



TECHNICAL DATASHEET

ASME DESIGN

KROMBACH® TUFSEAT™

Performance Series Ball Valves

TUFSEAT by KROMBACH - THE SUPERIOR MSBV

CRANE®

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KROMBACH® TUFSEAT™ Performance Series

Features and Benefits

KROMBACH® TUFSEAT™ PERFORMANCE SERIES

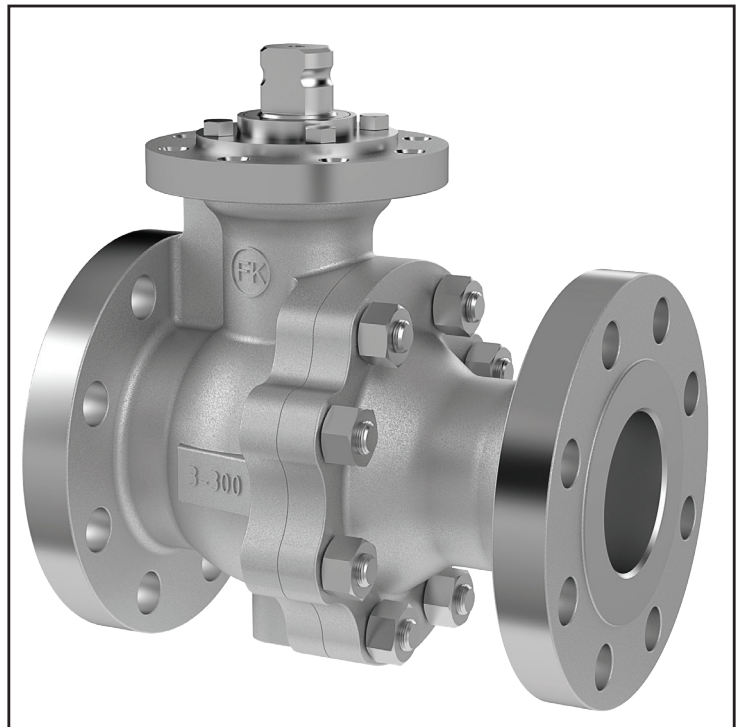
The KROMBACH® TUFSEAT Metal Seated Ball Valve Performance Series combines critical safety and performance features required for demanding service applications in chemical and refining markets.

STANDARD DESIGN

- Class V seat leak performance
- Up to 500F / 260°C
- Up to 10% Solids
- Hard Chrome or Nickel Alloy coatings on ball and seats
- Design acc. to ASME B16.34
- Floating Ball: KFO 1176 (1/2" to 6" / 150# and 300#)
- Trunnion: KFO 9176 (8" to 12" / 150# and 300#)

HIGH TEMPERATURE TRIM DESIGN

- Class VI seat leak performance
- Up to 800F / 427°C
- Up to 20% Solids
- Nickel Alloy, Chrome and Tungsten Carbide coatings on ball and seats available
- Floating Ball: KFO 1156 (1/2" to 6" / 150# and 300#)
- Trunnion: KFO 9156 (8" to 12" / 150# and 300#)



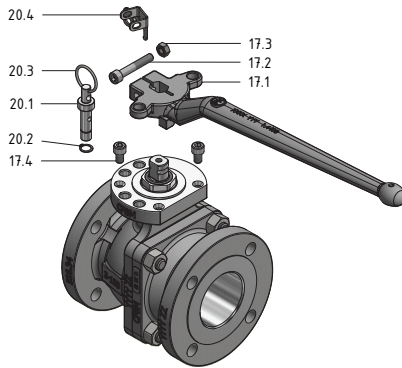
Product Range

| Size | Class | Body Design | Face-to-Face Dimension | Body Material |
|-----------------------|---------------|--|--|-------------------------------|
| 1/2"-12" DN 15-300 | Class 150-300 | 2-piece design Flanged Floating Ball and Trunnion Design | ASME B16.10 Long Pattern EN 558-1 Series 12 & 4 | WCB / 1.0619 CF8M / 1.4408 |

KROMBACH® TUFSEAT™ Performance Series

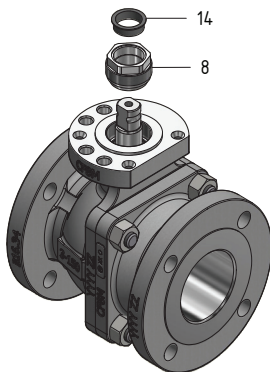
Floating Ball Design

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 | 1.431 | AISI 301 | 1.4310 |
| 20.4 | 1 | Locking plate | 316Ti | 1.4571 | 316Ti | 1.4571 |

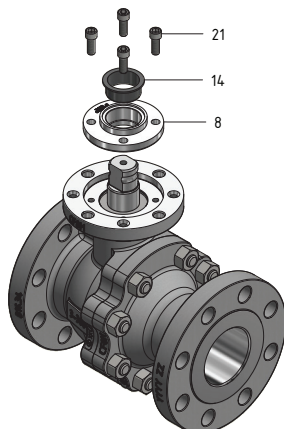
Press Nut Design



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

Sizes 1/2"-150# to 3"-150# and 1/2"-300# to 2"-300#.

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 |

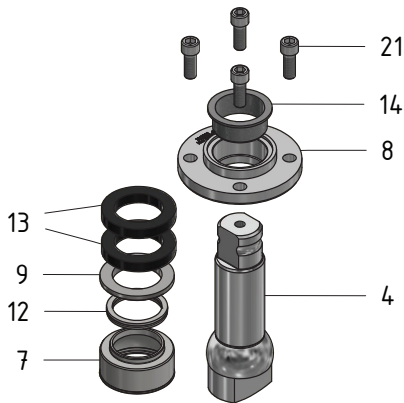
Sizes 4"-150# to 6"-150# and 3-300# to 6"-300#

KROMBACH® TUFSEAT™ Performance Series

Floating Ball Design Standard Trim

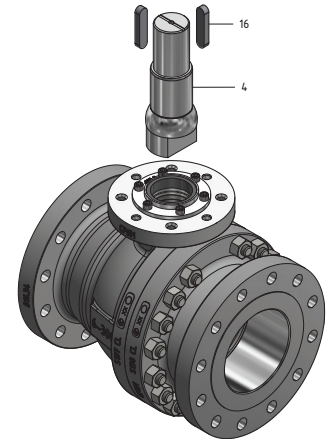
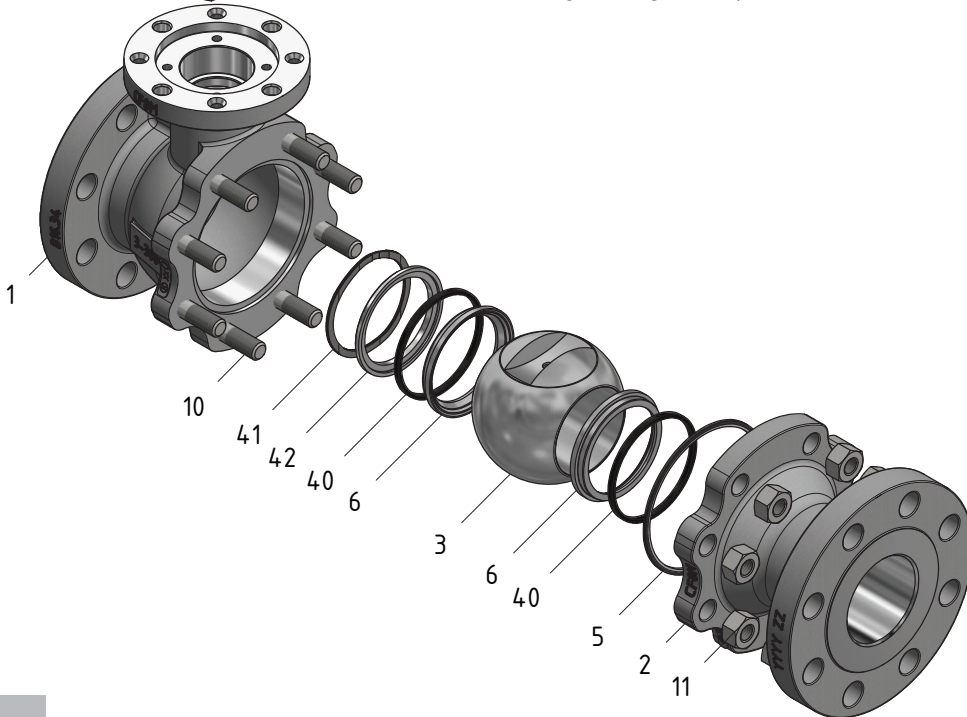
Floating Ball Design

| 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 | F51, A479 UNS S31803 | 1.4462 | F51, A479 UNS S31803 | 1.4462 |
| 5 | 1 | Body gasket | PTFE/Graphite/316SS | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 |
| 6 | 2 | Seat | A182 F316L+coating | 1.4404+coating | A182 F316L+coating | 1.4404+coating |
| 7 | 1 | SX Stem seal | TFM | TFM | TFM | TFM |
| 8 | 1 | Packing gland | A479 316Ti; 316SS | 1.4571; 1.4401 | A479 316Ti; 316SS | 1.4571; 1.4401 |
| 9 | 1 | Support Ring | A479 316Ti; 316SS | 1.4571; 1.4401 | A479 316Ti; 316 | 1.4571; 1.4401 |
| 10 | 4 | Stud | A193 Gr.B7 | A4-70 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 4 | Heavy hex nut | A194 Gr.2H | A4-70 | A194 Gr.8M | A4-70 |
| 12 | 1 | Spring energized lip seal | PTFE - Carbon+Graphite filled / AISI 301 | PTFE-Carbon+Graphite filled/ 1.4310 | PTFE - Carbon+Graphite filled / AISI 301 | PTFE - Carbon+Graphite filled / AISI 301 |
| 13 | 1 | Packing set | Graphite | Graphite | Graphite | Graphite |
| 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 |
| 40 | 2 | Seal ring | Graphite | Graphite | Graphite | Graphite |
| 41 | 1 | Wave spring | 17-7 PH | 1.4568 | 17-7 PH | 1.4568 |
| 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 |

