



# TECHNICAL DATASHEET

DIN DESIGN

## KROMBACH® TUFSEAT® Performance Series Ball Valves

TUFSEAT by KROMBACH - THE SUPERIOR MSBV

**CRANE**<sup>®</sup>

**v in** [www.cranecpe.com](http://www.cranecpe.com)

## Features and Benefits

### KROMBACH® TUFSEAT® PERFORMANCE SERIES

The KROMBACH® TUFSEAT® Ball Valve Performance Series combines critical safety and performance features required for demanding service applications in chemical and refining markets.

#### HIGH TEMPERATURE TRIM DESIGN

- Seat Leakage performance: ISO 5208 – Class B and ANSI/FCI 70-2 – Class VI
- Up to 800°F/ 427°C
- Up to 20% Solids
- Nickel Alloy, Chrome and Tungsten Carbide coatings on ball and seats available
- Floating Ball: KFO1156 ( DN15-DN150 / PN10, PN16, PN25, PN40)
- Trunnion: KFO 9156 (DN200-DN300 / PN10, PN16, PN25, PN40)

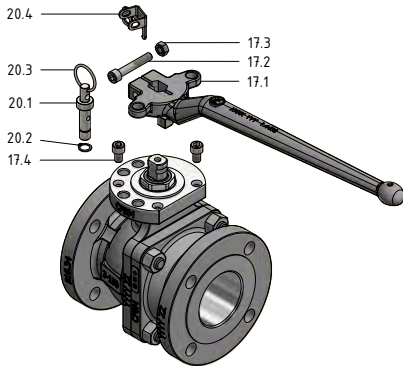


#### Product Range

| Size      | Class                        | Body Design  | Face-to-Face Dimension   | Body Material                 |
|-----------|------------------------------|--|--|-------------------------------|
| DN 15-300 | PN10<br>PN16<br>PN25<br>PN40 | 2-piece design<br>Flanged<br>Floating Ball and Trunnion Design | Long pattern EN 558 series 1<br>Short pattern EN 558 series 27 | WCB / 1.0619<br>CF8M / 1.4408 |

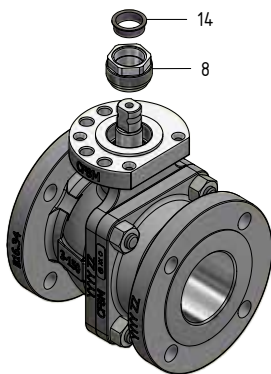
# Floating Ball Design

## Lever Design



| Item | Quantity | Description               | Carbon Steel |        | Stainless Steel |        |
|------|----------|---------------------------|--------------|--------|-----------------|--------|
|      |          |                           | ASTM         | DIN    | ASTM            | DIN    |
| 17.1 | 1        | Hand lever                | A351 CF8M    | 1.4408 | A351 CF8M       | 1.4408 |
| 17.2 | 1        | Hex socket head cap screw | 316SS        | A4-70  | 316SS           | A4-70  |
| 17.3 | 1        | Hex nut                   | 316SS        | A4     | 316SS           | A4     |
| 17.4 | 2        | Hex socket head cap screw | 316SS        | A4-70  | 316SS           | A4-70  |
| 20.1 | 1        | Locking pin               | AISI 316     | 1.4401 | AISI 316        | 1.4401 |
| 20.2 | 1        | Retaining ring            | -            | 1.4122 | -               | 1.4122 |
| 20.3 | 1        | Ring                      | AISI 301     | 1.4310 | AISI 301        | 1.4310 |
| 20.4 | 1        | Locking plate             | 316 Ti       | 1.4571 | 316 Ti          | 1.4571 |

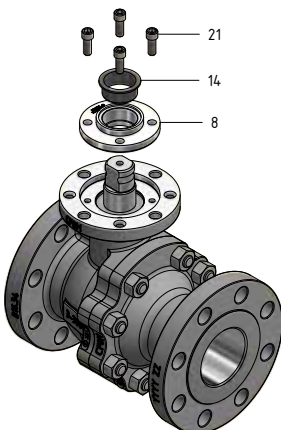
## Press Nut Design



| Item | Quantity | Description   | Carbon Steel         |                      | Stainless Steel      |                      |
|------|----------|---------------|----------------------|----------------------|----------------------|----------------------|
|      |          |               | ASTM                 | DIN                  | ASTM                 | DIN                  |
| 8    | 1        | Press nut     | A275 Gr. 431         | 1.4057               | F51, A479 UNS S31803 | 1.4462               |
| 14   | 1        | Guide bushing | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled |

Sizes DN15 to DN80 - PN10 & PN16 and DN15 to DN50 - PN25 & PN40.

## Packing Gland Design



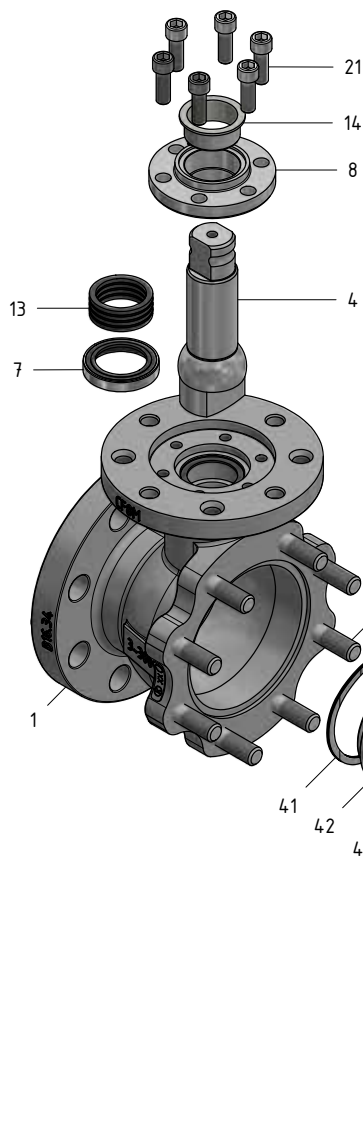
| Item | Quantity | Description               | Carbon Steel         |                      | Stainless Steel      |                      |
|------|----------|---------------------------|----------------------|----------------------|----------------------|----------------------|
|      |          |                           | ASTM                 | DIN                  | ASTM                 | DIN                  |
| 8    | 1        | Packing gland             | A479 316Ti; 316SS    | 1.4571; 1.4401       | A479 316Ti; 316SS    | 1.4571; 1.4401       |
| 14   | 1        | Guide bushing             | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled |
| 21   | 4        | Hex socket head cap screw | A193 B8M Class 2     | A4-70                | A193 B8M Class 2     | A4-70                |

Sizes DN100 to DN150 - PN10 & PN16 and DN80 to DN150 - PN25 & PN40

# Floating ball Design High Temperature Trim

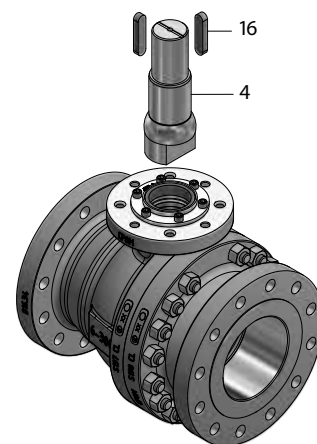
## Floating Ball Design

| Item | Quantity | Description               | Carbon Steel                                 |                        | Stainless Steel                               |                        |
|------|----------|---------------------------|--|------------------------|---|------------------------|
|      |          |                           | ASTM   | DIN                    | ASTM  | DIN                    |
| 1    | 1        | Body                      | A216 WCB                                     | 1.0619                 | A351 CF8M                                     | 1.4408                 |
| 2    | 1        | Tail                      | A216 WCB                                     | 1.0619                 | A351 CF8M                                     | 1.4408                 |
| 3    | 1        | Ball                      | A182 F316L+coating                           | 1.4404+coating         | A182 F316L+coating                            | 1.4404+coating         |
| 4    | 1        | Stem                      | A276 Gr.431                                  | 1.4057                 | A276 Gr.431                                   | 1.4057                 |
| 5    | 1        | Body gasket               | Graphite/316SS                               | Graphite/1.4571        | Graphite/316Ti                                | Graphite/1.4571        |
| 6    | 2        | Seat                      | A182 F316L +coating                          | 1.4404+coating         | A182 F316L +coating                           | 1.4404+coating         |
| 7    | 1        | S2 Stem seal              | e-Carbon                                     | e-Carbon               | e-Carbon                                      | e-Carbon               |
| 8    | 1        | Packing gland             | A479 316Ti; 316SS                            | 1.4571; 1.4401         | A479 316Ti; 316SS                             | 1.4571; 1.4401         |
| 10*  | 8        | Stud                      | A193 Gr.B7                                   | A4-70                  | A193 Gr.B8M Cl.2                              | A4-70                  |
| 11*  | 8        | Heavy hex nut             | A194 Gr.2H                                   | A4-70                  | A194 Gr.8M                                    | A4-70                  |
| 13   | 1        | Packing set               | Graphite                                     | Graphite               | Graphite                                      | Graphite               |
| 14   | 1        | Guide bushing             | A582 303 coated                              | 1.4305 coated          | A582 303 coated                               | 1.4305 coated          |
| 21*  | 6        | Hex socket head cap screw | A193 B8M Class 2                             | A4-70                  | A193 B8M Class 2                              | A4-70                  |
| 40   | 2        | Seal ring                 | Graphite                                     | Graphite               | Graphite                                      | Graphite               |
| 41   | 1        | Wave spring               | A286   | 1.4980                 | A286  | 1.4980                 |
| 42   | 1        | S-Ring                    | F51, A276 UNS S31803, A276 316L, A276 316 Ti | 1.4462; 1.4404; 1.4571 | F51, A276 UNS S31803, A276 316L, A276 316 Ti" | 1.4462; 1.4404; 1.4571 |



| Item | Quantity | Description  | Carbon Steel |           | Stainless Steel |           |
|------|----------|--------------|--------------|-----------|-----------------|-----------|
|      |          |              | ASTM         | DIN       | ASTM            | DIN       |
| 16   | 2        | Parallel key | 316SS/316Ti  | A4/1.4571 | 316ss/316Ti     | A4/1.4571 |

