568.00 | 270.00 | 287.50 | 504.00 | 260.00 | 581.00 | 405.00 | 445.00 | 50.00 | 54.00 | 14.00 | (F25) | 254.00 | 18x25        | 405  | 475   | 15224 | 14792 |
|              | inch | 9.92      | 20.98  | 22.36  | 10.63  | 11.32  | 19.84  | 10.24  | 22.87  | 15.94  | 17.52  | 1.97  | 2.13  | 0.55  |       | 10.00  | (8 holes)    | 893  | 1047  | 17600 | 17100 |
| DN300<br>12" | mm   | 303.00    | 610.00 | 648.00 | 298.00 | 313.00 | 590.00 | 300.00 | 671.00 | 485.00 | 520.00 | 60.00 | 63.50 | 18.00 | (F25) | 254.00 | 18x25        | 595  | 672   | 23096 | 22404 |
|              | inch | 11.93     | 24.02  | 25.51  | 11.73  | 12.32  | 23.23  | 11.81  | 26.42  | 19.09  | 20.47  | 2.36  | 2.50  | 0.71  |       | 10.00  | (8 holes)    | 1312 | 1481  | 26700 | 25900 |

## High Temperature Trunnion Ball 2 Piece Up to 538°C (1000°F)

### Valve dimensions

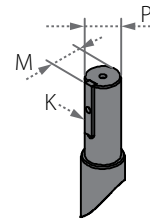
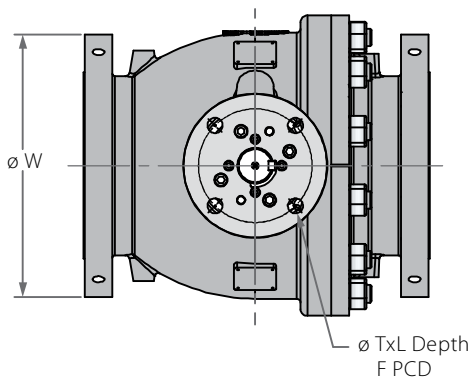
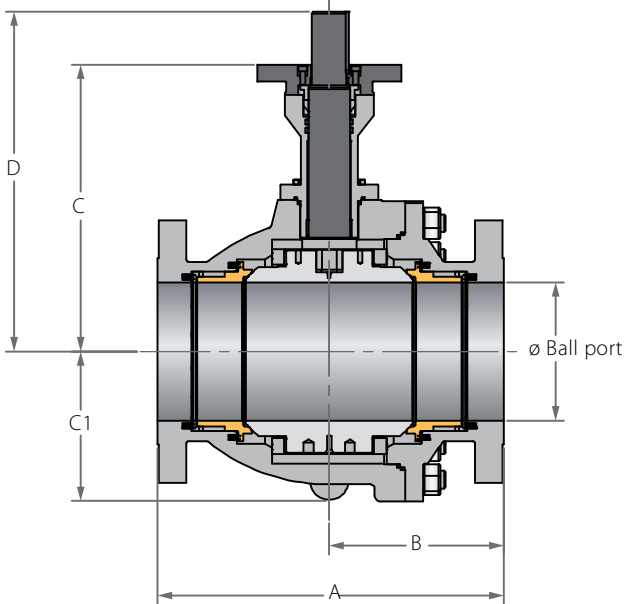


| Full port | Unit | Ball port | A      | B      | C      | C1     | D      | W      | M SQ  | P SQ  | F     | TxL    | Weight kg/ib        | Kv/Cv |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|-------|-------|-------|--------|---------------------|-------|------|
| DN50      | mm   | 49.00     | 292.00 | 131.00 | 272.00 | 119.00 | 291.00 | 165.00 | 16.90 | 21.30 | (F12) | 125.00 | M12X15<br>(4 holes) | 41    | 329  |
| 2"        | inch | 1.93      | 11.50  | 5.16   | 10.71  | 4.69   | 11.46  | 6.50   | 0.67  | 0.84  |       | 4.92   |                     | 90    | 380  |
| DN80      | mm   | 74.00     | 356.00 | 161.00 | 306.00 | 160.00 | 330.00 | 210.00 | 21.90 | 26.90 | (F12) | 125.00 | M12X15<br>(4 holes) | 76    | 874  |
| 3"        | inch | 2.91      | 14.02  | 6.34   | 12.05  | 6.30   | 12.99  | 8.27   | 0.86  | 1.06  |       | 4.92   |                     | 168   | 1010 |
| DN100     | mm   | 100.00    | 432.00 | 216.00 | 334.00 | 184.00 | 364.00 | 275.00 | 26.90 | 34.90 | (F16) | 165.00 | M22X25<br>(4 holes) | 132   | 1557 |
| 4"        | inch | 3.94      | 17.01  | 8.50   | 13.15  | 7.24   | 14.33  | 10.83  | 1.06  | 1.37  |       | 6.50   |                     | 291   | 1800 |
| DN150     | mm   | 150.00    | 559.00 | 278.00 | 386.00 | 220.00 | 424.00 | 355.00 | 35.90 | 46.20 | (F16) | 165.00 | M22X25<br>(4 holes) | 340   | 3893 |
| 6"        | inch | 5.91      | 22.01  | 10.94  | 15.20  | 8.66   | 16.69  | 13.98  | 1.41  | 1.82  |       | 6.50   |                     | 750   | 4500 |



## High Temperature Trunnion Ball 2 Piece Up to 538°C (1000°F)

### Valve dimensions



| Full port | Unit | Ball port | A      | B      | C      | C1     | D      | W      | P     | M     | K     | F     | TxL    | Weight kg/ib       | Kv/Cv |       |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--------|--------------------|-------|-------|
| DN50      | mm   | 201.00    | 660.00 | 330.00 | 418.00 | 263.00 | 515.00 | 420.00 | 72.00 | 76.50 | 20.00 | (F25) | 254.00 | 18x25<br>(8 holes) | 460   | 7742  |
| 2"        | inch | 7.91      | 25.98  | 12.99  | 16.46  | 10.35  | 20.28  | 16.54  | 2.83  | 3.01  | 0.79  |       | 10.00  |                    | 1014  | 8950  |
| DN80      | mm   | 252.00    | 787.00 | 400.00 | 519.00 | 310.00 | 616.00 | 510.00 | 72.00 | 76.50 | 20.00 | (F30) | 298.00 | 22x30<br>(8 holes) | 704   | 12543 |
| 3"        | inch | 9.92      | 30.98  | 15.75  | 20.43  | 12.20  | 24.25  | 20.08  | 2.83  | 3.01  | 0.79  |       | 11.73  |                    | 1552  | 14500 |
| DN100     | mm   | 303.00    | 838.00 | 419.00 | 598.00 | 344.00 | 695.00 | 560.00 | 72.00 | 76.50 | 20.00 | (F30) | 298.00 | 22x30<br>(8 holes) | 890   | 19809 |
| 4"        | inch | 11.93     | 32.99  | 16.50  | 23.54  | 13.54  | 27.36  | 22.05  | 2.83  | 3.01  | 0.79  |       |        |                    | 1962  | 22900 |

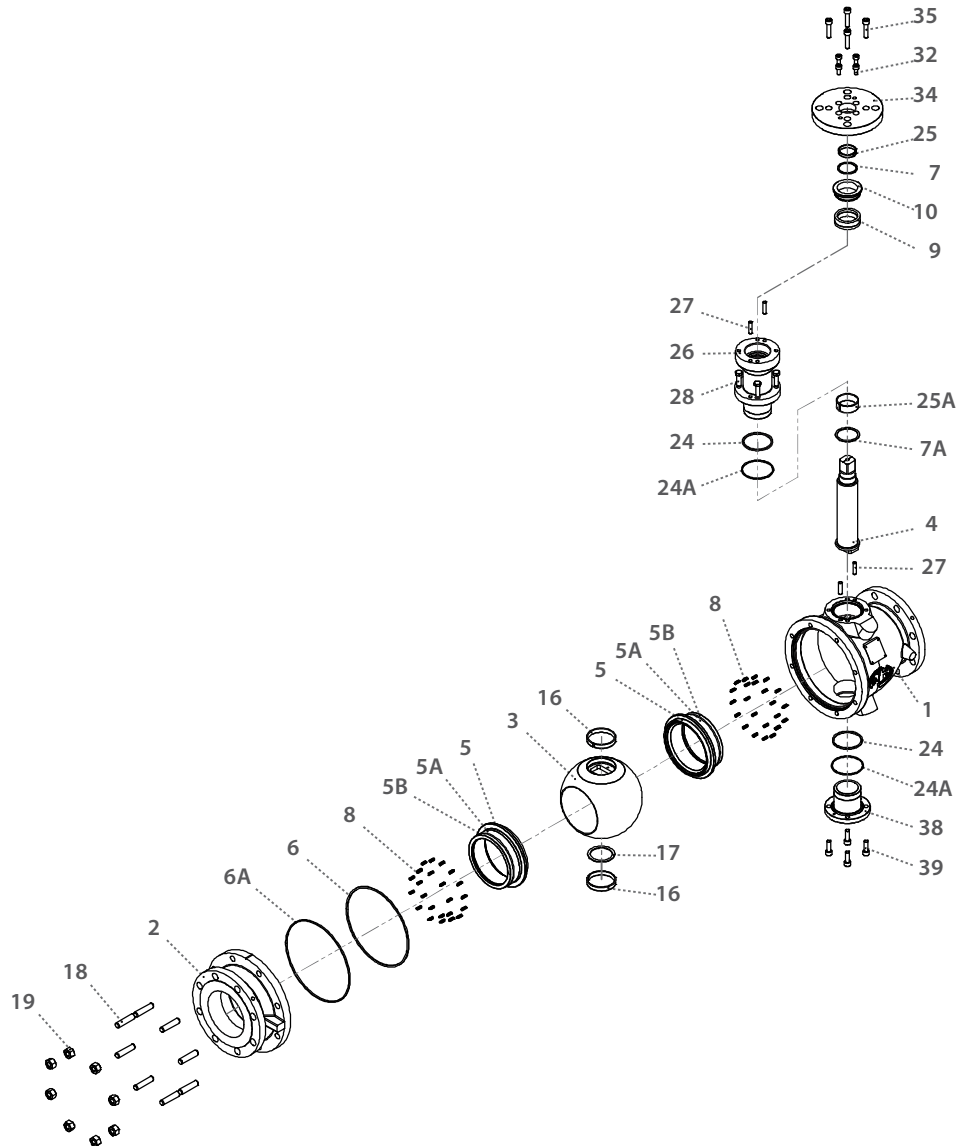
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Z82T

2"-6"

## High Temperature Trunnion Ball 2 Piece Up to 538°C (1000°F)

### Components & materials



| Item | Description       | Material Spec. ASTM       | Qty.  |
|------|-------------------|---------------------------|-------|
| 1    | Body              | Acc. Ordering Code        | 1     |
| 2    | End               | Acc. Ordering Code        | 1     |
| 3    | Ball              | Acc. Ordering Code        | 1     |
| 4    | Stem              | Acc. Ordering Code        | 1     |
| 5*   | Seat              | Acc. Ordering Code        | 2     |
| 5A*  | Seat seal         | Graphite                  | 2     |
| 5B*  | Seat ring         | Acc. Ordering Code        | 2     |
| 6*   | Body inner seal   | Graphite                  | 1     |
| 6A*  | 00-91-60-239      | Graphite                  | 1     |
| 7    | Upper thrust seal | S.steel 316 / Inconel 625 | 1     |
| 7A   | Lower thrust seal | S.steel 316 / Inconel 625 | 1     |
| 8    | Seat Spring       | Inconel X750              | 16-48 |
| 9*   | Stem seal         | Graphite                  | 1     |
| 10   | Follower          | S.steel                   | 1     |
| 16   | Ball bearing      | S.steel 316 / Inconel 625 | 2     |
| 17   | Ball thrust seal  | S.steel 316 / Inconel 625 | 1     |

| Item | Description             | Material Spec. ASTM       | Qty. |
|------|-------------------------|---------------------------|------|
| 18   | Body stud               | A193-B8M / A320 L7        | 4-12 |
| 19   | Body nuts               | A194 8M / A194 L7         | 4-12 |
| 24*  | Bonnet inner seal       | Graphite                  | 2    |
| 24A* | 48G-20-139              | Graphite                  | 2    |
| 25   | Upper stem bearing      | S.steel 316 / Inconel 625 | 1    |
| 25A  | Lower stem bearing      | S.steel 316 / Inconel 625 | 1    |
| 26   | Bonnet                  | S. steel / C. steel       | 1    |
| 27   | Bonnet pin              | S. steel / C. steel       | 4    |
| 28   | Bonnet bolts            | A193-B8M / A320 L7        | 4-8  |
| 32   | Follower drive bolts    | A193-B8M / A320 L7        | 4-8  |
| 34   | Iso plate               | S. steel / C. steel       | 1    |
| 35   | Iso plate bolts         | A193-B8M / A320 L7        | 4-8  |
| 38   | External trunnion       | S. steel / C. steel       | 1    |
| 39   | External trunnion bolts | A193-B8M / A320 L7        | 4-8  |

\* Repair kit components

Z81T

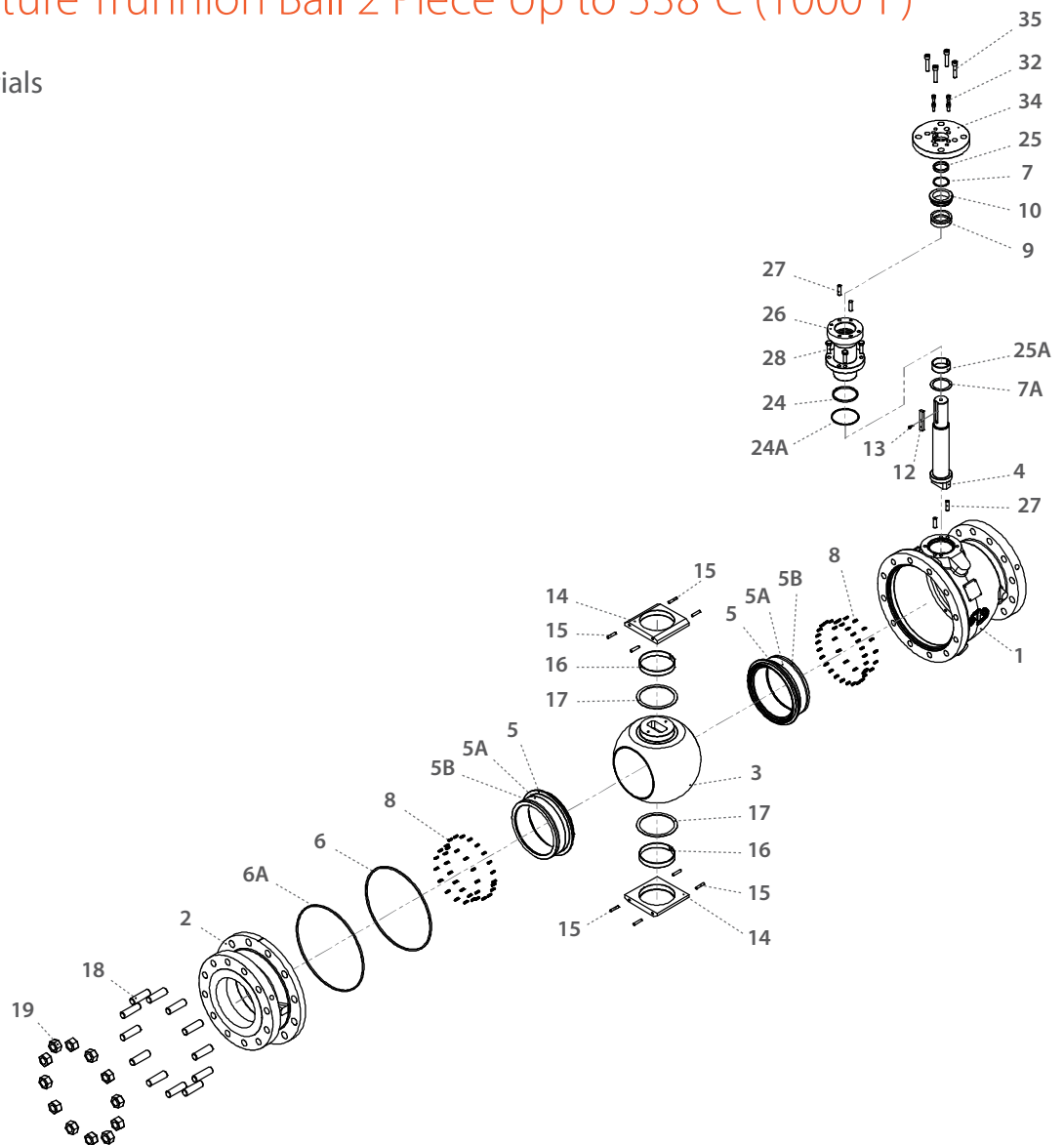
Z82T

8"-12"



## High Temperature Trunnion Ball 2 Piece Up to 538°C (1000°F)

### Components & materials



| Item | Description       | Material Spec. ASTM       | Qty.  |
|------|-------------------|---------------------------|-------|
| 1    | Body              | Acc. Ordering code        | 1     |
| 2    | End               | Acc. Ordering code        | 1     |
| 3    | Ball              | Acc. Ordering code        | 1     |
| 4    | Stem              | Acc. Ordering code        | 1     |
| 5*   | Seat              | Acc. Ordering code        | 2     |
| 5A*  | Seat seal         | Graphite                  | 2     |
| 5B*  | Seat ring         | Acc. Ordering code        | 2     |
| 6*   | Body inner seal   | Graphite                  | 1     |
| 6A*  | Body outer seal   | Graphite                  | 1     |
| 7    | Upper thrust seal | S.steel 316 / Inconel 625 | 1     |
| 7A   | Lower thrust seal | S.steel 316 / Inconel 625 | 1     |
| 8    | Seat Spring       | Inconel X750              | 68-76 |
| 9*   | Stem seal         | Graphite                  | 1     |
| 10   | Follower          | S.steel                   | 1     |
| 12   | Stem key          | S.steel / C.steel         | 1     |
| 13   | Stem key bolt     | S.steel / C.steel         | 1     |
| 14   | Trunnion plate    | S.steel / C.steel         | 2     |

| Item | Description          | Material Spec. ASTM       | Qty. |
|------|----------------------|---------------------------|------|
| 15   | Trunnion plate pin   | S.steel / C.steel         | 8    |
| 16   | Ball bearing         | S.steel 316 / Inconel 625 | 2    |
| 17   | Ball thrust washer   | S.steel 316 / Inconel 625 | 2    |
| 18   | Body stud            | A193-B8M / A320 L7        | 8-20 |
| 19   | Body nuts            | A194 8M / A194 L7         | 8-20 |
| 24*  | Bonnet inner seal    | Graphite                  | 1    |
| 24A* | Bonnet outer seal    | Graphite                  | 1    |
| 25   | Upper stem bearing   | S.steel 316 / Inconel 625 | 1    |
| 25A  | Lower stem bearing   | S.steel 316 / Inconel 625 | 1    |
| 26   | Bonnet               | S.steel / C.steel         | 1    |
| 27   | Bonnet pin           | S.steel / C.steel         | 4    |
| 28   | Bonnet bolts         | A193-B8M / A320 L7        | 4-8  |
| 32   | Follower drive bolts | A193-B8M / A320 L7        | 4-8  |
| 34   | Iso plate            | S.steel / C.steel         | 1    |
| 35   | Iso plate bolts      | A193-B8M / A320 L7        | 4-8  |

\* Repair kit components

Z81

Z82

Z83



## High Temperature Trunnion Ball 2 Piece - Ordering Code System

"Mandatory option" options are marked with **green background** | "Standard offer" options are marked with **light green background**

|      |   |          |   |   |        |   |        |                      |    |    |               |               |              |           |            |            |                |    |    |                  |    |    |    |     |    |  |
|------|---|----------|---|---|--------|---|--------|----------------------|----|----|---------------|---------------|--------------|-----------|------------|------------|----------------|----|----|------------------|----|----|----|-----|----|--|
| 1    | 2 | 3        | 4 | 5 | 6      | 7 | 8      | 9                    | 10 | 11 | 12            | 13            | 14           | 15        | 16         | 17         | 18             | 19 | 20 | 21               | 22 | 23 | 24 | ... | 30 |  |
| 4    | 0 |          |   | Z | B      | 8 | 1      | P                    | -  | 6  | M             | 6             | D            | I         | V          | G          | /              | 1  | 5  | 0                |    |    |    |     |    |  |
| Size |   | Features |   |   | Series |   | Design | Body & ends material |    |    | Stem material | Ball material | Seat feature | Hardening | Inner Seal | Outer Seal | End Connection |    |    | Special features |    |    |    |     |    |  |

| Size (1-2) |      |     |
|------------|------|-----|
| Code       | inch | mm  |
| 20         | 2"   | 50  |
| 30         | 3"   | 80  |
| 40         | 4"   | 100 |
| 60         | 6"   | 150 |
| 80         | 8"   | 200 |
| A0         | 10"  | 250 |
| A2         | 12"  | 300 |

| Features (3-6) |             |
|----------------|-------------|
| Z              | Metal seats |
| B              | Full port   |

| Series - 2 Piece Cast (7-8) |                            |
|-----------------------------|----------------------------|
| 81                          | ASME B16.5 #150 Flanged RF |
| 82                          | ASME B16.5 #300 Flanged RF |
| 83                          | ASME B16.5 #600 Flanged RF |

| Design (9) |                                     |
|------------|-------------------------------------|
| W          | -46°C to 200°C<br>(-50°F to 400°F)  |
| P          | -46°C to 327°C<br>(-40°F to 620°F)  |
| T          | -60°C to 538°C<br>(-76°F to 1000°F) |

| Body & ends material (11) |                    |
|---------------------------|--------------------|
| 4*                        | C. Steel A216 WCB  |
| 6                         | S. Steel A351 CF8M |

\* Up to 425°C (800°F)

| Stem (12) |                        |
|-----------|------------------------|
| M         | High Strength S. Steel |
| Z         | Inconel 718            |

| Ball material (13) |                             |
|--------------------|-----------------------------|
| 6                  | S. Steel A182 316           |
| Q                  | ASTM A182 F6A (S.Steel 410) |

| Seat feature (14) |  |
|-------------------|--|
| D                 | Double Piston Effect (DPE)<br>(API 6D DIB-1) |
| S                 | Single Piston Effect (SPE)<br>(API 6D DBB)   |
| C                 | DPE & SPE combination<br>(API 6D DIB-2)      |

| Hardening (15) |  |
|----------------|--|
| I              | Cr3C2- Chromium Carbide<br>with Nickel Chrome binder -<br>HVOF technique |
| O              | WC-Co- Tungsten Carbide<br>with Cobalt binder HVO<br>technique           |

| Inner Seal (16) |  |
|-----------------|--|
| V               | Viton (-20°C to 200°C<br>[-4°F to 400°F])  |
| H               | HNBR (-46°C to 150°C<br>[-50°F to 300°F])  |
| K               | Kalrez (-20°C to 327°C<br>[-4°F to 620°F]) |
| G               | Graphite                                   |

| Outer Seal (17) |          |
|-----------------|----------|
| G               | Graphite |

| End connections (19-22) |                 |
|-------------------------|-----------------|
| Flanged                 |                 |
| 150                     | ASME B16.5 #150 |
| 300                     | ASME B16.5 #300 |
| 600                     | ASME B16.5 #600 |

| Special features (23-30) |  |
|--------------------------|--|
| L*                       | Seat greasing point                          |
| D**                      | Drain & Vent                                 |
| Blank                    | Drain & vent is capped                       |
| H**                      | Drain ball valve & vent                      |
| PT***                    | Basic paint system                           |
| P1                       | Offshore,<br>Temp Ambient up to 93°C (200°F) |
| P2                       | Offshore, up to 537°C (998°F)                |

\* for 6" up not for -T design

\*\* for 6" up

\*\*\* colors RAL 1018 or 7036  
(other colors upon request)



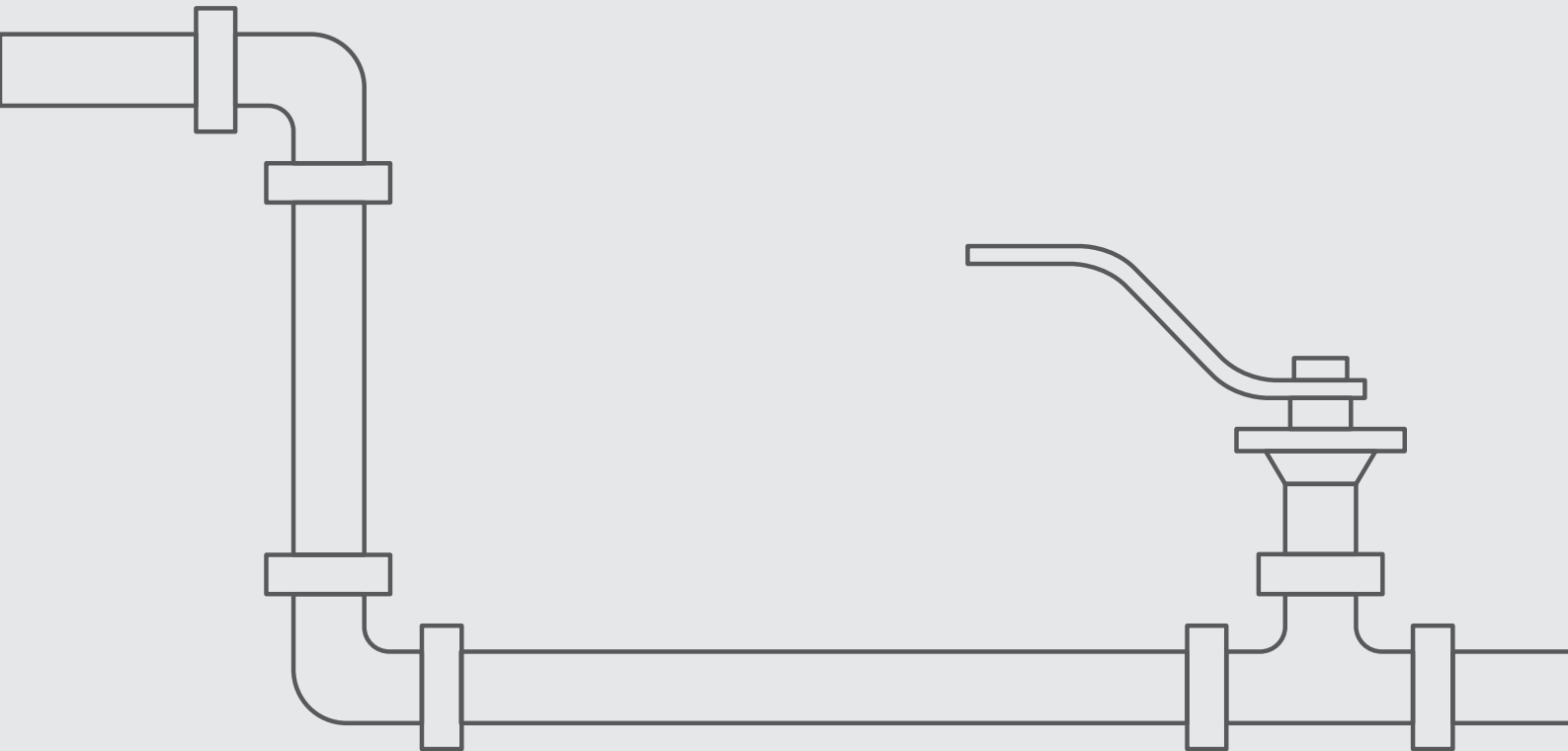
Z47



High Temp. Valves

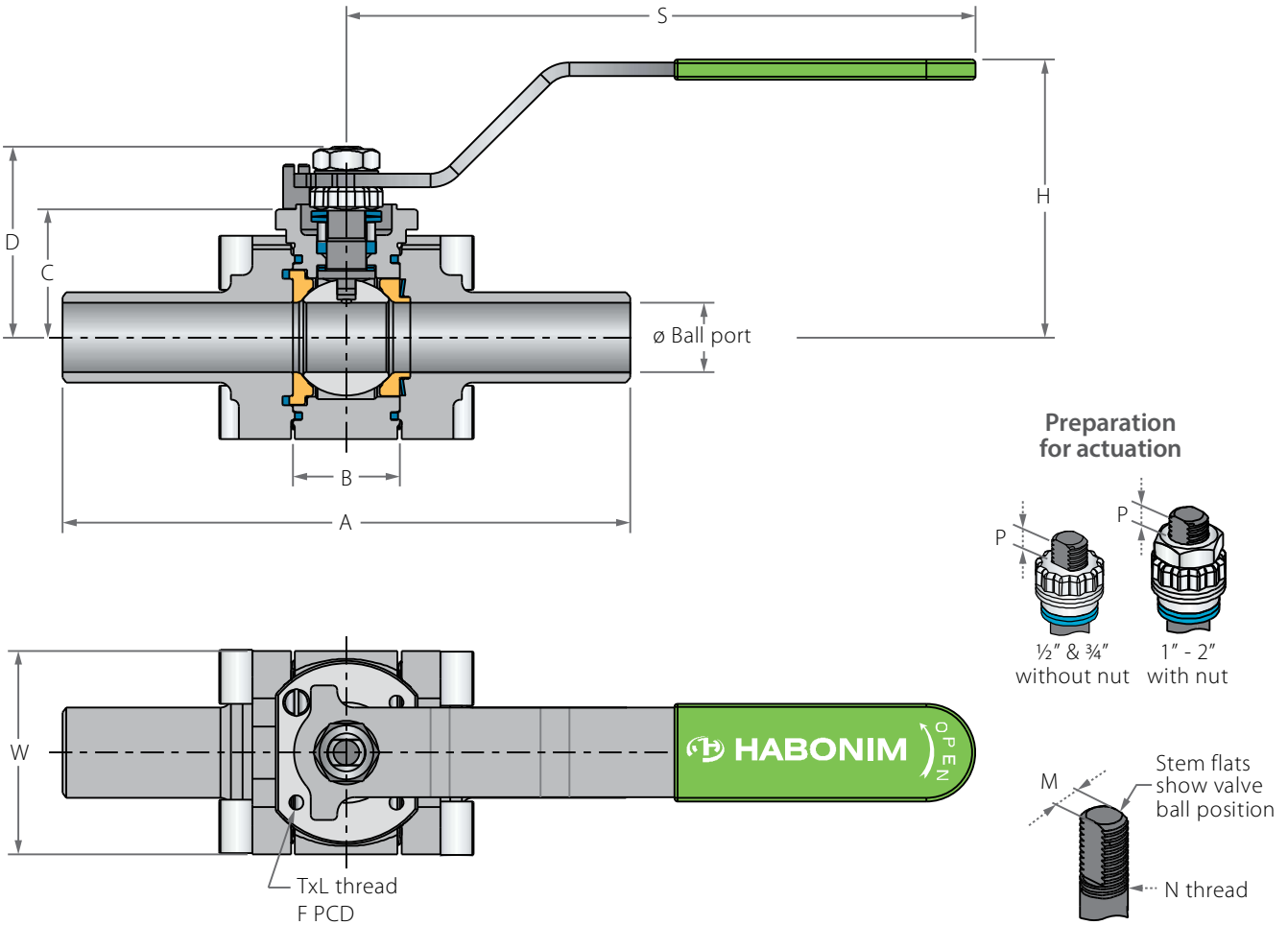
# FLOATING BALL

3 PIECE



**Z47W****Z47P****1/4"-2" | DN8-DN50 | CLASS 600**Floating Ball 3 Piece Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Valve dimensions



Valve Face To Face sizes are according to Habonim catalog data only, for Extended-weald/Flanged/Tri-clamp end see Face To Face sizes page.