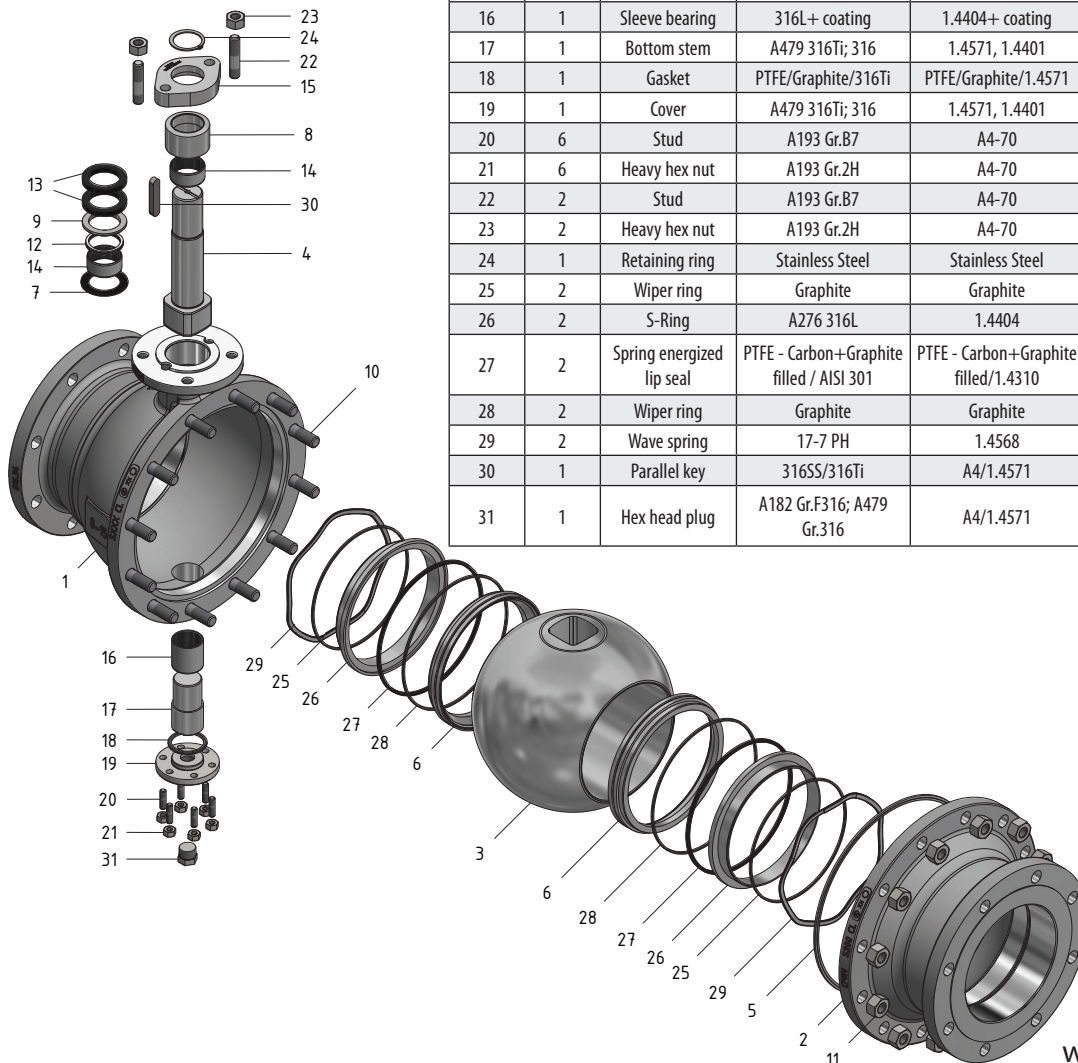
6" class 300 floating ball design with key connection item 16



KROMBACH® TUFSEAT™ Performance Series

Trunnion Design Standard 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; A182 F316L+ coating | 1.4408 +coating; 1.4404 +coating | A351 CF8M+ coating; A182 F316L+ coating | 1.4408+ coating, 1.4404+ coating |
| 4 | 1 | Stem | F51, A479 UNS S31803 | 1.4462 | F51, A479 UNS S31803 | 1.4462 |
| 5 | 1 | Body gasket | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 |
| 6 | 2 | Seat | A182 F316L+ coating | 1.4404+ coating | A182 F316L+coating | 1.4404 +coating |
| 7 | 1 | Stem seal | PTFE-Carbon filled | PTFE-Carbon filled | PTFE-Carbon filled | PTFE-Carbon filled |
| 8 | 1 | Gland | A582 303 | 1.4305 | A582 303 | 1.4305 |
| 9 | 1 | Support Ring | A479 316Ti; 316 | 1.4571, 1.4401 | A479 316Ti; 316 | 1.4571, 1.4401 |
| 10 | 12 | Stud | A193 Gr.B7 | A4-70 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 12 | Heavy hex nut | A193 Gr.2H | A4-70 | A194 Gr.8M | A4-70 |
| 12 | 1 | Spring energized lip seal | PTFE - Carbon+Graphite filled / AISI 301 | "PTFE - Carbon+Graphite filled/1.4310" | PTFE Carbon+Graphite Filled/ AISI 301 | PTFE - Carbon+Graphite filled/1.4310 |
| 13 | 1 | Packing set | Graphite | Graphite | Graphite | Graphite |
| 14 | 2 | Sleeve bearing | 316L+ coating | 1.4404+ coating | 316L+ coating | 1.4404+ coating |
| 15 | 1 | Gland flange | A240 316Ti; 316 | 1.4571, 1.4401 | A240 316Ti; 316 | 1.4571, 1.4401 |
| 16 | 1 | Sleeve bearing | 316L+ coating | 1.4404+ coating | 316L+ coating | 1.4404+ coating |
| 17 | 1 | Bottom stem | A479 316Ti; 316 | 1.4571, 1.4401 | A479 316Ti; 316 | 1.4571, 1.4401 |
| 18 | 1 | Gasket | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 |
| 19 | 1 | Cover | A479 316Ti; 316 | 1.4571, 1.4401 | A479 316Ti; 316 | 1.4571, 1.4401 |
| 20 | 6 | Stud | A193 Gr.B7 | A4-70 | A193 Gr.B8M Cl.2 | A4-70 |
| 21 | 6 | Heavy hex nut | A193 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 | A193 Gr.2H | A4-70 | A194 Gr.8M | A4-70 |
| 24 | 1 | Retaining ring | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel |
| 25 | 2 | Wiper ring | Graphite | Graphite | Graphite | Graphite |
| 26 | 2 | S-Ring | A276 316L | 1.4404 | A276 316L | 1.4404 |
| 27 | 2 | Spring energized lip seal | PTFE - Carbon+Graphite filled / AISI 301 | PTFE - Carbon+Graphite filled/1.4310 | PTFE Carbon+Graphite Filled/ AISI 301 | PTFE - Carbon+Graphite filled/1.4310 |
| 28 | 2 | Wiper ring | Graphite | Graphite | Graphite | Graphite |
| 29 | 2 | Wave spring | 17-7 PH | 1.4568 | 17-7 PH | 1.4568 |
| 30 | 1 | Parallel key | 316SS/316Ti | A4/1.4571 | 316ss/316Ti | A4/1.4571 |
| 31 | 1 | Hex head plug | A182 Gr.F316; A479 Gr.316 | A4/1.4571 | A182 Gr.F316; A479 Gr.316 | A4/1.4571 |

KROMBACH® TUFSEAT™ Performance Series

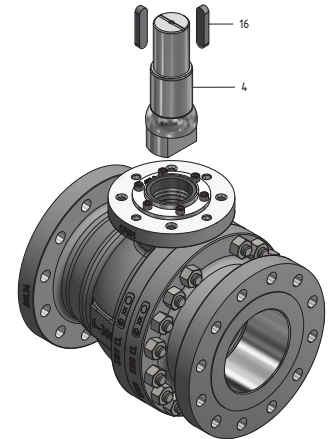
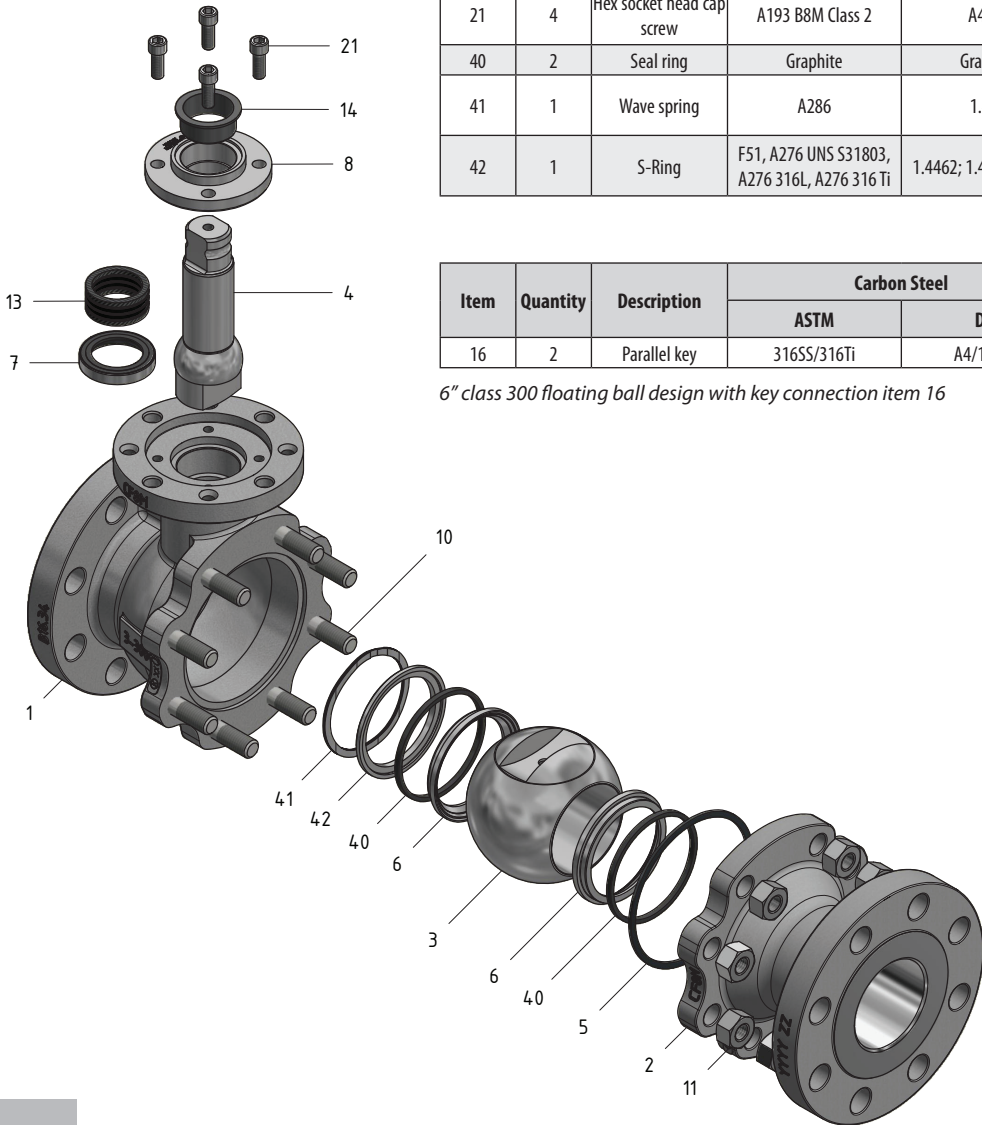
Floating ball Design High Temperature Trim