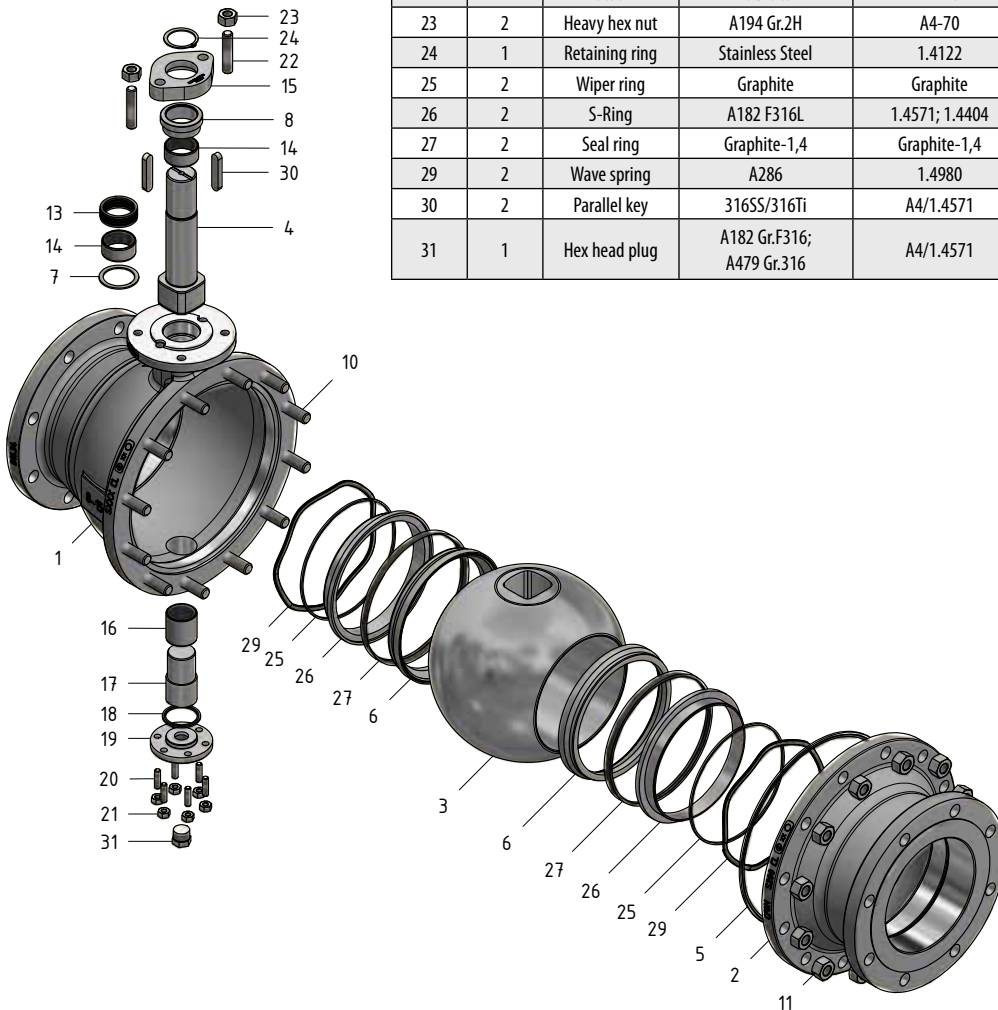
DN150 PN25 & PN 40 floating ball design with key connection item 16  
 \*Quantities may differ depending on the valve size



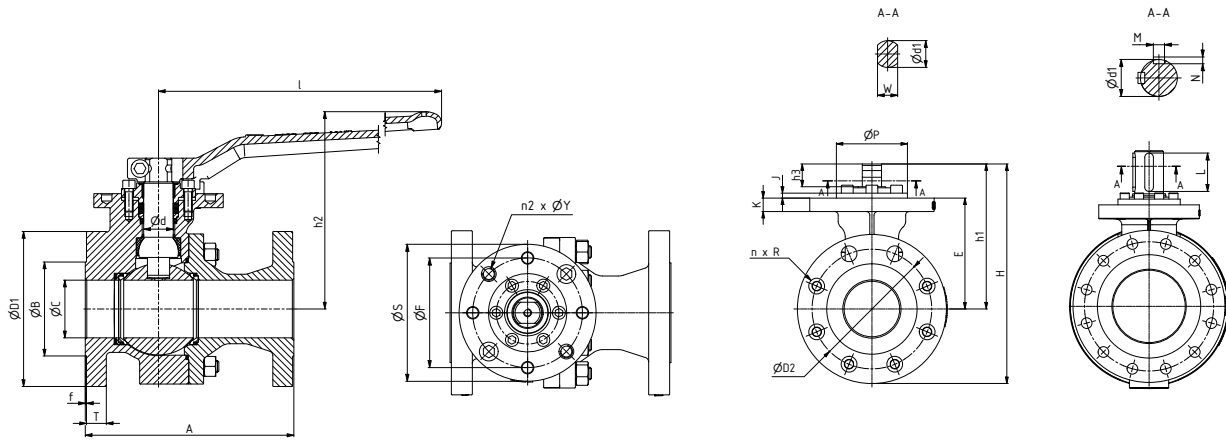
# Trunnion Design High Temperature Trim

## Trunnion Design

| Item | Quantity | Description    | Carbon Steel                             |                                   | Stainless Steel                          |                                   |
|------|----------|----------------|--|-----------------------------------|--|-----------------------------------|
|      |          |                | ASTM                                     | DIN                               | ASTM                                     | DIN                               |
| 1    | 1        | Body           | A216 WCB                                 | 1.0619                            | A351 CF8M                                | 1.4408                            |
| 2    | 1        | Tail           | A216 WCB                                 | 1.0619                            | A351 CF8M                                | 1.4408                            |
| 3    | 1        | Ball           | A351 CF8M+coating;<br>A182 F316L+coating | 1.4408+coating;<br>1.4404+coating | A351 CF8M+coating;<br>A182 F316L+coating | 1.4408+coating;<br>1.4404+coating |
| 4    | 1        | Stem           | A276 Gr.431                              | 1.4057                            | A276 Gr.431                              | 1.4057                            |
| 5    | 1        | Body gasket    | Graphite/316Ti                           | Graphite/1.4571                   | Graphite/316Ti                           | Graphite/1.4571                   |
| 6    | 2        | Seat           | A182 F316L+coating                       | 1.4404+coating                    | A182 F316L+coating                       | 1.4404+coating                    |
| 7    | 1        | Thrust washer  | Inconel 625+coating                      | Inconel 625+coating               | Inconel 625+coating                      | Inconel 625+coating               |
| 8    | 1        | Gland          | A582 Gr.303                              | 1.4305                            | A582 Gr.303                              | 1.4305                            |
| 10   | 12       | Stud           | A193 Gr.B7                               | A4-70                             | A193 Gr.B8M Cl.2                         | A4-70                             |
| 11   | 12       | Heavy hex nut  | A194 Gr.2H                               | A4-70                             | A194 Gr.8M                               | A4-70                             |
| 13   | 1        | Packing set    | Graphite                                 | Graphite                          | Graphite                                 | Graphite                          |
| 14   | 2        | Sleeve bearing | Inconel 625+coating                      | Inconel 625+coating               | Inconel 625+coating                      | Inconel 625+coating               |
| 15   | 1        | Gland flange   | A516 Gr.70                               | 1.0425                            | A240 316Ti; 316SS                        | 1.4571; 1.4401                    |
| 16   | 1        | Sleeve bearing | Inconel 625+coating                      | Inconel 625+coating               | Inconel 625+coating                      | Inconel 625+coating               |
| 17   | 1        | Bottom stem    | A479 316Ti; 316SS                        | 1.4571, 1.4401                    | A479 316Ti; 316SS                        | 1.4571, 1.4401                    |
| 18   | 1        | Sealing        | Graphite/316Ti                           | Graphite/1.4571                   | Graphite/316Ti                           | Graphite/1.4571                   |
| 19   | 1        | Cover          | A479 316Ti; 316                          | 1.4571; 1.4401                    | A479 316Ti; 316SS                        | 1.4571; 1.4401                    |
| 20   | 6        | Stud           | A193 Gr.B7                               | A4-70                             | A193 Gr.B8M Cl.2                         | A4-70                             |
| 21   | 6        | Heavy hex nut  | A194 Gr.2H                               | A4-70                             | A194 Gr.8M                               | A4-70                             |
| 22   | 2        | Stud           | A193 Gr.B7                               | A4-70                             | A193 Gr.B8M Cl.2                         | A4-70                             |
| 23   | 2        | Heavy hex nut  | A194 Gr.2H                               | A4-70                             | A194 Gr.8M                               | A4-70                             |
| 24   | 1        | Retaining ring | Stainless Steel                          | 1.4122                            | Stainless Steel                          | 1.4122                            |
| 25   | 2        | Wiper ring     | Graphite                                 | Graphite                          | Graphite                                 | Graphite                          |
| 26   | 2        | S-Ring         | A182 F316L                               | 1.4571; 1.4404                    | A276 316Ti, 316L                         | 1.4571; 1.4404                    |
| 27   | 2        | Seal ring      | Graphite-1,4                             | Graphite-1,4                      | Graphite-1,4                             | Graphite-1,4                      |
| 29   | 2        | Wave spring    | A286                                     | 1.4980                            | A286                                     | 1.4980                            |
| 30   | 2        | Parallel key   | 316SS/316Ti                              | A4/1.4571                         | 316SS/316Ti                              | A4/1.4571                         |
| 31   | 1        | Hex head plug  | A182 Gr.F316;<br>A479 Gr.316             | A4/1.4571                         | A182 Gr.F316;<br>A479 Gr.316             | A4/1.4571                         |



# Floating Ball Design Dimensions and Weights PN 10 & PN 16

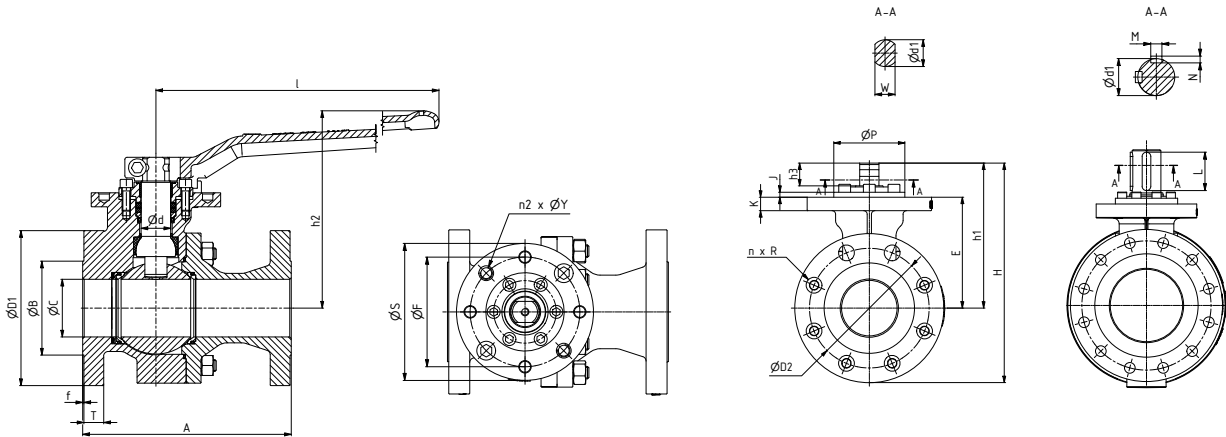


Dimensions D1, l, h2, S, E, h1 and H are for reference only.