| Std. port | Full port  | Unit | Ball port | A      |          | B     | C     | D     | H      | S      | W     | M    | N        | P          | F     | TxL   | Weight kg/lb | Kv Cv |
|-----------|------------|------|-----------|--------|----------|-------|-------|-------|--------|--------|-------|------|----------|------------|-------|-------|--------------|-------|
|           |            |      |           | Welded | Threaded |       |       |       |        |        |       |      |          |            |       |       |              |       |
| DN15      | DN8, DN10  | mm   | 11.15     | 140.60 | 66.00    | 20.60 | 29.00 | 37.90 | 62.00  | 150.00 | 46.00 | 5.54 | 1/2" UNF | 6.65 (F03) | 36.00 | M5x10 | 1            | 6.9   |
| 1/2"      | 1/4", 3/8" | inch | 0.44      | 5.54   | 2.60     | 0.81  | 1.14  | 1.49  | 2.44   | 5.91   | 1.81  | 0.22 |          | 0.26       | 1.42  |       | 2            | 8.0   |
| DN20      | DN15       | mm   | 14.30     | 146.95 | 70.60    | 24.55 | 31.40 | 40.30 | 64.00  | 150.00 | 52.10 | 5.54 | 3/4" UNF | 6.65 (F03) | 36.00 | M5x10 | 1            | 10    |
| 3/4"      | 1/2"       | inch | 0.56      | 5.79   | 2.78     | 0.97  | 1.24  | 1.59  | 2.52   | 5.91   | 2.05  | 0.22 |          | 0.26       | 1.42  |       | 2            | 12    |
| DN25      | DN20       | mm   | 20.65     | 168.75 | 94.00    | 31.75 | 38.15 | 55.50 | 80.00  | 187.00 | 60.50 | 7.54 | 1/2" UNF | 7.40 (F04) | 42.00 | M5x10 | 2            | 28    |
| 1"        | 3/4"       | inch | 0.81      | 6.64   | 3.70     | 1.25  | 1.50  | 2.19  | 3.15   | 7.36   | 2.38  | 0.30 |          | 0.29       | 1.65  |       | 4            | 32    |
| DN32      | DN25       | mm   | 25.50     | 179.25 | 108.50   | 41.25 | 42.65 | 60.50 | 84.50  | 187.00 | 69.00 | 7.54 | 1/2" UNF | 7.40 (F04) | 42.00 | M5x10 | 3            | 49    |
| 1 1/4"    | 1"         | inch | 1.00      | 7.06   | 4.27     | 1.62  | 1.68  | 2.38  | 3.33   | 7.36   | 2.72  | 0.30 |          | 0.29       | 1.65  |       | 6            | 57    |
| DN40      | DN32       | mm   | 31.80     | 189.40 | 116.00   | 48.40 | 43.50 | 73.00 | 96.00  | 237.00 | 79.20 | 8.71 | 1/2" UNF | 8.50 (F05) | 50.00 | M6x12 | 3            | 69    |
| 1 1/2"    | 1 1/4"     | inch | 1.25      | 7.46   | 4.57     | 1.91  | 1.71  | 2.87  | 3.78   | 9.33   | 3.12  | 0.34 |          | 0.33       | 1.97  |       | 8            | 80    |
| DN50      | DN40       | mm   | 38.10     | 200.30 | 128.00   | 56.30 | 48.20 | 77.70 | 100.00 | 237.00 | 90.70 | 8.71 | 1/2" UNF | 8.50 (F05) | 50.00 | M6x12 | 5            | 102   |
| 2"        | 1 1/2"     | inch | 1.50      | 7.89   | 5.04     | 2.22  | 1.90  | 3.06  | 3.94   | 9.33   | 3.57  | 0.34 |          | 0.33       | 1.97  |       | 11           | 208   |

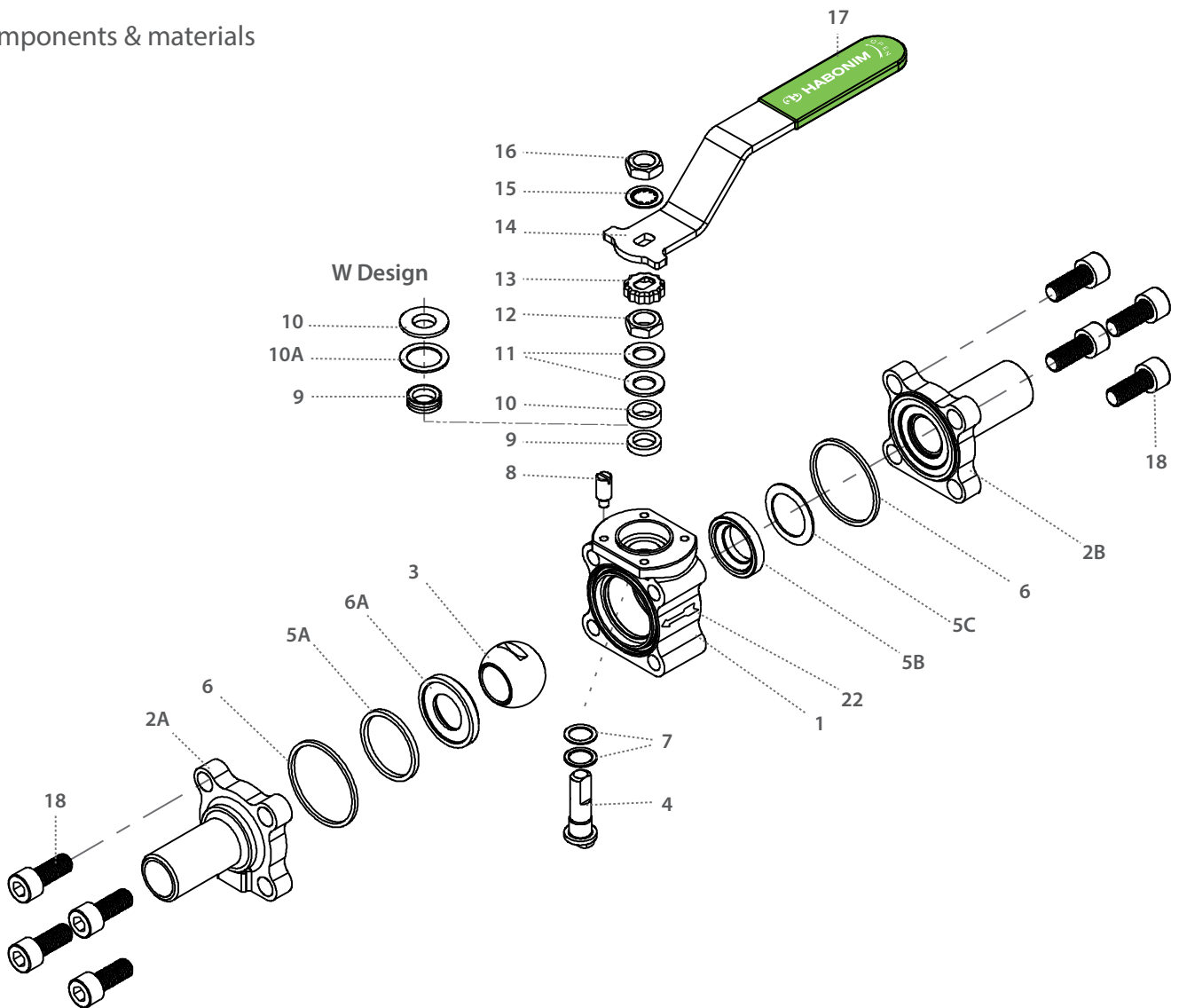
**Z47W****Z47P**

1/4"-2" | DN8-DN50 | CLASS 600



Floating Ball 3 Piece Up to **W** 260°C (500°F) | **P** 400°C (750°F)

### Components & materials



| Item | Description          | Material specification  | Qty. |
|------|----------------------|---|------|
| 1    | Body                 | Acc. Ordering Code  | 1    |
| 2A   | Downstream end       | Acc. Ordering Code  | 1    |
| 2B   | Upstream end         | Acc. Ordering Code  | 1    |
| 3    | Ball                 | Acc. Ordering Code  | 1    |
| 4    | Stem                 | Acc. Ordering Code  | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code  | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code  | 1    |
| 5C   | Upstream disc spring | Inconel 718   | 1    |
| 6*   | Body seal            | Graphite  | 2    |
| 6A*  | Seat seal            | Graphite  | 1    |
| 7*   | Stem thrust seal     | A479 316L Hardened with LTPN, B637 N07718 Inconel 718, Virgin peek, PCTFE | 2    |
| 8    | Stop pin             | S. Steel  | 1    |

| Item | Description     | Material specification | Qty. |
|------|-----------------|------------------------|------|
| 9*   | Stem seal       | Graphite ,CF PTFE, TFM | 1    |
| 10   | Follower        | S. Steel               | 1    |
| 10A* | Slide Bearing   | S. Steel               | 1    |
| 11   | Disc spring     | S. Steel               | 2    |
| 12   | Stem nut        | S. Steel               | 1    |
| 13   | Locking clip    | S. Steel               | 1    |
| 14   | Handle          | S. Steel               | 1    |
| 15   | Serrated washer | S. Steel               | 1    |
| 16   | Handle nut      | S. Steel               | 1    |
| 17   | Sleeve          | PVC                    | 1    |
| 18   | Body bolts      | S. Steel               | 8    |
| 22   | Arrow flow      | S. Steel               | 1    |
| 23   | Tag (not shown) | S. Steel               | 1    |

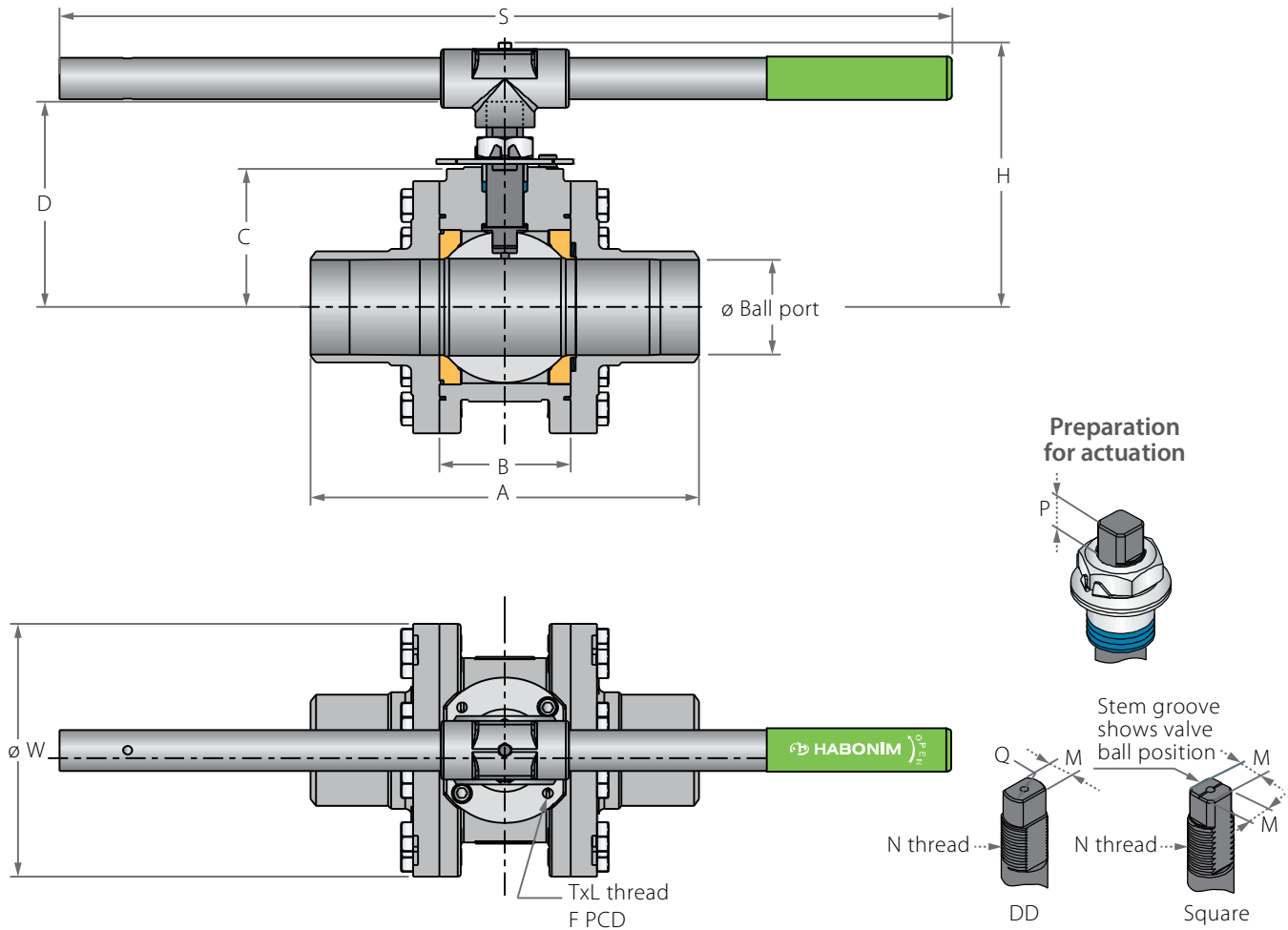
\* Repair kit components

**Z47W****Z47P**

2½"-8" | DN65-DN200 | CLASS 600

Floating Ball 3 Piece Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Valve dimensions



Valve Face To Face sizes are according to Habonim catalog data only, for Extended-weald/Flanged/Tri-clamp end see Face To Face sizes page.

| Std. port | Full port | Unit | Ball port | A      |          | B      | C      | D      | H      | S      | W      | M     | M (DD) | Q     | N      | P     | F     | TxL    | Weight kg/lb | Kv Cv  |      |
|-----------|-----------|------|-----------|--------|----------|--------|--------|--------|--------|--------|--------|-------|--------|-------|--------|-------|-------|--------|--------------|--------|------|
|           |           |      |           | Welded | Threaded |        |        |        |        |        |        |       |        |       |        |       |       |        |              |        |      |
| DN65      | DN50      | mm   | 51.00     | 200.00 | 160.00   | 75.00  | 87.50  | 134.00 | 174.00 | 401.00 | 150.00 | 18.90 | 15.90  | 22.70 | 1"-14  | 16.70 | (F10) | 102.00 | M10x20       | 14.20  | 430  |
| 2½"       | 2"        | inch | 2.01      | 7.87   | 6.30     | 2.95   | 3.44   | 5.28   | 6.85   | 15.79  | 5.91   | 0.74  | 0.63   | 0.89  | UNF-2A | 0.66  | 4.02  |        | M10x20       | 31.24  | 499  |
| DN80      | DN65      | mm   | 63.75     | 285.00 | 213.00   | 108.80 | 114.10 | 160.60 | 201.00 | 600.00 | 191.50 | 18.90 | 15.90  | 22.70 | 1"-14  | 16.70 | (F10) | 102.00 | M10x20       | 25.00  | 1000 |
| 3"        | 2½"       | inch | 2.51      | 11.22  | 8.39     | 4.28   | 4.49   | 6.32   | 7.91   | 23.62  | 7.54   | 0.74  | 0.63   | 0.89  | UNF-2A | 0.66  | 4.02  |        | M10x20       | 55.00  | 1160 |
| DN100     | DN80      | mm   | 80.00     | 356.00 | -        | 110.00 | 126.50 | 195.90 | 256.6  | 916.00 | 210.00 | 28.45 | 23.75  | 35.20 | 1½"-12 | 26.20 | (F12) | 125.00 | M12x20       | 38.00  | 1830 |
| 4"        | 3"        | inch | 3.15      | 14.02  | -        | 4.33   | 4.98   | 7.71   | 10.10  | 36.06  | 8.27   | 1.12  | 0.94   | 1.39  | UNF-2A | 1.03  | 4.92  |        | M12x20       | 83.60  | 2123 |
| DN150     | DN100     | mm   | 100.00    | 395.00 | -        | 135.00 | 142.40 | 211.9  | -      | -      | 260.00 | 28.45 | 23.75  | 35.20 | 1½"-12 | 26.20 | (F12) | 125.00 | M12x20       | 60.00  | 4380 |
| 6"        | 4"        | inch | 3.94      | 15.55  | -        | 5.31   | 5.61   | 8.34   | -      | -      | 10.24  | 1.12  | 0.94   | 1.39  | UNF-2A | 1.03  | 4.92  |        | M12x20       | 132.00 | 5081 |
| DN200     | DN150     | mm   | 150.00    | 490.00 | -        | 190.00 | 194.00 | 307    | -      | -      | 360.00 | 35.92 | 35.92  | 46.50 | 2"-8   | 40.00 | (F14) | 140.00 | M16x20       | 130.00 | 8070 |
| 8"        | 6"        | inch | 5.91      | 19.29  | -        | 7.48   | 7.64   | 12.09  | -      | -      | 14.17  | 1.41  | 1.41   | 1.83  | UN-2A  | 1.57  | 5.51  |        | M16x20       | 286.00 | 9361 |
|           | DN200     | mm   | 200.00    | 500.00 | -        | 275.00 | 245.00 | 400    | -      | -      | 470.00 | 45.90 | 45.90  | 55.00 | 2¾"-8  | 50.00 | (F16) | 165.00 | M20x30       | 315.00 | 7600 |
|           | 8"        | inch | 7.87      | 19.69  | -        | 10.83  | 9.65   | 15.75  | -      | -      | 18.50  | 1.81  | 1.81   | 2.17  | UN-2A  | 1.97  | 6.50  |        | M20x30       | 693.00 | 6590 |

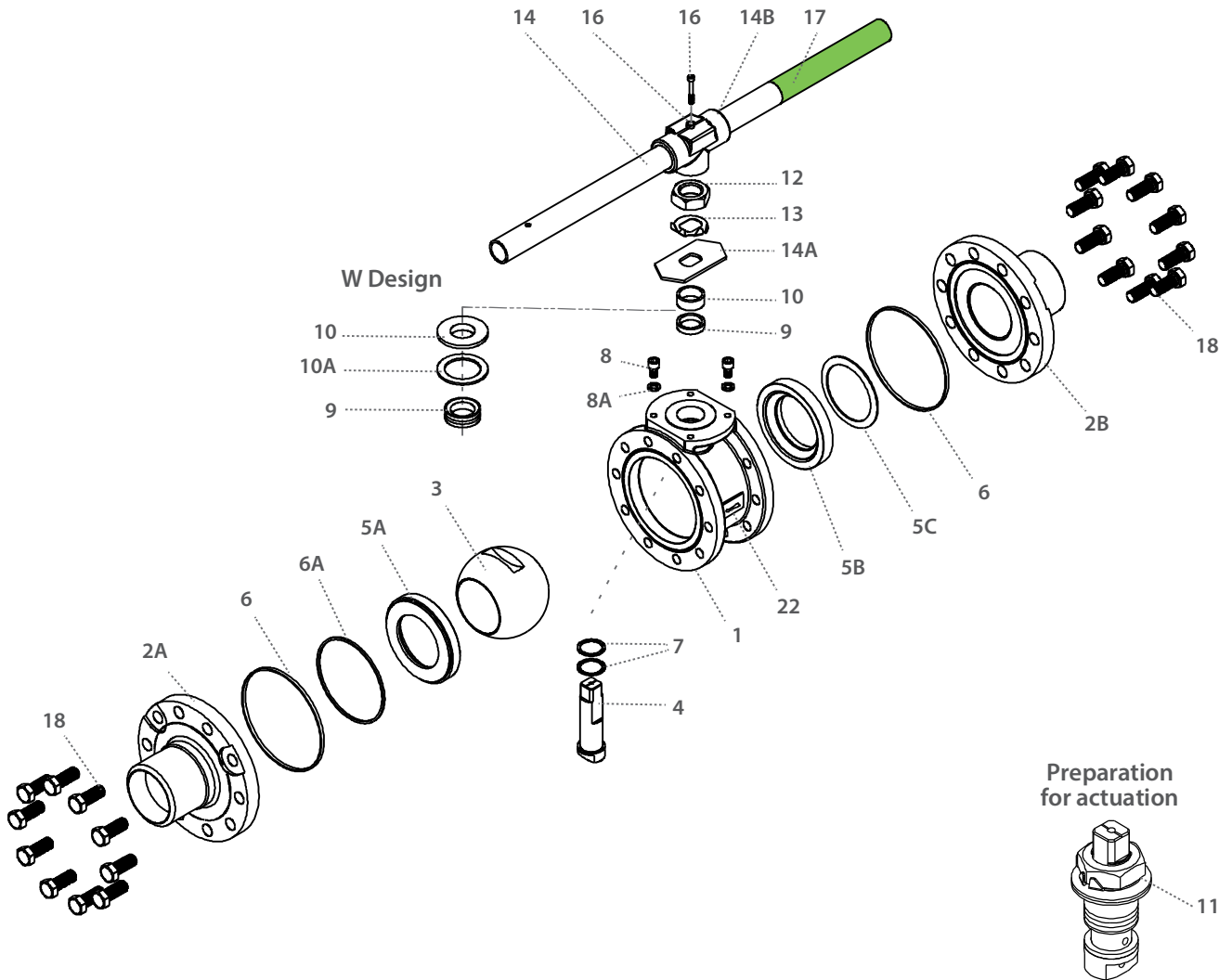
**Z47W****Z47P**

2½"-8" | DN65-DN200 | CLASS 600



Floating Ball 3 Piece Up to **W** 260°C (500°F) | **P** 400°C (750°F)

### Components & materials



| Item | Description          | Material specification  | Qty. |
|------|----------------------|---|------|
| 1    | Body                 | Acc. Ordering Code  | 1    |
| 2A   | Downstream end       | Acc. Ordering Code  | 1    |
| 2B   | Upstream end         | Acc. Ordering Code  | 1    |
| 3    | Ball                 | Acc. Ordering Code  | 1    |
| 4    | Stem                 | Acc. Ordering Code  | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code  | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code  | 1    |
| 5C   | Upstream disc spring | Inconel 718   | 1    |
| 6*   | Body seal            | Graphite  | 2    |
| 6A*  | Seat seal            | Graphite  | 1    |
| 7*   | Stem thrust seal     | A479 316L Hardened with LTPN, B637 N07718 Inconel 718, Virgin peek, PCTFE | 2    |
| 8    | Stop pin             | S. Steel  | 1    |
| 9*   | Stem seal            | Graphite, CF PTFE, TFM  | 1    |
| 10A* | Slide Bearing        | S. Steel  | 1    |

| Item | Description     | Material specification | Qty.  |
|------|-----------------|------------------------|-------|
| 10   | Follower        | S. Steel               | 1     |
| 11   | Disc spring     | S. Steel               | 2     |
| 12   | Stem nut        | S. Steel               | 1     |
| 13   | Tab lock washer | S. Steel               | 1     |
| 14** | Handle          | S. Steel               | 1     |
| 14A  | Stop plate      | S. Steel               | 1     |
| 14B  | Wrench head     | S. Steel               | 1     |
| 16   | Wrench bolt     | S. Steel               | 1     |
| 17   | Sleeve          | PVC                    | 1     |
| 18   | Body bolts      | S. Steel               | 20-32 |
| 22   |                 | S. Steel               | 1     |
| 23   | Tag (not shown) | S. Steel               | 1     |

\* Repair kit components

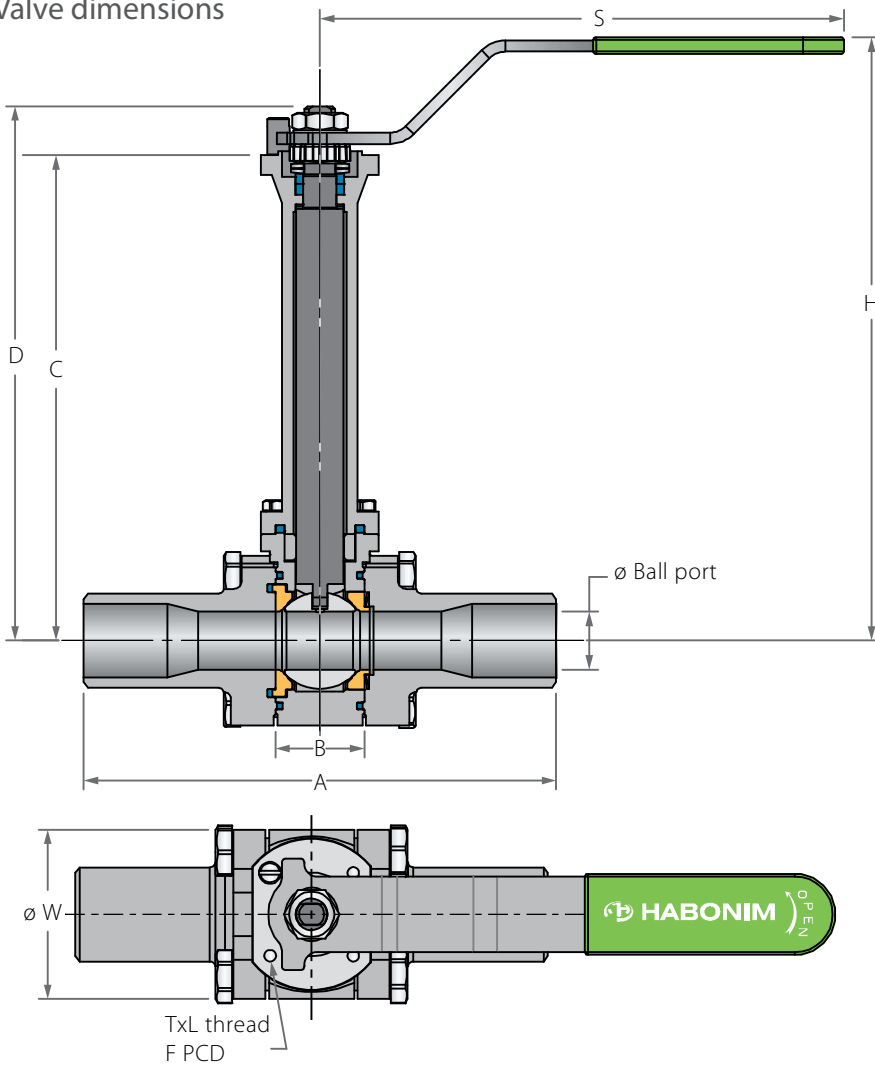
\*\* Gear operator should be used for size 6" DN150 and above (handle components are not included)

**Z47T****Z47M**

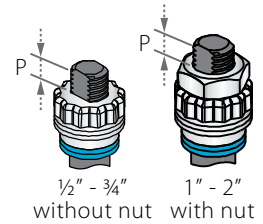
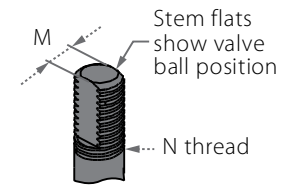
1/4"-2" | DN8-DN50 | CLASS 600

Floating Ball 3 Piece Up to **T** 538°C (1000°F) | **M** 650°C (1200°F)

Valve dimensions



Preparation for actuation

1/2" - 3/4" without nut  
1" - 2" with nut

Valve Face To Face sizes are according to Habonim catalog data only, for Extended-weald/Flanged/Tri-clamp end see Face To Face sizes page.

| Std. port | Full port  | Unit | Ball port | A      |          | B     | C      | D      | H      | S      | W     | M    | N        | P    | F     | W     | TxL   | Weight kg/lb | Kv Cv |
|-----------|------------|------|-----------|--------|----------|-------|--------|--------|--------|--------|-------|------|----------|------|-------|-------|-------|--------------|-------|
|           |            |      |           | Welded | Threaded |       |        |        |        |        |       |      |          |      |       |       |       |              |       |
| DN15      | DN8, DN10  | mm   | 11.15     | 140.60 | 66.00    | 20.60 | 181.40 | 190.30 | 214.40 | 150.00 | 46.00 | 5.54 | 3/8" UNF | 6.65 | (F03) | 36.00 | M5x10 | 1.35         | 6.9   |
| 1/2"      | 1/4", 3/8" | inch | 0.44      | 5.54   | 2.60     | 0.81  | 7.14   | 7.49   | 8.44   | 5.91   | 1.81  | 0.22 |          | 0.26 |       | 1.42  |       | 2.97         | 8.0   |
| DN20      | DN15       | mm   | 14.30     | 146.95 | 70.60    | 24.55 | 183.40 | 192.30 | 216.40 | 150.00 | 52.10 | 5.54 | 3/8" UNF | 6.65 | (F03) | 36.00 | M5x10 | 1.55         | 10    |
| 3/4"      | 1/2"       | inch | 0.56      | 5.79   | 2.78     | 0.97  | 7.22   | 7.57   | 8.52   | 5.91   | 2.05  | 0.22 |          | 0.26 |       | 1.42  |       | 3.41         | 12    |
| DN25      | DN20       | mm   | 20.65     | 168.75 | 94.00    | 31.75 | 190.40 | 207.90 | 231.40 | 230.00 | 60.50 | 7.54 | 1/2" UNF | 7.40 | (F04) | 42.00 | M5x10 | 2.85         | 28    |
| 1"        | 3/4"       | inch | 0.81      | 6.64   | 3.70     | 1.25  | 7.50   | 8.19   | 9.11   | 9.06   | 2.38  | 0.30 |          | 0.29 |       | 1.65  |       | 6.27         | 32    |
| DN32      | DN25       | mm   | 25.50     | 179.25 | 108.50   | 41.25 | 195.40 | 212.90 | 236.40 | 230.00 | 69.00 | 7.54 | 1/2" UNF | 7.40 | (F04) | 42.00 | M5x10 | 3.55         | 49    |
| 1 1/4"    | 1"         | inch | 1.00      | 7.06   | 4.27     | 1.62  | 7.69   | 8.38   | 9.31   | 9.06   | 2.72  | 0.30 |          | 0.29 |       | 1.65  |       | 7.81         | 57    |
| DN40      | DN32       | mm   | 31.80     | 189.40 | 116.00   | 48.40 | 195.40 | 224.90 | 248.40 | 237.00 | 79.20 | 8.71 | 1/2" UNF | 8.50 | (F05) | 50.00 | M6x12 | 4.50         | 69    |
| 1 1/2"    | 1 1/4"     | inch | 1.25      | 7.46   | 4.57     | 1.91  | 7.69   | 8.85   | 9.78   | 9.33   | 3.12  | 0.34 |          | 0.33 |       | 1.97  |       | 9.90         | 80    |
| DN50      | DN40       | mm   | 38.10     | 200.30 | 128.00   | 56.30 | 200.40 | 229.90 | 253.40 | 237.00 | 90.70 | 8.71 | 1/2" UNF | 8.50 | (F05) | 50.00 | M6x12 | 6.00         | 102   |
| 2"        | 1 1/2"     | inch | 1.50      | 7.89   | 5.04     | 2.22  | 7.89   | 9.05   | 9.98   | 9.33   | 3.57  | 0.34 |          | 0.33 |       | 1.97  |       | 13.20        | 118   |