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 | F51, A479 UNS S31803 | 1.4462 | F51, A479 UNS S31803 | 1.4462 |
| 5 | 1 | Body gasket | PTFE/Graphite/316SS | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 |
| 6 | 2 | Seat | A182 F316L +coating | 1.4404+coating | A182 F316L +coating | 1.4404+coating |
| 7 | 1 | SX Stem seal | TFM | TFM | TFM | TFM |
| 8 | 1 | Packing gland | A479 316Ti; 316SS | 1.4571; 1.4401 | A479 316Ti; 316SS | 1.4571; 1.4401 |
| 10 | 4 | Stud | A193 Gr.B7 | A4-70 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 4 | 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 | 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 |
| 40 | 2 | Seal ring | Graphite | Graphite | Graphite | Graphite |
| 41 | 1 | Wave spring | A286 | 1.498 | A286 | 1.498 |
| 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 |

6" class 300 floating ball design with key connection item 16

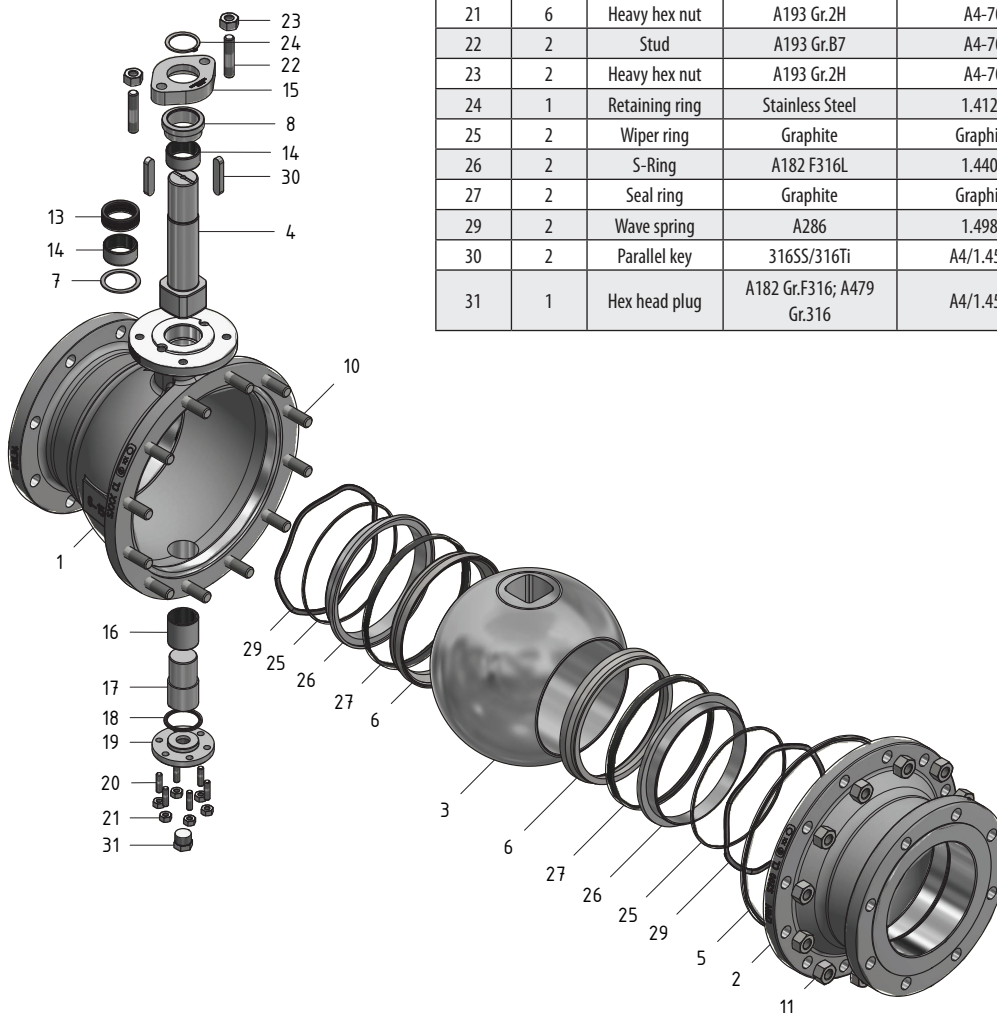


KROMBACH® TUFSEAT™ Performance Series

Trunnion Design High Temperature Trim

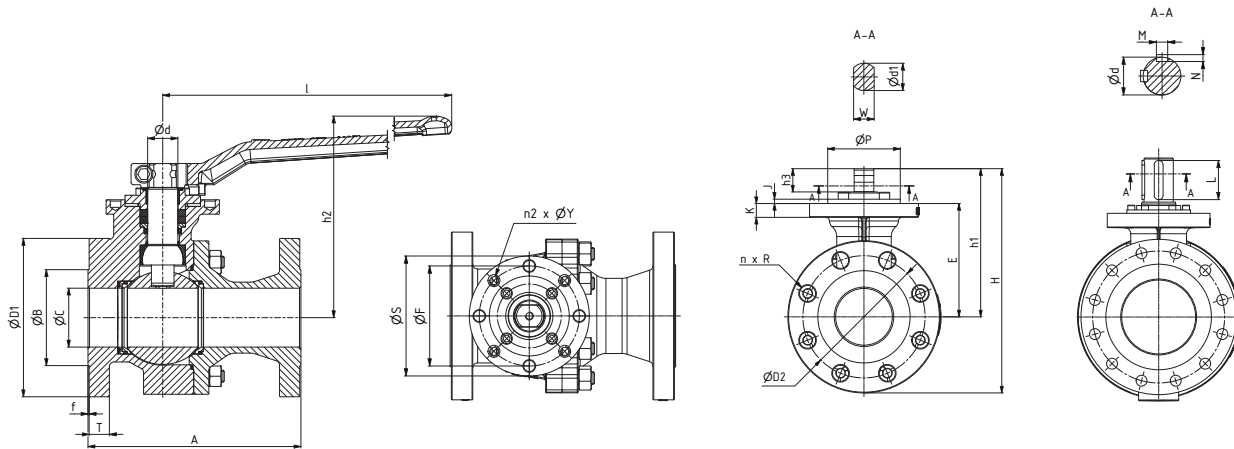
Trunnion Design

| 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 | 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 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/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 303 | 1.4305 | A582 303 | 1.4305 |
| 10 | 12 | Stud | A193 Gr.B7 | A4-70 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 12 | Heavy hex nut | A193 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 | |
| 15 | 1 | Gland flange | A240 316Ti; 316 | 1.4571, 1.4401 | A240 316Ti; 316 | 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; 316 | 1.4571, 1.4401 | A479 316Ti; 316 | 1.4571, 1.4401 |
| 18 | 1 | Sealing | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 |
| 19 | 1 | Cover | A479 316Ti; 316 | 1.4571, 1.4401 | A479 316Ti; 316 | 1.4571, 1.4401 |
| 20 | 6 | Stud | A193 Gr.B7 | A4-70 | A193 Gr.B8M Cl.2 | A4-70 |
| 21 | 6 | Heavy hex nut | A193 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 | A193 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 | 1.4404 | A182 F316L | 1.4404 |
| 27 | 2 | Seal ring | Graphite | Graphite | Graphite | Graphite |
| 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; A479 Gr.316 | A4/1.4571 | A182 Gr.F316; A479 Gr.316 | A4/1.4571 |



KROMBACH® TUFSEAT™ Performance Series Floating Ball Design

Dimensions and Weights Class 150



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

| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | Weights (lb) |
|-----|--------|-------------------|-------|------|------|-----|------|-------|---|-------|-------|-------|-------|--------|--------|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | l | |
| 15 | 1/2" | 4.252 | 0.512 | 5.6 | 2.7 | 1.9 | 3.5 | 2.382 | 4 | 0.622 | 1.378 | 0.382 | 0.063 | 3.858 | 7.165 | 5.1 |
| 20 | 3/4" | 4.606 | 0.748 | 6.0 | 2.9 | 2.1 | 3.9 | 2.752 | 4 | 0.622 | 1.693 | 0.437 | 0.063 | 4.016 | 7.165 | 6.4 |
| 25 | 1" | 5.000 | 0.984 | 6.3 | 3.1 | 2.3 | 4.3 | 3.118 | 4 | 0.622 | 2.000 | 0.500 | 0.063 | 4.213 | 7.165 | 7.7 |
| 40 | 1 1/2" | 6.496 | 1.496 | 8.4 | 4.4 | 3.2 | 5.0 | 3.882 | 4 | 0.622 | 2.882 | 0.626 | 0.063 | 5.906 | 11.024 | 17.3 |
| 50 | 2" | 7.008 | 1.929 | 9.2 | 4.6 | 3.5 | 6.0 | 4.752 | 4 | 0.748 | 3.622 | 0.689 | 0.063 | 6.220 | 11.024 | 23.3 |
| 80 | 3" | 7.992 | 3.071 | 12.5 | 6.5 | 5.0 | 7.5 | 5.984 | 4 | 0.748 | 5.000 | 0.878 | 0.063 | 8.740 | 17.638 | 49.7 |
| 100 | 4" | 9.016 | 3.937 | 15.4 | 8.5 | 6.6 | 9.0 | 7.500 | 8 | 0.748 | 6.189 | 0.878 | 0.063 | 10.945 | 28.346 | 83.0 |
| 150 | 6" | 15.512 | 5.945 | 17.0 | 10.4 | 8.3 | 11.0 | 9.500 | 8 | 0.875 | 8.500 | 0.937 | 0.063 | - | - | 213.5 |