| DN  | NPS    | Dimensions (mm) |        |     |     |     |     |     |     |   |    |     |    |   |     |     | Weights (kg) | Weights (kg) A-long |
|-----|--------|-----------------|--------|-----|-----|-----|-----|-----|-----|---|----|-----|----|---|-----|-----|--------------|---------------------|
|     |        | A               | A-long | ØC  | H   | h1  | E   | ØD1 | ØD2 | n | R  | ØB  | T  | f | h2  | l   |              |                     |
| 15  | 1/2"   | 115             | 130    | 13  | 146 | 69  | 49  | 95  | 65  | 4 | 14 | 45  | 14 | 2 | 98  | 182 | 3            | 3                   |
| 20  | 3/4"   | 120             | 150    | 19  | 157 | 75  | 55  | 105 | 75  | 4 | 14 | 58  | 16 | 2 | 104 | 182 | 4            | 4                   |
| 25  | 1"     | 125             | 160    | 25  | 165 | 78  | 58  | 115 | 85  | 4 | 14 | 68  | 16 | 2 | 107 | 182 | 5            | 5                   |
| 40  | 1 1/2" | 140             | 200    | 38  | 226 | 111 | 83  | 150 | 110 | 4 | 18 | 88  | 16 | 2 | 151 | 280 | 10           | 11                  |
| 50  | 2"     | 150             | 230    | 49  | 241 | 118 | 90  | 165 | 125 | 4 | 18 | 102 | 16 | 2 | 158 | 280 | 12           | 14                  |
| 80  | 3"     | 180             | 310    | 78  | 322 | 165 | 127 | 200 | 160 | 8 | 18 | 138 | 18 | 2 | 222 | 448 | 25           | 27                  |
| 100 | 4"     | 190             | 350    | 100 | 388 | 215 | 167 | 220 | 180 | 8 | 18 | 158 | 18 | 2 | 278 | 720 | 61           | 68                  |
| 150 | 6"     | 350             | 480    | 151 | 433 | 264 | 212 | 285 | 240 | 8 | 22 | 212 | 20 | 2 | -   | -   | 109          | 115                 |

| DN  | NPS    | Dimensions (mm) |     |     |     |    |     |      |   |    |   |   |   |      |    |      |
|-----|--------|-----------------|-----|-----|-----|----|-----|------|---|----|---|---|---|------|----|------|
|     |        | ISO 5211        | ØS  | ØP  | ØF  | n2 | ØY  | K    | J | Ød | L | M | N | h3   | W  | ø d1 |
| 15  | 1/2"   | F05             | 65  | 35  | 50  | 4  | M6  | 10   | 2 | 16 | - | - | - | 13   | 11 | 14   |
| 20  | 3/4"   | F05             | 65  | 35  | 50  | 4  | M6  | 11   | 2 | 16 | - | - | - | 13   | 11 | 14   |
| 25  | 1"     | F05             | 65  | 35  | 50  | 4  | M6  | 9    | 2 | 16 | - | - | - | 13   | 11 | 14   |
| 40  | 1 1/2" | F07             | 90  | 55  | 70  | 4  | M8  | 9    | 3 | 20 | - | - | - | 20   | 14 | 18   |
| 50  | 2"     | F07             | 90  | 55  | 70  | 4  | M8  | 10   | 3 | 20 | - | - | - | 20   | 14 | 18   |
| 80  | 3"     | F10             | 125 | 70  | 102 | 4  | M10 | 21.5 | 3 | 28 | - | - | - | 26   | 19 | 25   |
| 100 | 4"     | F14             | 175 | 100 | 140 | 4  | M16 | 18   | 6 | 40 | - | - | - | 33.5 | 27 | 36   |
| 150 | 6"     | F14             | 175 | 100 | 140 | 4  | M16 | 22   | 6 | 50 | - | - | - | 40   | 36 | 48   |

# Floating Ball Design Dimensions and Weights PN 25 & PN 40

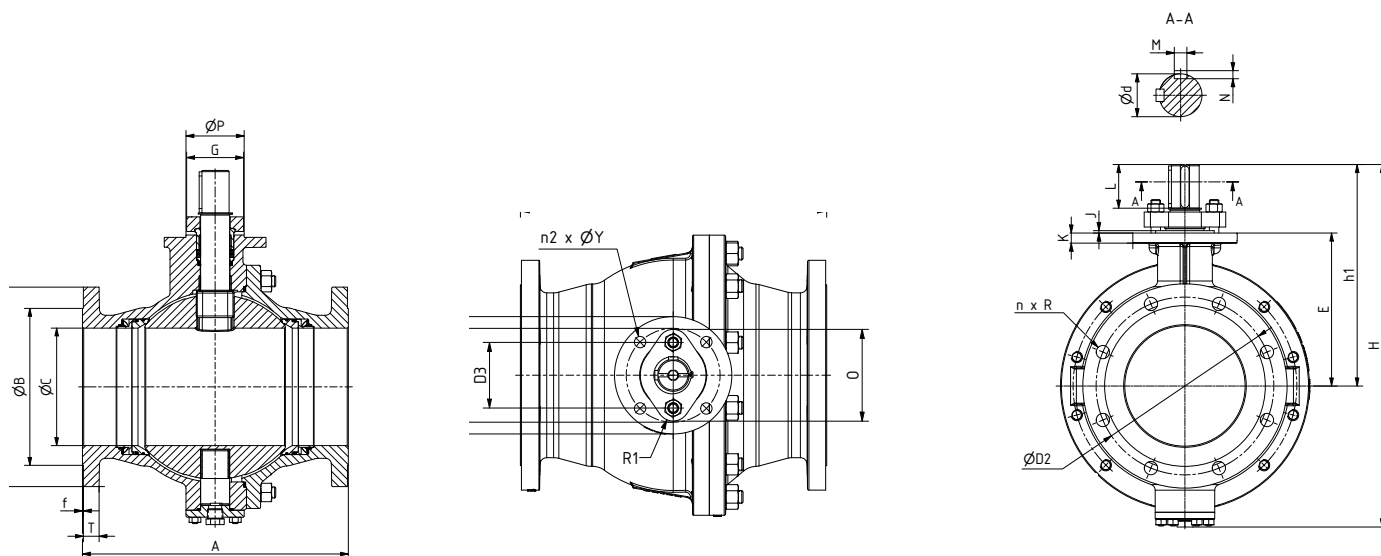


Dimensions D1, l, h2, S, E, h1 and H are for reference only.

| DN  | NPS    | Dimensions (mm) |        |     |     |     |     |     |     |   |    |     |    |   |     | Weights (kg) | Weights (kg) A-long |     |
|-----|--------|-----------------|--------|-----|-----|-----|-----|-----|-----|---|----|-----|----|---|-----|--------------|---------------------|-----|
|     |        | A               | A-long | ØC  | H   | h1  | E   | ØD1 | ØD2 | n | R  | ØB  | T  | f | h2  |              |                     | l   |
| 15  | 1/2"   | 115             | 130    | 13  | 146 | 69  | 49  | 95  | 65  | 4 | 14 | 45  | 14 | 2 | 98  | 182          | 3                   | 3   |
| 20  | 3/4"   | 120             | 150    | 19  | 155 | 75  | 55  | 105 | 75  | 4 | 14 | 58  | 16 | 2 | 104 | 182          | 4                   | 4   |
| 25  | 1"     | 125             | 160    | 25  | 165 | 78  | 58  | 115 | 85  | 4 | 14 | 68  | 16 | 2 | 107 | 182          | 5                   | 5   |
| 40  | 1 1/2" | 140             | 200    | 38  | 225 | 111 | 83  | 150 | 110 | 4 | 18 | 88  | 16 | 2 | 151 | 280          | 10                  | 11  |
| 50  | 2"     | 150             | 230    | 49  | 288 | 147 | 109 | 165 | 125 | 4 | 18 | 102 | 18 | 2 | 205 | 448          | 15                  | 16  |
| 80  | 3"     | 180             | 310    | 78  | 365 | 204 | 156 | 200 | 160 | 8 | 18 | 138 | 22 | 2 | 265 | 720          | 70                  | 73  |
| 100 | 4"     | 190             | 350    | 100 | 341 | 223 | 171 | 235 | 190 | 8 | 22 | 162 | 22 | 2 | -   | -            | 83                  | 84  |
| 150 | 6"     | 350             | 480    | 151 | 496 | 325 | 212 | 300 | 250 | 8 | 26 | 218 | 26 | 2 | -   | -            | 243                 | 248 |

| DN  | NPS    | Dimensions (mm) |     |     |     |    |     |    |   |    |    |    |    |      |    |     |
|-----|--------|-----------------|-----|-----|-----|----|-----|----|---|----|----|----|----|------|----|-----|
|     |        | ISO 5211        | ØS  | ØP  | ØF  | n2 | ØY  | K  | J | Ød | L  | M  | N  | h3   | W  | Ød1 |
| 15  | 1/2"   | F05             | 65  | 35  | 50  | 4  | M6  | 10 | 2 | 16 | -  | -  | -  | 13   | 11 | 14  |
| 20  | 3/4"   | F05             | 65  | 35  | 50  | 4  | M6  | 11 | 2 | 16 | -  | -  | -  | 13   | 11 | 14  |
| 25  | 1"     | F05             | 65  | 35  | 50  | 4  | M6  | 9  | 2 | 16 | -  | -  | -  | 13   | 11 | 14  |
| 40  | 1 1/2" | F07             | 90  | 55  | 70  | 4  | M8  | 9  | 3 | 20 | -  | -  | -  | 20   | 14 | 18  |
| 50  | 2"     | F10             | 125 | 70  | 102 | 4  | M10 | 17 | 3 | 28 | -  | -  | -  | 26   | 19 | 25  |
| 80  | 3"     | F14             | 175 | 100 | 140 | 4  | M16 | 19 | 6 | 40 | -  | -  | -  | 33.5 | 27 | 36  |
| 100 | 4"     | F14             | 175 | 100 | 140 | 4  | M16 | 24 | 6 | 50 | -  | -  | -  | 40   | 36 | 48  |
| 150 | 6"     | F16             | 210 | 130 | 165 | 4  | M20 | 29 | 7 | 70 | 80 | 18 | 11 | -    | -  | -   |

# Trunnion Design Dimensions and Weights PN 10 & PN 16



Dimensions D1, l, S, E, h1 and H are for reference only.