Z47T

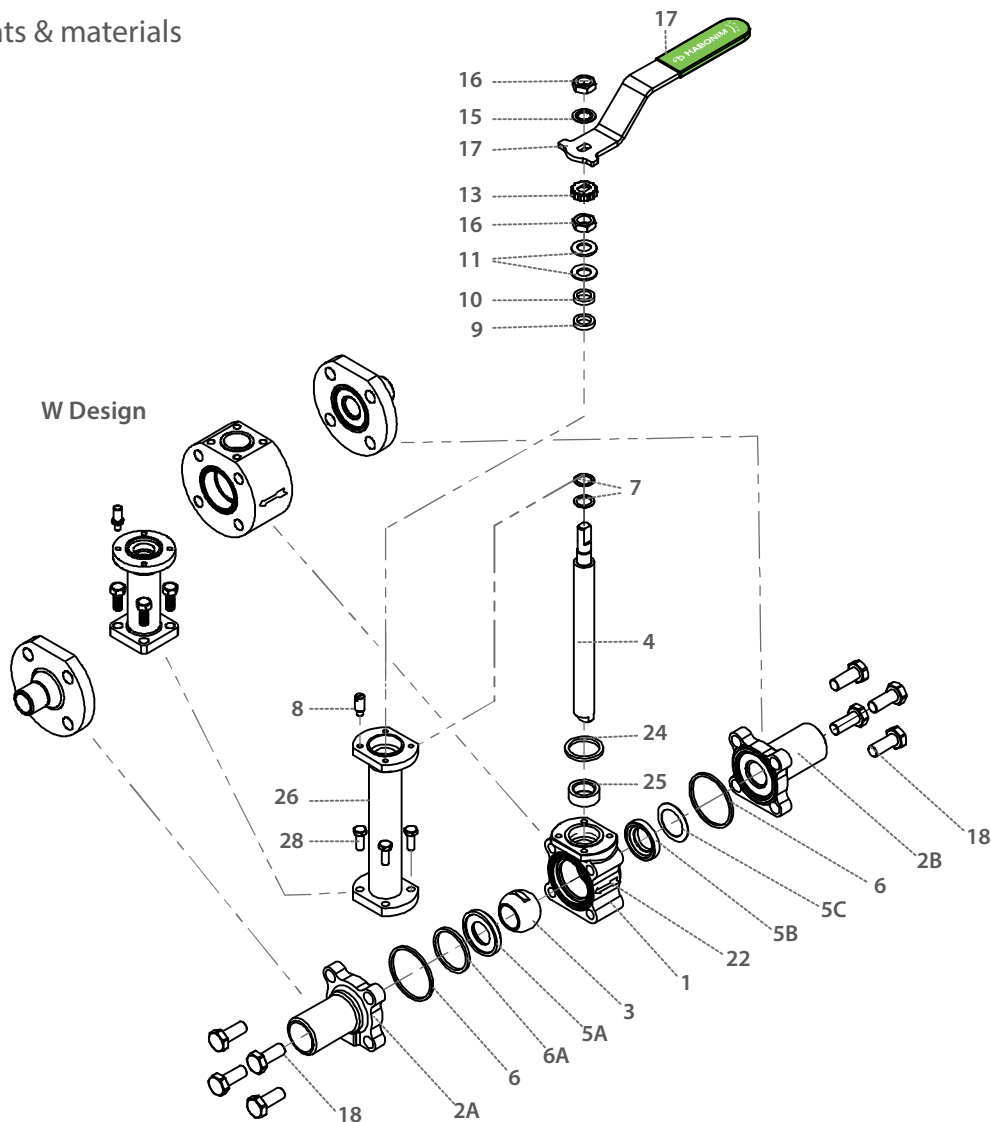
Z47M

1/4"-2" | DN8-DN50 | CLASS 600



Floating Ball 3 Piece Up to **T** 538°C (1000°F) | **M** 650°C (1200°F)

### Components & materials



| Item | Description          | Material specification                                 | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code                                     | 1    |
| 2A   | Downstream end       | Acc. Ordering Code                                     | 1    |
| 2B   | Upstream end         | Acc. Ordering Code                                     | 1    |
| 3    | Ball                 | Acc. Ordering Code                                     | 1    |
| 4    | Stem                 | Acc. Ordering Code                                     | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code                                     | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code                                     | 1    |
| 5C   | Upstream seat spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 2    |
| 6A*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L, Hardened with LTPN, B637 N07718 Inconel 718 | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite   | 1    |
| 10   | Follower             | S. Steel   | 1    |

| Item | Description     | Material specification | Qty. |
|------|-----------------|------------------------|------|
| 11   | Disc spring     | S. Steel               | 2    |
| 12   | Stem nut        | S. Steel               | 1    |
| 13   | Locking clip    | S. Steel               | 1    |
| 14   | Handle          | S. Steel               | 1    |
| 15   | Serrated washer | S. Steel               | 1    |
| 16   | Handle nut      | S. Steel               | 1    |
| 17   | Sleeve          | PVC                    | 1    |
| 18   | Body bolts      | S. Steel               | 8    |
| 22   |                 | S. Steel               | 1    |
| 23   | Tag (not shown) | S. Steel               | 1    |
| 24   | Bonnet seal     | Graphite               | 1    |
| 25   | Stem Bearing    | S. Steel               | 1    |
| 26   | Bonnet          | S. Steel               | 1    |
| 28   | Bonnet bolts    | S. Steel               | 4    |

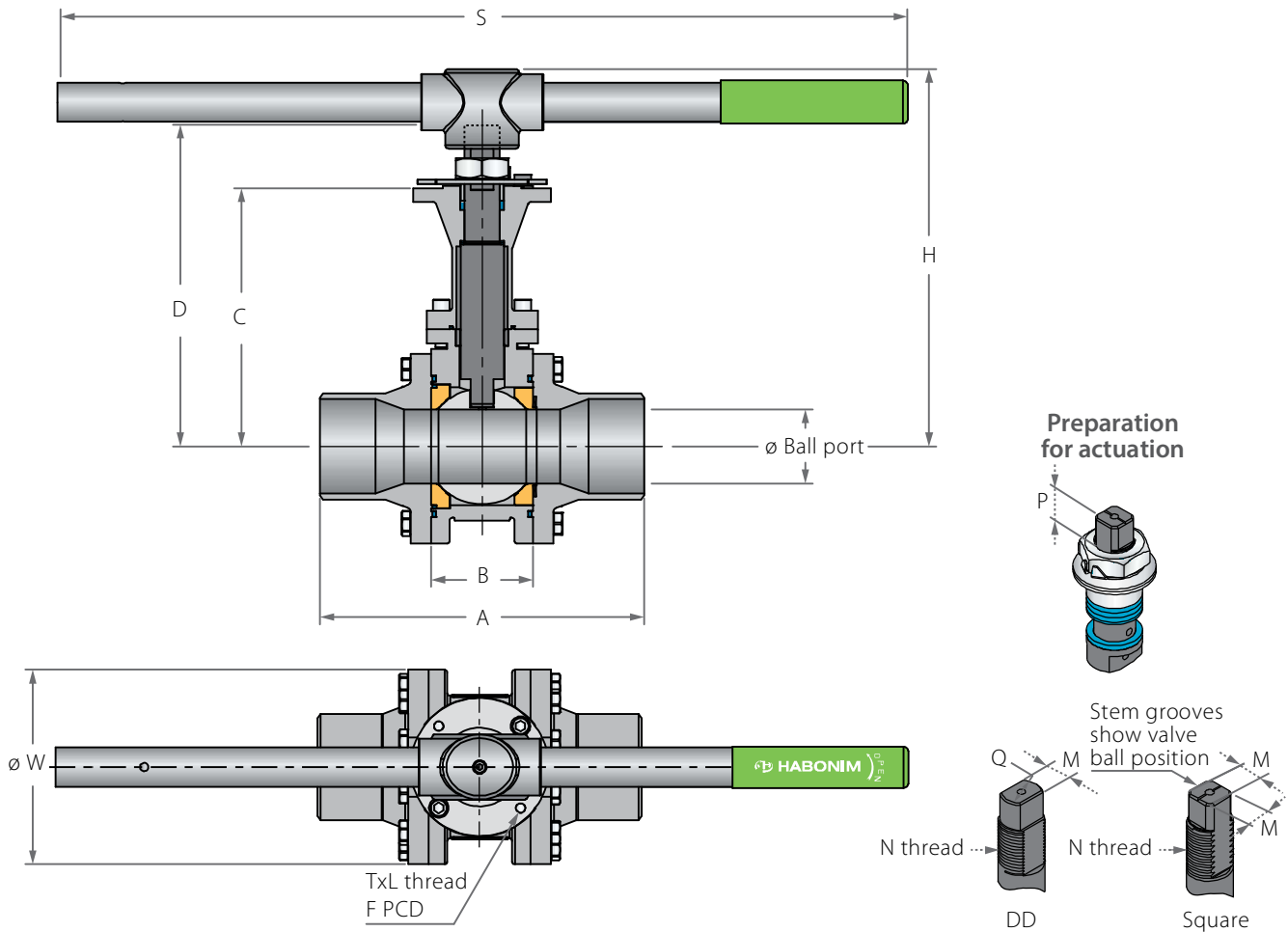
\* Repair kit components

**Z47T****Z47M**

2½"-8" | DN65-DN200 | CLASS 600

Floating Ball 3 Piece Up to **T** 538°C (1000°F) | **M** 650°C (1200°F)

## Valve dimensions



Valve Face To Face sizes are according to Habonim catalog data only, for Extended-weald/Flanged/Tri-clamp end see Face To Face sizes page.

| Std. port | Full port | Unit | Ball port | A      |          | B      | C      | D      | H      | S      | W      | M     | M (DD) | Q     | N      | P           | F      | TxL    | Weight kg/lb | Kv   |
|-----------|-----------|------|-----------|--------|----------|--------|--------|--------|--------|--------|--------|-------|--------|-------|--------|-------------|--------|--------|--------------|------|
|           |           |      |           | Welded | Threaded |        |        |        |        |        |        |       |        |       |        |             |        |        |              | Cv   |
| DN65      | DN50      | mm   | 51        | 200    | 160.00   | 75     | 239.90 | 286.40 | 326.40 | 401    | 150    | 18.90 | 15.90  | 22.70 | 1"-14  | 16.70 (F10) | 102.00 | M10x20 | 19.2         | 208  |
| 2½"       | 2"        | inch | 2.01      | 7.87   | 6.30     | 2.95   | 9.44   | 11.28  | 12.85  | 15.79  | 5.91   | 0.74  | 0.63   | 0.89  | UNS-2A | 0.66        | 4.02   | M10x20 | 42.2         | 241  |
| DN80      | DN65      | mm   | 63.75     | 285.00 | 213.00   | 108.80 | 266.50 | 313.00 | 353.50 | 600.00 | 191.50 | 18.90 | 15.90  | 22.70 | 1"-14  | 16.70 (F10) | 102.00 | M10x20 | 30.0         | 300  |
| 3"        | 2½"       | inch | 2.51      | 11.22  | 8.39     | 4.28   | 10.49  | 12.32  | 13.92  | 23.62  | 7.54   | 0.74  | 0.63   | 0.89  | UNS-2A | 0.66        | 4.02   | M10x20 | 66.0         | 348  |
| DN100     | DN80      | mm   | 80        | 356    | -        | 110    | 278.90 | 348.00 | -      | -      | 210    | 28.45 | 23.75  | 35.20 | 1½"-12 | 26.20 (F12) | 125.00 | M12X20 | 46.0         | 615  |
| 4"        | 3"        | inch | 3.15      | 14.02  | -        | 4.33   | 10.98  | 13.70  | -      | -      | 8.27   | 1.12  | 0.94   | 1.39  | UNF-2A | 1.03        | 4.92   | M12X20 | 101.2        | 713  |
| DN150     | DN100     | mm   | 100       | 400.00 | -        | 135    | 294.80 | 364.00 | -      | -      | 260    | 28.45 | 23.75  | 35.20 | 1½"-12 | 26.20 (F12) | 125.00 | M12X20 | 68.0         | 872  |
| 6"        | 4"        | inch | 3.94      | 15.75  | -        | 5.31   | 11.61  | 14.33  | -      | -      | 10.24  | 1.12  | 0.94   | 1.39  | UNF-2A | 1.03        | 4.92   | M12X20 | 149.6        | 1012 |
| DN200     | DN150     | mm   | 150       | 490    | -        | 190    | 397.20 | 510.00 | -      | -      | 360    | 35.92 | 35.92  | 46.50 | 2"-8   | 40.00 (F14) | 140.00 | M16X20 | 148.0        | 1552 |
| 8"        | 6"        | inch | 5.91      | 19.29  | -        | 7.48   | 15.64  | 20.08  | -      | -      | 14.17  | 1.41  | 1.41   | 1.83  | UN-2A  | 1.57        | 5.51   | M16X20 | 325.6        | 1800 |
|           | DN200     | mm   | 200       | 500    | -        | 275    | 499.00 | 654.00 | -      | -      | 470    | 45.90 | 45.90  | 55.00 | 2¾"-8  | 50.00 (F16) | 165.00 | M20x30 | 380.0        | 1552 |
|           | 8"        | inch | 7.87      | 19.69  | -        | 10.83  | 19.65  | 25.75  | -      | -      | 18.50  | 1.81  | 1.81   | 2.17  | UN-2A  | 1.97        | 6.50   | M20x30 | 836.0        | 1800 |



Z47T

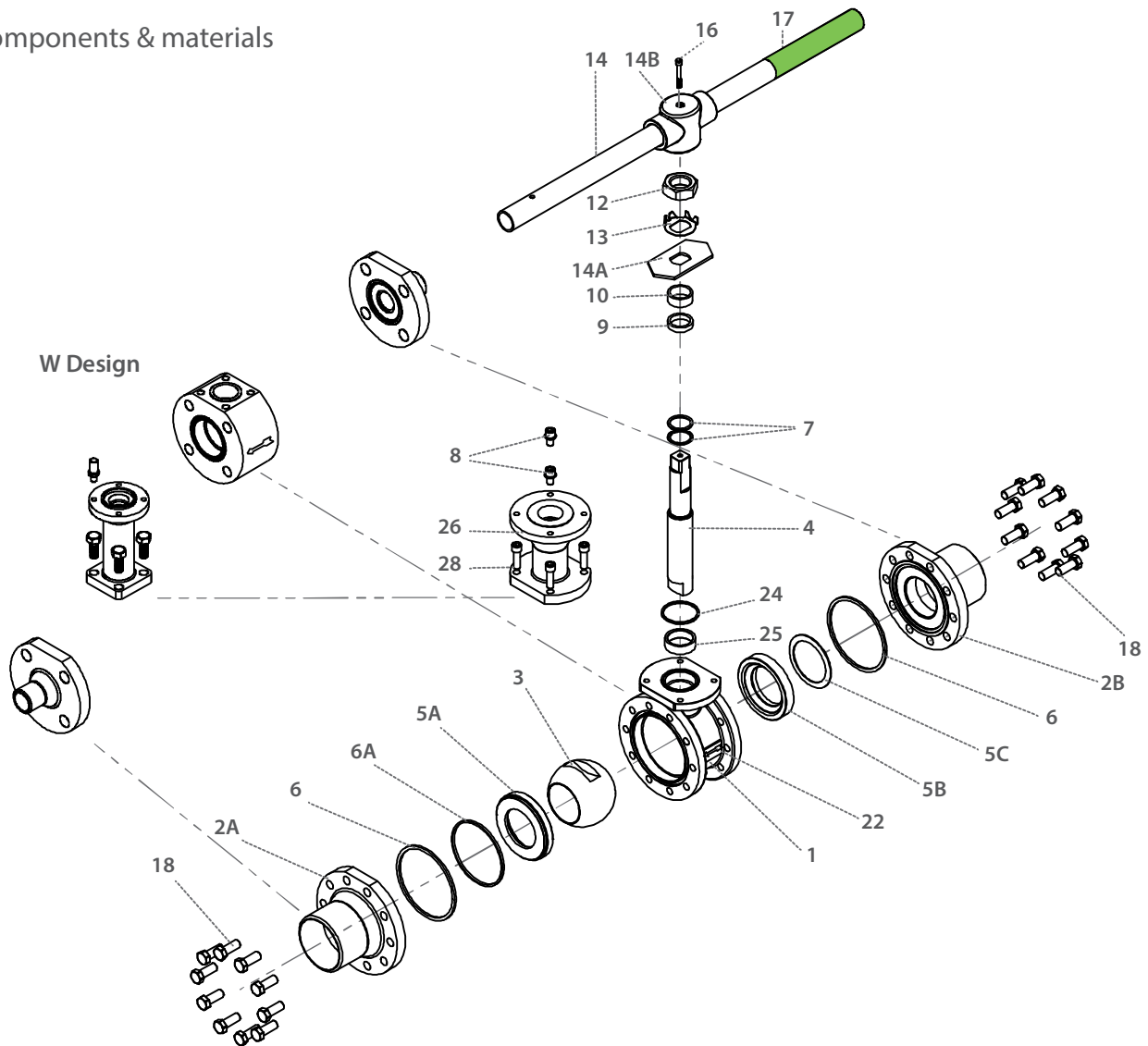
Z47M

2½"-8" | DN65-DN200 | CLASS 600



Floating Ball 3 Piece Up to **T** 538°C (1000°F) | **M** 650°C (1200°F)

### Components & materials



| Item | Description          | Material specification                                 | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code                                     | 1    |
| 2A   | Downstream end       | Acc. Ordering Code                                     | 1    |
| 2B   | Upstream end         | Acc. Ordering Code                                     | 1    |
| 3    | Ball                 | Acc. Ordering Code                                     | 1    |
| 4    | Stem                 | Acc. Ordering Code                                     | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code                                     | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code                                     | 1    |
| 5C   | Upstream seat spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 2    |
| 6B*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L, Hardened with LTPN, B637 N07718 Inconel 718 | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite   | 1    |
| 10   | Follower             | S. Steel   | 1    |
| 11   | Disc spring          | S. Steel   | 2    |

| Item | Description     | Material specification | Qty.  |
|------|-----------------|------------------------|-------|
| 12   | Stem nut        | S. Steel               | 1     |
| 13   | Tab lock washer | S. Steel               | 1     |
| 14** | Handle          | S. Steel               | 1     |
| 14A  | Stop plate      | S. Steel               | 1     |
| 14B  | Wrench head     | S. Steel               | 1     |
| 16   | Wrench bolt     | S. Steel               | 1     |
| 17   | Sleeve          | PVC                    | 1     |
| 18   | Body bolts      | S. Steel               | 20-32 |
| 22   | Arrow Valve     | S. Steel               | 1     |
| 23   | Tag (not shown) | S. Steel               | 1     |
| 24   | Bonnet seal     | S. Steel               | 1     |
| 25   | Stem Bearing    | S. Steel               | 1     |
| 26   | Bonnet          | S. Steel               | 1     |
| 28   | Bonnet bolts    | S. Steel               | 4-6   |

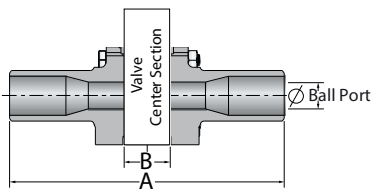
\* Repair kit components

\*\* Gear operator should be used for size 4" DN100 and above (handle components are not included)

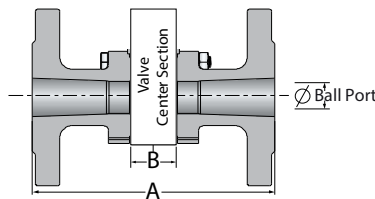
## Face To Face Sizes

| Valve Size | Unit | B         |           | A-XBW     |           | A-ETO     | A-Flanged |           | A-TC      |
|------------|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|            |      | Std. port | Full port | Std. port | Full port | Std. port | Std. port | Full port | Full port |
| DN10       | mm   | 20.6      | 20.6      | 140.6     | 143.0     | 108.6     |           |           |           |
| 3/8"       | inch | 0.8       | 0.8       | 5.5       | 5.6       | 4.3       |           |           |           |
| DN15       | mm   | 20.6      | 24.6      | 140.6     | 147.0     | 137.0     | 140.0     | 152.0     | 88.8      |
| 1/2"       | inch | 0.8       | 1.0       | 5.5       | 5.8       | 5.4       | 5.5       | 6.0       | 3.5       |
| DN20       | mm   | 24.6      | 31.7      | 147.0     | 168.7     | 147.0     | 152.0     | 165.1     | 101.6     |
| 3/4"       | inch | 1.0       | 1.2       | 5.8       | 6.6       | 5.8       | 6.0       | 6.5       | 4.0       |
| DN25       | mm   | 31.7      | 41.3      | 168.7     | 179.3     | 164.1     | 165.1     | 178.1     | 114.3     |
| 1"         | inch | 1.2       | 1.6       | 6.6       | 7.1       | 6.5       | 6.5       | 7.0       | 4.5       |
| DN32       | mm   | 41.3      | 48.4      | 179.3     | 189.4     | 179.3     | 178.1     | 190.0     |           |
| 1 1/4"     | inch | 1.6       | 1.9       | 7.1       | 7.5       | 7.1       | 7.0       | 7.5       |           |
| DN40       | mm   | 48.4      | 56.3      | 189.4     | 200.3     | 184.0     | 190.0     | 216.1     | 139.8     |
| 1 1/2"     | inch | 1.9       | 2.2       | 7.5       | 7.9       | 7.2       | 7.5       | 8.5       | 5.5       |
| DN50       | mm   | 56.3      | 72.6      | 200.3     | 232.6     | 193.5     | 216.1     | 241.0     | 158.9     |
| 2"         | inch | 2.2       | 2.9       | 7.9       | 9.2       | 7.6       | 8.5       | 9.5       | 6.3       |
| DN65       | mm   | 72.6      | 83.4      | 232.6     | 283.4     | 222.6     | 241.0     | 282.0     | 213.0     |
| 2 1/2"     | inch | 2.9       | 3.3       | 9.2       | 11.2      | 8.8       | 9.5       | 11.1      | 8.4       |
| DN80       | mm   | 83.4      | 108.8     | 283.4     | 348.8     | 250.4     | 282.0     | 282.0     | 215.8     |
| 3"         | inch | 3.3       | 4.3       | 11.2      | 13.7      | 9.9       | 11.1      | 11.1      | 8.5       |
| DN100      | mm   | 108.8     | 123.0     | 348.8     | 390.0     | 348.8     | 305.0     | 305.0     | 245.4     |
| 4"         | inch | 4.3       | 4.8       | 13.7      | 15.4      | 13.7      | 12.0      | 12.0      | 9.7       |
| DN200      | mm   | 146.1     | 180.0     | 444.1     | 180.0     | 444.1     | 403.1     | 403.0     | 146.1     |
| 6"         | inch | 5.8       | 7.1       | 17.5      | 7.1       | 17.5      | 15.9      | 15.9      | 5.8       |

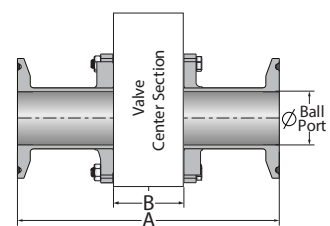
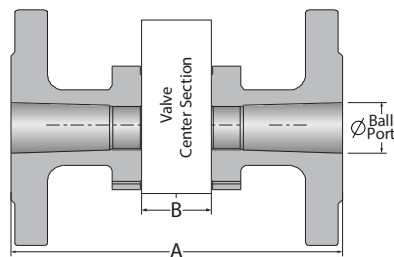
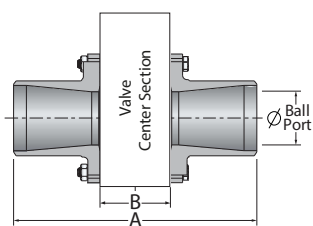
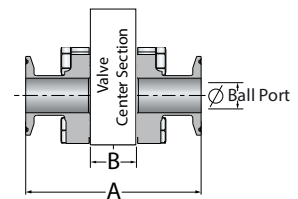
XBW / ETO



Flanged



TC

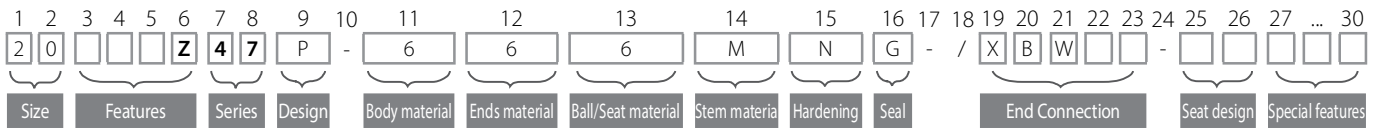




# High Temperature - Ordering Code System

"Mandatory option" options are marked with **green background**

light green background



| Size (1-2) |      |     |
|------------|------|-----|
| Code       | inch | mm  |
| 02         | ¼"   | 8   |
| 03         | ⅜"   | 10  |
| 05         | ½"   | 15  |
| 07         | ¾"   | 20  |
| 10         | 1"   | 25  |
| 12         | 1¼"  | 32  |
| 15         | 1½"  | 40  |
| 20         | 2"   | 50  |
| 25         | 2½"  | 65  |
| 30         | 3"   | 80  |
| 40         | 4"   | 100 |
| 60         | 6"   | 150 |

| Features (3-6) |                    |
|----------------|--------------------|
| Z              | <b>Metal seats</b> |
| B              | Full port          |
| N              | Control service    |

| Series (7-8) |                              |
|--------------|------------------------------|
| 47           | <b>Floating ball 3 piece</b> |

| Design (9) |   |
|------------|---|
| P          | -60°C to 400°C (-76°F to 752°F)                       |
| W          | -60°C to 260°C (-76°F to 500°F)<br>HermetiX stem seal |
| T          | -60°C to 538°C<br>(-76°F to 1000°F)                   |
| M*         | -60°C to 650°C<br>(-76°F to 1200°F)                   |

| Body material (11) |                     |
|--------------------|---------------------|
| 4*                 | A216 C.st WCB/ A105 |
| 6                  | CF8M                |
| F                  | LF2                 |
| H**                | 321H                |
| J**                | F22                 |

| Ends material (12) |              |
|--------------------|--------------|
| 6                  | CF3M         |
| F                  | LF2          |
| H*                 | 321H         |
| J*                 | F22          |
| 7**                | Monel        |
| D***               | Duplex       |
| K***               | Super duplex |

| Ball/Seat material (13) |               |
|-------------------------|---------------|
| 6                       | St. Steel     |
| 7*                      | Monel         |
| D**                     | Duplex        |
| K**                     | Super duplex  |
| Q***                    | St. Steel 410 |

\* Up to 475°C (887°F)  
 \*\* Up to 315°C (600°F)  
 \*\*\* For O hardening only

| Stem material (14) |                        |
|--------------------|------------------------|
| M                  | High Strength S. Steel |
| Z                  | Inconel 718            |

| Hardening (15) |  |
|----------------|--|
| N*             | LTPN- Low Temperature<br>Plasma Carbonitriding                           |
| I**            | Cr3C2- Chromium Carbide<br>with Nickel Chrome binder -<br>HVOF technique |
| O              | WC-Co- Tungsten Carbide<br>with Cobalt binder - HVOF<br>technique        |

\* standard offering up to size 2".  
 Applicable only for P/W design  
 \*\* standard offering for size 2½"  
 and up.

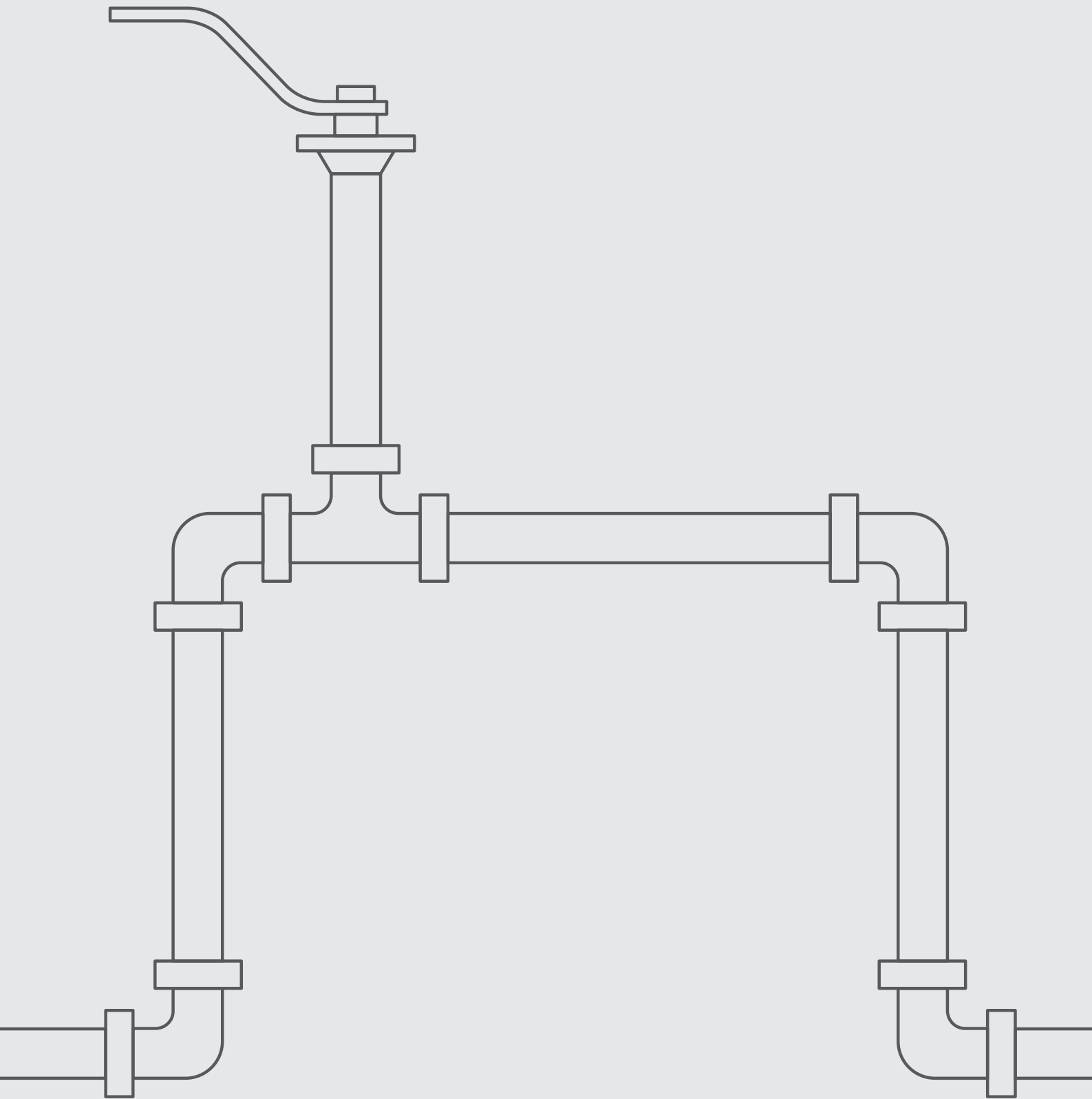
| Seal Material (16) |                   |
|--------------------|-------------------|
| G                  | Expanded graphite |
| B                  | NBR               |
| V                  | Viton             |
| K                  | FFKM              |

| End connections (19-23) |  |
|-------------------------|--|
| Welded                  |  |
| XBW                     | Extended butt weld schd. 40                  |
| XSW                     | Extended socket weld                         |
| Threaded                |  |
| NPT                     | ASME B1.20.1 -<br>National Pipe Taper thread |
| BSPT                    | EN 10226 - Pipe Taper thread                 |
| BSPP                    | ISO228-1, DIN3852 -<br>Pipe Parallel thread  |
| DIN3852                 | DIN3852 - Pipe Parallel thread               |

| Flanged |                    |
|---------|--------------------|
| 150     | ASME B16.5 #150 RF |
| 300     | ASME B16.5 #300 RF |
| 600     | ASME B16.5 #600 RF |
| 900     | ASME B16.5 #900 RF |
| PN16    | EN1092 PN16 RF     |
| PN40    | EN1092 PN40 RF     |
| PN64    | EN1092 PN64 RF     |
| PN100   | EN1092 PN100 RF    |
| PN160   | EN1092 PN160 RF    |

| Seat design (25-26) |                    |
|---------------------|--------------------|
| Blank               | Type A seat design |
| TB                  | Type B seat design |
| TC                  | Type C seat design |
| TD                  | Type D seat design |

| Special Features (27-30) |  |
|--------------------------|--|
| RTJ                      | Ring Type Joint                          |
| B                        | Body made from rolled bar                |
| Vxx                      | Characterized control ball<br>xx = angle |