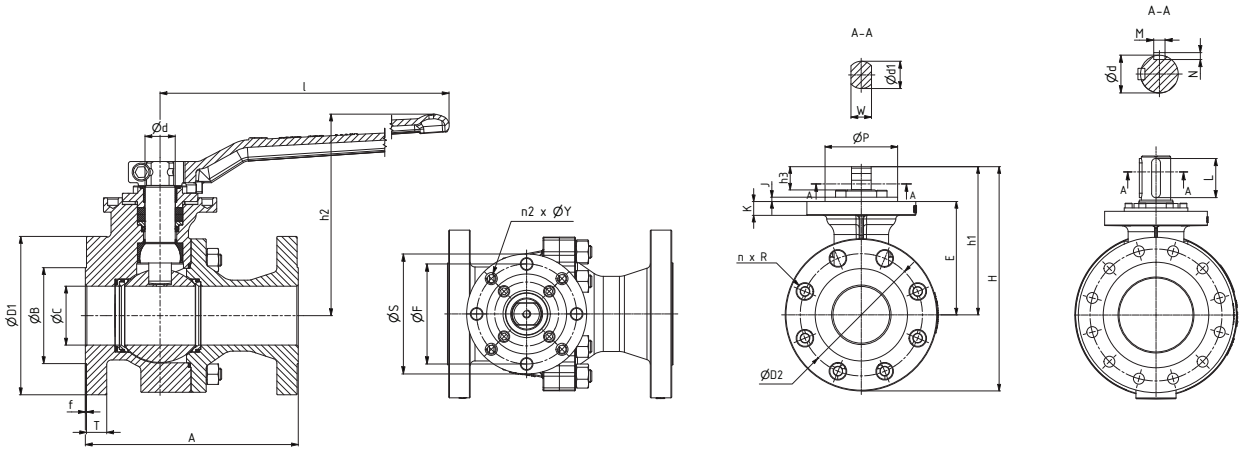
| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | |
|-----|--------|-------------------|-------|-------|-------|----|-----|-------|-------|-------|---|---|---|-------|-------|-------|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N | h3 | W | Ød1 |
| 15 | 1/2" | F05 | 2.559 | 1.378 | 1.969 | 4 | M6 | 0.354 | 0.079 | 0.630 | - | - | - | 0.472 | 0.433 | 0.551 |
| 20 | 3/4" | F05 | 2.559 | 1.378 | 1.969 | 4 | M6 | 0.354 | 0.079 | 0.630 | - | - | - | 0.472 | 0.433 | 0.551 |
| 25 | 1" | F05 | 2.559 | 1.378 | 1.969 | 4 | M6 | 0.354 | 0.079 | 0.630 | - | - | - | 0.472 | 0.433 | 0.551 |
| 40 | 1 1/2" | F07 | 3.543 | 2.165 | 2.756 | 4 | M8 | 0.354 | 0.118 | 0.787 | - | - | - | 0.709 | 0.551 | 0.709 |
| 50 | 2" | F07 | 3.543 | 2.165 | 2.756 | 4 | M8 | 0.394 | 0.118 | 0.787 | - | - | - | 0.709 | 0.551 | 0.709 |
| 80 | 3" | F10 | 4.921 | 2.756 | 4.016 | 4 | M10 | 0.846 | 0.118 | 1.102 | - | - | - | 0.945 | 0.748 | 0.984 |
| 100 | 4" | F12 | 5.906 | 3.937 | 4.921 | 4 | M12 | 0.709 | 0.236 | 1.575 | - | - | - | 1.260 | 1.063 | 1.417 |
| 150 | 6" | F14 | 6.890 | 3.937 | 5.512 | 4 | M16 | 0.866 | 0.236 | 1.969 | - | - | - | 1.417 | 1.417 | 1.890 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | Weights (kg) |
|-----|--------|-----------------|-----|-----|-----|-----|-----|-----|---|------|-------|----|-----|-----|-----|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | l | |
| 15 | 1/2" | 108 | 13 | 143 | 69 | 48 | 89 | 61 | 4 | 15.8 | 35.0 | 10 | 1.6 | 98 | 182 | 2.3 |
| 20 | 3/4" | 117 | 19 | 151 | 73 | 53 | 99 | 70 | 4 | 15.8 | 43.0 | 11 | 1.6 | 102 | 182 | 2.9 |
| 25 | 1" | 127 | 25 | 161 | 78 | 58 | 108 | 79 | 4 | 15.8 | 50.8 | 13 | 1.6 | 107 | 182 | 3.5 |
| 40 | 1 1/2" | 165 | 38 | 214 | 111 | 82 | 127 | 99 | 4 | 15.8 | 73.2 | 16 | 1.6 | 150 | 280 | 7.8 |
| 50 | 2" | 178 | 49 | 234 | 118 | 90 | 152 | 121 | 4 | 19.0 | 92.0 | 18 | 1.6 | 158 | 280 | 10.6 |
| 80 | 3" | 203 | 78 | 317 | 165 | 127 | 191 | 152 | 4 | 19.0 | 127.0 | 22 | 1.6 | 222 | 448 | 22.6 |
| 100 | 4" | 229 | 100 | 392 | 215 | 167 | 229 | 191 | 8 | 19.0 | 157.2 | 22 | 1.6 | 278 | 720 | 37.6 |
| 150 | 6" | 394 | 151 | 433 | 264 | 212 | 279 | 241 | 8 | 22.2 | 215.9 | 24 | 1.6 | - | - | 96.9 |

| 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 | 9 | 2 | 16 | - | - | - | 12 | 11 | 14 |
| 20 | 3/4" | F05 | 65 | 35 | 50 | 4 | M6 | 9 | 2 | 16 | - | - | - | 12 | 11 | 14 |
| 25 | 1" | F05 | 65 | 35 | 50 | 4 | M6 | 9 | 2 | 16 | - | - | - | 12 | 11 | 14 |
| 40 | 1 1/2" | F07 | 90 | 55 | 70 | 4 | M8 | 9 | 3 | 20 | - | - | - | 18 | 14 | 18 |
| 50 | 2" | F07 | 90 | 55 | 70 | 4 | M8 | 10 | 3 | 20 | - | - | - | 18 | 14 | 18 |
| 80 | 3" | F10 | 125 | 70 | 102 | 4 | M10 | 22 | 3 | 28 | - | - | - | 24 | 19 | 25 |
| 100 | 4" | F12 | 150 | 100 | 125 | 4 | M12 | 18 | 6 | 40 | - | - | - | 32 | 27 | 36 |
| 150 | 6" | F14 | 175 | 100 | 140 | 4 | M16 | 22 | 6 | 50 | - | - | - | 36 | 36 | 48 |

KROMBACH® TUFSEAT™ Performance Series Floating Ball Design

Dimensions and Weights Class 300



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

| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | Weights (lb) |
|-----|--------|-------------------|-------|------|------|-----|------|--------|----|-------|-------|-------|-------|--------|--------|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | l | |
| 15 | 1/2" | 5.512 | 0.512 | 5.7 | 2.7 | 1.9 | 3.7 | 2.618 | 4 | 0.622 | 1.378 | 0.500 | 0.063 | 3.858 | 7.165 | 7.1 |
| 20 | 3/4" | 5.984 | 0.748 | 6.3 | 2.9 | 2.1 | 4.6 | 3.252 | 4 | 0.748 | 1.693 | 0.555 | 0.063 | 4.016 | 7.165 | 9.9 |
| 25 | 1" | 6.496 | 0.984 | 6.7 | 3.1 | 2.3 | 4.9 | 3.500 | 4 | 0.748 | 2.000 | 0.622 | 0.063 | 4.213 | 7.165 | 11.2 |
| 40 | 1 1/2" | 7.480 | 1.496 | 9.0 | 4.4 | 3.2 | 6.1 | 4.500 | 4 | 0.874 | 2.882 | 0.752 | 0.063 | 5.906 | 11.024 | 24.3 |
| 50 | 2" | 8.504 | 1.929 | 11.3 | 5.8 | 4.3 | 6.5 | 5.000 | 8 | 0.748 | 3.622 | 0.815 | 0.063 | 8.071 | 17.638 | 35.1 |
| 80 | 3" | 11.102 | 3.071 | 14.6 | 8.0 | 6.1 | 8.3 | 6.622 | 8 | 0.874 | 5.000 | 1.055 | 0.063 | 10.433 | 28.346 | 76.1 |
| 100 | 4" | 12.008 | 3.937 | 13.8 | 8.8 | 6.7 | 10.0 | 7.882 | 8 | 0.874 | 6.189 | 1.189 | 0.063 | - | - | 124 |
| 150 | 6" | 15.866 | 5.945 | 19.5 | 12.8 | 8.3 | 12.5 | 10.618 | 12 | 0.875 | 8.500 | 1.378 | 0.063 | - | - | 301.2 |