## PN 10

| DN  | NPS | Dimensions (mm) |        |     |     |       |     |     |     |    |    |     |    |   |     |     |     |    | Weights (kg) | Weights (kg) A-long |
|-----|-----|-----------------|--------|-----|-----|-------|-----|-----|-----|----|----|-----|----|---|-----|-----|-----|----|--------------|---------------------|
|     |     | A               | A-long | ØC  | H   | h1    | E   | ØD1 | ØD2 | n  | R  | ØB  | T  | f | O   | G   | D3  | R1 |              |                     |
| 200 | 8"  | 400             | 600    | 202 | 596 | 370   | 257 | 340 | 295 | 8  | 22 | 268 | 22 | 2 | 137 | 98  | 98  | 20 | 184          | 200                 |
| 250 | 10" | 450             | 730    | 252 | 677 | 413   | 300 | 395 | 350 | 12 | 22 | 320 | 24 | 2 | 137 | 98  | 98  | 20 | 291          | 319                 |
| 300 | 12" | 500             | 850    | 303 | 809 | 483.5 | 335 | 445 | 400 | 12 | 22 | 370 | 24 | 2 | 182 | 128 | 130 | 24 | 463          | 511                 |

| DN  | NPS | Dimensions (mm) |     |     |     |    |    |    |   |    |    |    |   |    |   |     |
|-----|-----|-----------------|-----|-----|-----|----|----|----|---|----|----|----|---|----|---|-----|
|     |     | ISO 5211        | ØS  | ØP  | ØF  | n2 | ØY | K  | J | Ød | L  | M  | N | h3 | W | Ød1 |
| 200 | 8"  | F14             | 175 | 100 | 140 | 4  | 17 | 17 | 4 | 50 | 70 | 14 | 9 | -  | - | 48  |
| 250 | 10" | F14             | 175 | 100 | 140 | 4  | 17 | 22 | 4 | 50 | 70 | 14 | 9 | -  | - | 48  |
| 300 | 12" | F16             | 210 | 130 | 165 | 4  | 21 | 22 | 4 | 70 | 70 | 14 | 9 | -  | - | 60  |

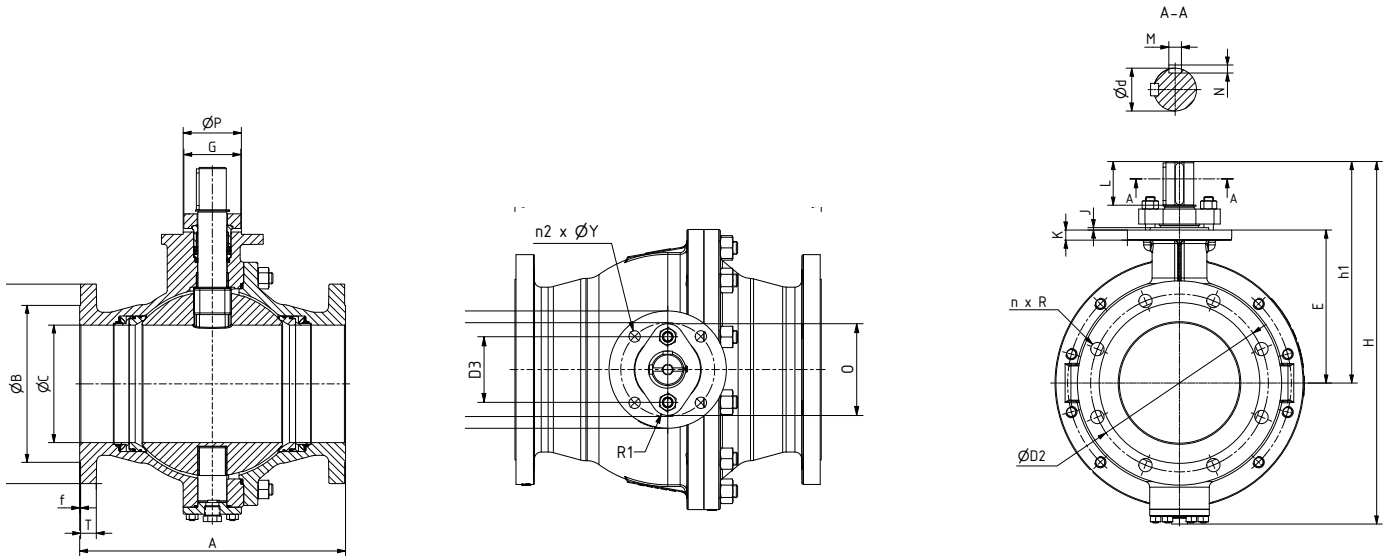
## PN 16

| DN  | NPS | Dimensions (mm) |        |     |     |       |     |     |     |    |    |     |    |   |     |     |     |    | Weights (kg) | Weights (kg) A-long |
|-----|-----|-----------------|--------|-----|-----|-------|-----|-----|-----|----|----|-----|----|---|-----|-----|-----|----|--------------|---------------------|
|     |     | A               | A-long | ØC  | H   | h1    | E   | ØD1 | ØD2 | n  | R  | ØB  | T  | f | O   | G   | D3  | R1 |              |                     |
| 200 | 8"  | 400             | 600    | 202 | 596 | 370   | 257 | 340 | 295 | 8  | 22 | 268 | 22 | 2 | 137 | 98  | 98  | 20 | 184          | 200                 |
| 250 | 10" | 450             | 730    | 252 | 677 | 413   | 300 | 405 | 355 | 12 | 26 | 320 | 24 | 2 | 137 | 98  | 98  | 20 | 293          | 321                 |
| 300 | 12" | 500             | 850    | 303 | 809 | 483.5 | 335 | 460 | 410 | 12 | 26 | 378 | 26 | 2 | 182 | 128 | 130 | 24 | 468          | 517                 |

| DN  | NPS | Dimensions (mm) |     |     |     |    |    |    |   |    |     |    |    |    |   |     |
|-----|-----|-----------------|-----|-----|-----|----|----|----|---|----|-----|----|----|----|---|-----|
|     |     | ISO 5211        | ØS  | ØP  | ØF  | n2 | ØY | K  | J | Ød | L   | M  | N  | h3 | W | Ød1 |
| 200 | 8"  | F14             | 175 | 100 | 140 | 4  | 17 | 17 | 4 | 50 | 70  | 14 | 9  | -  | - | 48  |
| 250 | 10" | F14             | 175 | 100 | 140 | 4  | 17 | 22 | 4 | 50 | 70  | 14 | 9  | -  | - | 48  |
| 300 | 12" | F16             | 210 | 130 | 165 | 4  | 21 | 21 | 5 | 70 | 100 | 18 | 11 | -  | - | 60  |



# Trunnion Design Dimensions and Weights PN 25 & PN 40



Dimensions D1, l, S, E, h1 and H are for reference only.

## PN 25

| DN  | NPS | Dimensions (mm) |        |     |     |     |     |     |     |    |    |     |    |   |     |     |     | Weights (kg) | Weights (kg) A-long |     |
|-----|-----|-----------------|--------|-----|-----|-----|-----|-----|-----|----|----|-----|----|---|-----|-----|-----|--------------|---------------------|-----|
|     |     | A               | A-long | ØC  | H   | h1  | E   | ØD1 | ØD2 | n  | R  | ØB  | T  | f | O   | G   | D3  |              |                     | R1  |
| 200 | 8"  | 400             | 600    | 202 | 609 | 372 | 256 | 360 | 310 | 12 | 26 | 278 | 28 | 2 | 178 | 102 | 130 | 24           | 293                 | 313 |
| 250 | 10" | 450             | 730    | 252 | 716 | 441 | 290 | 425 | 370 | 12 | 30 | 335 | 30 | 2 | 178 | 102 | 130 | 24           | 447                 | 486 |
| 300 | 12" | 500             | 850    | 303 | 824 | 497 | 335 | 485 | 430 | 16 | 30 | 395 | 32 | 2 | 188 | 112 | 140 | 24           | 684                 | 751 |

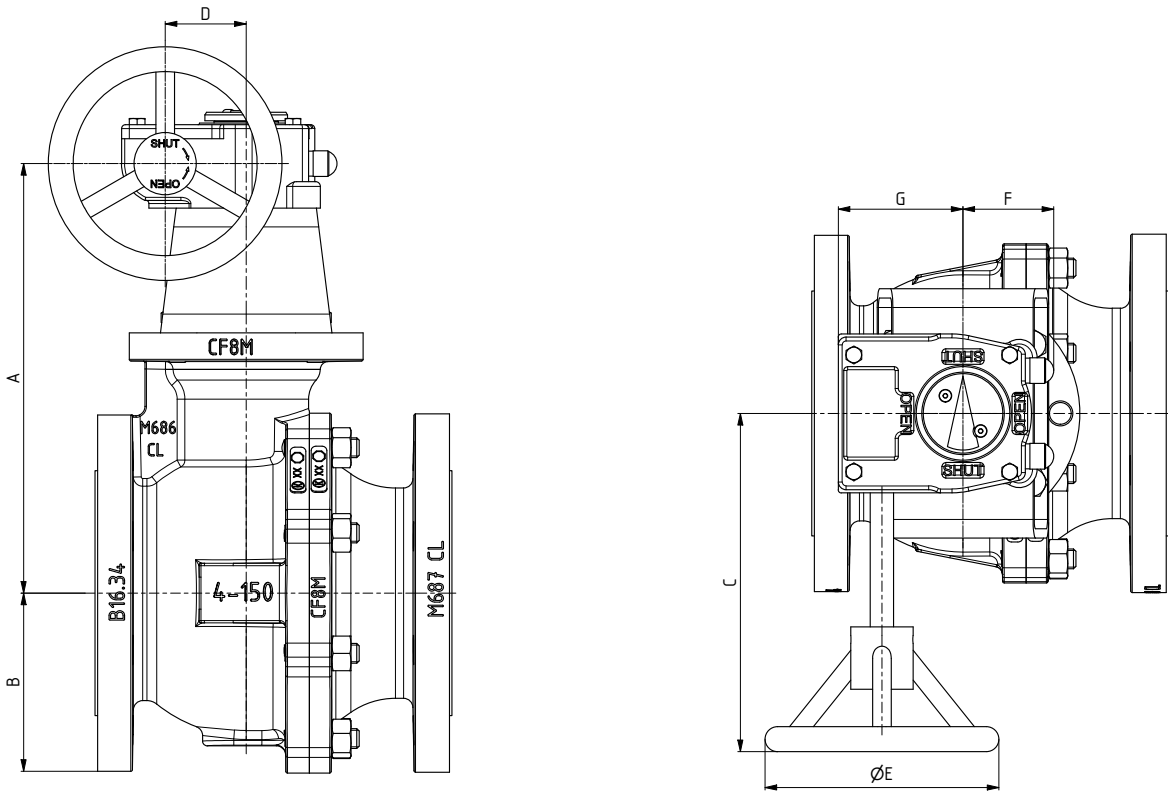
| DN  | NPS | Dimensions (mm) |     |     |     |    |    |    |   |    |     |    |    |    |   |     |
|-----|-----|-----------------|-----|-----|-----|----|----|----|---|----|-----|----|----|----|---|-----|
|     |     | ISO 5211        | ØS  | ØP  | ØF  | n2 | ØY | K  | J | Ød | L   | M  | N  | h3 | W | Ød1 |
| 200 | 8"  | F16             | 210 | 130 | 165 | 4  | 21 | 21 | 5 | 70 | 70  | 18 | 11 | -  | - | 60  |
| 250 | 10" | F25             | 300 | 200 | 254 | 8  | 17 | 18 | 5 | 70 | 100 | 18 | 11 | -  | - | 60  |
| 300 | 12" | F25             | 300 | 200 | 254 | 8  | 17 | 30 | 5 | 80 | 110 | 20 | 12 | -  | - | 72  |