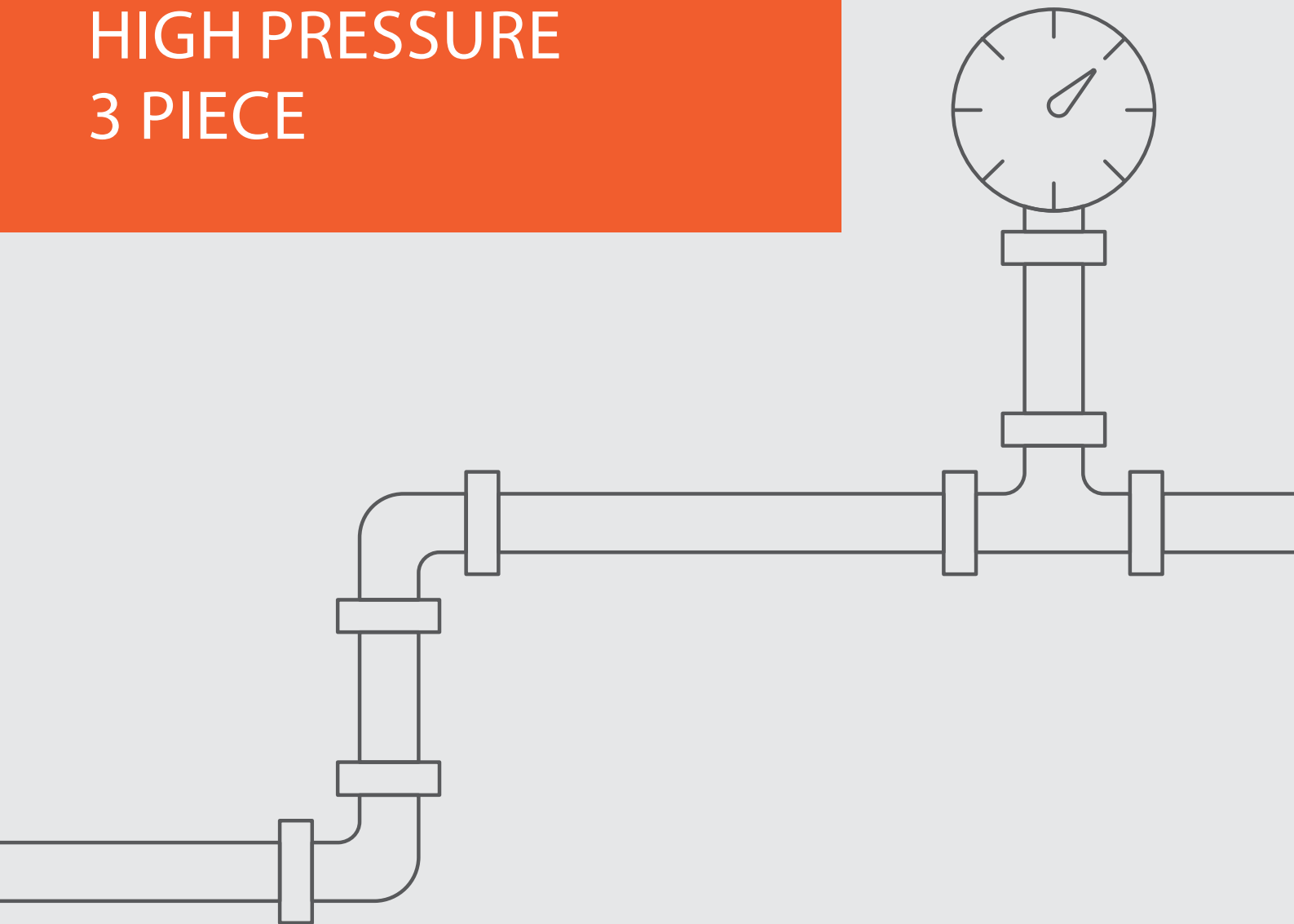
Z28



High Temp. Valves

# FLOATING BALL

HIGH PRESSURE  
3 PIECE

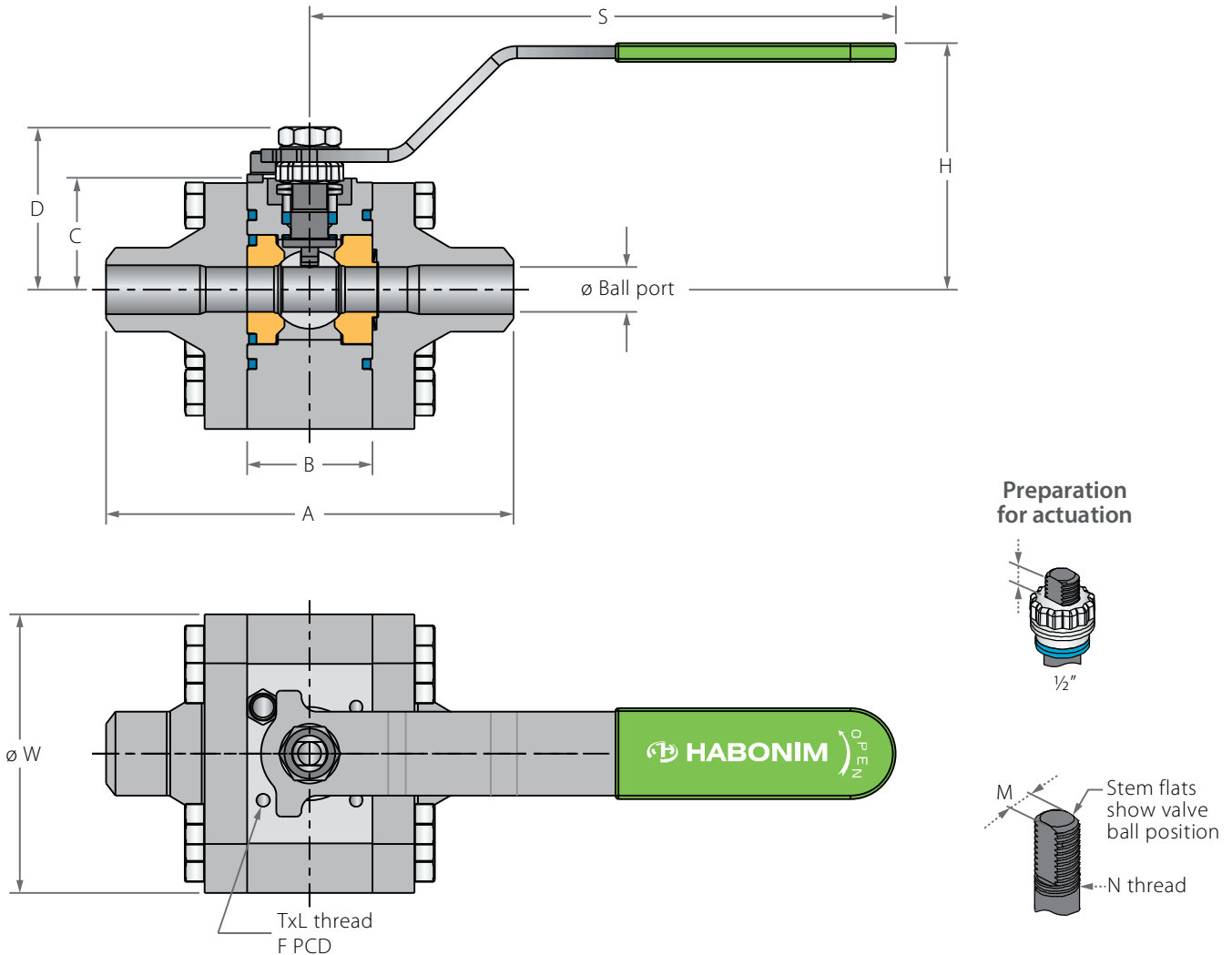


**Z28W****Z28P**

1/4"-1 1/4" | DN8-DN32 | CLASS 2500

HP Floating Ball 3 Piece Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Valve dimensions



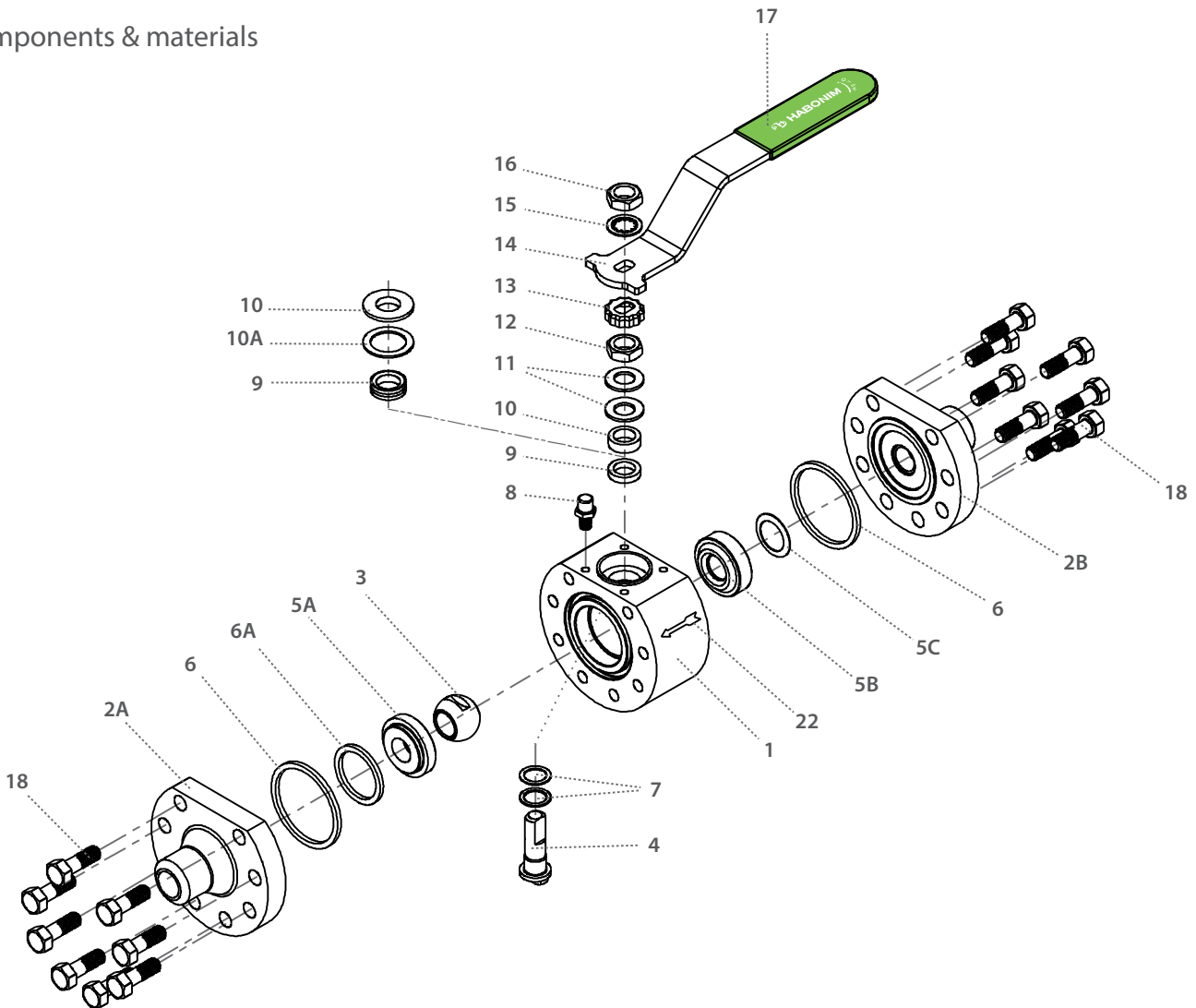
| Std. port | Full port  | Unit | Ball port | A      |          | B     | C     | D     | H     | S      | W      | M    | N        | P     | F     | W     | TxL   | Weight kg/lb | Kv Cv |
|-----------|------------|------|-----------|--------|----------|-------|-------|-------|-------|--------|--------|------|----------|-------|-------|-------|-------|--------------|-------|
|           |            |      |           | Welded | Threaded |       |       |       |       |        |        |      |          |       |       |       |       |              |       |
| DN15      | DN8, DN10  | mm   | 11.15     | 159.00 | 92.00    | 35.00 | 29.00 | 38.00 | 63.00 | 150.00 | 69.00  | 5.54 | 3/8" UNF | 6.70  | (F03) | 36.00 | M5X10 | 2.75         | 6.9   |
| 1/2"      | 1/4", 3/8" | inch | 0.44      | 6.26   | 3.62     | 1.38  | 1.14  | 1.50  | 2.48  | 5.91   | 2.72   | 0.22 |          | 0.26  |       | 1.42  |       | 6.1          | 8.0   |
| DN20      | DN15       | mm   | 13.00     | 169.00 | 100.00   | 40.00 | 34.10 | 52.40 | 78.00 | 230.00 | 89.00  | 7.54 | 1/2" UNF | 11.30 | (F04) | 42.00 | M5X10 | 4.3          | 10    |
| 3/4"      | 1/2"       | inch | 0.51      | 6.65   | 3.94     | 1.57  | 1.34  | 2.06  | 3.07  | 9.06   | 3.50   | 0.30 |          | 0.44  |       | 1.65  |       | 9.5          | 12    |
| DN25      | DN20       | mm   | 20.65     | 190.00 | 125.00   | 49.00 | 43.70 | 66.00 | 92.00 | 237.00 | 104.00 | 7.54 | 1/2" UNF | 14.30 | (F04) | 42.00 | M5X10 | 6.8          | 28    |
| 1"        | 3/4"       | inch | 0.81      | 7.48   | 4.92     | 1.93  | 1.72  | 2.60  | 3.62  | 9.33   | 4.09   | 0.30 |          | 0.56  |       | 1.65  |       | 15.0         | 32    |
| DN32      | DN25       | mm   | 193.00    | 187.00 | 133.00   | 49.00 | 51.50 | 69.50 | 96.00 | 237.00 | 119.00 | 8.71 | 1/2" UNF | 14.30 | (F05) | 50.00 | M6X12 | 9.5          | 49    |
| 1 1/4"    | 1"         | inch | 7.60      | 7.36   | 5.24     | 1.93  | 2.03  | 2.74  | 3.78  | 9.33   | 4.69   | 0.34 |          | 0.56  |       | 1.97  |       | 20.9         | 57    |

**Z28W****Z28P**

1/4"-1 1/4" | DN8-DN32 | CLASS 2500


 HP Floating Ball 3 Piece Up to **W** 260°C (500°F) | **P** 400°C (750°F)

### Components & materials



| Item | Description      | Material specification  | Qty. |
|------|------------------|---|------|
| 1    | Body             | Acc. Ordering Code  | 1    |
| 2A   | Downstream end   | Acc. Ordering Code  | 1    |
| 2B   | Upstream end     | Acc. Ordering Code  | 1    |
| 3    | Ball             | Acc. Ordering Code  | 1    |
| 4    | Stem             | Acc. Ordering Code  | 1    |
| 5A   | Downstream seat  | Acc. Ordering Code  | 1    |
| 5B   | Upstream seat    | Acc. Ordering Code  | 1    |
| 6*   | Body seal        | Graphite  | 2    |
| 6A   | Seat seal        | Graphite  | 1    |
| 7*   | Stem thrust seal | A479 316L Hardened with LTPN, B637 N07718 Inconel 718, Virgin peek, PCTFE | 2    |
| 8    | Stop pin         | S. Steel  | 1    |
| 9*   | Stem seal        | Graphite, CF PTFE, TFM  | 1    |

| Item | Description     | Material specification | Qty.  |
|------|-----------------|------------------------|-------|
| 10   | Follower        | S. Steel               | 1     |
| 10A  | Slide Bearing   | S. Steel               | 1     |
| 11   | Disc spring     | S. Steel               | 2     |
| 12   | Stem nut        | S. Steel               | 1     |
| 13   | Locking clip    | S. Steel               | 1     |
| 14   | Handle          | S. Steel               | 1     |
| 15   | Serrated washer | S. Steel               | 1     |
| 16   | Handle nut      | S. Steel               | 1     |
| 17   | Sleeve          | PVC                    | 1     |
| 18   | Body bolts      | S. Steel               | 12-16 |
| 22   |                 | S. Steel               | 1     |
| 23   | Tag (not shown) | S. Steel               | 1     |

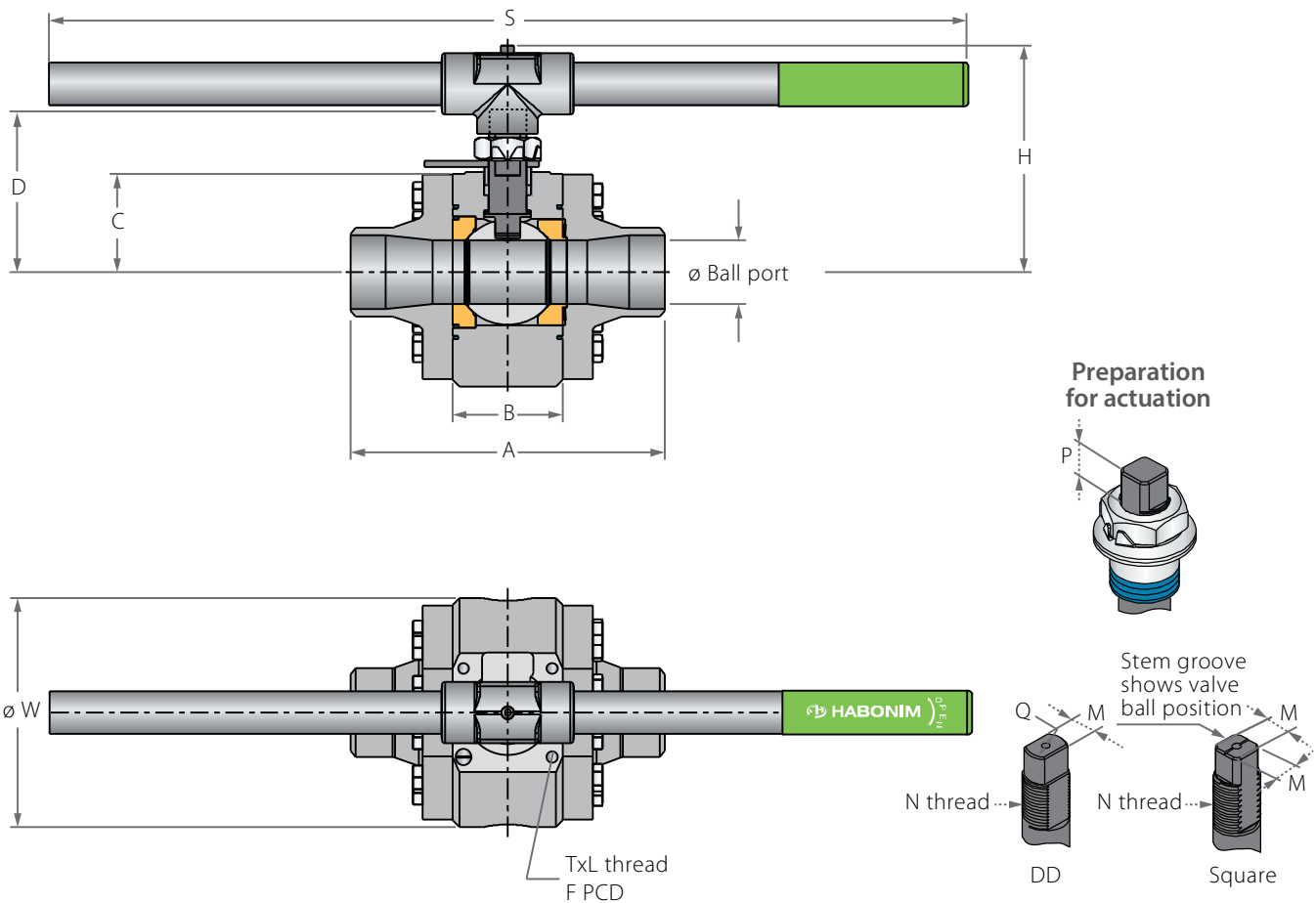
\* Repair kit components

**Z28W****Z28P**

1½"-6" | DN40-DN150 | CLASS 2500

HP Floating Ball 3 Piece Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Valve dimensions



| Std. port | Full port | Unit | Ball port | A      |          | B      | C      | D      | H      | S      | W      | M     | M (DD) | Q     | N            | P           | F      | TxL    | Weight kg/lb | Kv   |
|-----------|-----------|------|-----------|--------|----------|--------|--------|--------|--------|--------|--------|-------|--------|-------|--------------|-------------|--------|--------|--------------|------|
|           |           |      |           | Welded | Threaded |        |        |        |        |        |        |       |        |       |              |             |        |        |              | Cv   |
| DN40      | DN32      | mm   | 31.80     | 237.00 | 154.00   | 70.00  | 53.00  | 94.60  | 123.20 | 401    | 134.00 | -     | 13.90  | 20.00 | M20x2.5      | 14.25 (F07) | 70.00  | M8x12  | 14.5         | 69   |
| 1½"       | 1¼"       | inch | 1.25      | 9.33   | 6.06     | 2.76   | 2.09   | 3.72   | 4.85   | 15.79  | 5.28   | -     | 0.55   | 0.79  |              | 0.56        | 2.76   |        | 31.9         | 80   |
| DN50      | DN32      | mm   | 38.10     | 241.00 | 157.00   | 70.00  | 64.10  | 101.60 | 130.00 | 600.00 | 169.00 | -     | 13.90  | 20.00 | M20x2.5      | 13.80 (F07) | 70.00  | M8x12  | 22.0         | 102  |
| 2"        | 1¼"       | inch | 1.50      | 9.49   | 6.18     | 2.76   | 2.52   | 4.00   | 5.12   | 23.62  | 6.65   | -     | 0.55   | 0.79  |              | 0.54        | 2.76   |        | 48.4         | 118  |
| DN65      | DN50      | mm   | 51        | 302.00 | 194.00   | 94.00  | 87.50  | 134.00 | 174.50 | 401    | 197.00 | 18.90 | 15.90  | 22.70 | 1"-14 UNF-2A | 20.00 (F10) | 102.00 | M10x20 | 36.0         | 208  |
| 2½"       | 2"        | inch | 2.01      | 11.89  | 7.64     | 3.70   | 3.44   | 5.28   | 6.87   | 15.79  | 7.76   | 0.74  | 0.63   | 0.89  |              | 0.79        | 4.02   |        | 79.2         | 241  |
| DN80      | DN65      | mm   | 63.75     | 378.00 | 254.00   | 115.00 | 110.00 | 167.60 | -      | -      | 249.00 | 28.45 | 23.75  | 35.20 | 1"-12 UNF-2A | 22.25 (F12) | 125.00 | M12x20 | 76.0         | 300  |
| 3"        | 2½"       | inch | 2.51      | 14.88  | 10.00    | 4.53   | 4.33   | 6.60   | -      | -      | 9.80   | 1.12  | 0.94   | 1.39  |              | 0.88        | 4.92   |        | 167.2        | 348  |
| DN100     | DN80      | mm   | 80        | 410.00 | -        | 130.00 | 136.00 | 203.00 | -      | -      | 298.00 | 35.92 | 35.92  | 46.50 | 2"-8 UN-2A   | 30.00 (F14) | 140.00 | M16x20 | 110.0        | 615  |
| 4"        | 3"        | inch | 3.15      | 16.14  | -        | 5.12   | 5.35   | 7.99   | -      | -      | 11.73  | 1.41  | 1.41   | 1.83  |              | 1.18        | 5.51   |        | 242.0        | 713  |
| DN150     | DN100     | mm   | 100       | 510.00 | -        | 175.00 | 177.00 | 281.00 | -      | -      | 389.00 | 45.90 | 45.90  | 55.00 | 2¾"-8 UN-2A  | 40.00 (F16) | 165.00 | M20x30 | 235.0        | 872  |
| 6"        | 4"        | inch | 3.94      | 20.08  | -        | 6.89   | 6.97   | 11.06  | -      | -      | 15.31  | 1.81  | 1.81   | 2.17  |              | 1.57        | 6.50   |        | 517.0        | 1012 |



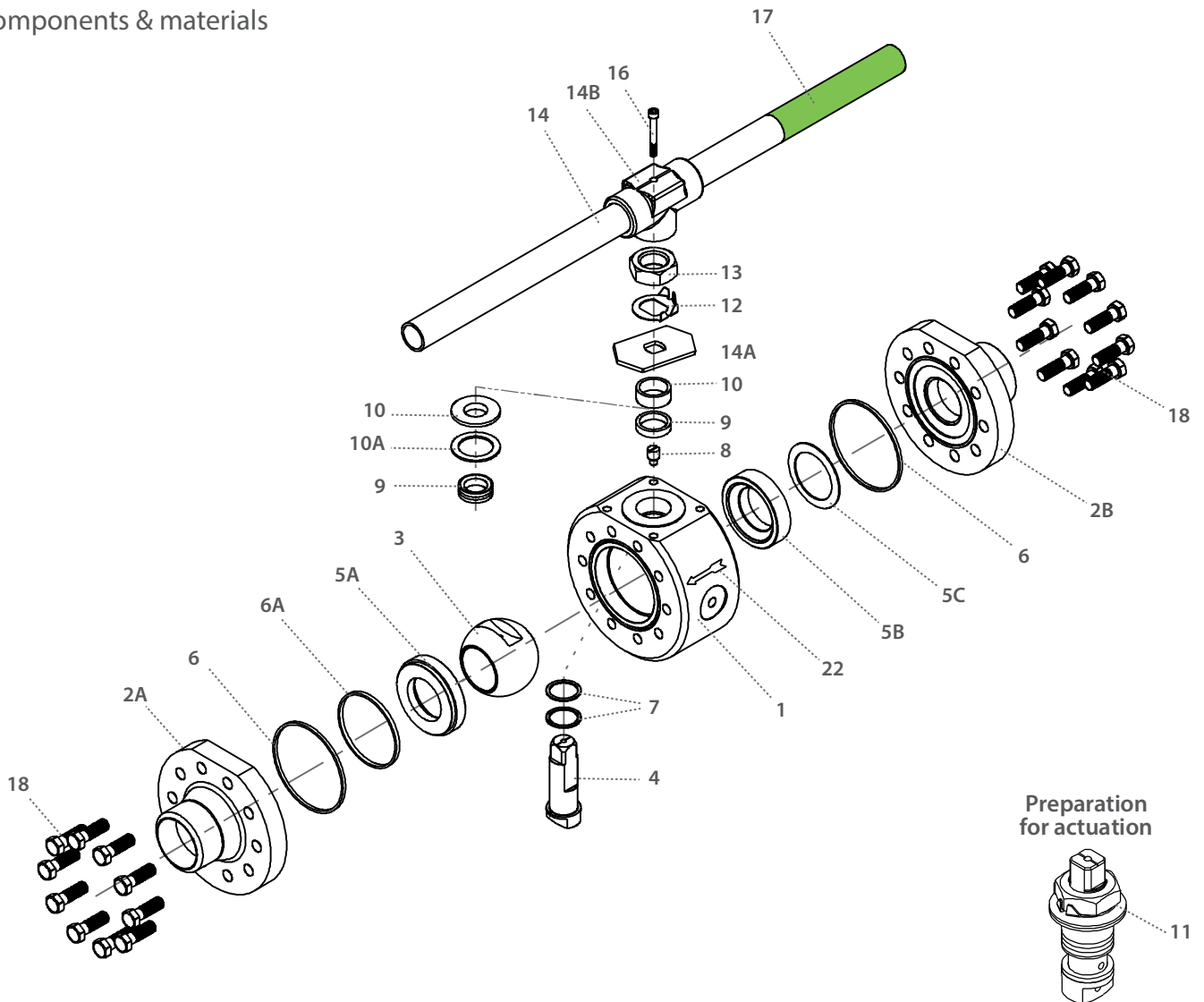
**Z28W****Z28P**

1½"-6" | DN40-DN150 | CLASS 2500



HP Floating Ball 3 Piece Up to **W** 260°C (500°F) | **P** 400°C (750°F)

### Components & materials



| Item | Description          | Material specification  | Qty. |
|------|----------------------|---|------|
| 1    | Body                 | Acc. Ordering Code  | 1    |
| 2A   | Downstream end       | Acc. Ordering Code  | 1    |
| 2B   | Upstream end         | Acc. Ordering Code  | 1    |
| 3    | Ball                 | Acc. Ordering Code  | 1    |
| 4    | Stem                 | Acc. Ordering Code  | 1    |
| 5A   | Dwonstream seat      | Acc. Ordering Code  | 1    |
| 5B   | Upstream end         | Acc. Ordering Code  | 1    |
| 5C   | Upstream seat spring | Acc. Ordering Code  | 1    |
| 6*   | Body seal            | Graphite  | 2    |
| 6A   | Seat seal            | Graphite  | 1    |
| 7*   | Stem thrust seal     | A479 316L Hardended with LTPN, B637 N07718 Inconel 718, Virgin peek,PCTFE | 2    |
| 8    | Stop pin             | S. Steel  | 1    |
| 9*   | Stem seal            | Graphite, CF PTFE, TFM  | 1    |
| 10A* | Slide Bearing        | S. Steel  | 1    |

| Item | Description     | Material specification | Qty.  |
|------|-----------------|------------------------|-------|
| 10   | Follower        | S. Steel               | 1     |
| 11   | Disc spring     | S. Steel               | 2     |
| 12   | Stem nut        | S. Steel               | 1     |
| 13   | Tab lock washer | S. Steel               | 1     |
| 14** | Handle          | S. Steel               | 1     |
| 14A  | Stop plate      | S. Steel               | 1     |
| 14B  | Wrench head     | S. Steel               | 1     |
| 16   | Wrench bolt     | S. Steel               | 1     |
| 17   | Sleeve          | PVC                    | 1     |
| 18   | Body bolts      | S. Steel               | 16-52 |
| 22   |                 | S. Steel               | 1     |
| 23   | Tag (not shown) | S. Steel               | 1     |

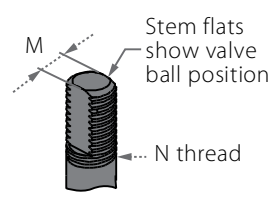
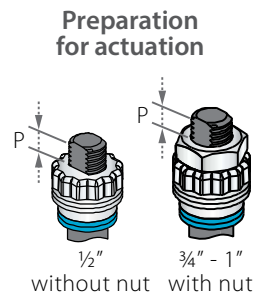
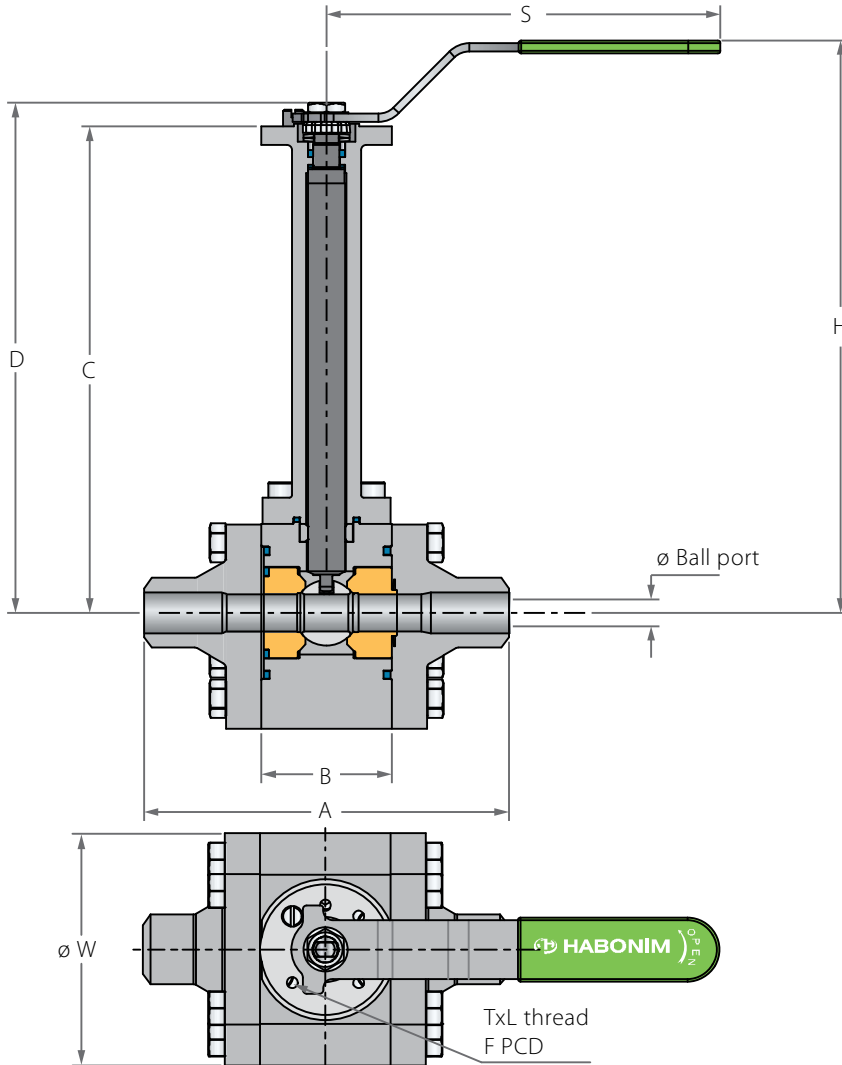
\* Repair kit components