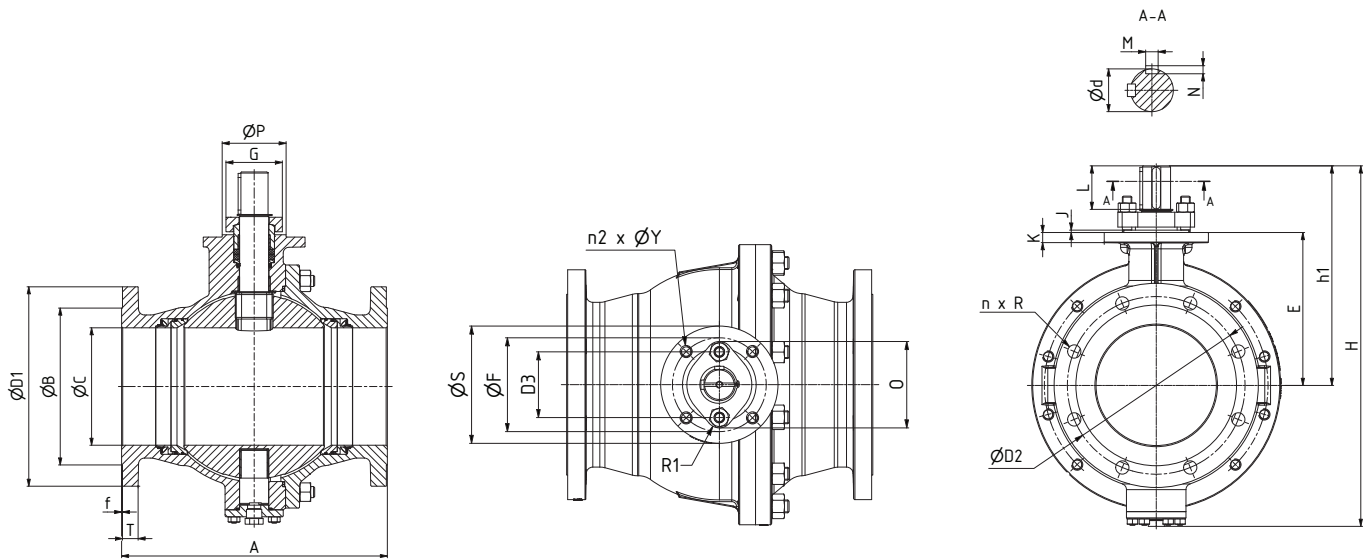
| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | |
|-----|--------|-------------------|-------|-------|-------|----|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N | h3 | W | Ød1 |
| 15 | 1/2" | F05 | 2.559 | 1.378 | 1.969 | 4 | M6 | 0.354 | 0.079 | 0.630 | - | - | - | 0.472 | 0.433 | 0.551 |
| 20 | 3/4" | F05 | 2.559 | 1.378 | 1.969 | 4 | M6 | 0.354 | 0.079 | 0.630 | - | - | - | 0.472 | 0.433 | 0.551 |
| 25 | 1" | F05 | 2.559 | 1.378 | 1.969 | 4 | M6 | 0.354 | 0.079 | 0.630 | - | - | - | 0.472 | 0.433 | 0.551 |
| 40 | 1 1/2" | F07 | 3.543 | 2.165 | 2.756 | 4 | M8 | 0.354 | 0.118 | 0.787 | - | - | - | 0.709 | 0.551 | 0.709 |
| 50 | 2" | F10 | 4.921 | 2.756 | 4.016 | 4 | M10 | 0.669 | 0.118 | 1.102 | - | - | - | 0.945 | 0.748 | 0.984 |
| 80 | 3" | F12 | 4.921 | 2.756 | 4.016 | 4 | M10 | 0.748 | 0.236 | 1.575 | - | - | - | 1.260 | 1.063 | 1.417 |
| 100 | 4" | F14 | 6.890 | 3.937 | 5.512 | 4 | M16 | 0.945 | 0.236 | 1.969 | - | - | - | 1.417 | 1.417 | 1.890 |
| 150 | 6" | F14 | 8.268 | 5.118 | 6.496 | 4 | M20 | 1.142 | 0.276 | 2.756 | 3.150 | 0.709 | 0.433 | - | - | - |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | Weights (kg) |
|-----|--------|-----------------|-----|-----|-----|-----|-----|-----|----|------|-------|----|-----|-----|-----|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | l | |
| 15 | 1/2" | 140 | 13 | 146 | 69 | 48 | 95 | 67 | 4 | 15.8 | 35.0 | 13 | 1.6 | 98 | 182 | 3.2 |
| 20 | 3/4" | 152 | 19 | 161 | 73 | 53 | 117 | 83 | 4 | 19.0 | 43.0 | 14 | 1.6 | 102 | 182 | 4.5 |
| 25 | 1" | 165 | 25 | 169 | 78 | 58 | 124 | 89 | 4 | 19.0 | 50.8 | 16 | 1.6 | 107 | 182 | 5.1 |
| 40 | 1 1/2" | 190 | 38 | 228 | 111 | 82 | 155 | 114 | 4 | 22.2 | 73.2 | 19 | 1.6 | 150 | 280 | 11.0 |
| 50 | 2" | 216 | 49 | 288 | 147 | 109 | 165 | 127 | 8 | 19.0 | 92.0 | 21 | 1.6 | 205 | 448 | 15.9 |
| 80 | 3" | 282 | 78 | 370 | 204 | 156 | 210 | 168 | 8 | 22.2 | 127.0 | 27 | 1.6 | 265 | 720 | 34.5 |
| 100 | 4" | 305 | 100 | 350 | 223 | 171 | 254 | 200 | 8 | 22.2 | 157.2 | 30 | 1.6 | - | - | 56.3 |
| 150 | 6" | 403 | 151 | 496 | 325 | 212 | 318 | 270 | 12 | 22.2 | 215.9 | 35 | 1.6 | - | - | 136.6 |

| DN | NPS | Dimensions (m) | | | | | | | | | | | | | | |
|-----|--------|----------------|-----|-----|-----|----|-----|----|---|----|----|----|----|----|----|-----|
| | | 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 | 9 | 2 | 16 | - | - | - | 12 | 11 | 14 |
| 20 | 3/4" | F05 | 65 | 35 | 50 | 4 | M6 | 9 | 2 | 16 | - | - | - | 12 | 11 | 14 |
| 25 | 1" | F05 | 65 | 35 | 50 | 4 | M6 | 9 | 2 | 16 | - | - | - | 12 | 11 | 14 |
| 40 | 1 1/2" | F07 | 90 | 55 | 70 | 4 | M8 | 9 | 3 | 20 | - | - | - | 18 | 14 | 18 |
| 50 | 2" | F10 | 125 | 70 | 102 | 4 | M10 | 17 | 3 | 28 | - | - | - | 24 | 19 | 25 |
| 80 | 3" | F12 | 125 | 70 | 102 | 4 | M10 | 19 | 6 | 40 | - | - | - | 32 | 27 | 36 |
| 100 | 4" | F14 | 175 | 100 | 140 | 4 | M16 | 24 | 6 | 50 | - | - | - | 36 | 36 | 48 |
| 150 | 6" | F14 | 210 | 130 | 165 | 4 | M20 | 29 | 7 | 70 | 80 | 18 | 11 | - | - | - |

KROMBACH[®] TUFSEAT[™] Performance Series Trunnion Design

Dimensions and Weights Class 150



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

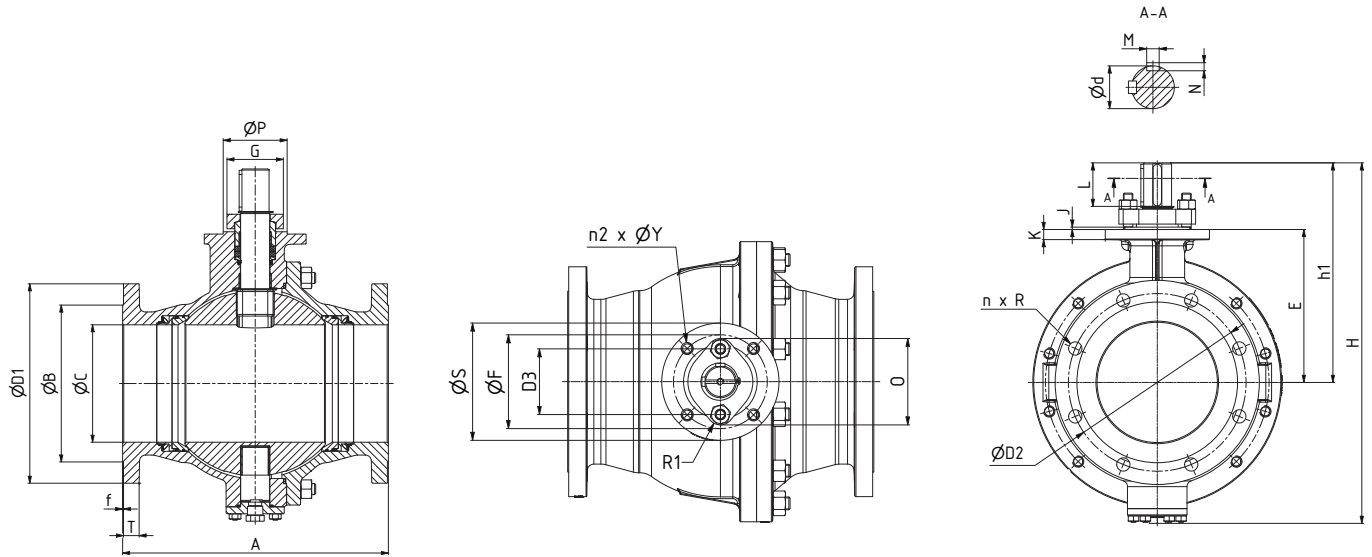
| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | | Weights (lb) | |
|-----|-----|-------------------|--------|------|------|------|------|--------|----|-------|--------|-------|-------|-------|-------|-------|--------------|--------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | O | G | D3 | | R1 |
| 200 | 8" | 17.992 | 7.953 | 23.5 | 14.5 | 10.1 | 13.5 | 11.748 | 8 | 0.875 | 10.622 | 1.059 | 0.063 | 5.079 | 3.819 | 3.858 | 0.787 | 377.5 |
| 250 | 10" | 20.984 | 9.921 | 26.7 | 16.2 | 11.8 | 16.0 | 14.252 | 12 | 1.000 | 12.748 | 1.126 | 0.063 | 5.079 | 3.819 | 3.858 | 0.787 | 619.8 |
| 300 | 12" | 24.016 | 11.929 | 31.9 | 19.0 | 13.2 | 19.0 | 17.000 | 12 | 1.000 | 15.000 | 1.189 | 0.063 | 7.008 | 4.016 | 5.118 | 0.945 | 1016.6 |