## PN 40

| DN  | NPS | Dimensions (mm) |        |     |     |     |     |     |     |    |    |     |    |   |     |     |     | Weights (kg) | Weights (kg) A-long |     |
|-----|-----|-----------------|--------|-----|-----|-----|-----|-----|-----|----|----|-----|----|---|-----|-----|-----|--------------|---------------------|-----|
|     |     | A               | A-long | ØC  | H   | h1  | E   | ØD1 | ØD2 | n  | R  | ØB  | T  | f | O   | G   | D3  |              |                     | R1  |
| 200 | 8"  | 400             | 600    | 202 | 609 | 372 | 256 | 375 | 320 | 12 | 30 | 285 | 32 | 2 | 178 | 102 | 130 | 24           | 299                 | 320 |
| 250 | 10" | 450             | 730    | 252 | 716 | 441 | 290 | 450 | 385 | 12 | 33 | 345 | 36 | 2 | 178 | 102 | 130 | 24           | 462                 | 501 |
| 300 | 12" | 500             | 850    | 303 | 824 | 497 | 335 | 515 | 450 | 16 | 33 | 410 | 40 | 2 | 188 | 112 | 140 | 24           | 706                 | 770 |

| DN  | NPS | Dimensions (mm) |     |     |     |    |    |    |   |    |     |    |    |    |   |     |
|-----|-----|-----------------|-----|-----|-----|----|----|----|---|----|-----|----|----|----|---|-----|
|     |     | ISO 5211        | ØS  | ØP  | ØF  | n2 | ØY | K  | J | Ød | L   | M  | N  | h3 | W | Ød1 |
| 200 | 8"  | F16             | 210 | 130 | 165 | 4  | 21 | 21 | 5 | 70 | 70  | 18 | 11 | -  | - | 60  |
| 250 | 10" | F25             | 300 | 200 | 254 | 8  | 17 | 18 | 5 | 70 | 100 | 18 | 11 | -  | - | 60  |
| 300 | 12" | F25             | 300 | 200 | 254 | 8  | 17 | 30 | 5 | 80 | 110 | 20 | 12 | -  | - | 72  |

# High Temperature Design with Gears PN 10 & PN 16

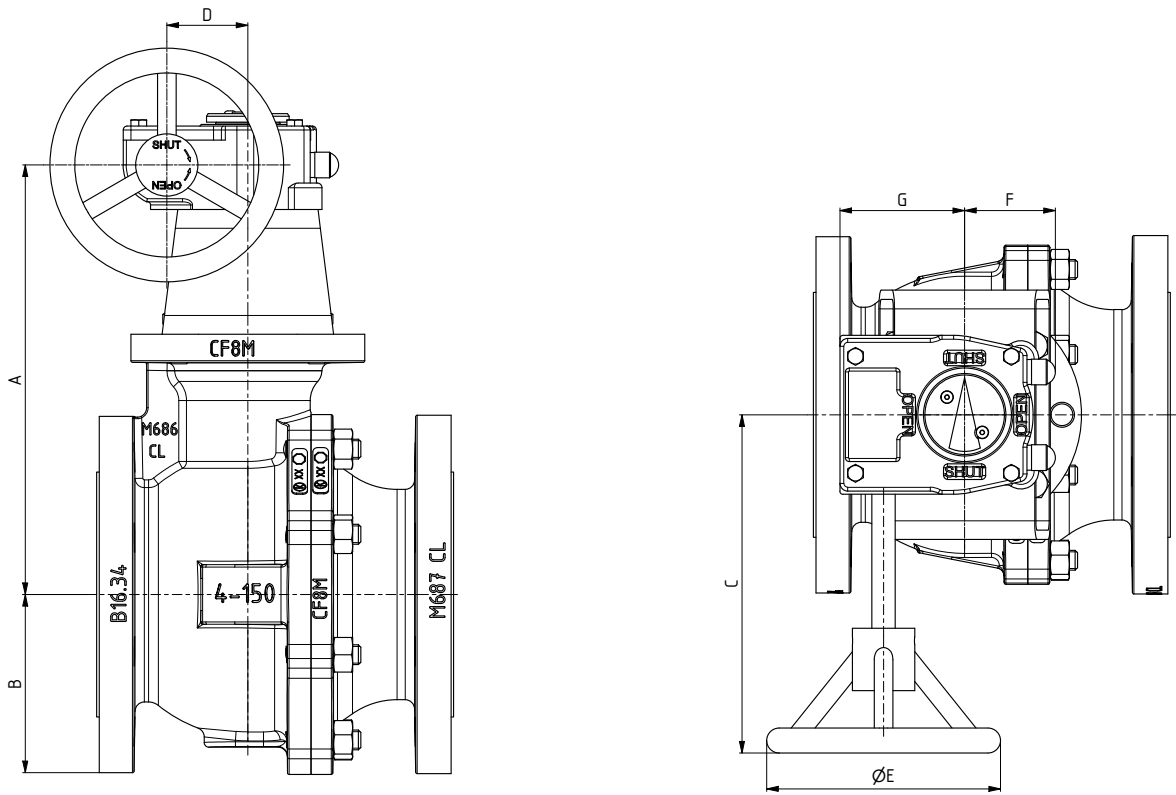


*Gear dimensions are for reference only.*

| DN  | NPS | Dimensions (mm) |     |     |    |     |     |     |
|-----|-----|-----------------|-----|-----|----|-----|-----|-----|
|     |     | A               | B   | C   | D  | ØE  | F   | G   |
| 100 | 4"  | 288             | 123 | 249 | 71 | 150 | 85  | 105 |
| 150 | 6"  | 334             | 169 | 270 | 86 | 300 | 103 | 126 |
| 200 | 8"  | 459             | 237 | 270 | 86 | 300 | 103 | 126 |
| 250 | 10" | 502             | 265 | 270 | 86 | 300 | 103 | 126 |
| 300 | 12" | 589             | 327 | 318 | 53 | 350 | 109 | 150 |

*Gear size is based on clear, clean liquid fluid at maximum differential pressure.*

## High Temperature Design with Gears PN 25 & PN 40



*Gear dimensions are for reference only.*

| DN  | NPS | Dimensions (mm) |     |     |     |     |     |     |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
|     |     | A               | B   | C   | D   | ØE  | F   | G   |
| 80  | 3"  | 277             | 100 | 249 | 71  | 150 | 86  | 105 |
| 100 | 4"  | 293             | 122 | 265 | 86  | 250 | 103 | 126 |
| 150 | 6"  | 468             | 172 | 318 | 53  | 350 | 109 | 150 |
| 200 | 8"  | 510             | 237 | 318 | 53  | 350 | 109 | 150 |
| 250 | 10" | 543             | 275 | 378 | 130 | 250 | 127 | 180 |
| 300 | 12" | 598             | 327 | 400 | 140 | 350 | 133 | 195 |

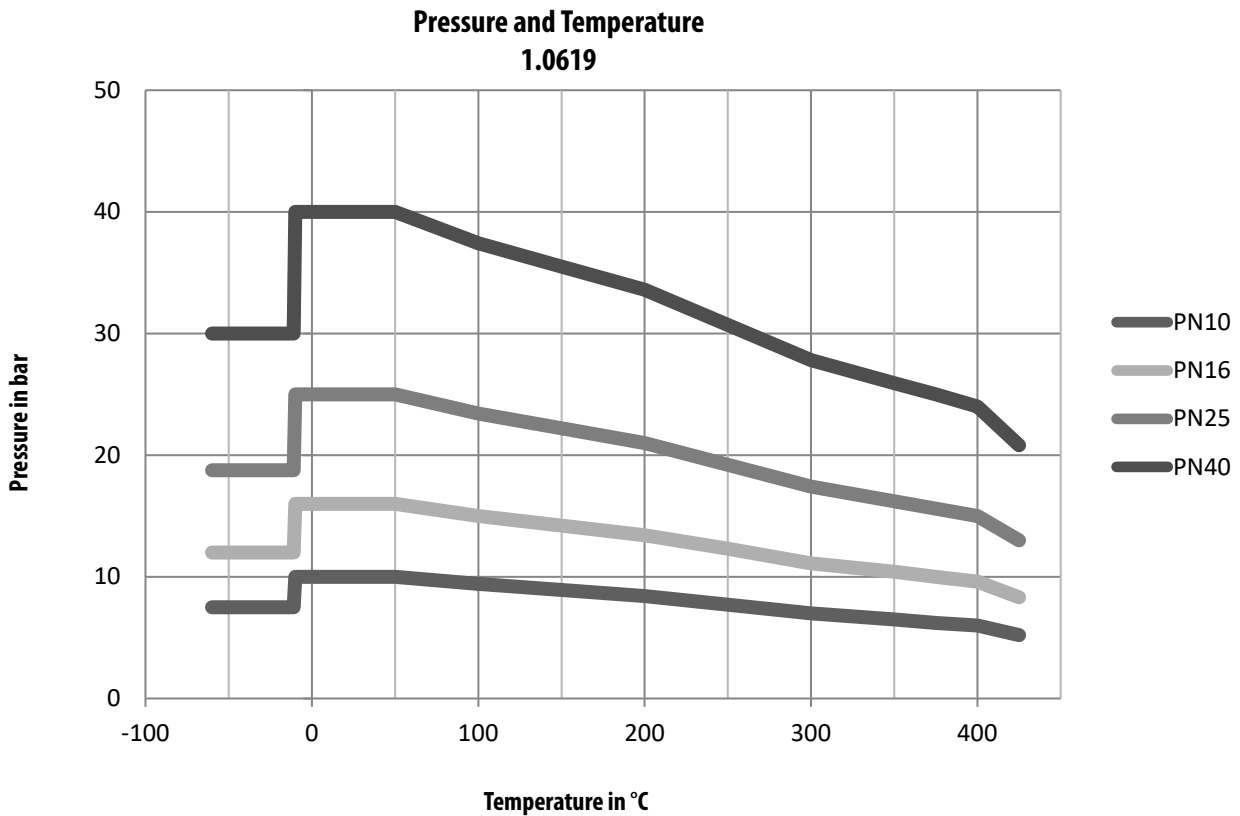
*Gear size is based on clear, clean liquid fluid at maximum differential pressure.*