\*\* Gear operator should be used for size 3" DN80 and above (handle components are not included)

# Z28M 1/4"-1 1/4" | DN85-DN32 | CLASS 2500

## High Temperature HP Floating Ball 3 Piece Up to 650°C (1200°F)

### Valve dimensions

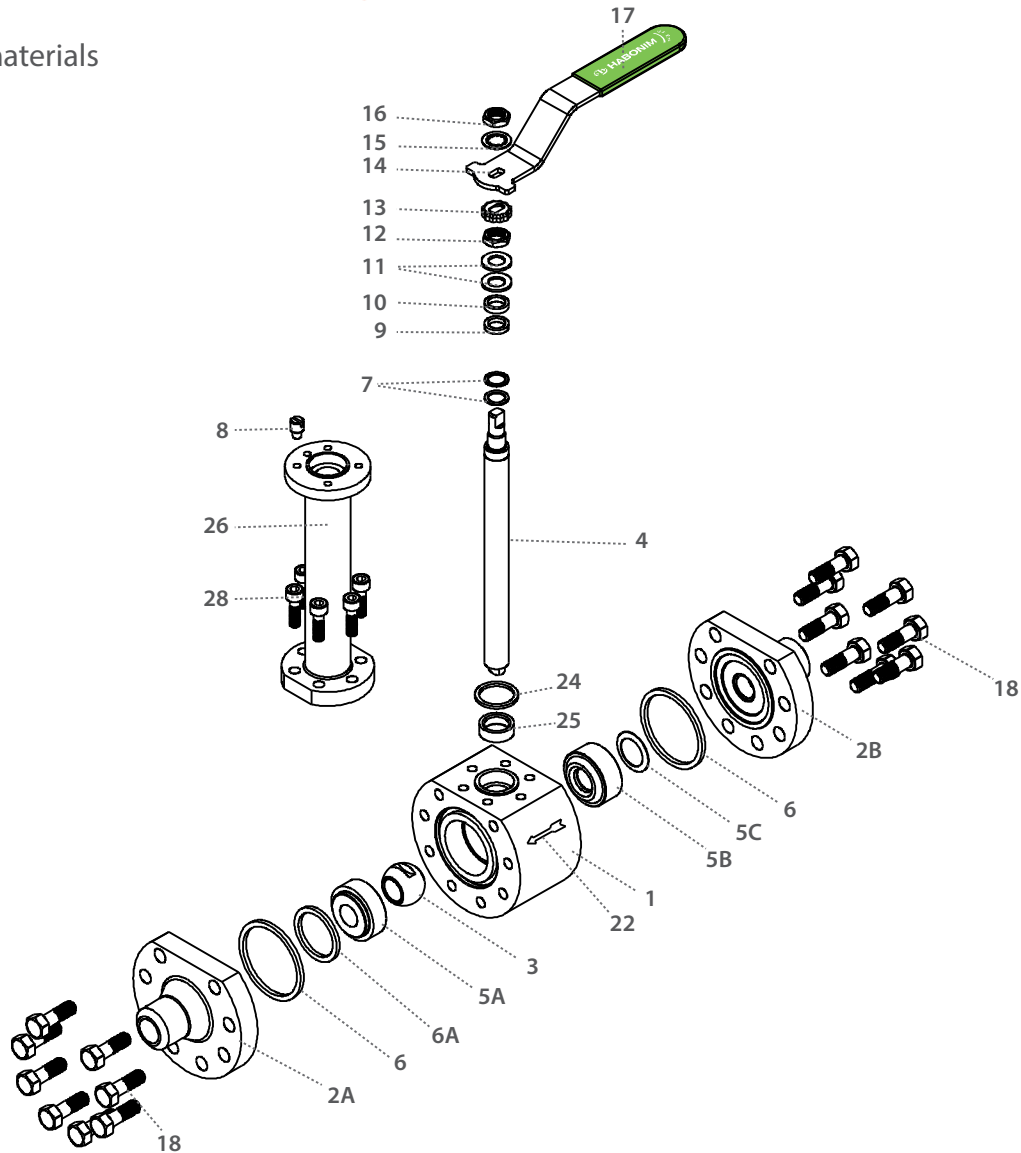


| Std. port | Full port  | Unit | Ball port | A      |          | B     | C      | D      | H      | S      | W      | M    | N        | P          | F     | W     | TxL  | Weight kg/lb | Kv Cv |
|-----------|------------|------|-----------|--------|----------|-------|--------|--------|--------|--------|--------|------|----------|------------|-------|-------|------|--------------|-------|
|           |            |      |           | Welded | Threaded |       |        |        |        |        |        |      |          |            |       |       |      |              |       |
| DN15      | DN8, DN10  | mm   | 11.15     | 174.00 | 107.00   | 50.00 | 182.00 | 191.00 | 216.00 | 150.00 | 69.50  | 5.54 | 1/2" UNF | 6.65 (F03) | 36.00 | M5X10 | 4.3  | 6.9          |       |
| 1/2"      | 1/4", 3/8" | inch | 0.44      | 6.85   | 4.21     | 1.97  | 7.17   | 7.52   | 8.50   | 5.91   | 2.74   | 0.22 | 1/2" UNF | 0.26       | 1.42  | M5X10 | 9.5  | 8.0          |       |
| DN20      | DN15       | mm   | 13.00     | 189.00 | 120.00   | 60.00 | 187.00 | 204.50 | 229.00 | 230.00 | 98.00  | 7.54 | 1/2" UNF | 7.40 (F04) | 42.00 | M5X10 | 5.0  | 10           |       |
| 3/4"      | 1/2"       | inch | 0.51      | 7.44   | 4.72     | 2.36  | 7.36   | 8.05   | 9.02   | 9.06   | 3.86   | 0.30 | 1/2" UNF | 0.29       | 1.65  | M5X10 | 11.0 | 12           |       |
| DN25      | DN20       | mm   | 20.65     | 209.00 | 144.00   | 68.00 | 196.50 | 226.00 | 252.00 | 237.00 | 109.00 | 7.54 | 1/2" UNF | 7.40 (F04) | 42.00 | M5X10 | 10.5 | 28           |       |
| 1"        | 3/4"       | inch | 0.81      | 8.23   | 5.67     | 2.68  | 7.74   | 8.90   | 9.92   | 9.33   | 4.29   | 0.30 | 1/2" UNF | 0.29       | 1.65  | M5X10 | 23.1 | 32           |       |
| DN32      | DN25       | mm   | 193.00    | 225.00 | 152.00   | 68.00 | 204.50 | 233.00 | 260.00 | 237.00 | 128.00 | 8.71 | 1/2" UNF | 8.50 (F05) | 50.00 | M6X12 | 13.0 | 49           |       |
| 1 1/4"    | 1"         | inch | 7.60      | 8.86   | 5.98     | 2.68  | 8.05   | 9.17   | 10.24  | 9.33   | 5.04   | 0.34 | 1/2" UNF | 0.33       | 1.97  | M6X12 | 28.6 | 57           |       |



## High Temperature HP Floating Ball 3 Piece Up to 650°C (1200°F)

### Components & materials



| Item | Description          | Material specification                                 | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code                                     | 1    |
| 2A   | Downstream end       | Acc. Ordering Code                                     | 1    |
| 2B   | Upstream end         | Acc. Ordering Code                                     | 1    |
| 3    | Ball                 | Acc. Ordering Code                                     | 1    |
| 4    | Stem                 | Acc. Ordering Code                                     | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code                                     | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code                                     | 1    |
| 5C   | Upstream seat spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 2    |
| 6A*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L, Hardened with LTPN, B637 N07718 Inconel 718 | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite   | 1    |
| 10   | Follower             | S. Steel   | 1    |

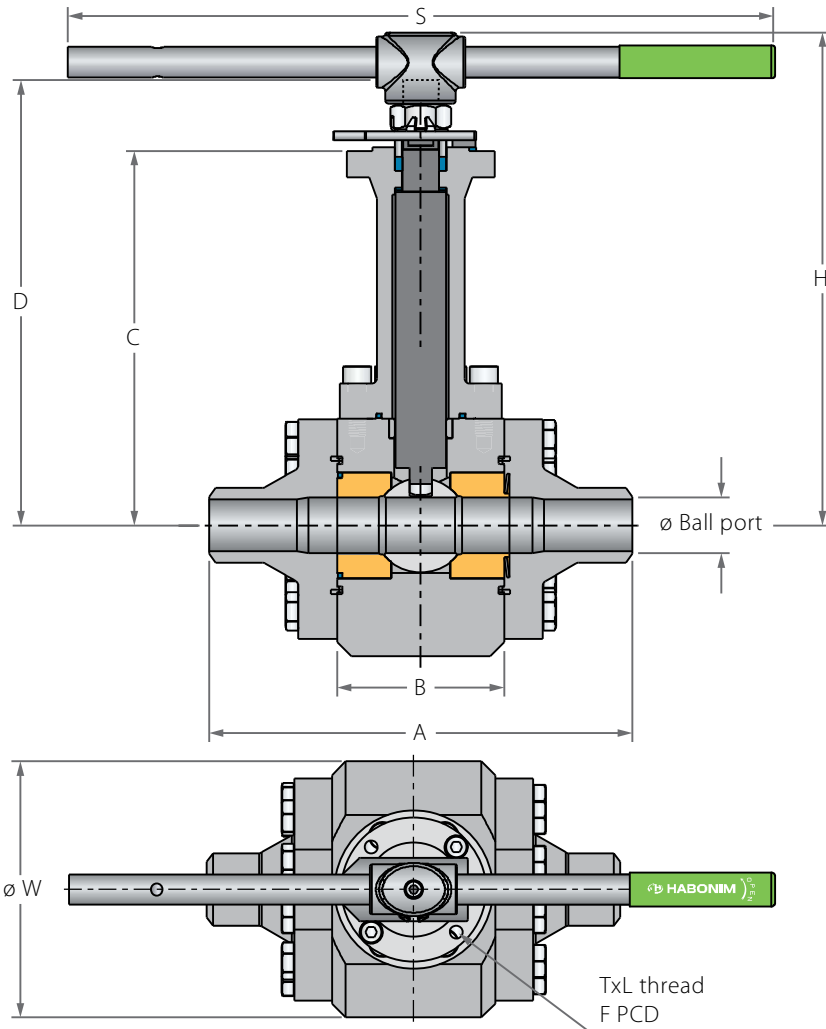
| Item | Description     | Material specification | Qty.  |
|------|-----------------|------------------------|-------|
| 11   | Disc spring     | S. Steel               | 2     |
| 12   | Stem nut        | S. Steel               | 1     |
| 13   | Locking clip    | S. Steel               | 1     |
| 14   | Handle          | S. Steel               | 1     |
| 15   | Serrated washer | S. Steel               | 1     |
| 16   | Handle nut      | S. Steel               | 1     |
| 17   | Sleeve          | PVC                    | 1     |
| 18   | Body bolts      | S. Steel               | 12-16 |
| 22   |                 | S. Steel               | 1     |
| 23   | Tag (not shown) | S. Steel               | 1     |
| 24   | Bonnet seal     | Graphite               | 1     |
| 25   | Stem Bearing    | S. Steel               | 1     |
| 26   | Bonnet          | S. Steel               | 1     |
| 28   | Bonnet bolts    | S. Steel               | 6     |

\* Repair kit components

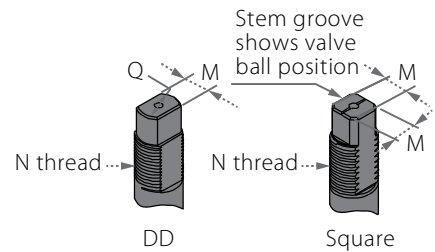
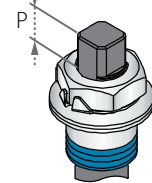
# Z28M 1½"-6" | DN40-DN150 | CLASS 2500

## High Temperature HP Floating Ball 3 Piece Up to 650°C (1200°F)

### Valve dimensions



### Preparation for actuation

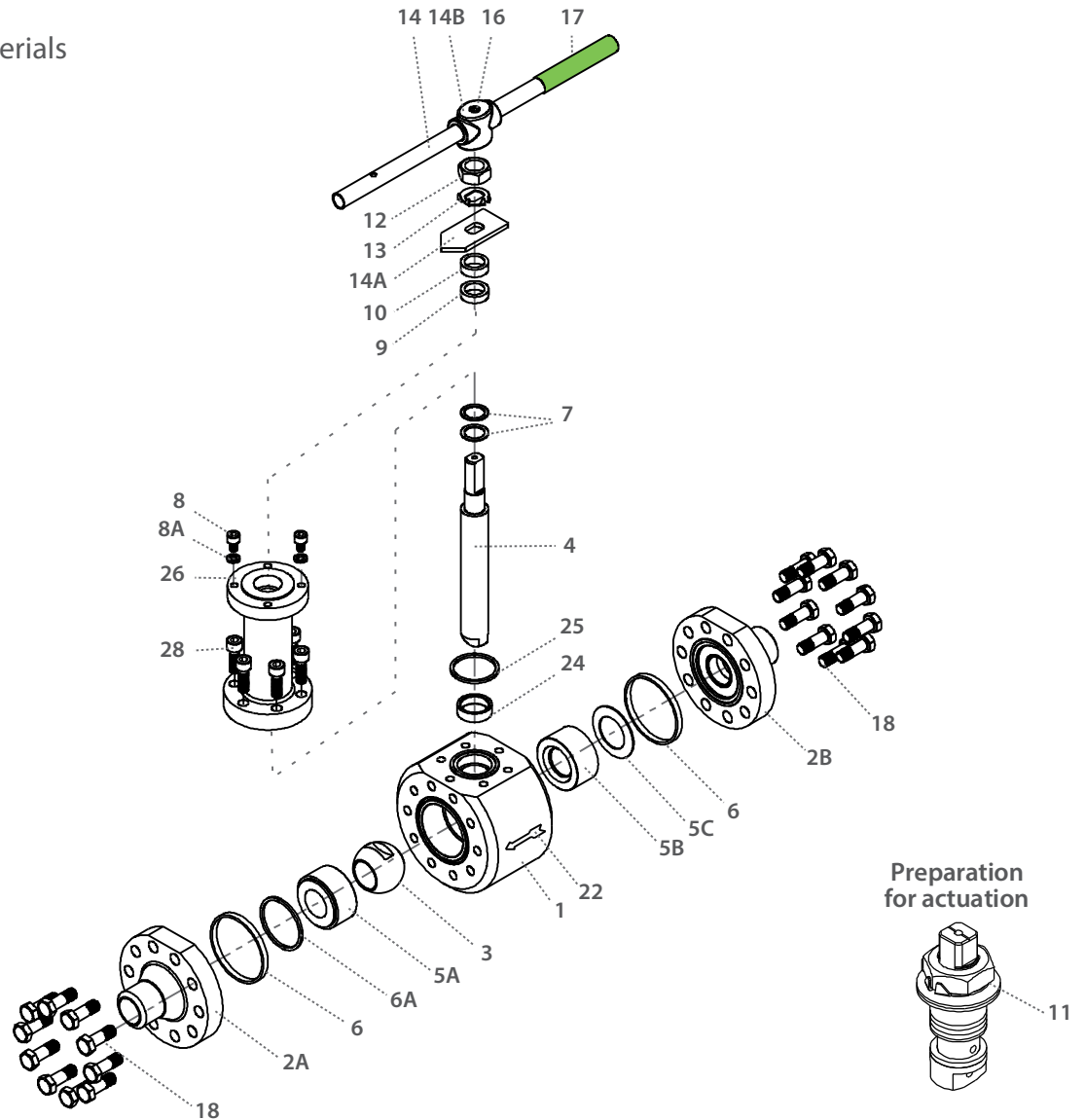


| Std. port | Full port | Unit | Ball port | A      |          | B      | C      | D      | H      | S      | W      | M     | MDD   | Q     | N              | P     | F     | W      | TxL    | Weight kg/lb | Kv   |
|-----------|-----------|------|-----------|--------|----------|--------|--------|--------|--------|--------|--------|-------|-------|-------|----------------|-------|-------|--------|--------|--------------|------|
|           |           |      |           | Welded | Threaded |        |        |        |        |        |        |       |       |       |                |       |       |        |        |              | Cv   |
| DN40      | DN32      | mm   | 31.80     | 237.00 | 154.00   | 95.00  | 205.80 | 247.40 | 283.00 | 401    | 145.00 | -     | 13.90 | 20.00 | M20x2.5        | 14.60 | (F07) | 70.00  | M8x12  | 25           | 69   |
| 1½"       | 1¼"       | inch | 1.25      | 9.33   | 6.06     | 3.74   | 8.10   | 9.74   | 11.14  | 15.79  | 5.71   | -     | 0.55  | 0.79  |                | 0.57  |       | 2.76   |        | 55.0         | 80   |
| DN50      | DN40      | mm   | 38.10     | 241.00 | 157.00   | 105.00 | 257.80 | 299.40 | 335.00 | 600.00 | 215.00 | -     | 13.90 | 20.00 | M20x2.5        | 14.60 | (F07) | 70.00  | M8x12  | 50           | 102  |
| 2"        | 1½"       | inch | 1.50      | 9.49   | 6.18     | 4.13   | 10.15  | 11.79  | 13.19  | 23.62  | 8.46   | -     | 0.55  | 0.79  |                | 0.57  |       | 2.76   |        | 110.0        | 118  |
| DN65      | DN50      | mm   | 51        | 302.00 | 194.00   | 125.00 | 275.00 | 344.50 | 384.50 | 401.00 | 240.00 | 18.90 | 15.90 | 22.70 | 1"-14 UNF-2A   | 16.70 | (F10) | 102.00 | M10x20 | 80           | 208  |
| 2½"       | 2"        | inch | 2.01      | 11.89  | 7.64     | 4.92   | 10.83  | 13.56  | 15.14  | 15.79  | 9.45   | 0.74  | 0.63  | 0.89  |                | 0.66  |       | 4.02   |        | 176.0        | 241  |
| DN80      | DN65      | mm   | 63.75     | 378.00 | 254.00   | 140.00 | 292.80 | 362.30 | -      | -      | 265.00 | 28.45 | 23.75 | 35.20 | 1 ½"-12 UNF-2A | 26.20 | (F12) | 125.00 | M12x20 | 125          | 300  |
| 3"        | 2½"       | inch | 2.51      | 14.88  | 10.00    | 5.51   | 11.53  | 14.26  | -      | -      | 10.43  | 1.12  | 0.94  | 1.39  |                | 1.03  |       | 4.92   |        | 275.0        | 348  |
| DN100     | DN80      | mm   | 80        | 410.00 | N/A      | 140.00 | 395.00 | 507.70 | -      | -      | 310.00 | 35.92 | 35.92 | 46.50 | 2"-8 UN-2A     | 40.00 | (F14) | 140.00 | M16x20 | 175          | 615  |
| 4"        | 3"        | inch | 3.15      | 16.14  | N/A      | 5.51   | 15.55  | 19.99  | -      | -      | 12.20  | 1.41  | 1.41  | 1.83  |                | 1.57  |       | 5.51   |        | 385.0        | 713  |
| DN150     | DN100     | mm   | 100       | 510.00 | N/A      | 195.00 | 480.00 | 281.00 | -      | -      | 395.00 | 45.90 | 45.90 | 55.00 | 2¾"-8 UN-2A    | 50.00 | (F16) | 165.00 | M20x30 | 435          | 872  |
| 6"        | 4"        | inch | 3.94      | 20.08  | N/A      | 7.68   | 18.90  | 11.06  | -      | -      | 15.55  | 1.81  | 1.81  | 2.17  |                | 1.97  |       | 6.50   |        | 957.0        | 1012 |



## High Temperature HP Floating Ball 3 Piece Up to 650°C (1200°F)

### Components & materials



| Item | Description          | Material specification                                 | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code                                     | 1    |
| 2A   | Downstream end       | Acc. Ordering Code                                     | 1    |
| 2B   | Upstream end         | Acc. Ordering Code                                     | 1    |
| 3    | Ball                 | Acc. Ordering Code                                     | 1    |
| 4    | Stem                 | Acc. Ordering Code                                     | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code                                     | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code                                     | 1    |
| 5C   | Upstream seat spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 2    |
| 6B*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L, Hardened with LTPN, B637 N07718 Inconel 718 | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite   | 1    |
| 10   | Follower             | S. Steel   | 1    |
| 11   | Disc spring          | S. Steel   | 2    |

| Item | Description                         | Material specification | Qty.  |
|------|-------------------------------------|------------------------|-------|
| 12   | Stem nut                            | S. Steel               | 1     |
| 13   | Tab lock washer                     | S. Steel               | 1     |
| 14** | Handle                              | S. Steel               | 1     |
| 14A  | Stop plate                          | S. Steel               | 1     |
| 14B  | Wrench head                         | S. Steel               | 1     |
| 16   | Wrench bolt                         | S. Steel               | 1     |
| 17   | Sleeve                              | PVC                    | 1     |
| 18   | Body bolts                          | S. Steel               | 16-52 |
| 22   | Arrow <b>Arrow</b> <del>Arrow</del> | S. Steel               | 1     |
| 23   | Tag (not shown)                     | S. Steel               | 1     |
| 24   | Bonnet seal                         | Graphite               | 1     |
| 25   | Stem Bearing                        | S. Steel               | 1     |
| 26   | Bonnet                              | S. Steel               | 1     |
| 28   | Bonnet bolts                        | S. Steel               | 6-12  |

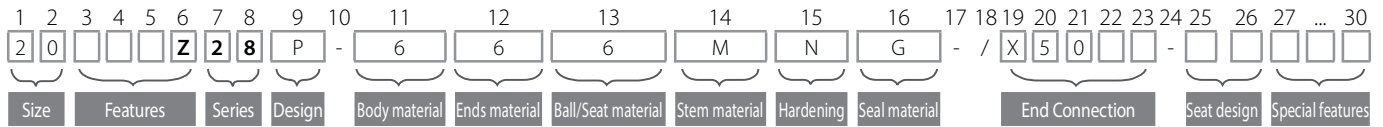
\* Repair kit components

\*\* Gear operator should be used for size 3" DN80 and above (handle components are not included)



# High Temperature - Ordering Code System

"Mandatory option" options are marked with **green background** | "Standard offer" options are marked with **light green background**



| Size (1-2) |      |     |
|------------|------|-----|
| Code       | inch | mm  |
| 02         | ¼"   | 8   |
| 03         | ⅜"   | 10  |
| 05         | ½"   | 15  |
| 07         | ¾"   | 20  |
| 10         | 1"   | 25  |
| 12         | 1¼"  | 32  |
| 15         | 1½"  | 40  |
| 20         | 2"   | 50  |
| 25         | 2½"  | 65  |
| 30         | 3"   | 80  |
| 40         | 4"   | 100 |
| 60         | 6"   | 150 |
| 80*        | 8"   | 200 |

\* std. port only

| Features (3-6) |                 |
|----------------|-----------------|
| Z              | Metal seats     |
| B              | Full Port       |
| N              | Control service |

| Series (7-8) |                          |
|--------------|--------------------------|
| 28           | HP Floating ball 3 piece |

| Design (9) |  |
|------------|--|
| P          | -60°C to 400°C (-76°F to 752°F)  |
| W          | -60°C to 260°C (-76°F to 500°F)<br>HermetiX stem seal                            |
| M          | -60°C to 650°C<br>(-76°F to 1200°F) - available<br>with H/J valve materials only |

| Body & ends material (11-12) |      |
|------------------------------|------|
| 6                            | CF8M |
| F                            | LF2  |
| H*                           | 321H |
| J*                           | F22  |

\* For M design only

| Ball/Seat material (13) |               |
|-------------------------|---------------|
| 6                       | St. Steel     |
| 7*                      | Monel         |
| D**                     | Duplex        |
| K**                     | Super duplex  |
| N***                    | St. Steel 410 |

\* Up to 475°C (887°F)

\*\* Up to 315°C (600°F)

\*\*\* For O hardening only

| Stem material (14) |                        |
|--------------------|------------------------|
| M                  | High Strength S. Steel |
| Z                  | Inconel 718            |

| Hardening (15) |   |
|----------------|---|
| I              | Cr3C2- Chromium Carbide<br>with Nickel Chrome binder-<br>HVOF technique |
| O              | WC-Co- Tungsten Carbide<br>with Coblat binder- HVOF<br>technique        |

| Seal Material (16) |                   |
|--------------------|-------------------|
| G                  | Expanded graphite |
| B                  | NBR sh. 90        |
| V                  | Viton Sh. 70      |
| K                  | FFKM              |

| End connections (19-23) |                                      |
|-------------------------|--------------------------------------|
| Welded Ends             |                                      |
| XBW160*                 | Extended butt weld ends (sch160)     |
| XSW                     | Extended socket weld ends            |
| SW                      | Socket weld ends                     |
| BW80                    | butt weld ends (sch80)               |
| BW160*                  | butt weld ends (sch160)              |
| XBW80                   | Extended butt weld ends (sch80)      |
| XBWXS*                  | Extended butt weld ends (sch<br>XXS) |

| Threaded Ends |   |
|---------------|---|
| NPT           | ASME B1.20.1 -<br>National Pipe Taper thread          |
| BSPT          | EN 10226 - Pipe Taper thread                          |
| BSPP          | ISO228-1,<br>DIN3852 - Pipe Parallel thread           |
| DIN3852       | DIN3852 - Pipe Parallel thread                        |
| AS5202        | AS 5202 on-face gasket sealing<br>threaded connection |

| Flanged  |                      |
|----------|----------------------|
| 1500     | ANSI B16.5 #1500 RF  |
| 2500     | ANSI B16.5 #2500 RF  |
| PN160-F3 | EN1092 PN160, FTF F3 |
| PN250-F3 | EN1092 PN250, FTF F3 |
| PN320-F3 | EN1092 PN320, FTF F3 |
| PN400-F3 | EN1092 PN400, FTF F3 |

| Flanged RTJ |                      |
|-------------|----------------------|
| 1500RTJ     | ANSI B16.5 #1500 RTJ |
| 2500RTJ     | ANSI B16.5 #2500 RTJ |

| Flanged SAE J518 / ISO 6162 Threaded |                              |
|--------------------------------------|------------------------------|
| SAE3000                              | Code 61/ISO 6162-1 Flat face |
| SAE6000                              | Code 62/ISO 6162-2 Flat face |

\* Std. port only

| Seat design (25-26) |                    |
|---------------------|--------------------|
| Blank               | Type A seat design |
| TB                  | Type B seat design |
| TC                  | Type C seat design |
| TD                  | Type D seat design |

| Special Features (27-30) |  |
|--------------------------|--|
| RTJ                      | Ring Type Joint                          |
| Vxx                      | Characterized control ball<br>xx = angle |

Z73

Z74

Z77

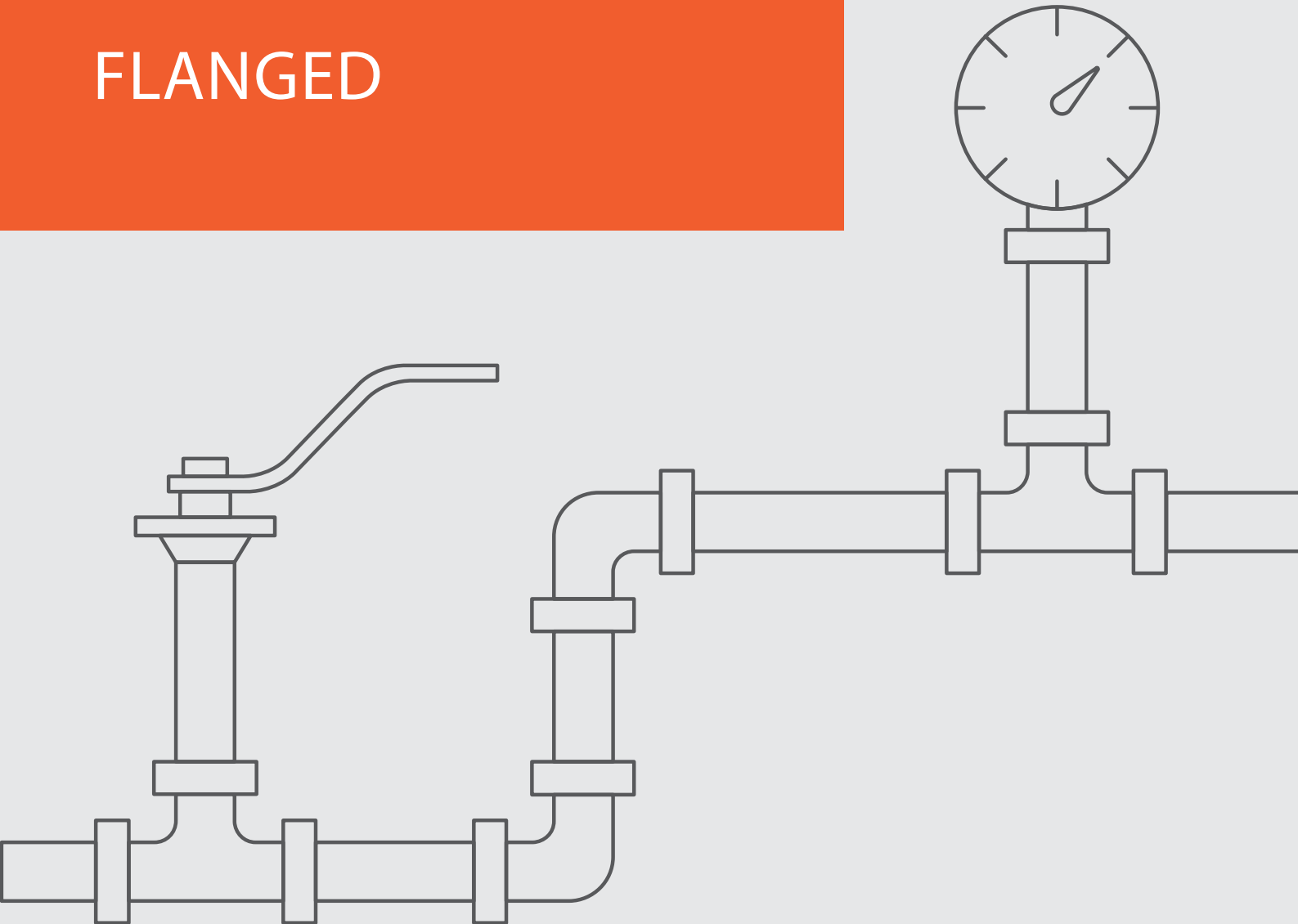
Z78



High Temp. Valves

# FLOATING BALL

FLANGED



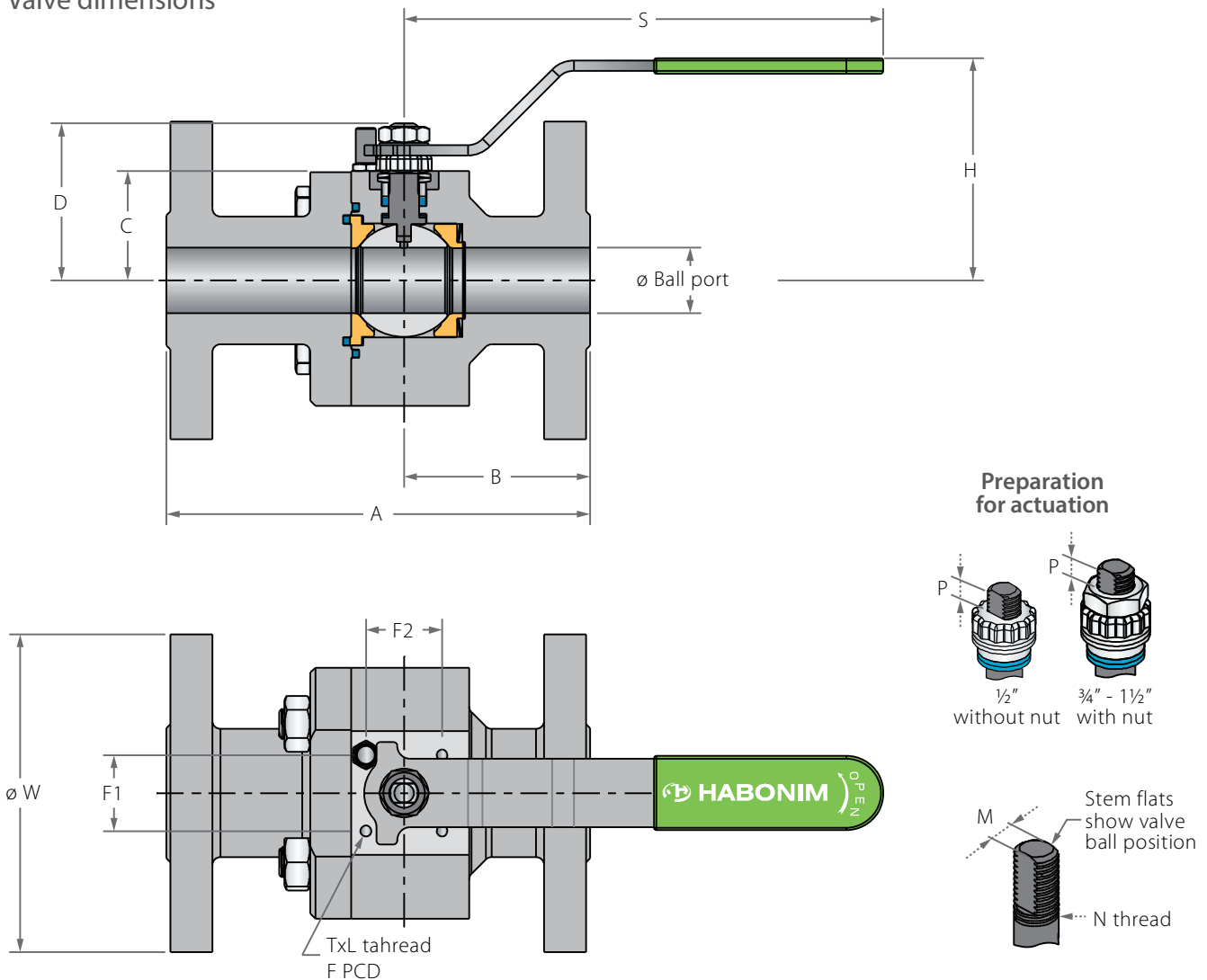
**Z73W****Z74W****Z73P****Z74P**

1/2"-1 1/2" | DN15-DN40

CLASS 150/300

Floating Ball Flanged Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Valve dimensions