| DN | NPS | Dimensions (inch) | | | | | | | | | | | |
|-----|-----|-------------------|-------|-------|-------|----|-----|-------|-------|-------|-------|-------|-------|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 200 | 8" | F14 | 6.890 | 3.937 | 5.512 | 4 | M16 | 0.669 | 0.157 | 1.969 | 2.756 | 0.551 | 0.354 |
| 250 | 10" | F14 | 6.890 | 3.937 | 5.512 | 4 | M16 | 0.866 | 0.157 | 1.969 | 2.756 | 0.551 | 0.354 |
| 300 | 12" | F16 | 8.268 | 5.118 | 6.496 | 4 | M20 | 0.827 | 0.197 | 2.756 | 3.937 | 0.709 | 0.433 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | | | Weights (kg) |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|----|------|-------|----|-----|-----|-----|-----|----|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | O | G | D3 | R1 | |
| 200 | 8" | 457 | 202 | 596 | 369 | 257 | 343 | 298 | 8 | 22.2 | 269.8 | 27 | 1.6 | 129 | 97 | 98 | 20 | 171.2 |
| 250 | 10" | 533 | 252 | 677 | 412 | 300 | 406 | 362 | 12 | 25.4 | 323.8 | 29 | 1.6 | 129 | 97 | 98 | 20 | 281.1 |
| 300 | 12" | 610 | 303 | 809 | 482 | 335 | 483 | 432 | 12 | 25.4 | 381.0 | 30 | 1.6 | 178 | 102 | 130 | 24 | 461.1 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | |
|-----|-----|-----------------|-----|-----|-----|----|-----|----|---|----|-----|----|----|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 200 | 8" | F14 | 175 | 100 | 140 | 4 | M16 | 17 | 4 | 50 | 70 | 14 | 9 |
| 250 | 10" | F14 | 175 | 100 | 140 | 4 | M16 | 22 | 4 | 50 | 70 | 14 | 9 |
| 300 | 12" | F16 | 210 | 130 | 165 | 4 | M20 | 21 | 5 | 70 | 100 | 18 | 11 |

KROMBACH® TUFSEAT™ Performance Series Trunnion Design Dimensions and Weights Class 300



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

| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | | | Weights (lb) |
|-----|-----|-------------------|-----------------|------|------|------|------------------|------------------|----|-------|-----------------|-------|-------|-------|-------|-------|-------|--------------|
| | | A | $\varnothing C$ | H | h1 | E | $\varnothing D1$ | $\varnothing D2$ | n | R | $\varnothing B$ | T | f | O | G | D3 | R1 | |
| 200 | 8" | 19.764 | 7.953 | 24.0 | 14.6 | 10.1 | 15.0 | 13.000 | 12 | 1.000 | 10.622 | 1.555 | 0.063 | 7.008 | 4.016 | 5.118 | 0.945 | 517.3 |
| 250 | 10" | 22.362 | 9.921 | 28.2 | 17.4 | 11.4 | 17.5 | 15.252 | 16 | 1.125 | 12.748 | 1.815 | 0.063 | 7.008 | 4.016 | 5.118 | 0.945 | 913.7 |
| 300 | 12" | 25.512 | 11.929 | 32.4 | 19.5 | 13.2 | 20.5 | 17.748 | 16 | 1.250 | 15.000 | 1.937 | 0.063 | 7.402 | 4.409 | 5.512 | 0.945 | 1312.4 |

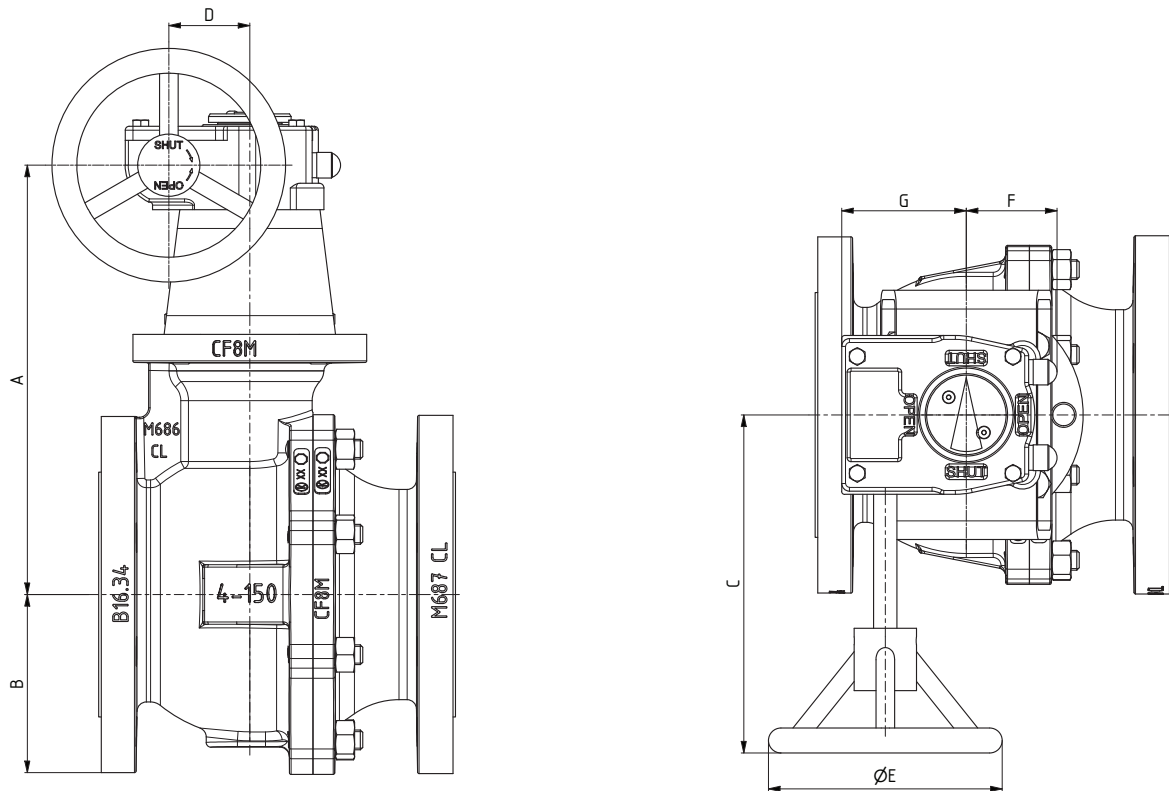
| DN | NPS | Dimensions (inch) | | | | | | | | | | | |
|-----|-----|-------------------|-----------------|-----------------|-----------------|----|-----------------|-------|-------|-----------------|-------|-------|-------|
| | | ISO 5211 | $\varnothing S$ | $\varnothing P$ | $\varnothing F$ | n2 | $\varnothing Y$ | K | J | $\varnothing d$ | L | M | N |
| 200 | 8" | F14 | 8.268 | 5.118 | 6.496 | 4 | M20 | 1.142 | 0.276 | 2.756 | 3.150 | 0.709 | 0.433 |
| 250 | 10" | F16 | 8.268 | 5.118 | 6.496 | 4 | M20 | 0.827 | 0.197 | 2.756 | 2.756 | 0.709 | 0.433 |
| 300 | 12" | F25 | 11.811 | 7.874 | 10.000 | 8 | M16 | 0.709 | 0.197 | 2.756 | 3.937 | 0.709 | 0.433 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | | | Weights (kg) |
|-----|-----|-----------------|-----------------|-----|-----|-----|------------------|------------------|----|------|-----------------|----|-----|-----|-----|-----|----|--------------|
| | | A | $\varnothing C$ | H | h1 | E | $\varnothing D1$ | $\varnothing D2$ | n | R | $\varnothing B$ | T | f | O | G | D3 | R1 | |
| 200 | 8" | 502 | 202 | 609 | 372 | 256 | 381 | 330 | 12 | 25.4 | 269.8 | 40 | 1.6 | 178 | 102 | 130 | 24 | 234.6 |
| 250 | 10" | 568 | 252 | 716 | 441 | 290 | 445 | 387 | 16 | 28.6 | 323.8 | 46 | 1.6 | 178 | 102 | 130 | 24 | 414.5 |
| 300 | 12" | 648 | 303 | 824 | 497 | 335 | 521 | 451 | 16 | 31.8 | 381.0 | 49 | 1.6 | 188 | 112 | 140 | 24 | 595.3 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | |
|-----|-----|-----------------|-----------------|-----------------|-----------------|----|-----------------|----|---|-----------------|-----|----|----|
| | | ISO 5211 | $\varnothing S$ | $\varnothing P$ | $\varnothing F$ | n2 | $\varnothing Y$ | K | J | $\varnothing d$ | L | M | N |
| 200 | 8" | F16 | 210 | 130 | 165 | 4 | M20 | 21 | 5 | 70 | 70 | 18 | 11 |
| 250 | 10" | F25 | 300 | 200 | 254 | 8 | M16 | 18 | 5 | 70 | 100 | 18 | 11 |
| 300 | 12" | F25 | 300 | 200 | 254 | 8 | M16 | 30 | 5 | 80 | 110 | 20 | 12 |