# Pressure/Temperature Ratings for Carbon Steel

| Temperature | Max working pressure<br>PN 10 | Max working pressure<br>PN 16 | Max working pressure<br>PN 25 | Max working pressure<br>PN 40 |
|-------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|             | 1.0619*                       |                               |                               |                               |
| °C          | bar                           |                               |                               |                               |
| -60**       | 7.5                           | 12.0                          | 18.8                          | 30.0                          |
| -10         | 10.0                          | 16.0                          | 25.0                          | 40.0                          |
| 50          | 10.0                          | 16.0                          | 25.0                          | 40.0                          |
| 100         | 9.4                           | 15.0                          | 23.4                          | 37.4                          |
| 150         | 8.9                           | 14.2                          | 22.2                          | 35.5                          |
| 200         | 8.4                           | 13.4                          | 21.0                          | 33.6                          |
| 250         | 7.7                           | 12.3                          | 19.2                          | 30.7                          |
| 300         | 7.0                           | 11.1                          | 17.4                          | 27.8                          |
| 350         | 6.5                           | 10.4                          | 16.2                          | 25.9                          |
| 375         | 6.2                           | 10.0                          | 15.6                          | 25.0                          |
| 400         | 6.0                           | 9.6                           | 15.0                          | 24.0                          |
| 425         | 5.2                           | 8.3                           | 13.0                          | 20.8                          |

\* according EN12516-1 - Material Group 3E0

\*\* Values in accordance to AD2000-W10 - Stress category II

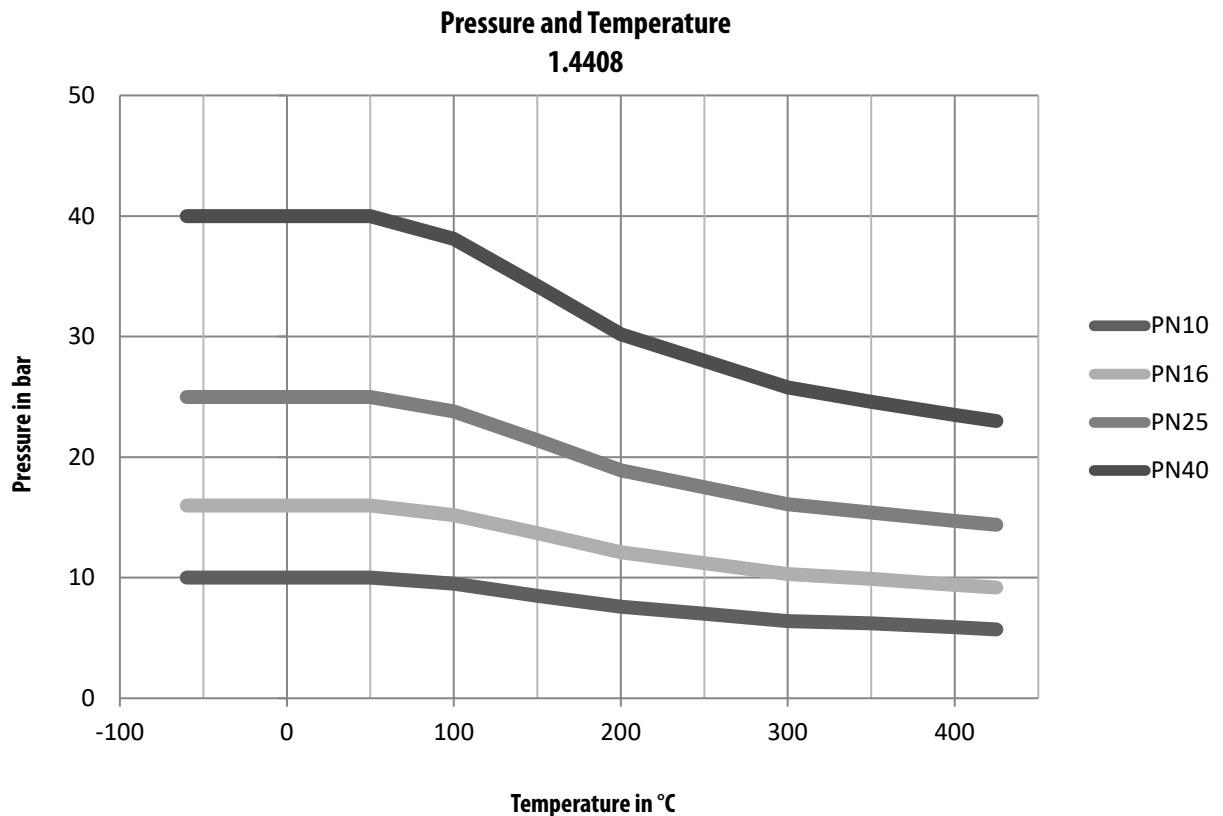


## Pressure/Temperature Ratings for Stainless Steel

| Temperature | Max working pressure<br>PN 10 | Max working pressure<br>PN 16 | Max working pressure<br>PN 25 | Max working pressure<br>PN 40 |
|-------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|             | 1.4408 *                      |                               |                               |                               |
| °C          | bar                           |                               |                               |                               |
| -60**       | 10.0                          | 16.0                          | 25.0                          | 40.0                          |
| -10         | 10.0                          | 16.0                          | 25.0                          | 40.0                          |
| 50          | 10.0                          | 16.0                          | 25.0                          | 40.0                          |
| 100         | 9.5                           | 15.2                          | 23.8                          | 38.1                          |
| 150         | 8.5                           | 13.7                          | 21.4                          | 34.2                          |
| 200         | 7.6                           | 12.1                          | 18.9                          | 30.2                          |
| 250         | 7.0                           | 11.2                          | 17.5                          | 28.0                          |
| 300         | 6.4                           | 10.3                          | 16.1                          | 25.8                          |
| 350         | 6.2                           | 9.9                           | 15.4                          | 24.6                          |
| 400         | 5.9                           | 9.4                           | 14.7                          | 23.5                          |
| 425         | 5.7                           | 9.2                           | 14.4                          | 23.0                          |

\* according EN1092-1 Material Group 14E0

\*\* Values in accordance to AD2000-W10 - Stress category I



# Maximum Allowable Stem Torques

## Maximum Allowable Stem Torque PN 10 & PN 16

| DN                          | NPS    | MAST [Nm]            |                    |                      |                      |                        |                        |                        |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
|                             |        | Stem Material        |                    |                      |                      |                        |                        |                        |
|                             |        | A276 Gr431<br>1.4057 | A182 F51<br>1.4462 | A564 Gr630<br>1.4542 | A453 Gr660<br>1.4980 | A276 Gr316Ti<br>1.4571 | A276 Gr316 L<br>1.4404 | A286 GrXM-19<br>1.3964 |
| <b>Floating Ball Design</b> |        |                      |                    |                      |                      |                        |                        |                        |
| 15                          | 1/2"   | 108                  | 84                 | 107                  | 122                  | 66                     | 53                     | 88                     |
| 20                          | 3/4"   | 108                  | 84                 | 107                  | 122                  | 66                     | 53                     | 88                     |
| 25                          | 1"     | 108                  | 84                 | 107                  | 122                  | 66                     | 53                     | 88                     |
| 40                          | 1 1/2" | 276                  | 214                | 275                  | 311                  | 157                    | 111                    | 225                    |
| 50                          | 2"     | 276                  | 214                | 275                  | 311                  | 157                    | 111                    | 225                    |
| 80                          | 3"     | 792                  | 614                | 787                  | 891                  | 406                    | 286                    | 644                    |
| 100                         | 4"     | 2177                 | 1687               | 2164                 | 2449                 | 1187                   | 837                    | 1769                   |
| 150                         | 6"     | 4355                 | 3375               | 4327                 | 4899                 | 2667                   | 1983                   | 3538                   |
| <b>Trunion Design</b>       |        |                      |                    |                      |                      |                        |                        |                        |
| 200                         | 8"     | 7609                 | 5681               | 6531                 | 7609                 | 3094                   | 2181                   | 5073                   |
| 250                         | 10"    | 7609                 | 5681               | 6531                 | 7609                 | 3094                   | 2181                   | 5073                   |
| 300                         | 12"    | 14736                | 11003              | 12649                | 14736                | 5993                   | 4224                   | 9824                   |

## Maximum Allowable Stem Torque PN 25 & PN 40

| DN                          | NPS    | MAST [Nm]            |                    |                      |                      |                        |                        |                        |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
|                             |        | Stem Material        |                    |                      |                      |                        |                        |                        |
|                             |        | A276 Gr431<br>1.4057 | A182 F51<br>1.4462 | A564 Gr630<br>1.4542 | A453 Gr660<br>1.4980 | A276 Gr316Ti<br>1.4571 | A276 Gr316 L<br>1.4404 | A286 GrXM-19<br>1.3964 |
| <b>Floating Ball Design</b> |        |                      |                    |                      |                      |                        |                        |                        |
| 15                          | 1/2"   | 108                  | 84                 | 107                  | 122                  | 66                     | 53                     | 88                     |
| 20                          | 3/4"   | 108                  | 84                 | 107                  | 122                  | 66                     | 53                     | 88                     |
| 25                          | 1"     | 108                  | 84                 | 107                  | 122                  | 66                     | 53                     | 88                     |
| 40                          | 1 1/2" | 276                  | 214                | 275                  | 311                  | 157                    | 111                    | 225                    |
| 50                          | 2"     | 792                  | 614                | 787                  | 891                  | 406                    | 286                    | 644                    |
| 80                          | 3"     | 2177                 | 1687               | 2164                 | 2449                 | 1187                   | 837                    | 1769                   |
| 100                         | 4"     | 4355                 | 3375               | 4327                 | 4899                 | 2667                   | 1983                   | 3538                   |
| 150                         | 6"     | 13707                | 11003              | 12649                | 13707                | 5993                   | 4224                   | 9824                   |
| <b>Trunion Design</b>       |        |                      |                    |                      |                      |                        |                        |                        |
| 200                         | 8"     | 11776                | 11003              | 11776                | 11776                | 5993                   | 4224                   | 9824                   |
| 250                         | 10"    | 14736                | 11003              | 12649                | 14736                | 5993                   | 4224                   | 9824                   |
| 300                         | 12"    | 25272                | 19997              | 22988                | 25272                | 10891                  | 7678                   | 17855                  |