| Std. port | Unit | Ball port | A      |        | B     |       | C     | D     | H      | S      | W      |        | M    | N         | P          | F     | TxL   | Weight kg/lb |    | Kv Cv |
|-----------|------|-----------|--------|--------|-------|-------|-------|-------|--------|--------|--------|--------|------|-----------|------------|-------|-------|--------------|----|-------|
|           |      |           | 150    | 300    | 150   | 300   |       |       |        |        | 150    | 300    |      |           |            |       |       |              |    |       |
| DN15      | mm   | 14.30     | 108.00 | 139.70 | 49.00 | 60.00 | 29.40 | 40.40 | 92.00  | 151.00 | 89.00  | 95.00  | 5.54 | 1/2" UNF  | 6.65 (F03) | 36.00 | M5x10 | 2.70         | 4  | 28    |
| 1/2"      | inch | 0.56      | 4.25   | 5.50   | 1.93  | 2.36  | 1.16  | 1.59  | 3.62   | 5.94   | 3.50   | 3.74   | 0.22 | 1/2" UNF  | 0.26       | 1.42  | M5x10 | 6.00         | 9  | 32    |
| DN20      | mm   | 20.65     | 117.00 | 152.00 | 58.00 | 65.00 | 38.20 | 55.70 | 103.50 | 170.00 | 98.00  | 117.00 | 7.54 | 3/4" UNF  | 7.40 (F04) | 42.00 | M5x10 | 4.00         | 5  | 46    |
| 3/4"      | inch | 0.81      | 4.61   | 5.98   | 2.28  | 2.56  | 1.50  | 2.19  | 4.07   | 6.69   | 3.86   | 4.61   | 0.30 | 3/4" UNF  | 0.29       | 1.65  | M5x10 | 8.80         | 12 | 53    |
| DN25      | mm   | 25.50     | 127.00 | 165.00 | 55.00 | 73.00 | 42.65 | 60.20 | 108.00 | 170.00 | 108.00 | 124.00 | 7.54 | 7/16" UNF | 7.40 (F04) | 42.00 | M5x10 | 5.40         | 7  | 80    |
| 1"        | inch | 1.00      | 5.00   | 6.50   | 2.17  | 2.87  | 1.68  | 2.37  | 4.25   | 6.69   | 4.25   | 4.88   | 0.30 | 7/16" UNF | 0.29       | 1.65  | M5x10 | 11.90        | 15 | 93    |
| DN40      | mm   | 38.10     | 165.00 | 190.00 | 68.00 | 80.40 | 48.20 | 77.70 | 124.00 | 220.50 | 127.00 | 156.00 | 8.71 | 1/2" UNF  | 8.50 (F05) | 50.00 | M6x12 | 7.20         | 10 | 220   |
| 1 1/2"    | inch | 1.50      | 6.50   | 7.48   | 2.68  | 3.17  | 1.90  | 3.06  | 4.88   | 8.68   | 5.00   | 6.14   | 0.34 | 1/2" UNF  | 0.33       | 1.97  | M6x12 | 15.90        | 23 | 255   |



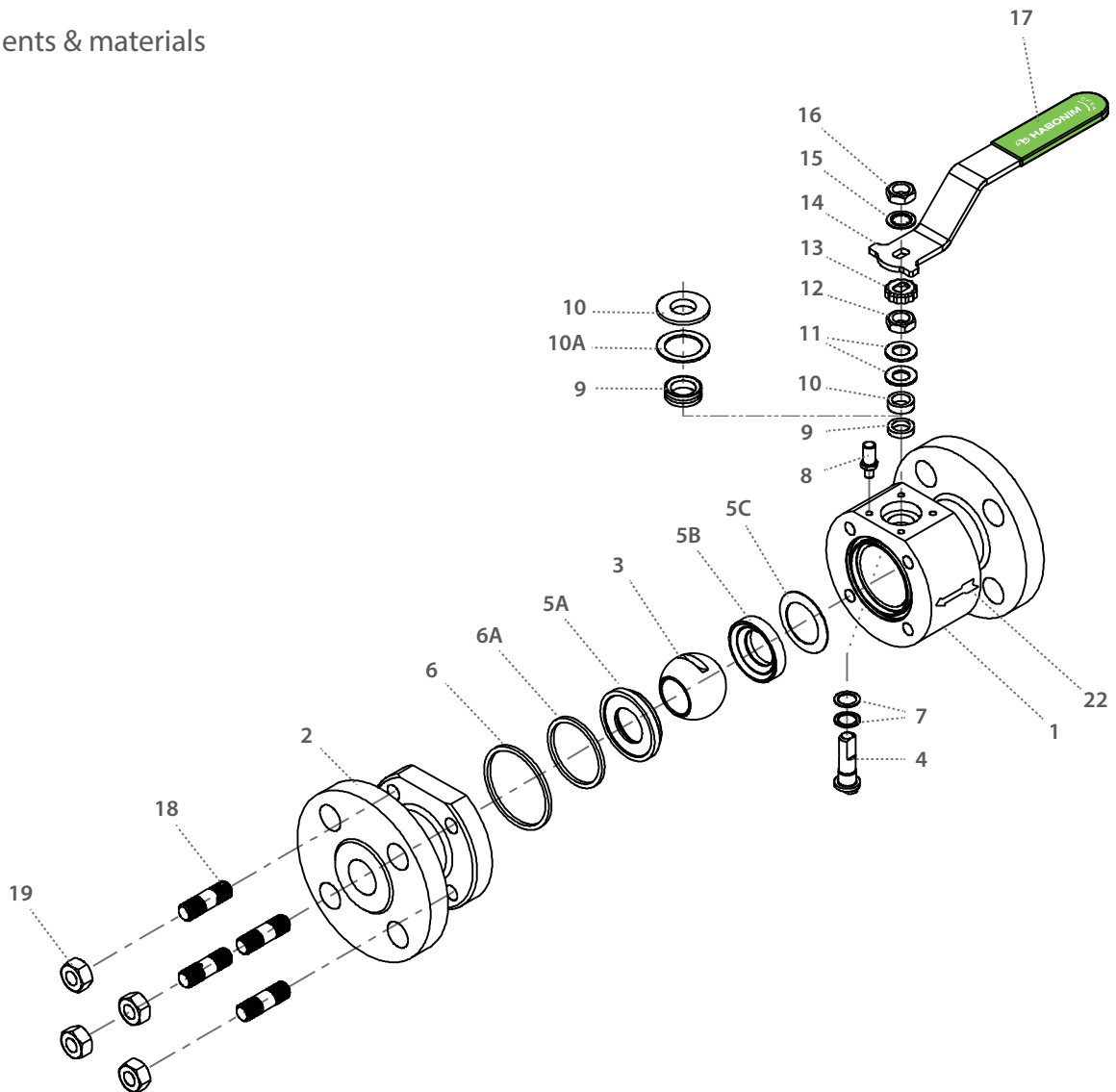
**Z73W****Z74W****Z73P****Z74P**

1/2"-1 1/2" | DN15-DN40

CLASS 150/300

Floating Ball Flanged Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Components &amp; materials



| Item | Description          | Material specification  | Qty. |
|------|----------------------|---|------|
| 1    | Body                 | Acc. Ordering Code  | 1    |
| 2    | End                  | Acc. Ordering Code  | 1    |
| 3    | Ball                 | Acc. Ordering Code  | 1    |
| 4    | Stem                 | Acc. Ordering Code  | 1    |
| 5A   | Upstream seat        | Acc. Ordering Code  | 1    |
| 5B   | Downstream seat      | Acc. Ordering Code  | 1    |
| 5C   | Upstream disc spring | Inconel 718   | 1    |
| 6*   | Body seal            | Graphite  | 1    |
| 6A*  | Seat seal            | Graphite  | 1    |
| 7*   | Stem thrust seal     | A479 316L Hardended with LTPN, B637 N07718 Inconel 718, Virgin peek,PCTFE | 2    |
| 8    | Stop pin             | S. Steel  | 1    |
| 9*   | Stem seal            | Graphite, CF PTFE, TFM  | 1    |
| 10   | Follower             | S. Steel  | 1    |

| Item | Description      | Material specification | Qty. |
|------|------------------|------------------------|------|
| 10A* | Slide Bearing    | S. Steel               | 1    |
| 11   | Disc spring      | S. Steel               | 2    |
| 12   | Stem nut         | S. Steel               | 1    |
| 13   | Locking clip     | S. Steel               | 1    |
| 14   | Handle           | S. Steel               | 1    |
| 15   | Serrated washer  | S. Steel               | 1    |
| 16   | Handle nut       | S. Steel               | 1    |
| 17   | Sleeve           | PVC                    | 1    |
| 18   | Body bolts/studs | S. Steel               | 4    |
| 19   | Body nuts        | S. Steel               | 4    |
| 22   | Arrow flow       | S. Steel               | 1    |
| 23   | Tag (not shown)  | S. Steel               | 1    |

\* Repair kit components

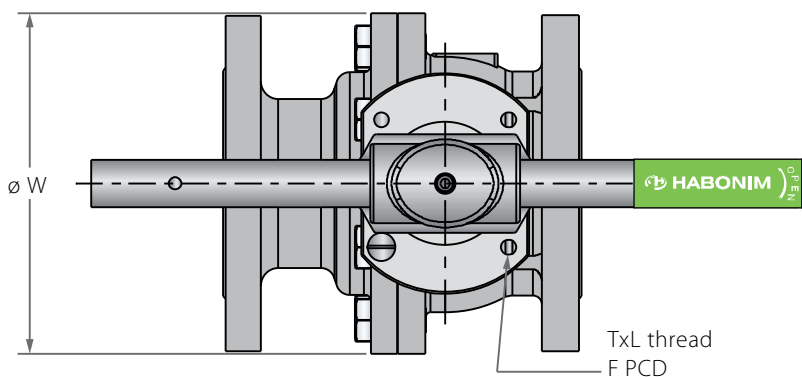
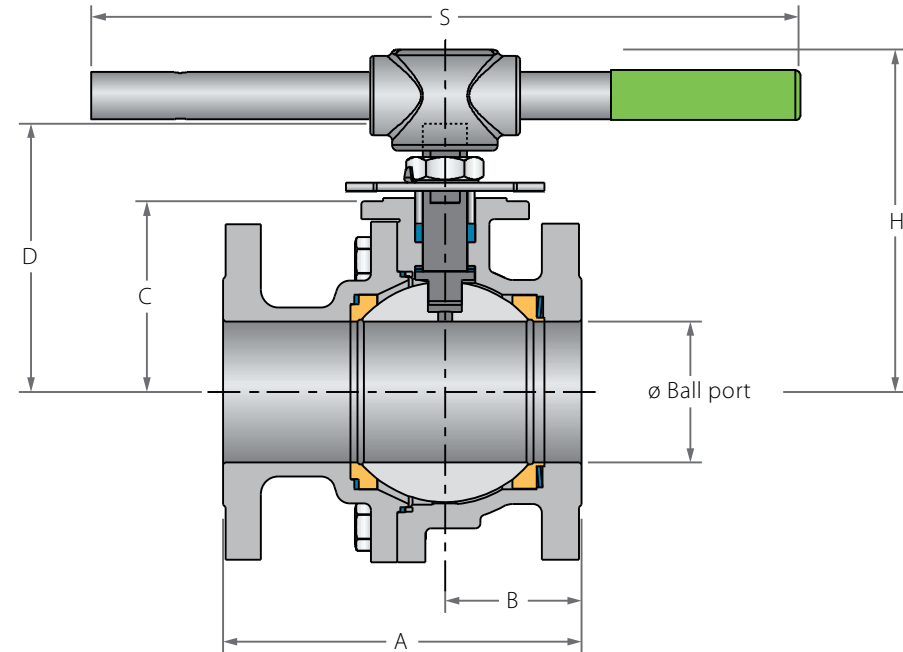
**Z73W****Z74W****Z73P****Z74P**

2"-8" | DN50-DN200

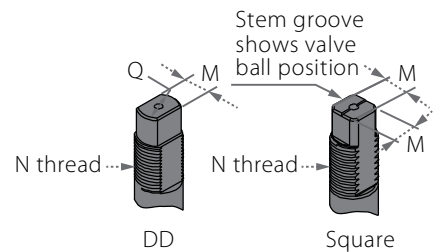
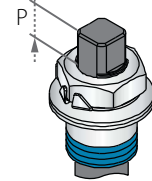
CLASS 150/300

Floating Ball Flanged Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Valve dimensions



## Preparation for actuation



| Std. port | Unit | Ball port | A      |        | B      |        | C      | D      | H      | S      | W      |        | M     | M (DD) | Q     | N       | P           | F      | TxL    | Weight kg/lb |     | Kv Cv |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|-------|---------|-------------|--------|--------|--------------|-----|-------|
|           |      |           | 150    | 300    | 150    | 300    |        |        |        |        | 150    | 300    |       |        |       |         |             |        |        |              |     |       |
| DN50      | mm   | 50.05     | 178.00 | 216.00 | 69.00  | 75.10  | 70.00  | 111.60 | 137.30 | 256.00 | 152.00 | 165.00 | -     | 13.90  | 20.00 | M20x2.5 | 14.60 (F07) | 70.00  | M8x12  | 11           | 14  | 430   |
| 2"        | inch | 1.97      | 7.01   | 8.50   | 2.72   | 2.96   | 2.76   | 4.39   | 5.41   | 10.08  | 5.98   | 6.50   | -     | 0.55   | 0.79  |         | 0.57        | 2.76   |        | 25           | 31  | 499   |
| DN80      | mm   | 80.00     | 203.00 | 282.50 | 77.50  | 96.40  | 108.00 | 154.60 | 194.80 | 610.00 | 191.00 | 210.00 | 18.90 | 15.90  | 22.70 | 1"-14   | 16.70 (F10) | 102.00 | M10x20 | 22           | 28  | 1000  |
| 3"        | inch | 3.15      | 7.99   | 11.12  | 3.05   | 3.80   | 4.25   | 6.09   | 7.67   | 24.00  | 7.52   | 8.27   | 0.74  | 0.63   | 0.89  | UNF-2A  | 0.66        | 4.02   |        | 48           | 62  | 1160  |
| DN100     | mm   | 100.00    | 228.50 | 304.80 | 84.50  | 104.50 | 124.00 | 210.80 | -      | -      | 230.00 | 254.00 | 18.90 | 15.90  | 22.70 | 1"-14   | 16.70 (F10) | 102.00 | M12x20 | 39           | 44  | 1830  |
| 4"        | inch | 3.94      | 9.00   | 12.00  | 3.33   | 4.11   | 4.88   | 8.30   | -      | -      | 9.06   | 10.00  | 0.74  | 0.63   | 0.89  | UNF-2A  | 0.66        | 4.02   |        | 86           | 98  | 2123  |
| DN150     | mm   | 150.00    | 394.00 | 403.50 | 163.50 | 174.50 | 179.00 | 248.50 | -      | -      | 328.00 | 328.00 | 28.45 | 23.75  | 35.20 | 1½"-12  | 26.20 (F12) | 125.00 | M12x20 | 82           | 100 | 4380  |
| 6"        | inch | 5.91      | 15.51  | 15.89  | 6.44   | 6.87   | 7.05   | 9.78   | -      | -      | 12.91  | 12.91  | 1.12  | 0.94   | 1.39  | UNF-2A  | 1.03        | 4.92   |        | 181          | 220 | 5081  |
| DN200     | mm   | 200.00    | 457.20 | 501.80 | 242.50 | 240.70 | 241.00 | 353.70 | -      | -      | 450.00 | 450.00 | 35.92 | 35.92  | 46.50 | 2"-8    | 37.50 (F14) | 140.00 | M16x30 | 190          | 225 | 8070  |
| 8"        | inch | 7.87      | 18.00  | 19.75  | 9.55   | 9.48   | 9.49   | 13.93  | -      | -      | 17.72  | 17.72  | 1.41  | 1.41   | 1.83  | UN-2A   | 1.48        | 5.51   |        | 419          | 496 | 9361  |

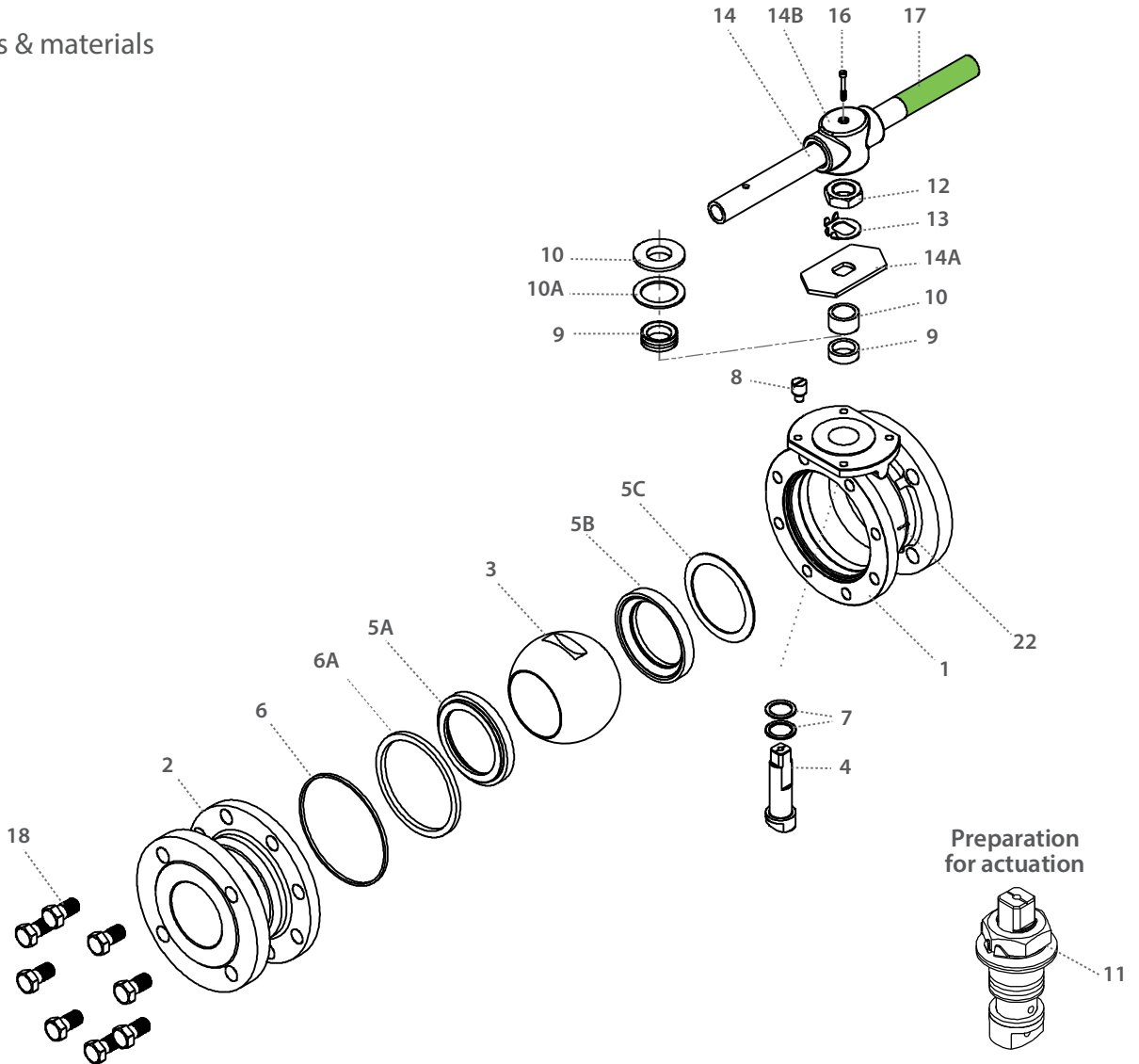
**Z73W****Z74W****Z73P****Z74P**

2"-8" | DN50-DN200

CLASS 150/300

Floating Ball Flanged Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Components &amp; materials



| Item | Description          | Material specification   | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code   | 1    |
| 2    | End                  | Acc. Ordering Code   | 1    |
| 3    | Ball                 | Acc. Ordering Code   | 1    |
| 4    | Stem                 | Acc. Ordering Code   | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code   | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code   | 1    |
| 5C   | Upstream disc spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 1    |
| 6A*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L Hardended with LTPN, B637 N07718 Inconel 718, Virgin peek, PCTFE | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite, CF PTFE, TFM   | 1    |
| 10   | Follower             | S. Steel   | 1    |

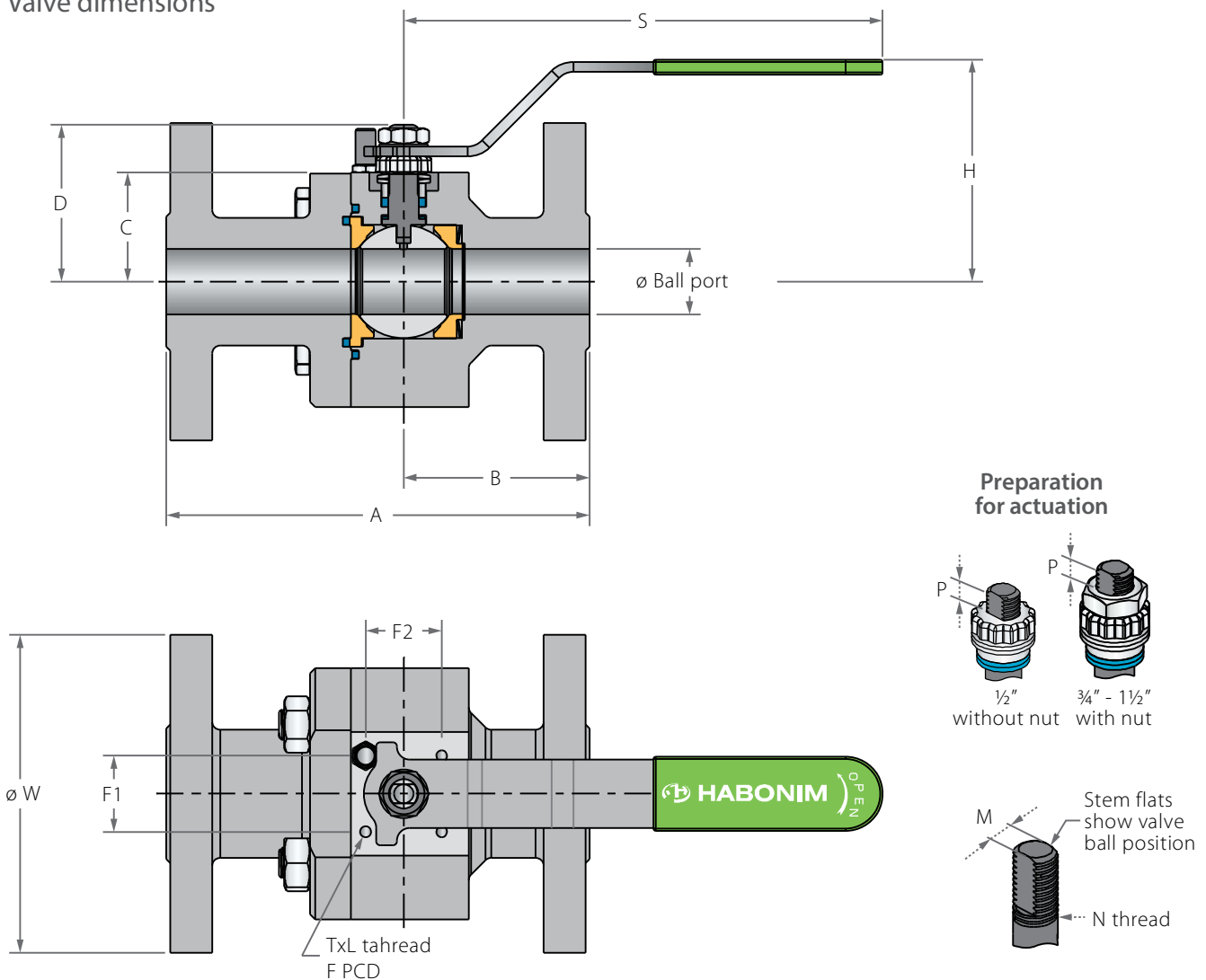
| Item | Description     | Material specification | Qty. |
|------|-----------------|------------------------|------|
| 10A* | Slide Bearing   | S. Steel               | 1    |
| 11   | Disc spring     | S. Steel               | 2    |
| 12   | Stem nut        | S. Steel               | 1    |
| 13   | Tab lock washer | S. Steel               | 1    |
| 14** | Handle          | S. Steel               | 1    |
| 14A  | Stop plate      | S. Steel               | 1    |
| 14B  | Wrench head     | S. Steel               | 1    |
| 16   | Wrench bolt     | S. Steel               | 1    |
| 17   | Sleeve          | PVC                    | 1    |
| 18   | Body bolts      | S. Steel               | 8-12 |
| 22   |                 | S. Steel               | 1    |
| 23   | Tag (not shown) | S. Steel               | 1    |

\* Repair kit components

\*\* Gear operator should be used for size 4" DN100 and above (handle components are not included)

**Z78W****Z78P****1/2"-1 1/2" | DN15-DN40 | PN40**Floating Ball Flanged Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Valve dimensions



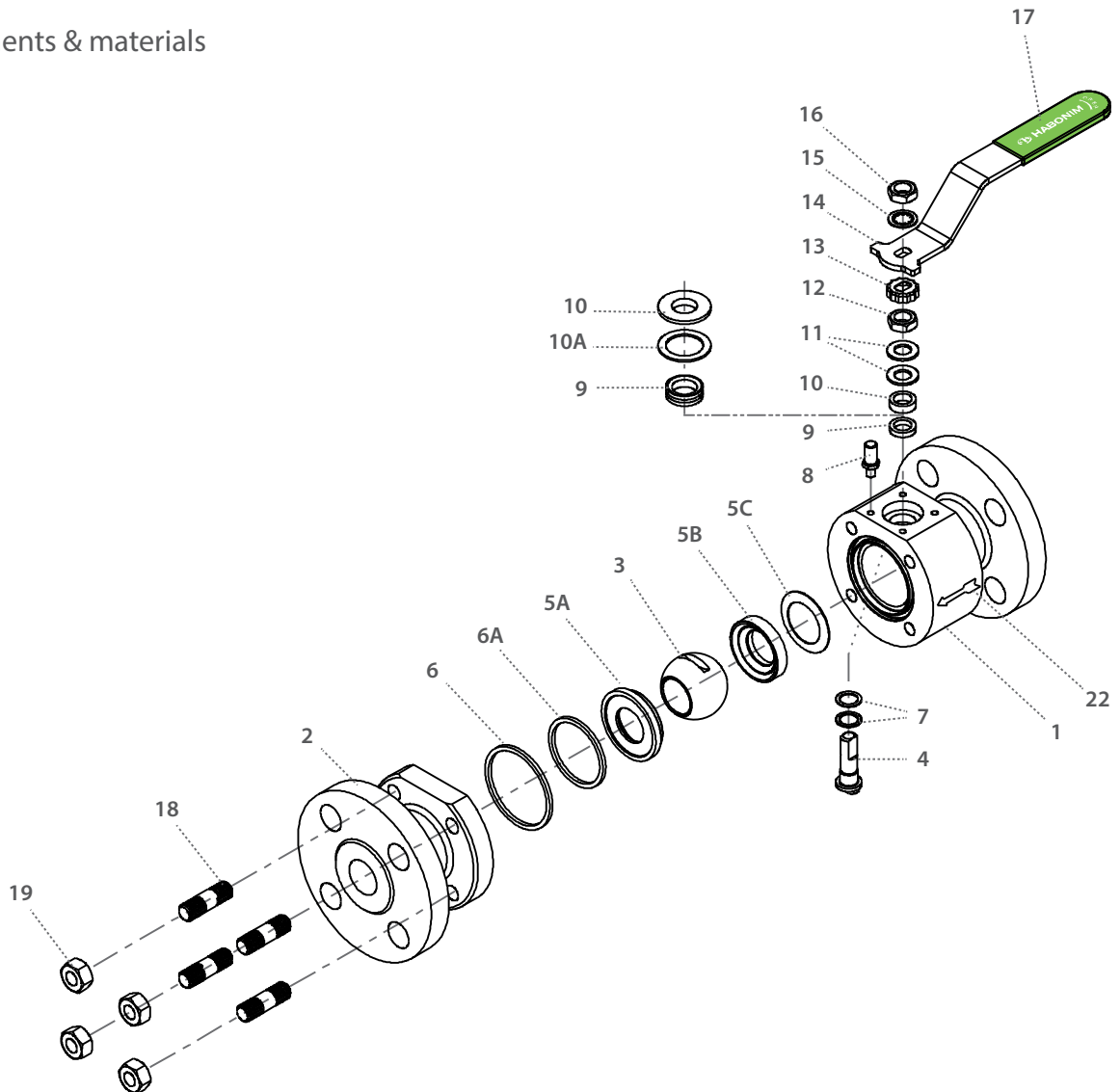
| Std. port | Unit | Ball port | A      | B     | C     | D     | H      | S      | W      | M    | N          | P    | F     | TxL   | Weight kg/lb | Cv  |     |
|-----------|------|-----------|--------|-------|-------|-------|--------|--------|--------|------|------------|------|-------|-------|--------------|-----|-----|
| DN15      | mm   | 14.30     | 130.00 | 49.00 | 29.40 | 38.40 | 92.00  | 151.00 | 95.00  | 5.54 | 1/2" UNF   | 6.65 | (F03) | 36.00 | M5x10        | 3   | 28  |
| 1/2"      | inch | 0.56      | 5.11   | 1.93  | 1.16  | 1.51  | 3.62   | 5.94   | 3.74   | 0.22 |            | 0.26 | 1.42  | 7     |              | 32  |     |
| DN20      | mm   | 20.65     | 150.00 | 58.00 | 38.20 | 55.70 | 103.50 | 170.00 | 105.00 | 7.54 | 3/4" UNF   | 7.40 | (F04) | 42.00 | M5x10        | 4   | 46  |
| 3/4"      | inch | 0.81      | 5.90   | 2.28  | 1.50  | 2.19  | 4.07   | 6.69   | 4.13   | 0.30 |            | 0.29 | 1.65  | 9     |              | 53  |     |
| DN25      | mm   | 25.50     | 160.00 | 55.00 | 42.65 | 60.20 | 108.00 | 170.00 | 115.00 | 7.54 | 1" UNF     | 7.40 | (F04) | 42.00 | M5x10        | 6   | 80  |
| 1"        | inch | 1.00      | 6.30   | 2.17  | 1.68  | 2.37  | 4.25   | 6.69   | 4.53   | 0.30 |            | 0.29 | 1.65  | 13    |              | 93  |     |
| DN40      | mm   | 38.10     | 140.00 | 65.90 | 48.20 | 77.70 | 124.00 | 220.50 | 150.00 | 8.71 | 1 1/2" UNF | 8.50 | (F05) | 50.00 | M6x12        | 8   | 220 |
| 1 1/2"    | inch | 1.50      | 5.51   | 2.59  | 1.90  | 3.06  | 4.88   | 8.68   | 5.91   | 0.34 |            | 0.33 | 1.97  | 18    |              | 255 |     |