KROMBACH® TUFSEAT™ Performance Series

Floating Ball Design with Gears Class 150



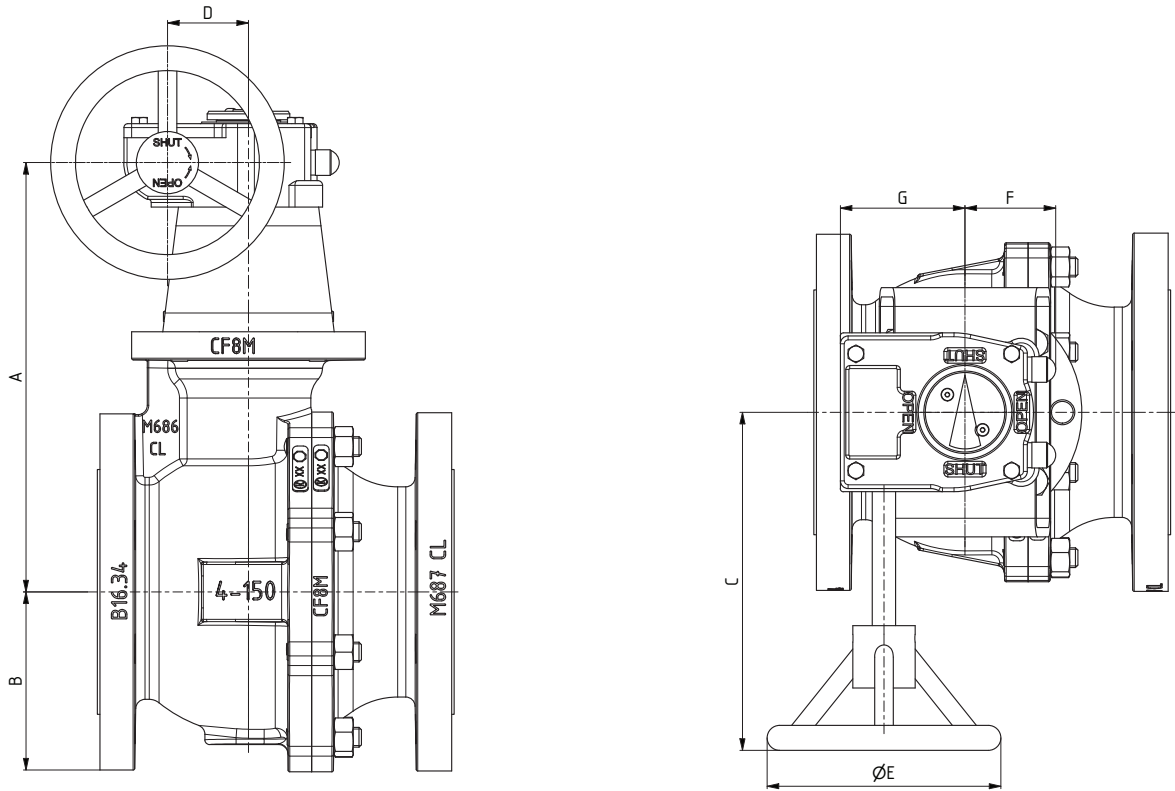
Gear dimensions are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|------|
| | | A | B | C | D | ØE | F | G |
| 100 | 4" | 10.87 | 4.53 | 8.54 | 2.05 | 5.91 | 2.28 | 3.15 |
| 150 | 6" | 13.15 | 5.51 | 10.63 | 3.39 | 11.81 | 4.06 | 4.96 |
| 200 | 8" | 18.03 | 9.33 | 9.73 | 2.80 | 7.88 | 3.39 | 4.13 |
| 250 | 10" | 19.76 | 10.43 | 10.63 | 3.39 | 11.81 | 4.06 | 4.96 |
| 300 | 12" | 22.88 | 12.88 | 12.44 | 4.13 | 13.78 | 4.21 | 5.83 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 100 | 4" | 276 | 115 | 217 | 52 | 150 | 58 | 80 |
| 150 | 6" | 334 | 140 | 270 | 86 | 300 | 103 | 126 |
| 200 | 8" | 458 | 237 | 247 | 71 | 200 | 86 | 105 |
| 250 | 10" | 502 | 265 | 270 | 86 | 300 | 103 | 126 |
| 300 | 12" | 581 | 327 | 316 | 105 | 350 | 107 | 148 |

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

KROMBACH® TUFSEAT™ Performance Series Floating Ball Design with Gears Class 300



Gear dimensions are for reference only.

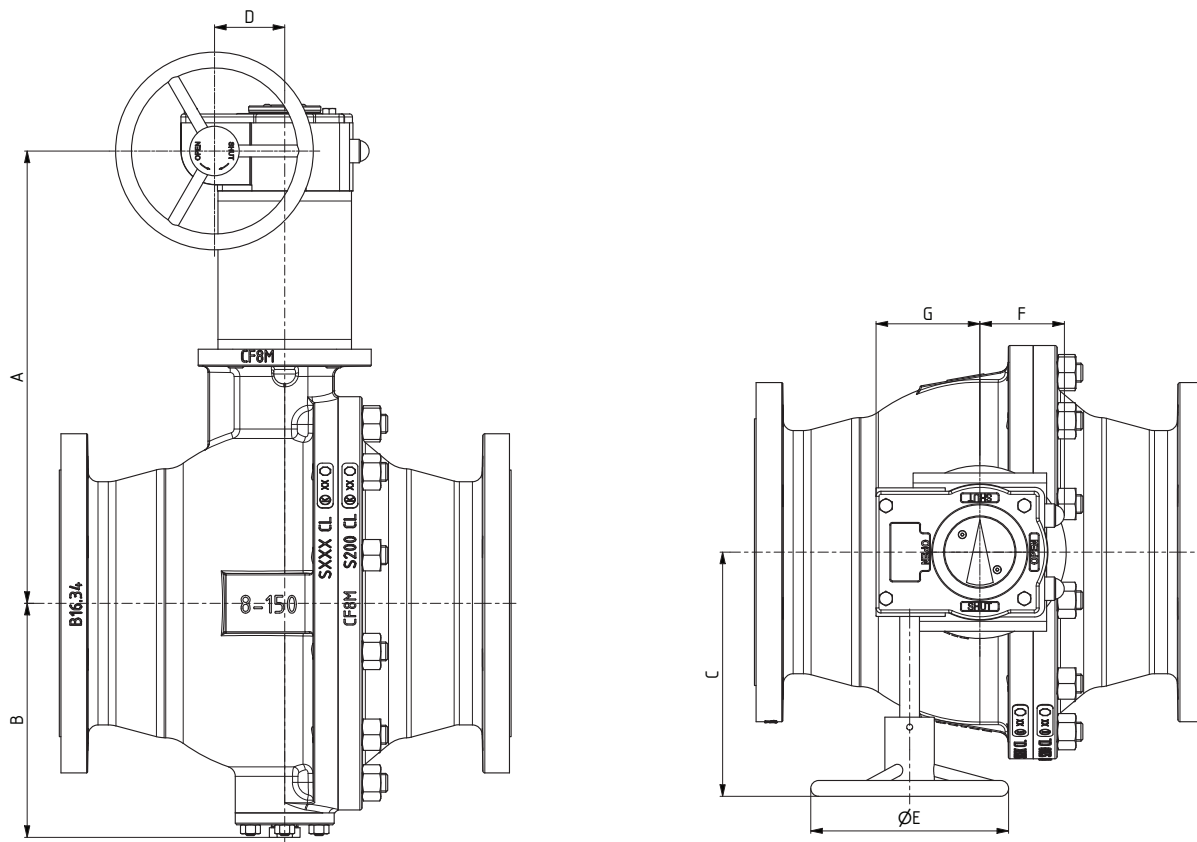
| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|------|
| | | A | B | C | D | ØE | F | G |
| 80 | 3" | 10.43 | 4.13 | 8.54 | 2.05 | 5.91 | 2.28 | 3.15 |
| 100 | 4" | 11.50 | 5.00 | 10.91 | 2.80 | 9.84 | 3.39 | 4.13 |
| 150 | 6" | 16.14 | 6.77 | 13.62 | 4.13 | 17.72 | 4.21 | 5.83 |
| 200 | 8" | 17.88 | 9.33 | 12.44 | 4.13 | 13.78 | 4.21 | 5.83 |
| 250 | 10" | 21.10 | 10.83 | 13.62 | 4.13 | 19.69 | 4.21 | 5.83 |
| 300 | 12" | 23.15 | 12.88 | 14.88 | 5.12 | 9.84 | 5.63 | 7.09 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 80 | 3" | 265 | 105 | 217 | 52 | 150 | 58 | 80 |
| 100 | 4" | 292 | 127 | 277 | 71 | 250 | 86 | 105 |
| 150 | 6" | 410 | 172 | 346 | 105 | 450 | 107 | 148 |
| 200 | 8" | 454 | 237 | 316 | 105 | 350 | 107 | 148 |
| 250 | 10" | 536 | 275 | 346 | 105 | 500 | 107 | 148 |
| 300 | 12" | 588 | 327 | 378 | 130 | 250 | 143 | 180 |

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

KROMBACH[®] TUFSEAT[™] Performance Series

Trunnion Design with Gears Class 150



Gear dimensions are for reference only.