# Kv / Cv Values

## Kv / Cv Values Class PN 10 - PN 40

| DN                          | NPS    | Opening Angle |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |
|-----------------------------|--------|---------------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|
|                             |        | 90°           |       | 80°   |       | 70°   |       | 60°  |      | 50°  |      | 40°  |      | 30°  |      | 20°  |      |
|                             |        | Kv            | Cv    | Kv    | Cv    | Kv    | Cv    | Kv   | Cv   | Kv   | Cv   | Kv   | Cv   | Kv   | Cv   | Kv   | Cv   |
| <b>Floating Ball Design</b> |        |               |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |
| 15                          | 1/2"   | 26            | 30    | 22    | 26    | 17    | 20    | 10   | 12   | 7    | 8    | 4    | 5    | 3    | 3    | 2    | 2    |
| 20                          | 3/4"   | 48            | 56    | 41    | 48    | 31    | 36    | 18   | 21   | 12   | 14   | 8    | 9    | 5    | 6    | 3    | 3    |
| 25                          | 1"     | 82            | 95    | 71    | 82    | 52    | 60    | 31   | 36   | 21   | 24   | 13   | 15   | 8    | 9    | 5    | 6    |
| 40                          | 1 1/2" | 225           | 261   | 194   | 225   | 144   | 167   | 86   | 100  | 56   | 65   | 36   | 42   | 23   | 27   | 14   | 16   |
| 50                          | 2"     | 424           | 492   | 365   | 423   | 271   | 314   | 161  | 187  | 106  | 123  | 68   | 79   | 42   | 49   | 25   | 29   |
| 80                          | 3"     | 1125          | 1305  | 968   | 1123  | 720   | 835   | 428  | 496  | 281  | 326  | 180  | 209  | 113  | 131  | 68   | 79   |
| 100                         | 4"     | 1903          | 2207  | 1637  | 1899  | 1218  | 1413  | 723  | 839  | 476  | 552  | 304  | 353  | 190  | 220  | 114  | 132  |
| 150                         | 6"     | 4801          | 5569  | 4129  | 4790  | 3073  | 3565  | 1824 | 2116 | 1200 | 1392 | 768  | 891  | 480  | 557  | 288  | 334  |
| <b>Trunion Design</b>       |        |               |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |
| 200                         | 8"     | 8737          | 10135 | 7514  | 8716  | 5592  | 6487  | 3320 | 3851 | 2184 | 2533 | 1398 | 1622 | 874  | 1014 | 524  | 608  |
| 250                         | 10"    | 14186         | 16456 | 12200 | 14152 | 9079  | 10532 | 5391 | 6254 | 3547 | 4115 | 2270 | 2633 | 1419 | 1646 | 851  | 987  |
| 300                         | 12"    | 20933         | 24282 | 18002 | 20882 | 13397 | 15541 | 7955 | 9228 | 5233 | 6070 | 3349 | 3885 | 2093 | 2428 | 1256 | 1457 |

# Operating Torques

## Operating Torques PN 10

| DN                          | NPS    | Torque [Nm] |     |     |  |     |     |     |
|-----------------------------|--------|-------------|-----|-----|--|-----|-----|-----|
|                             |        | BTO         | RUN | ETO |  | BTC | RUN | ETC |
| <b>Floating Ball Design</b> |        |             |     |     |  |     |     |     |
| 15                          | 1/2"   | 10          | 9   | 9   |  | 10  | 9   | 9   |
| 20                          | 3/4"   | 11          | 9   | 10  |  | 11  | 9   | 10  |
| 25                          | 1"     | 11          | 10  | 10  |  | 11  | 10  | 10  |
| 40                          | 1 1/2" | 24          | 18  | 19  |  | 21  | 18  | 20  |
| 50                          | 2"     | 34          | 22  | 25  |  | 27  | 22  | 28  |
| 80                          | 3"     | 97          | 54  | 59  |  | 65  | 54  | 73  |
| 100                         | 4"     | 217         | 122 | 130 |  | 143 | 122 | 161 |
| 150                         | 6"     | 598         | 300 | 333 |  | 367 | 300 | 434 |
| <b>Trunion Design</b>       |        |             |     |     |  |     |     |     |
| 200                         | 8"     | 465         | 270 | 296 |  | 325 | 270 | 320 |
| 250                         | 10"    | 661         | 372 | 418 |  | 460 | 372 | 446 |
| 300                         | 12"    | 1202        | 670 | 746 |  | 820 | 670 | 817 |

## Operating Torques PN 16

| DN                          | NPS    | Torque [Nm] |     |     |  |     |     |      |
|-----------------------------|--------|-------------|-----|-----|--|-----|-----|------|
|                             |        | BTO         | RUN | ETO |  | BTC | RUN | ETC  |
| <b>Floating Ball Design</b> |        |             |     |     |  |     |     |      |
| 15                          | 1/2"   | 10          | 9   | 9   |  | 10  | 9   | 9    |
| 20                          | 3/4"   | 11          | 9   | 10  |  | 11  | 9   | 10   |
| 25                          | 1"     | 13          | 10  | 10  |  | 11  | 10  | 11   |
| 40                          | 1 1/2" | 28          | 18  | 19  |  | 21  | 18  | 22   |
| 50                          | 2"     | 44          | 24  | 26  |  | 29  | 24  | 33   |
| 80                          | 3"     | 132         | 60  | 65  |  | 71  | 60  | 90   |
| 100                         | 4"     | 291         | 135 | 143 |  | 157 | 135 | 198  |
| 150                         | 6"     | 844         | 343 | 376 |  | 414 | 343 | 557  |
| <b>Trunion Design</b>       |        |             |     |     |  |     |     |      |
| 200                         | 8"     | 601         | 304 | 330 |  | 363 | 304 | 384  |
| 250                         | 10"    | 865         | 422 | 468 |  | 515 | 422 | 541  |
| 300                         | 12"    | 1585        | 768 | 843 |  | 928 | 768 | 1003 |

## Operating Torques PN 25

| DN                          | NPS    | Torque [Nm] |      |      |  |      |      |      |
|-----------------------------|--------|-------------|------|------|--|------|------|------|
|                             |        | BTO         | RUN  | ETO  |  | BTC  | RUN  | ETC  |
| <b>Floating Ball Design</b> |        |             |      |      |  |      |      |      |
| 15                          | 1/2"   | 11          | 9    | 9    |  | 10   | 9    | 9    |
| 20                          | 3/4"   | 12          | 9    | 10   |  | 11   | 9    | 10   |
| 25                          | 1"     | 15          | 10   | 11   |  | 12   | 10   | 12   |
| 40                          | 1 1/2" | 36          | 20   | 21   |  | 23   | 20   | 26   |
| 50                          | 2"     | 77          | 43   | 45   |  | 50   | 43   | 56   |
| 80                          | 3"     | 235         | 115  | 120  |  | 132  | 115  | 162  |
| 100                         | 4"     | 451         | 199  | 207  |  | 228  | 199  | 298  |
| 150                         | 6"     | 1372        | 550  | 583  |  | 641  | 550  | 884  |
| <b>Trunion Design</b>       |        |             |      |      |  |      |      |      |
| 200                         | 8"     | 970         | 502  | 528  |  | 580  | 502  | 655  |
| 250                         | 10"    | 1361        | 651  | 697  |  | 767  | 651  | 881  |
| 300                         | 12"    | 2239        | 1010 | 1085 |  | 1194 | 1010 | 1401 |

## Operating Torques PN 40

| DN                          | NPS    | Torque [Nm] |      |      |  |      |      |      |
|-----------------------------|--------|-------------|------|------|--|------|------|------|
|                             |        | BTO         | RUN  | ETO  |  | BTC  | RUN  | ETC  |
| <b>Floating Ball Design</b> |        |             |      |      |  |      |      |      |
| 15                          | 1/2"   | 12          | 9    | 10   |  | 11   | 9    | 10   |
| 20                          | 3/4"   | 15          | 10   | 10   |  | 11   | 10   | 12   |
| 25                          | 1"     | 19          | 11   | 11   |  | 13   | 11   | 14   |
| 40                          | 1 1/2" | 48          | 22   | 23   |  | 25   | 22   | 32   |
| 50                          | 2"     | 102         | 48   | 50   |  | 55   | 48   | 69   |
| 80                          | 3"     | 323         | 133  | 137  |  | 151  | 133  | 207  |
| 100                         | 4"     | 638         | 235  | 243  |  | 267  | 235  | 394  |
| 150                         | 6"     | 1998        | 666  | 699  |  | 769  | 666  | 1201 |
| <b>Trunion Design</b>       |        |             |      |      |  |      |      |      |
| 200                         | 8"     | 1333        | 606  | 631  |  | 694  | 606  | 850  |
| 250                         | 10"    | 1908        | 799  | 845  |  | 930  | 799  | 1168 |
| 300                         | 12"    | 3196        | 1268 | 1343 |  | 1477 | 1268 | 1893 |

The torques shown in the chart are for reference only (clean clear lubricating liquid, actuation safety factor = 1.0). For application-specific torques, please consult the factory.

BTO = Break to open  
 RUN = Running  
 ETO = End to open

BTC = Break to close  
 RUN = Running  
 ETC = End to close



# Torques for Packing Gland Nut, Body Joint and Cover

## Packing gland nut torques PN 10 & PN 16

| DN                          | NPS    | Thread Size | Standard Trim | High Temperature Trim |
|-----------------------------|--------|-------------|---------------|-----------------------|
|                             |        |             | [Nm]          | [Nm]                  |
| <b>Floating Ball Design</b> |        |             |               |                       |
| 15                          | 1/2"   | M30x1       | 116           | 116                   |
| 20                          | 3/4"   | M30x1       | 116           | 116                   |
| 25                          | 1"     | M30x1       | 116           | 116                   |
| 40                          | 1 1/2" | M36x1,5     | 224           | 224                   |
| 50                          | 2"     | M36x1,5     | 224           | 224                   |
| 80                          | 3"     | M48x1,5     | 490           | 389                   |
| 100                         | 4"     | M12x1.75    | 29            | 20                    |
| 150                         | 6"     | M12x1.75    | 26            | 18                    |
| <b>Trunion Design</b>       |        |             |               |                       |
| 200                         | 8"     | M16x2       | 140           | 97                    |
| 250                         | 10"    | M16x2       | 140           | 97                    |
| 300                         | 12"    | M24x3       | 329           | 330                   |