**Z78W****Z78P**

1/2"-1 1/2" | DN15-DN40 | PN40

Floating Ball Flanged Up to **W** 260°C (500°F) | **P** 400°C (750°F)

## Components &amp; materials



| Item | Description          | Material specification   | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code   | 1    |
| 2    | End                  | Acc. Ordering Code   | 1    |
| 3    | Ball                 | Acc. Ordering Code   | 1    |
| 4    | Stem                 | Acc. Ordering Code   | 1    |
| 5A   | Upstream seat        | Acc. Ordering Code   | 1    |
| 5B   | Downstream seat      | Acc. Ordering Code   | 1    |
| 5C   | Upstream disc spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 1    |
| 6A*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L Hardended with LTPN, B637 N07718 Inconel 718, Virgin peek, PCTFE | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite, CF PTFE, TFM   | 1    |
| 10   | Follower             | S. Steel   | 1    |

| Item | Description      | Material specification | Qty. |
|------|------------------|------------------------|------|
| 10A* | Slide Bearing    | S. Steel               | 1    |
| 11   | Disc spring      | S. Steel               | 2    |
| 12   | Stem nut         | S. Steel               | 1    |
| 13   | Locking clip     | S. Steel               | 1    |
| 14   | Handle           | S. Steel               | 1    |
| 15   | Serrated washer  | S. Steel               | 1    |
| 16   | Handle nut       | S. Steel               | 1    |
| 17   | Sleeve           | PVC                    | 1    |
| 18   | Body bolts/studs | S. Steel               | 4    |
| 19   | Body nut         | S. Steel               | 4    |
| 22   |                  | S. Steel               | 1    |
| 23   | Tag (not shown)  | S. Steel               | 1    |

\* Repair kit components

**Z78W****Z78P**

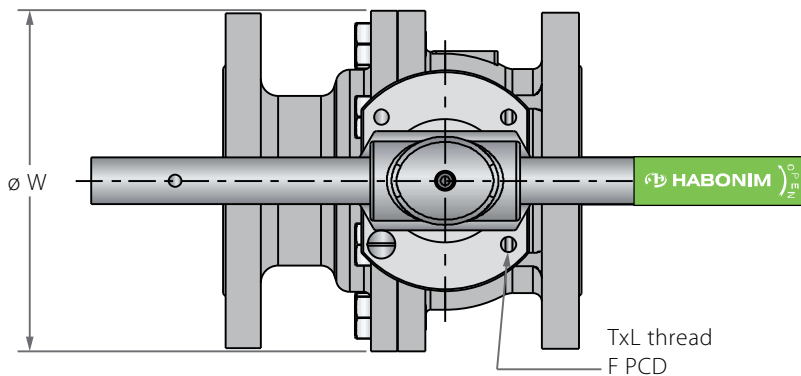
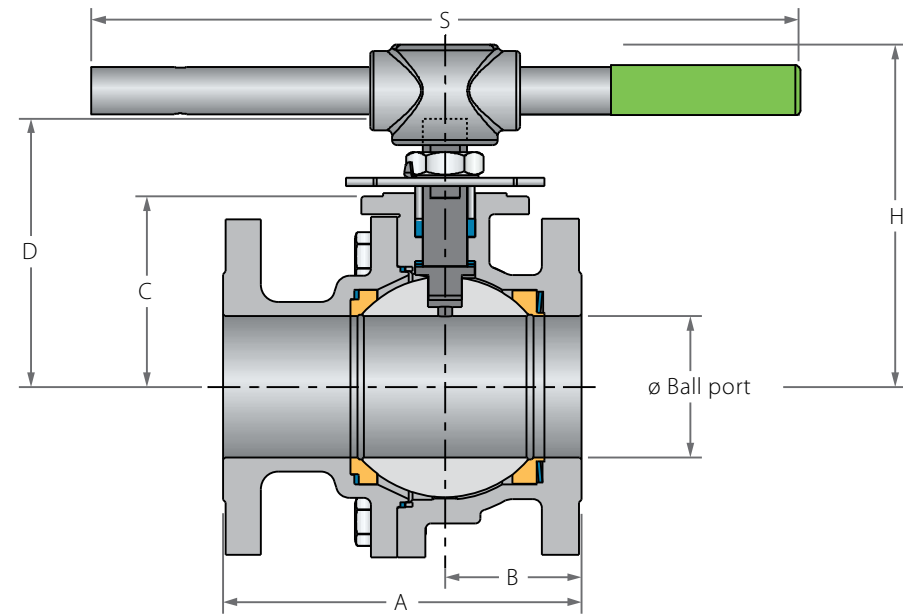
2" | DN50 | PN40

**Z77W****Z77P**

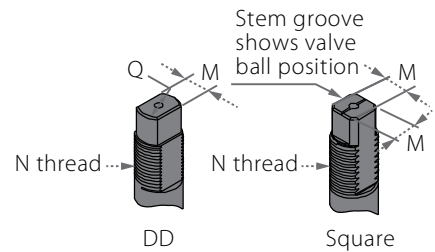
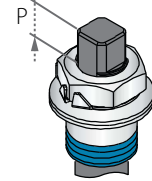
3"-6" | DN80-DN150 | PN16

Floating Ball Flanged Up to **W** 260°C (500°F) | **P** 400°C (750°F)

Valve dimensions



Preparation for actuation



| Std. port | Unit | Ball port | A      | B      | C      | D      | H      | S      | W      | M     | M (DD) | Q     | N             | P     | F     | TxL    | Weight kg/lb | Cv |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|-------|--------|-------|---------------|-------|-------|--------|--------------|----|------|
| DN50      | mm   | 50.05     | 150.00 | 60.70  | 70.00  | 111.60 | 137.30 | 256.00 | 165.00 | -     | 13.90  | 20.00 | M20x2.5       | 14.60 | (F07) | 70.00  | M8X12        | 11 | 430  |
| 2"        | inch | 1.97      | 5.91   | 2.39   | 2.76   | 4.39   | 5.41   | 10.08  | 6.50   | -     | 0.55   | 0.79  |               | 0.57  |       | 2.76   |              |    | 25   |
| DN80      | mm   | 80.00     | 180.00 | 77.50  | 108.00 | 154.60 | 194.80 | 610.00 | 200.00 | 18.90 | 15.90  | 22.70 | 1"-14 UNF-2A  | 16.70 | (F10) | 102.00 | M10X20       | 24 | 1000 |
| 3"        | inch | 3.15      | 7.09   | 3.05   | 4.25   | 6.09   | 7.67   | 24.00  | 7.87   | 0.74  | 0.63   | 0.89  |               | 0.66  |       | 4.02   |              |    | 53   |
| DN100     | mm   | 100.00    | 190.00 | 84.50  | 124.00 | 210.80 | -      | -      | 225.00 | 18.90 | 15.90  | 22.70 | 1"-14 UNF-2A  | 16.70 | (F10) | 102.00 | M10X20       | 31 | 1830 |
| 4"        | inch | 3.94      | 7.48   | 3.33   | 4.88   | 8.30   | -      | -      | 8.86   | 0.74  | 0.63   | 0.89  |               | 0.66  |       | 4.02   |              |    | 69   |
| DN150     | mm   | 150.00    | 350.00 | 163.50 | 179.00 | 248.50 | -      | -      | 328.00 | 28.45 | 23.75  | 35.20 | 1½"-12 UNF-2A | 26.20 | (F12) | 125.00 | M12X20       | 78 | 4380 |
| 6"        | inch | 5.91      | 13.78  | 6.44   | 7.05   | 9.78   | -      | -      | 12.91  | 1.12  | 0.94   | 1.39  |               | 1.03  |       | 4.92   |              |    | 172  |

Z78W

Z78P

2" | DN50 | PN40



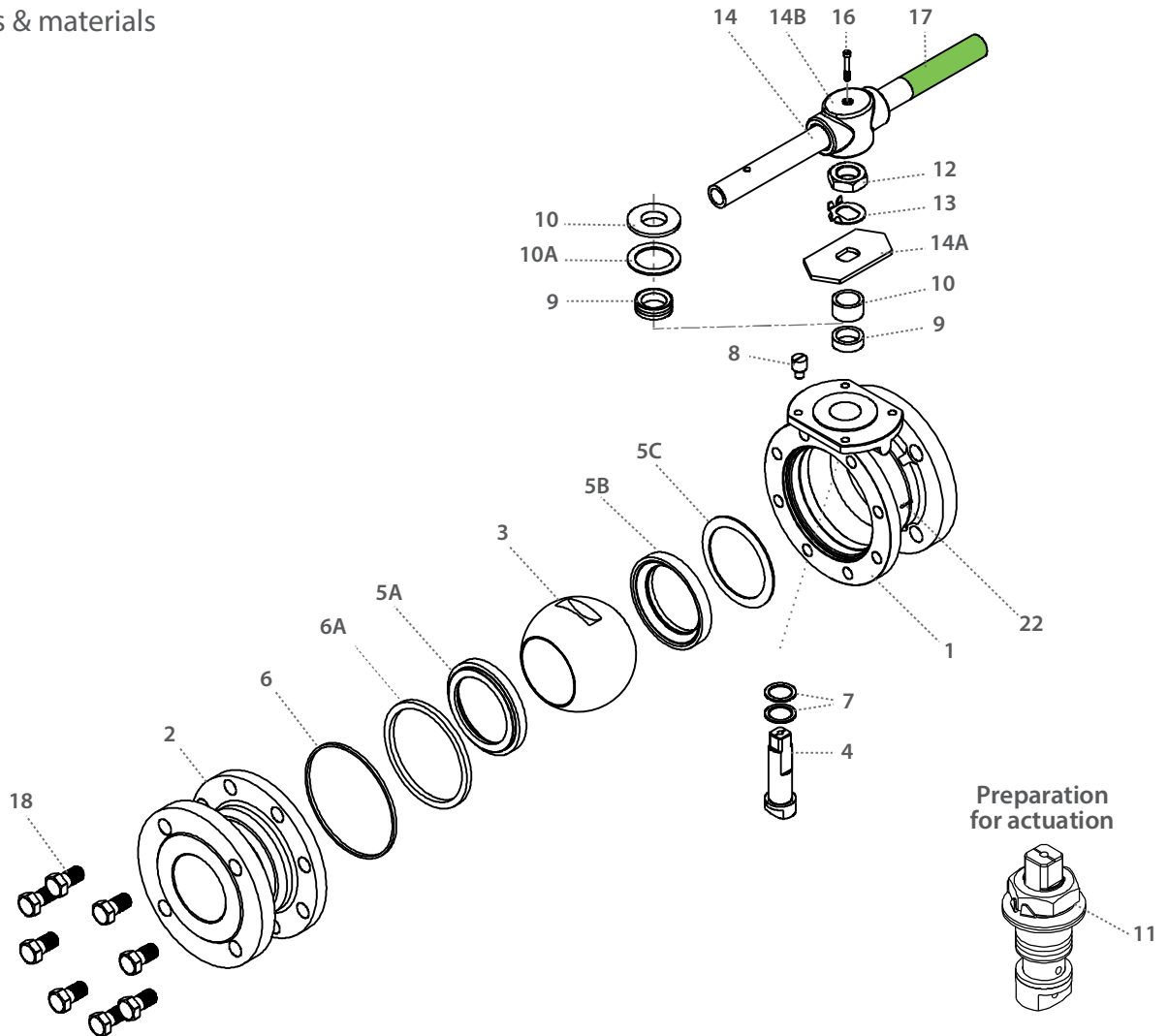
Z77W

Z77P

3"-6" | DN80-DN150 | PN16

Floating Ball Flanged Up to **W** 260°C (500°F) | **P** 400°C (750°F)

Components & materials



| Item | Description          | Material specification   | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code   | 1    |
| 2    | End                  | Acc. Ordering Code   | 1    |
| 3    | Ball                 | Acc. Ordering Code   | 1    |
| 4    | Stem                 | Acc. Ordering Code   | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code   | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code   | 1    |
| 5C   | Upstream disc spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 1    |
| 6A*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L Hardended with LTPN, B637 N07718 Inconel 718, Virgin peek, PCTFE | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite, CF PTFE, TFM   | 1    |
| 10   | Follower             | S. Steel   | 1    |

| Item | Description     | Material specification | Qty. |
|------|-----------------|------------------------|------|
| 10A* | Slide Bearing   | S. Steel               | 1    |
| 11   | Disc spring     | S. Steel               | 2    |
| 12   | Stem nut        | S. Steel               | 1    |
| 13   | Tab lock washer | S. Steel               | 1    |
| 14** | Handle          | S. Steel               | 1    |
| 14A  | Stop plate      | S. Steel               | 1    |
| 14B  | Wrench head     | S. Steel               | 1    |
| 16   | Wrench bolt     | S. Steel               | 1    |
| 17   | Sleeve          | PVC                    | 1    |
| 18   | Body bolts      | S. Steel               | 8-12 |
| 22   |                 | S. Steel               | 1    |
| 23   | Tag (not shown) | S. Steel               | 1    |

\* Repair kit components

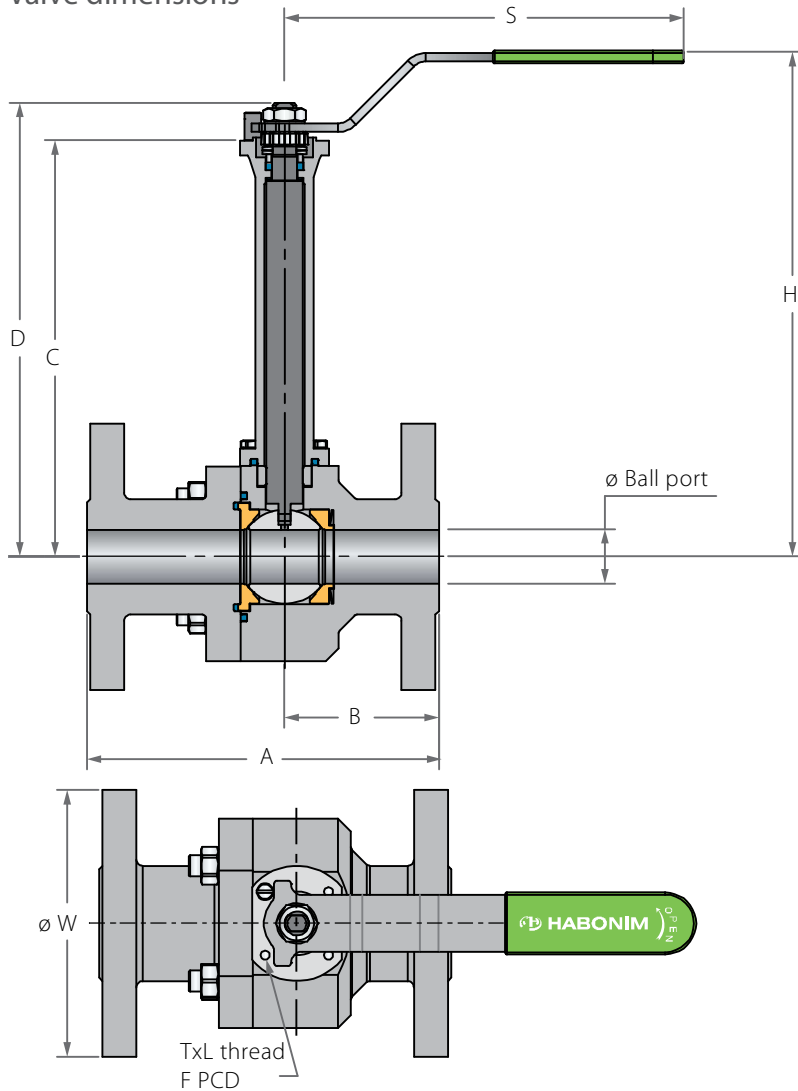
\*\* Gear operator should be used for size 4" DN100 and above (handle components are not included)

**Z73T****Z74T**

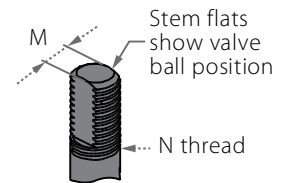
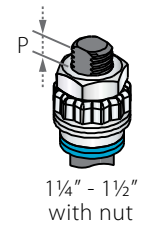
1 1/4"-1 1/2" | DN25-DN40 | CLASS 150/300

## Floating Ball Flanged Up to 538°C (1000°F)

### Valve dimensions



### Preparation for actuation



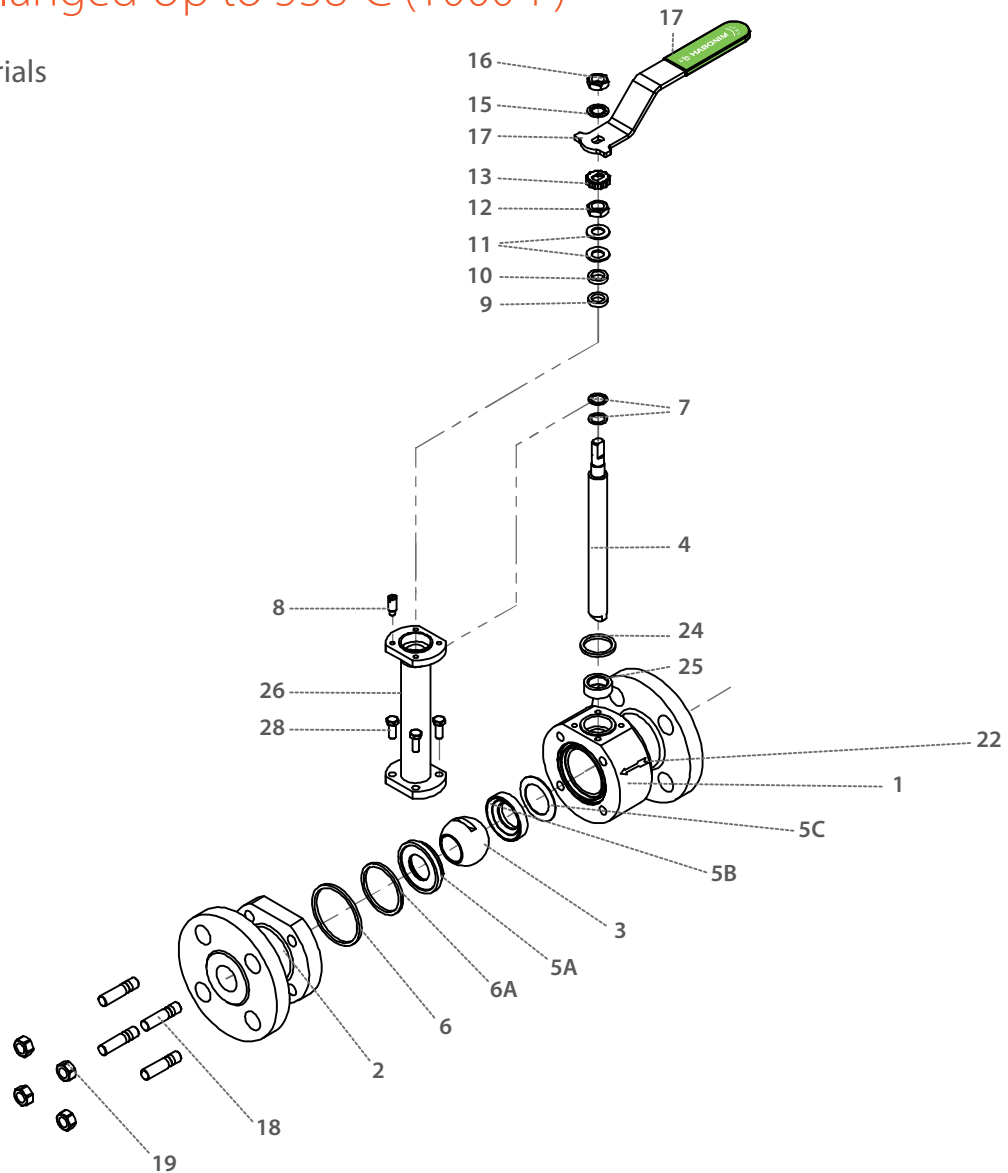
| Std. port | Unit | Ball port | A      |        | B     |       | C      | D      | H      | S      | W      |        | M    | N         | P          | F     | TxL   | Weight kg/lb |      | Kv  |
|-----------|------|-----------|--------|--------|-------|-------|--------|--------|--------|--------|--------|--------|------|-----------|------------|-------|-------|--------------|------|-----|
|           |      |           | 150    | 300    | 150   | 300   |        |        |        |        | 150    | 300    |      |           |            |       |       | 150          | 300  |     |
| DN32      | mm   | 31.8      | 140    | 178    | 59    | -     | 49.00  | 73     | 120.5  | 220.1  | 115    | 135    | 8.71 | 1/16" UNF | 8.5 (F05)  | 50    | M6x12 | -            | -    | -   |
| 1 1/4"    | inch | 1.25      | 5.51   | 7.00   | 2.32  | -     | 1.92   | 2.87   | 4.74   | 8.66   | 4.53   | 5.31   | 0.34 | 1/16" UNF | 0.33       | 1.97  | M6x12 | -            | -    | -   |
| DN40      | mm   | 38.10     | 165.00 | 190.00 | 68.00 | 80.40 | 201.00 | 230.60 | 276.80 | 237.00 | 127.00 | 165.00 | 8.71 | 1/16" UNF | 8.50 (F05) | 50.00 | M6x12 | 8.5          | 11.5 | 220 |
| 1 1/2"    | inch | 1.50      | 6.50   | 7.48   | 2.68  | 3.17  | 7.91   | 9.08   | 10.90  | 9.33   | 5.00   | -      | 0.34 | 1/16" UNF | 0.33       | 1.97  | M6x12 | 18.7         | 25.3 | 255 |





## Floating Ball Flanged Up to 538°C (1000°F)

### Components & materials



| Item | Description          | Material specification                                 | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code                                     | 1    |
| 2    | End                  | Acc. Ordering Code                                     | 1    |
| 3    | Ball                 | Acc. Ordering Code                                     | 1    |
| 4    | Stem                 | Acc. Ordering Code                                     | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code                                     | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code                                     | 1    |
| 5C   | Upstream seat spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 2    |
| 6A*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L, Hardened with LTPN, B637 N07718 Inconel 718 | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite   | 1    |
| 10   | Follower             | S. Steel   | 1    |
| 11   | Disc spring          | S. Steel   | 2    |

| Item | Description      | Material specification | Qty. |
|------|------------------|------------------------|------|
| 12   | Stem nut         | S. Steel               | 1    |
| 13   | Locking clip     | S. Steel               | 1    |
| 14   | Handle           | S. Steel               | 1    |
| 15   | Serrated washer  | S. Steel               | 1    |
| 16   | Handle nut       | S. Steel               | 1    |
| 17   | Sleeve           | PVC                    | 1    |
| 18   | Body bolts/studs | S. Steel               | 4    |
| 19   | Body nuts        | S. Steel               | 4    |
| 22   |                  | S. Steel               | 1    |
| 23   | Tag (not shown)  | S. Steel               | 1    |
| 24   | Bonnet seal      | Graphite               | 1    |
| 25   | Stem Bearing     | S. Steel               | 1    |
| 26   | Bonnet           | S. Steel               | 1    |
| 29   | Bonnet bolts     | S. Steel               | 4-6  |

\* Repair kit components

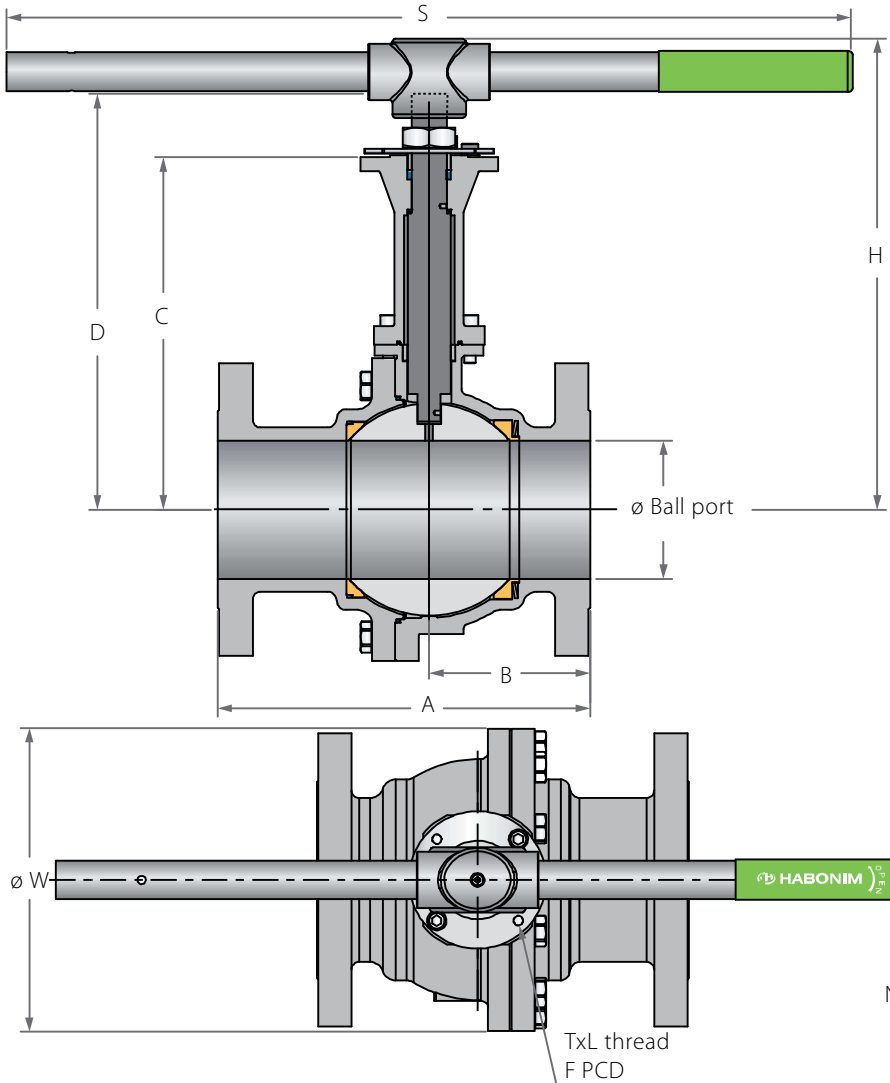
Z73T

Z74T

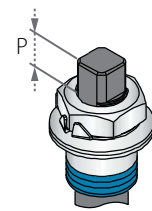
2"-8" | DN50-DN200 | CLASS 150/300

## Floating Ball Flanged Up to 538°C (1000°F)

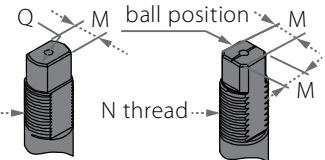
Valve dimensions



Preparation for actuation



Stem groove shows valve ball position

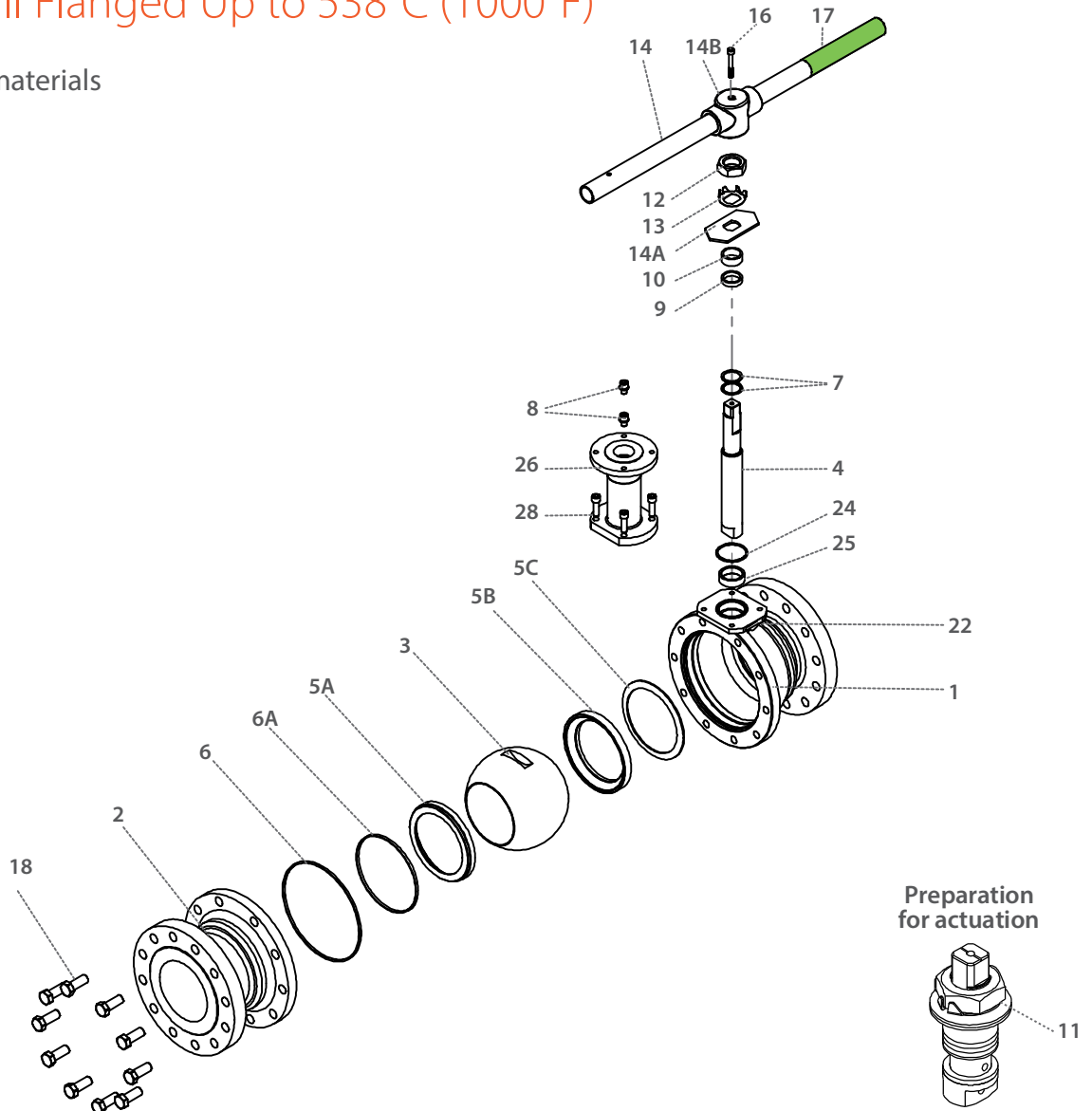


| Std. port | Unit | Ball port | A      |        | B      |        | C      | D      | H      | S      | W      |        | M     | M DD  | Q     | N             | P           | F      | TxL    | Weight kg/lb |       | Kv   |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|---------------|-------------|--------|--------|--------------|-------|------|
|           |      |           | 150    | 300    | 150    | 300    |        |        |        |        | 150    | 300    |       |       |       |               |             |        |        | 150          | 300   |      |
| DN50      | mm   | 51        | 178.00 | 216.00 | 69.00  | 75.10  | 222.80 | 264.40 | 290.00 | 256.00 | 127.00 | 127.00 | -     | 13.90 | 20.00 | M20x2.5       | 14.60 (F07) | 70.00  | M8x12  | 13.5         | 15.5  | 430  |
| 2"        | inch | 2.01      | 7.01   | 8.50   | 2.72   | 2.96   | 8.77   | 10.41  | 11.42  | 10.08  | 5.00   | 5.00   | -     | 0.55  | 0.79  | M20x2.5       | 0.57        | 2.76   | M8x12  | 29.7         | 34.1  | 499  |
| DN80      | mm   | 80        | 203.00 | 282.50 | 77.50  | 96.40  | 260.40 | 307.00 | 347.20 | 401.00 | 190.50 | 210.00 | 18.90 | 15.90 | 22.70 | 1"-14 UNF-2A  | 16.70 (F10) | 102.00 | M10x20 | 25           | 32    | 1000 |
| 3"        | inch | 3.15      | 7.99   | 11.12  | 3.05   | 3.80   | 10.25  | 12.09  | 13.67  | 15.79  | 7.50   | 8.27   | 0.74  | 0.63  | 0.89  | 1"-14 UNF-2A  | 0.66        | 4.02   | M10x20 | 55.0         | 70.4  | 1160 |
| DN100     | mm   | 100       | 228.50 | 304.80 | 84.50  | 104.50 | 276.40 | 323.00 | -      | -      | 230.00 | 254.00 | 18.90 | 15.90 | 22.70 | 1"-14 UNF-2A  | 16.70 (F10) | 102.00 | M10x20 | 45           | 50.0  | 1830 |
| 4"        | inch | 3.94      | 9.00   | 12.00  | 3.33   | 4.11   | 10.88  | 12.72  | -      | -      | 9.06   | 10.00  | 0.74  | 0.63  | 0.89  | 1"-14 UNF-2A  | 0.66        | 4.02   | M10x20 | 99.0         | 110.0 | 2123 |
| DN150     | mm   | 150       | 394.00 | 403.50 | 163.50 | 174.50 | 382.20 | 451.70 | -      | -      | 328.00 | 328.00 | 28.45 | 23.75 | 35.20 | 1½"-12 UNF-2A | 26.20 (F12) | 125.00 | M12x20 | 90           | 110   | 4380 |
| 6"        | inch | 5.91      | 15.51  | 15.89  | 6.44   | 6.87   | 15.05  | 17.78  | -      | -      | 12.91  | 12.91  | 1.12  | 0.94  | 1.39  | 1½"-12 UNF-2A | 1.03        | 4.92   | M12x20 | 198.0        | 242.0 | 5081 |
| DN200     | mm   | 200       | 457.20 | 501.65 | 242.50 | 240.70 | 495.50 | 608.20 | -      | -      | 343.00 | 381.00 | 35.92 | 35.92 | 46.50 | 2"-8 UN-2A    | 37.50 (F14) | 140.00 | M16x30 | 210          | 245   | 8070 |
| 8"        | inch | 7.87      | 18.00  | 19.75  | 9.55   | 9.48   | 19.51  | 23.94  | -      | -      | 13.50  | 15.00  | 1.41  | 1.41  | 1.83  | 2"-8 UN-2A    | 1.48        | 5.51   | M16x30 | 462.0        | 539.0 | 9361 |