## Packing gland nut torques PN 25 & PN 40

| DN                          | NPS    | Thread Size | Standard Trim | High Temperature Trim |
|-----------------------------|--------|-------------|---------------|-----------------------|
|                             |        |             | [Nm]          | [Nm]                  |
| <b>Floating Ball Design</b> |        |             |               |                       |
| 15                          | 1/2"   | M30x1       | 116           | 116                   |
| 20                          | 3/4"   | M30x1       | 116           | 116                   |
| 25                          | 1"     | M30x1       | 116           | 116                   |
| 40                          | 1 1/2" | M36x1,5     | 224           | 224                   |
| 50                          | 2"     | M48x1,5     | 490           | 389                   |
| 80                          | 3"     | M12x1.75    | 29            | 20                    |
| 100                         | 4"     | M12x1.75    | 26            | 18                    |
| 150                         | 6"     | M12x1.75    | 41            | 41                    |
| <b>Trunion Design</b>       |        |             |               |                       |
| 200                         | 8"     | M24x3       | 329           | 330                   |
| 250                         | 10"    | M24x3       | 329           | 330                   |
| 300                         | 12"    | M24x3       | 374           | 374                   |

## Body joint torques PN 10 & PN 16

| DN                          | NPS    | Thread Size | [Nm] |
|-----------------------------|--------|-------------|------|
| <b>Floating Ball Design</b> |        |             |      |
| 15                          | 1/2"   | M10         | 30   |
| 20                          | 3/4"   | M10         | 30   |
| 25                          | 1"     | M10         | 30   |
| 40                          | 1 1/2" | M12         | 50   |
| 50                          | 2"     | M12         | 50   |
| 80                          | 3"     | M16         | 120  |
| 100                         | 4"     | M12         | 50   |
| 150                         | 6"     | M16         | 120  |
| <b>Trunion Design</b>       |        |             |      |
| 200                         | 8"     | M20         | 230  |
| 250                         | 10"    | M20         | 230  |
| 300                         | 12"    | M22         | 318  |

## Body joint torques PN 25 & PN 40

| DN                          | NPS    | Thread Size | [Nm] |
|-----------------------------|--------|-------------|------|
| <b>Floating Ball Design</b> |        |             |      |
| 15                          | 1/2"   | M10         | 30   |
| 20                          | 3/4"   | M10         | 30   |
| 25                          | 1"     | M10         | 30   |
| 40                          | 1 1/2" | M12         | 50   |
| 50                          | 2"     | M12         | 50   |
| 80                          | 3"     | M14         | 77   |
| 100                         | 4"     | M16         | 120  |
| 150                         | 6"     | M20         | 230  |
| <b>Trunion Design</b>       |        |             |      |
| 200                         | 8"     | M20         | 230  |
| 250                         | 10"    | M22         | 318  |
| 300                         | 12"    | M24         | 405  |

## Cover torques PN 10 & PN 16

| DN                          | NPS     | Thread Size | [Nm] |
|-----------------------------|---------|-------------|------|
| <b>Floating Ball Design</b> |         |             |      |
| 15-150                      | 1/2"-6" | -           | -    |
| <b>Trunion Design</b>       |         |             |      |
| 200                         | 8"      | M10x1.5     | 28   |
| 250                         | 10"     | M10x1.5     | 28   |
| 300                         | 12"     | M10x1.5     | 28   |

## Cover torques PN 25 & PN 40

| DN                          | NPS     | Thread Size | [Nm] |
|-----------------------------|---------|-------------|------|
| <b>Floating Ball Design</b> |         |             |      |
| 15-150                      | 1/2"-6" | -           | -    |
| <b>Trunion Design</b>       |         |             |      |
| 200                         | 8"      | M10x1.5     | 28   |
| 250                         | 10"     | M10x1.5     | 28   |
| 300                         | 12"     | M10x1.5     | 28   |

# Product Coding

| PRODUCT LINE |                |        |            | DESIGN |                |           |                |           |                |              |
|--------------|----------------|--------|------------|--------|----------------|-----------|----------------|-----------|----------------|--------------|
| Valve        | General Design | Bonnet | Valve Type | Size   | Pressure Class | Seat Type | Sealing System | Bore Size | End Connection | Face to Face |
| KFO          | 1              | 1      | 76         | G      | C              | B         | 1              | 1         | A              | 3            |

## PRODUCT LINE

| Valve                      |     |
|----------------------------|-----|
| Standard Flange Ball Valve | KFO |

| General Design                      |   |
|-------------------------------------|---|
| Cast split body, floating           | 1 |
| Forged split body, floating         | 5 |
| Forged split body, trunnion mounted | 7 |
| Cast split body, trunnion mounted   | 9 |

| Bonnet           |   |
|------------------|---|
| Standard         | 1 |
| Bonnet extension | 2 |

| Valve Type                       |    |
|----------------------------------|----|
| Performance Series (425°C/800°F) | 56 |
| Performance Series (260°C/500°F) | 76 |

## DESIGN

| Nominal Pipe Size |   |
|-------------------|---|
| DN 10             | A |
| DN 15             | B |
| DN 20             | C |
| DN 25             | D |
| DN 40             | F |
| DN 50             | G |
| DN 80             | I |
| DN 100            | J |
| DN 150            | L |
| DN 200            | M |
| DN 250            | N |
| DN 300            | O |

| Pressure Class |   |
|----------------|---|
| PN 10          | B |
| PN 16          | C |
| PN 25          | E |
| PN 40          | F |

| Seat Type                   |   |
|-----------------------------|---|
| Double Seat/ Bi-Directional | B |

| Standard Sealing System |   |
|-------------------------|---|
| Standard Sealing System | 1 |

| Seat Type |   |
|-----------|---|
| Full Port | 1 |

| Connection                     |   |
|--------------------------------|---|
| Flanged - EN 1092-1 Form B1    | D |
| Flanged - EN 1092-1 Form B2    | E |
| Flanged - EN 1092-1 Form C     | I |
| Flanged - EN 1092-1 Form D     | J |
| Flanged - EN 1092-1 Form C & D | K |
| Flanged - EN 1092-1 Form E     | L |
| Flanged - EN 1092-1 Form F     | M |
| Flanged - EN 1092-1 Form E & F | N |

| Face to Face            |   |
|-------------------------|---|
| EN558 series 27 (Short) | 3 |
| EN558 series 1 (Long)   | 5 |

# Product Coding

| MATERIAL      |               |           |                    |                    |                | OTHER               |        |                    | OPERATION | OPTIONS |
|---------------|---------------|-----------|--------------------|--------------------|----------------|---------------------|--------|--------------------|-----------|---------|
| Body Material | Stem Material | Stem Seal | Ball Base Material | Seat Base Material | Coating System | Maximum Temperature | Jacket | Drain/ Purge Ports | Operator  | Options |
| B             | H             | 2         | F                  | F                  | 2              | B                   | 0      | 0                  | F         | 0       |

## MATERIAL

| Body Material              |   |
|----------------------------|---|
| 1.0619 (GP240GH)           | A |
| 1.4408 (GX5CrNiMo19-11-2)  | B |
| 1.4469 (GX2CrNiMoN26-7-4)  | C |
| 1.7357 (G17CrMo5-5)        | G |
| 2.4816 (NiCr15Fe)          | J |
| 2.4660 (NiCr20CuMo)        | K |
| 1.4859 (GX10NiCrNb 32-20)  | L |
| 2.4365 (GNIcu30Nb)         | M |
| 1.4409 (GX2CrNiMoN19-11-2) | N |
| 1.4417 (GX2CrNiMoN25-7-3)  | R |
| 2.4602 (NiCr21Mo14W)       | T |
| Other                      | X |

| Stem Material                  |   |
|--------------------------------|---|
| 1.4542 (X5CrNiCuNb16-4)        | A |
| 1.4021 (X20Cr13)               | B |
| 1.4571 (X6CrNiMoTi17-12-2)     | C |
| 1.4462 (X2CrNiMoN22-5-3)       | D |
| 1.4980 (X6NiCrTiMoVB25-15-2)   | E |
| 1.3964 (X2CrNiMnMoNb21-16-5-3) | F |
| 1.4057 (X17CrNi16-2)           | H |
| 1.4404 (X2CrNiMo17-12-2)       | I |
| Other                          | X |

| Stem Seal (Packing)                          |   |
|--|---|
| Standard Graphite                            | 1 |
| Fugitive Emission Packing (ISO15484/API-641) | 2 |

| Ball Base Material           |   |
|------------------------------|---|
| 1.4571 (X6CrNiMoTi17-12-2)   | C |
| 1.4462 (X2CrNiMoN22-5-3)     | D |
| 1.4980 (X6NiCrTiMoVB25-15-2) | E |
| 1.4404 (X2CrNiMo17-12-2)     | F |
| Other                        | X |

| Seat Base Material           |   |
|------------------------------|---|
| 1.4571 (X6CrNiMoTi17-12-2)   | C |
| 1.4462 (X2CrNiMoN22-5-3)     | D |
| 1.4980 (X6NiCrTiMoVB25-15-2) | E |
| 1.4404 (X2CrNiMo17-12-2)     | F |
| Other                        | X |

| Coating System |  |   |
|----------------|--|---|
| H3             | Ball: M3 Nickel/Chrome (NiCr)<br>Seat: M3 Nickel/Chrome (NiCr)   | 2 |
| H4             | Ball: M6 Nickel/Chrome/Tungsten Carbide (NiCr-WC)<br>Seat: M3 Nickel/Chrome (NiCr)                                 | 3 |
| H5             | Ball: M4 Cobalt based (Stellite SF20)<br>Seat: M4 Cobalt based (Stellite SF20)                                     | 4 |
| H6             | Ball: M11 Chromium Carbide/Nickel/Chromium (Cr3C2-NiCr)<br>Seat: M11 Chromium Carbide/Nickel/Chromium (Cr3C2-NiCr) | 5 |
| H10            | Ball: M12 Tungsten Carbide<br>Seat: M12 Tungsten Carbide   | 6 |
| H11            | Ball: M2 Hard Chromium (Cr)<br>Seat: M2 Hard Chromium (Cr)   | 7 |

## OTHER

| Maximum Temperature |   |
|---------------------|---|
| 260°C / 500°F       | B |
| 425°C / 800°F       | C |

| Heating Jacket |   |
|----------------|---|
| None           | 0 |

| Drain/Purge Ports |   |
|-------------------|---|
| None              | 0 |

## OPERATION

| Operator                                  |   |
|---|---|
| Bare Stem                                 | F |
| Lever - Locking                           | L |
| Gear (manual)                             | G |
| Actuated (pneumatic, hydraulic, electric) | A |
| Mounting kit w/o Operator                 | M |
| Extended Lever                            | J |
| Stem Extension                            | H |
| Stem Extension with Locking Lever         | O |
| Stem Extension with Gear                  | P |
| Stem Extension with Actuator              | R |
| Other                                     | X |

## OPTIONS

| Options              |   |
|----------------------|---|
| None                 | 0 |
| NACE MR 0103 or 0175 | 1 |
| Special              | X |

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