## Floating Ball Flanged Up to 538°C (1000°F)

### Components & materials



| Item | Description          | Material specification                                 | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code                                     | 1    |
| 2    | End                  | Acc. Ordering Code                                     | 1    |
| 3    | Ball                 | Acc. Ordering Code                                     | 1    |
| 4    | Stem                 | Acc. Ordering Code                                     | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code                                     | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code                                     | 1    |
| 5C   | Upstream seat spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 2    |
| 6A*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L, Hardened with LTPN, B637 N07718 Inconel 718 | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite   | 1    |
| 10   | Follower             | S. Steel   | 1    |
| 11   | Disc spring          | S. Steel   | 2    |
| 12   | Stem nut             | S. Steel   | 1    |

| Item | Description     | Material specification | Qty. |
|------|-----------------|------------------------|------|
| 13   | Tab lock washer | S. Steel               | 1    |
| 14** | Handle          | S. Steel               | 1    |
| 14A  | Stop plate      | S. Steel               | 1    |
| 14B  | Wrench head     | S. Steel               | 1    |
| 16   | Wrench bolt     | S. Steel               | 1    |
| 17   | Sleeve          | PVC                    | 1    |
| 18   | Body bolts      | S. Steel               | 8-12 |
| 22   |                 | S. Steel               | 1    |
| 23   | Tag (not shown) | S. Steel               | 1    |
| 24   | Bonnet seal     | Graphite               | 1    |
| 25   | Stem Bearing    | S. Steel               | 1    |
| 26   | Bonnet          | S. Steel               | 1    |
| 28   | Bonnet bolts    | S. Steel               | 4-6  |

\* Repair kit components

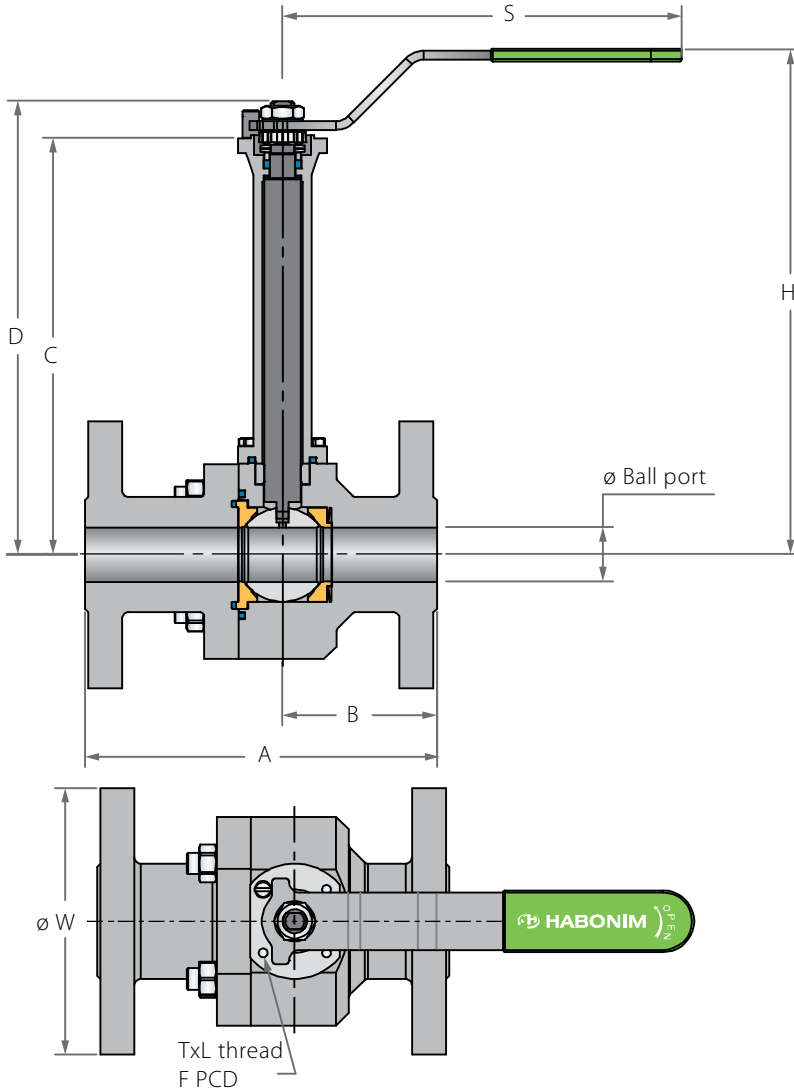
\*\* Gear operator should be used for size 4" DN100 and above (handle components are not included)

**Z78T**

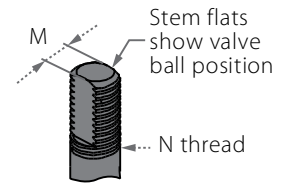
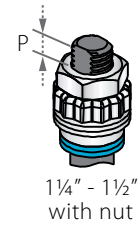
1¼"-1½" | DN25-DN40 | PN40

## Floating Ball Flanged Up to 538°C (1000°F)

### Valve dimensions



### Preparation for actuation

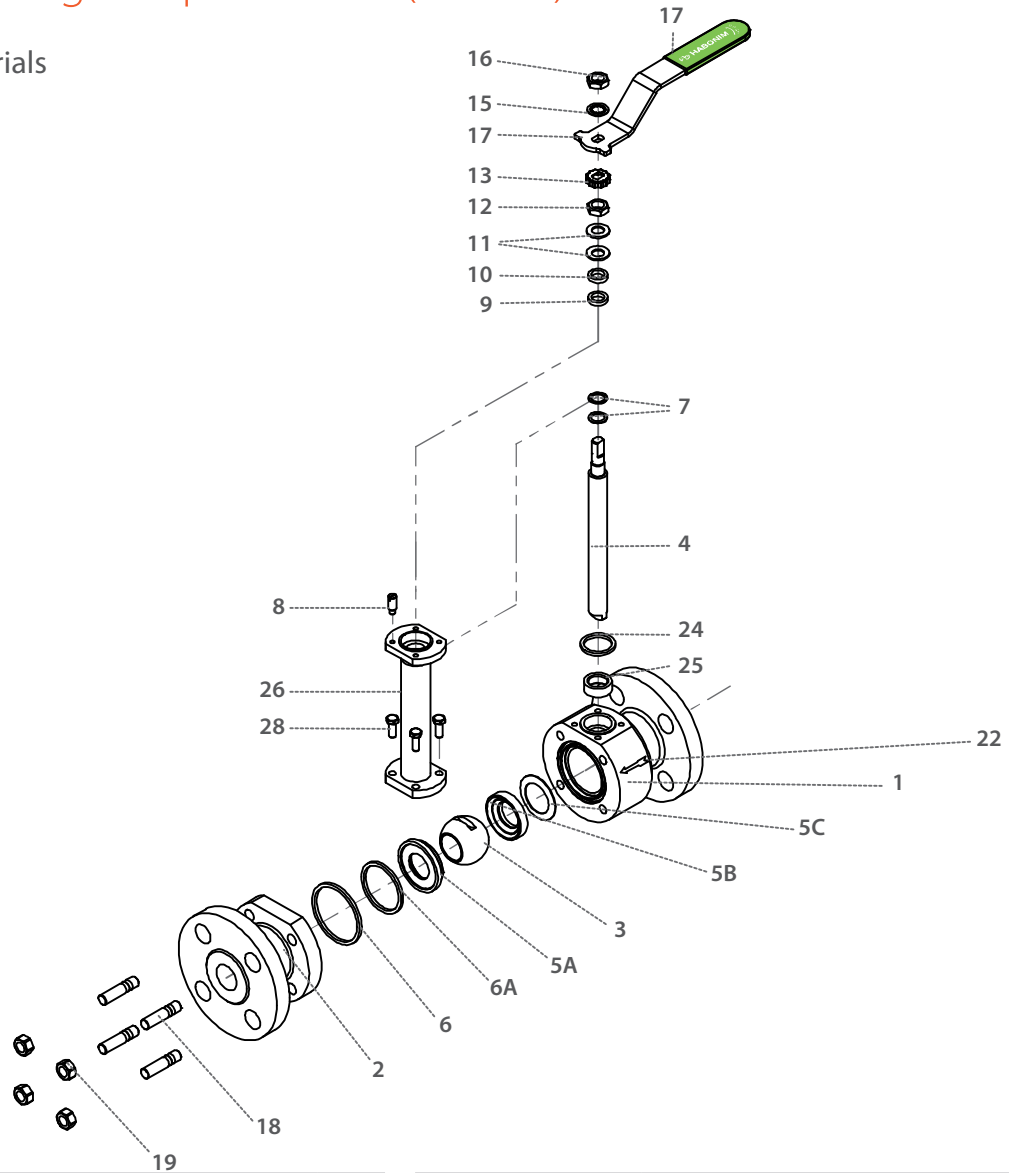


| Std. port | Unit | Ball port | A      |        | B     | C      | D      | H      | S      | W      | M    | N         | P          | F     | TxL   | Weight kg/lb |      |     | Kv  |
|-----------|------|-----------|--------|--------|-------|--------|--------|--------|--------|--------|------|-----------|------------|-------|-------|--------------|------|-----|-----|
|           |      |           | F1     | F4     |       |        |        |        |        |        |      |           |            |       |       | F1           | F4   | Cv  |     |
| DN32      | mm   | 31.8      | 180    | 130    | 56    | 196.7  | 226.3  | 272.5  | 237    | 140    | 8.71 | 1/16" UNF | 8.5 (F05)  | 50    | M6x12 | -            | -    | -   | -   |
| 1¼"       | inch | 1.25      | 7.10   | 5.11   | 2.20  | 7.74   | 8.91   | 10.73  | 9.33   | 5.51   | 0.34 | 1/16" UNF | 0.33       | 1.97  | M6x12 | -            | -    | -   | -   |
| DN40      | mm   | 38.10     | 200.00 | 140.00 | 76.00 | 201.00 | 230.60 | 276.80 | 237.00 | 150.00 | 8.71 | 1/16" UNF | 8.50 (F05) | 50.00 | M6x12 | 12.0         | 8.0  | 220 | 220 |
| 1½"       | inch | 1.50      | 7.87   | 5.51   | 2.99  | 7.91   | 9.08   | 10.90  | 9.33   | 5.91   | 0.34 | 1/16" UNF | 0.33       | 1.97  | M6x12 | 26.4         | 17.6 | 255 | 255 |



## Floating Ball Flanged Up to 538°C (1000°F)

### Components & materials



| Item | Description          | Material specification                                 | Qty. |
|------|----------------------|--|------|
| 1    | Body                 | Acc. Ordering Code                                     | 1    |
| 2    | End                  | Acc. Ordering Code                                     | 1    |
| 3    | Ball                 | Acc. Ordering Code                                     | 1    |
| 4    | Stem                 | Acc. Ordering Code                                     | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code                                     | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code                                     | 1    |
| 5C   | Upstream seat spring | Inconel 718  | 1    |
| 6*   | Body seal            | Graphite   | 2    |
| 6A*  | Seat seal            | Graphite   | 1    |
| 7*   | Stem thrust seal     | A479 316L, Hardened with LTPN, B637 N07718 Inconel 718 | 2    |
| 8    | Stop pin             | S. Steel   | 1    |
| 9*   | Stem seal            | Graphite   | 1    |
| 10   | Follower             | S. Steel   | 1    |
| 11   | Disc spring          | S. Steel   | 2    |

| Item | Description      | Material specification | Qty. |
|------|------------------|------------------------|------|
| 12   | Stem nut         | S. Steel               | 1    |
| 13   | Locking clip     | S. Steel               | 1    |
| 14   | Handle           | S. Steel               | 1    |
| 15   | Serrated washer  | S. Steel               | 1    |
| 16   | Handle nut       | S. Steel               | 1    |
| 17   | Sleeve           | PVC                    | 1    |
| 18   | Body bolts/studs | S. Steel               | 4    |
| 19   | Body nuts        | S. Steel               | 4    |
| 22   |                  | S. Steel               | 1    |
| 23   | Tag (not shown)  | S. Steel               | 1    |
| 24   | Bonnet seal      | Graphite               | 1    |
| 25   | Stem Bearing     | S. Steel               | 1    |
| 26   | Bonnet           | S. Steel               | 1    |
| 29   | Bonnet bolts     | S. Steel               | 4    |

\* Repair kit components

**Z78T**

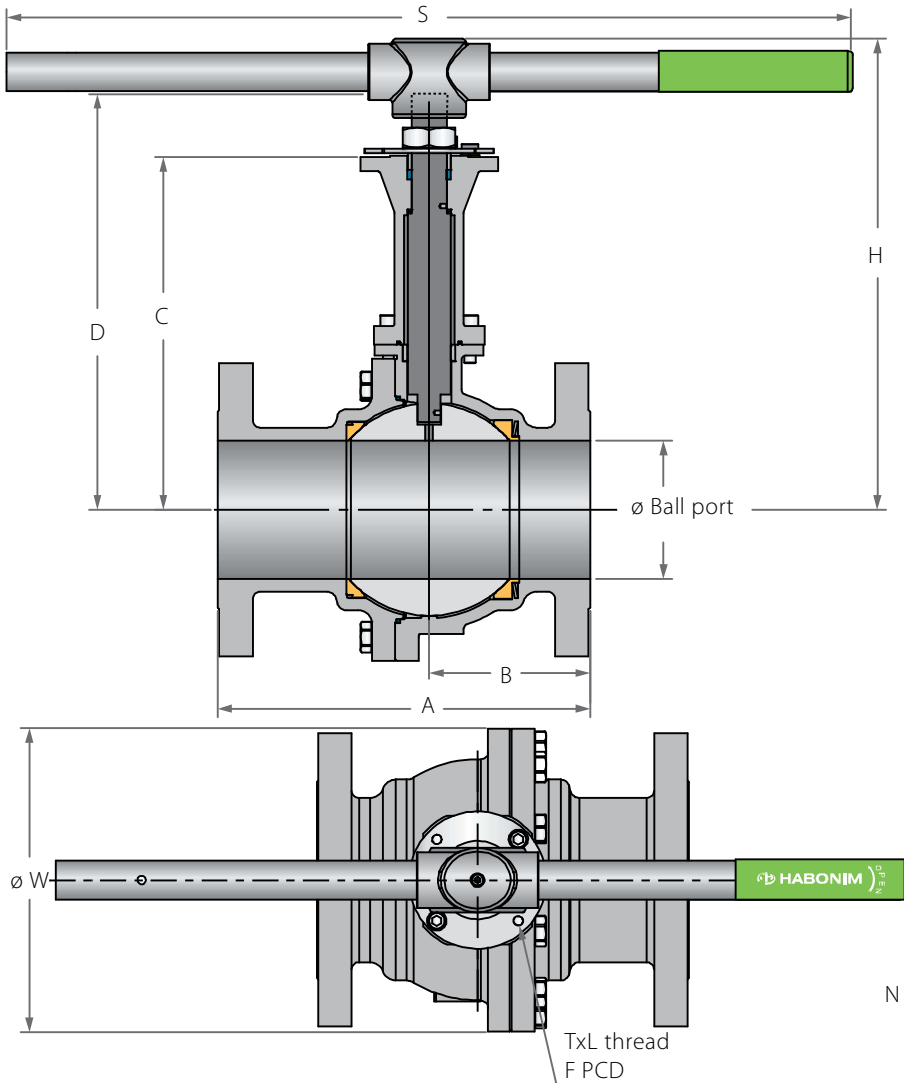
2" | DN50 | PN40

**Z77T**

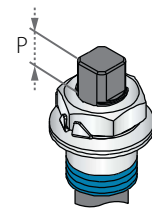
2"-6" | DN80-DN150 | PN16

## Floating Ball Flanged Up to 538°C (1000°F)

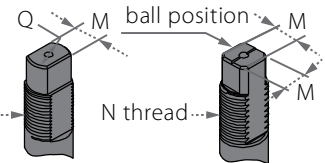
### Valve dimensions



### Preparation for actuation



Stem groove shows valve ball position



N thread

N thread

DD

Square

| Std. port | Unit | Ball port | A      | B      | C      | D      | H      | S      | W      | M     | M (DD) | Q     | N             | P     | F     | TxL    | Weight kg/lb | Cv    |      |
|-----------|------|-----------|--------|--------|--------|--------|--------|--------|--------|-------|--------|-------|---------------|-------|-------|--------|--------------|-------|------|
| DN50      | mm   | 51        | 150.00 | 69.00  | 222.80 | 264.40 | 290.00 | 256.00 | 165.00 | -     | 13.90  | 20.00 | M20x2.5       | 14.60 | (F07) | 70.00  | M8x12        | 12.5  | 430  |
| 2"        | inch | 2.01      | 5.91   | 2.72   | 8.77   | 10.41  | 11.42  | 10.08  | 6.50   | -     | 0.55   | 0.79  |               | 0.57  |       | 2.76   |              | 27.5  | 499  |
| DN80      | mm   | 80        | 180.00 | 77.50  | 260.40 | 307.00 | 347.20 | 401.00 | 200.00 | 18.90 | 15.90  | 22.70 | 1"-14 UNF-2A  | 16.70 | (F10) | 102.00 | M10x20       | 31.0  | 1000 |
| 3"        | inch | 3.15      | 7.09   | 3.05   | 10.25  | 12.09  | 13.67  | 15.79  | 7.87   | 0.74  | 0.63   | 0.89  |               | 0.66  |       | 4.02   |              | 68.2  | 1160 |
| DN100     | mm   | 100       | 190.00 | 84.50  | 276.40 | 323.00 | -      | -      | 220.00 | 18.90 | 15.90  | 22.70 | 1"-14 UNF-2A  | 16.70 | (F10) | 102.00 | M10x20       | 45.0  | 1830 |
| 4"        | inch | 3.94      | 7.48   | 3.33   | 10.88  | 12.72  | -      | -      | 8.66   | 0.74  | 0.63   | 0.89  |               | 0.66  |       | 4.02   |              | 99.0  | 2123 |
| DN150     | mm   | 150       | 350.00 | 163.50 | 382.20 | 451.70 | -      | -      | 285.00 | 28.45 | 23.75  | 35.20 | 1½"-12 UNF-2A | 26.20 | (F12) | 125.00 | M12x20       | 100.0 | 4380 |
| 6"        | inch | 5.91      | 13.78  | 6.44   | 15.05  | 17.78  | -      | -      | 11.22  | 1.12  | 0.94   | 1.39  |               | 1.03  |       | 4.92   |              | 220.0 | 5081 |

<sup>(1)</sup> Due to high valve torque, pipe handle cannot be used. A manual gear or automation means should be used to operate the valve.

**Z78T**

2" | DN50 | PN40

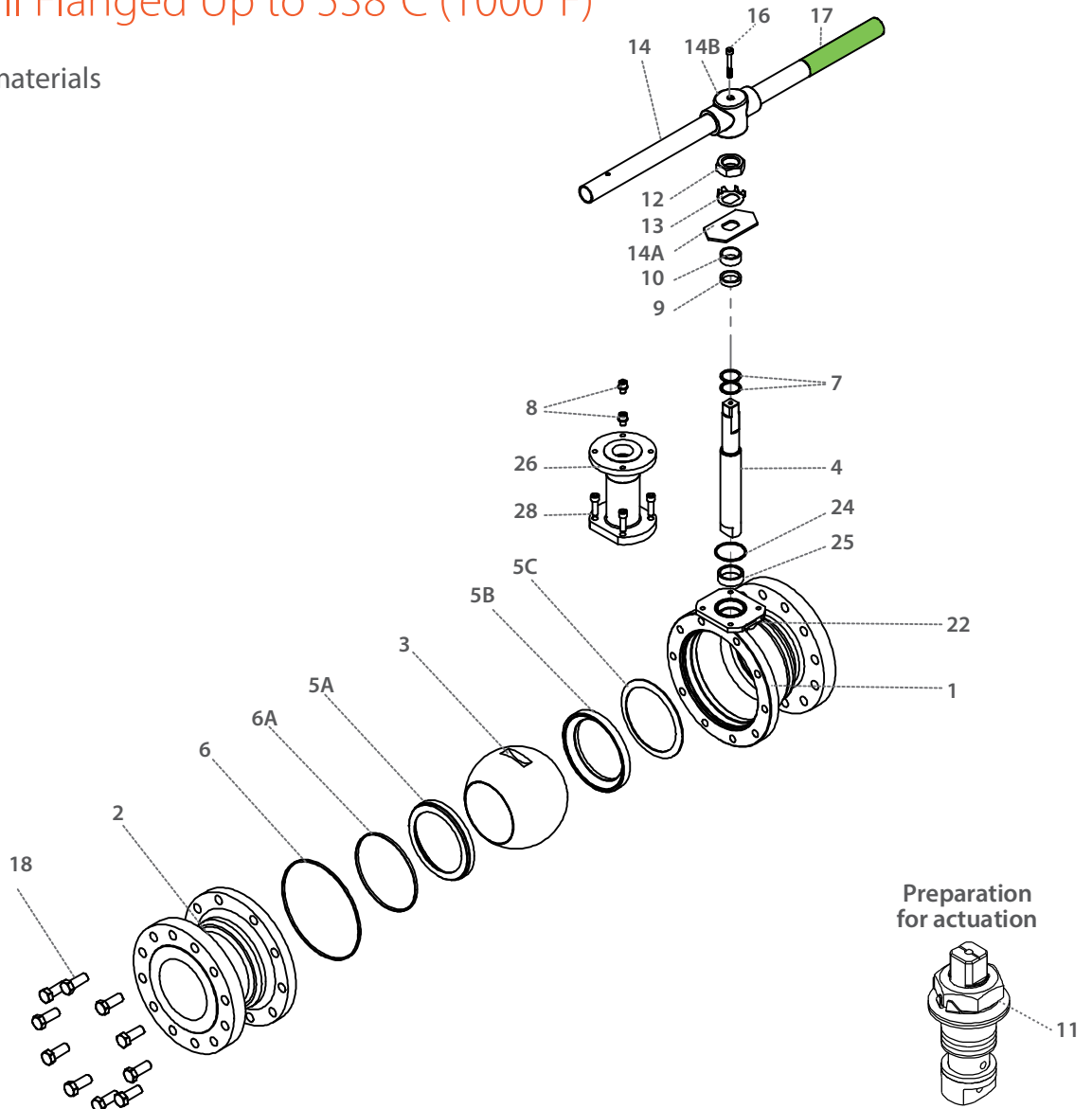
**Z77T**

2"-6" | DN80-DN150 | PN16



## Floating Ball Flanged Up to 538°C (1000°F)

### Components & materials



| Item | Description          | Material specification                                  | Qty. |
|------|----------------------|---|------|
| 1    | Body                 | Acc. Ordering Code                                      | 1    |
| 2    | End                  | Acc. Ordering Code                                      | 1    |
| 3    | Ball                 | Acc. Ordering Code                                      | 1    |
| 4    | Stem                 | Acc. Ordering Code                                      | 1    |
| 5A   | Downstream seat      | Acc. Ordering Code                                      | 1    |
| 5B   | Upstream seat        | Acc. Ordering Code                                      | 1    |
| 5C   | Upstream seat spring | Inconel 718   | 1    |
| 6*   | Body seal            | Graphite  | 2    |
| 6A*  | Seat seal            | Graphite  | 1    |
| 7*   | Stem thrust seal     | A479 316L, Hardened with LTPN, B637 N07718 Inconel 718x | 2    |
| 8    | Stop pin             | S. Steel  | 1    |
| 9*   | Stem seal            | Graphite  | 1    |
| 10   | Follower             | S. Steel  | 1    |
| 11   | Disc spring          | S. Steel  | 2    |

| Item  | Description     | Material specification | Qty. |
|-------|-----------------|------------------------|------|
| 12    | Stem nut        | S. Steel               | 1    |
| 13    | Tab lock washer | S. Steel               | 1    |
| 14*** | Handle          | S. Steel               | 1    |
| 14A   | Stop plate      | S. Steel               | 1    |
| 14B   | Wrench head     | S. Steel               | 1    |
| 16    | Wrench bolt     | S. Steel               | 1    |
| 17    | Sleeve          | PVC                    | 1    |
| 18    | Body bolts      | S. Steel               | 8-12 |
| 22    |                 | S. Steel               | 1    |
| 23    | Tag (not shown) | S. Steel               | 1    |
| 24    | Bonnet seal     | Graphite               | 1    |
| 25    | Stem Bearing    | S. Steel               | 1    |
| 26    | Bonnet          | S. Steel               | 1    |
| 28    | Bonnet bolts    | S. Steel               | 4-6  |

\* Repair kit components

\*\* Variety of coatings available

Z73

Z74

Z77

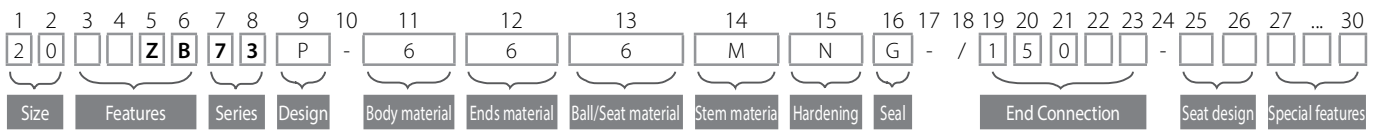
Z78



## High Temperature - Ordering Code System

"Mandatory option" options are marked with **green background**

light green background



| Size (1-2) |      |     |
|------------|------|-----|
| Code       | inch | mm  |
| 12         | 1¼"  | 32  |
| 15         | 1½"  | 40  |
| 20         | 2"   | 50  |
| 25         | 2½"  | 65  |
| 30         | 3"   | 80  |
| 40         | 4"   | 100 |
| 60         | 6"   | 150 |
| 80         | 8"   | 200 |

Up to size 1" see Z47 series

| Features (3-6) |                 |
|----------------|-----------------|
| Z              | Metal seats     |
| N              | Control service |

| Series (7-8) |                     |
|--------------|---------------------|
| 73           | ANSI #150 full port |
| 74           | ANSI #300 full port |
| 77           | DIN PN 16 full port |
| 78           | DIN PN 40 full port |

| Design (9) |   |
|------------|---|
| P          | -60°C to 400°C (-76°F to 752°F)                       |
| W          | -60°C to 260°C (-76°F to 500°F)<br>HermetiX stem seal |
| T          | -60°C to 538°C<br>(-76°F to 1000°F)                   |

| Body/Ends material (11-12) |               |
|----------------------------|---------------|
| 6                          | CF8M          |
| 4                          | A216 C.st WCB |

| Ball/Seat material (13) |                        |
|-------------------------|------------------------|
| 6                       | ASTM A479 S. Steel316L |
| N*                      | St. Steel 410          |

\* For O hardening only

| Stem material (14) |                        |
|--------------------|------------------------|
| M                  | High Strength S. Steel |
| Z                  | Inconel 718            |

| Hardening (15) |   |
|----------------|---|
| N*             | LTPN - Low Temperature<br>Plasma Carbonitriding                           |
| I**            | Cr3C2 - Chromium Carbide<br>with Nickel Chrome binder -<br>HVOF technique |
| O              | WC-Co - Tungsten Carbide<br>with Cobalt binder- HVOF<br>technique         |

\* LTPN is standard offering up to size 2". Applicable only for P/W design

\*\* standard offering for size 2½" and up

| Seal Material (16) |                   |
|--------------------|-------------------|
| G                  | Expanded graphite |
| B                  | NBR               |
| V                  | Viton             |
| K                  | FFKM              |

| End connections (19-23) |                    |
|-------------------------|--------------------|
| Flanged                 |                    |
| 150                     | ASME B16.5 #150 RF |
| 300                     | ASME B16.5 #300 RF |
| PN16                    | EN1092 PN16 RF     |
| PN40                    | EN1092 PN40 RF     |

| Seat design (25-26) |                    |
|---------------------|--------------------|
| Blank               | Type A seat design |
| TB                  | Type B seat design |
| TC                  | Type C seat design |
| TD                  | Type D seat design |

| Special Features (27-30) |                                      |
|--------------------------|--------------------------------------|
| RTJ                      | Ring Type Joint                      |
| F1*                      | F1 - DIN 3202-1 RF face-to-face size |
| F4**                     | F4 - DIN 3202-1 RF face-to-face size |
| F5***                    | F5 - DIN 3202-1 RF face-to-face size |
| V30                      | Characterized control ball           |

\* Up to 2"

\*\* Up to 4"

\*\*\* 6" only