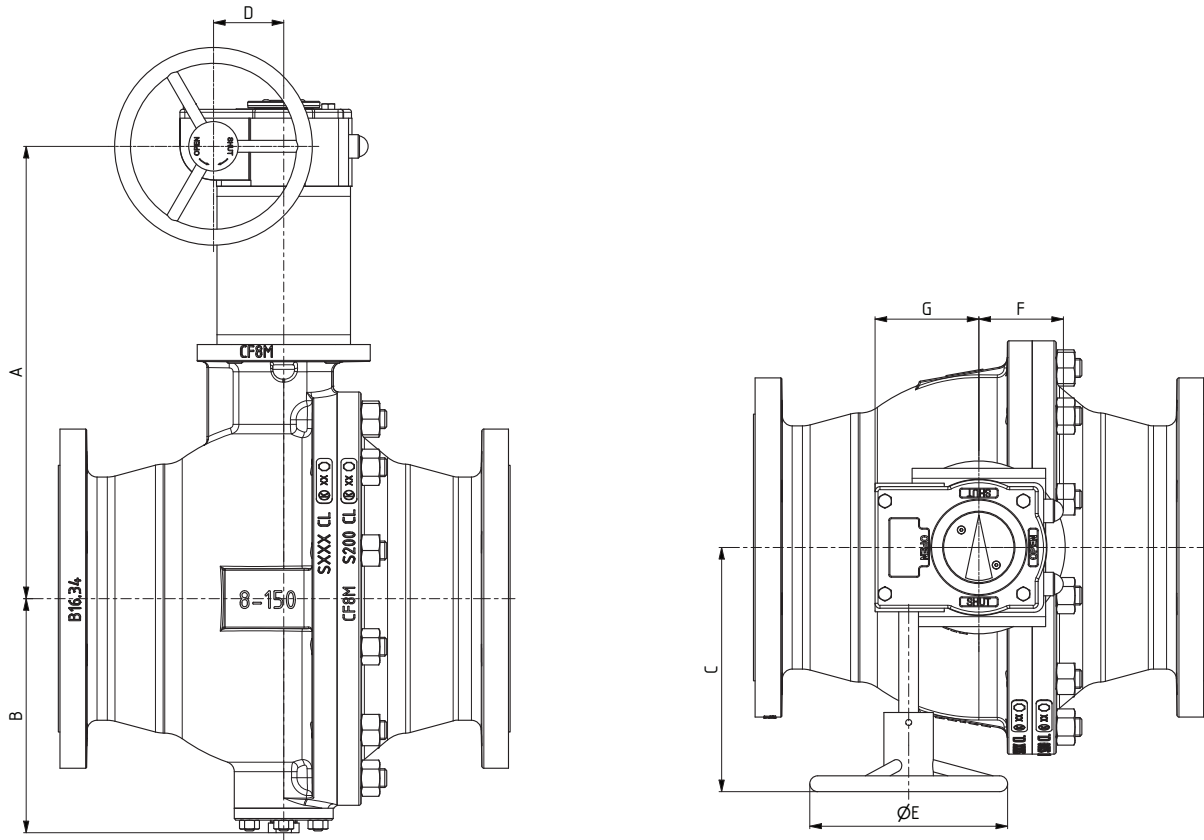
| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|------|
| | | A | B | C | D | ØE | F | G |
| 100 | 4" | 11.34 | 4.53 | 9.80 | 2.80 | 5.91 | 3.35 | 4.13 |
| 150 | 6" | 13.15 | 5.51 | 10.63 | 3.39 | 11.81 | 4.06 | 4.96 |
| 200 | 8" | 18.07 | 9.33 | 10.63 | 3.39 | 11.81 | 4.06 | 4.96 |
| 250 | 10" | 19.76 | 10.43 | 10.63 | 3.39 | 11.81 | 4.06 | 4.96 |
| 300 | 12" | 23.19 | 12.88 | 12.52 | 2.09 | 13.78 | 4.29 | 5.91 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 100 | 4" | 288 | 115 | 249 | 71 | 150 | 85 | 105 |
| 150 | 6" | 334 | 140 | 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.

KROMBACH® TUFSEAT™ Performance Series

Trunnion Design with Gears Class 300



Gear dimensions are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|------|
| | | A | B | C | D | ØE | F | G |
| 80 | 3" | 10.91 | 4.13 | 9.80 | 2.80 | 5.91 | 3.39 | 4.13 |
| 100 | 4" | 11.54 | 5.00 | 10.43 | 3.39 | 9.84 | 4.06 | 4.96 |
| 150 | 6" | 18.43 | 6.77 | 12.52 | 2.09 | 13.78 | 4.29 | 5.91 |
| 200 | 8" | 20.08 | 9.33 | 12.52 | 2.09 | 13.78 | 4.29 | 5.91 |
| 250 | 10" | 21.38 | 10.83 | 14.88 | 5.12 | 9.84 | 5.00 | 7.09 |
| 300 | 12" | 23.54 | 12.88 | 15.75 | 5.51 | 13.78 | 5.24 | 7.68 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 80 | 3" | 277 | 105 | 249 | 71 | 150 | 86 | 105 |
| 100 | 4" | 293 | 127 | 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.

KROMBACH[®] TUFSEAT[™] Performance Series

Pressure/Temperature Ratings

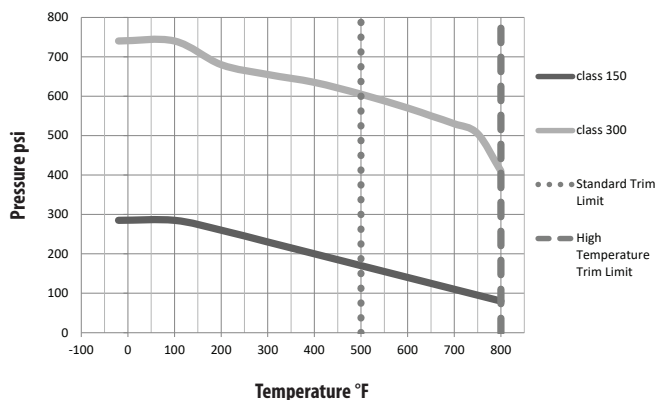
| Temperature | Max working pressure ASME class 150 | Max working pressure ASME class 300 |
|-------------|--|--|
| | ASTM A216 Gr. WCB* | |
| °F | psi | |
| -20 | 285 | 740 |
| 100 | 285 | 740 |
| 200 | 260 | 680 |
| 300 | 230 | 655 |
| 400 | 200 | 635 |
| 500 | 170 | 605 |
| 600 | 140 | 570 |
| 650 | 125 | 550 |
| 700 | 110 | 530 |
| 750 | 95 | 505 |
| 800 | 80 | 410 |

*according ASME B16.34 - Material Group 1.1

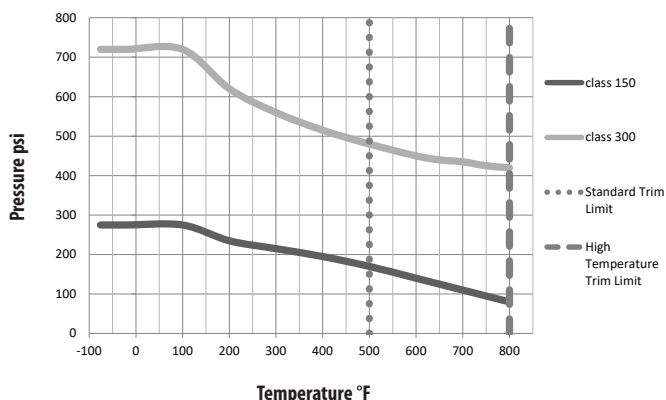
| Temperature | Max working pressure ASME class 150 | Max working pressure ASME class 300 |
|-------------|--|--|
| | ASTM A351 Gr. CF8M* | |
| °F | psi | |
| -76 | 275 | 720 |
| -20 | 275 | 720 |
| 100 | 275 | 720 |
| 200 | 235 | 620 |
| 300 | 215 | 560 |
| 400 | 195 | 515 |
| 500 | 170 | 480 |
| 600 | 140 | 450 |
| 650 | 125 | 440 |
| 700 | 110 | 435 |
| 750 | 95 | 425 |
| 800 | 80 | 420 |

*according ASME B16.34 - Material Group 2.2

Pressure & Temperature
 ASTM A216 Gr. WCB



Pressure & Temperature
 ASTM A351 Gr. CF8M



KROMBACH® TUFSEAT™ Performance Series

Pressure/Temperature Ratings

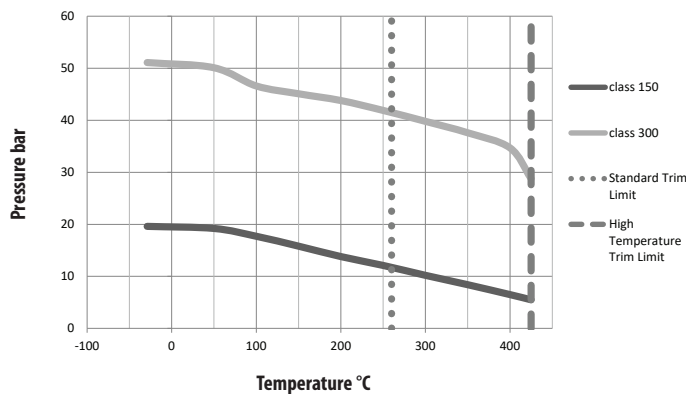
| Temperature | Max working pressure ASME class 150 | Max working pressure ASME class 300 |
|-------------|--|--|
| | ASTM A216 Gr. WCB* | |
| °C | bar | |
| -29 | 19.6 | 51.1 |
| 50 | 19.2 | 50.1 |
| 100 | 17.7 | 46.6 |
| 150 | 15.8 | 45.1 |
| 200 | 13.8 | 43.8 |
| 250 | 12.1 | 41.9 |
| 300 | 10.2 | 39.8 |
| 350 | 8.4 | 37.6 |
| 400 | 6.5 | 34.7 |
| 425 | 5.5 | 28.8 |

*according ASME B16.34 - Material Group 1.1

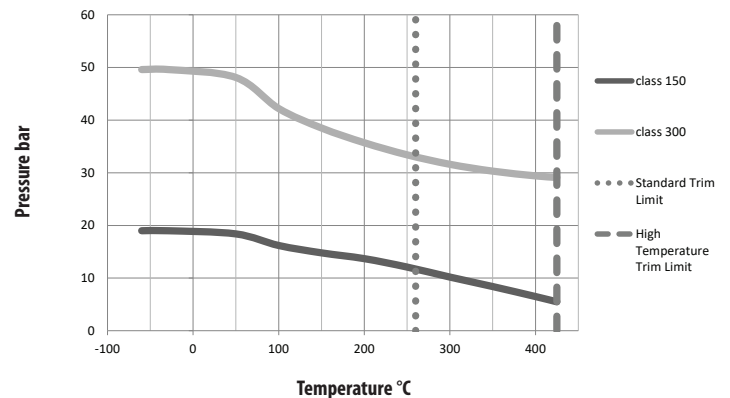
| Temperature | Max working pressure ASME class 150 | Max working pressure ASME class 300 |
|-------------|--|--|
| | ASTM A351 Gr. CF8M* | |
| °C | bar | |
| -60 | 19.0 | 49.6 |
| -29 | 19.0 | 49.6 |
| 50 | 18.4 | 48.1 |
| 100 | 16.2 | 42.2 |
| 150 | 14.8 | 38.5 |
| 200 | 13.7 | 35.7 |
| 250 | 12.1 | 33.4 |
| 300 | 10.2 | 31.6 |
| 350 | 8.4 | 30.3 |
| 400 | 6.5 | 29.4 |
| 425 | 5.5 | 29.1 |

*according ASME B16.34 - Material Group 2.2

Pressure & Temperature
ASTM A216 Gr. WCB



Pressure & Temperature
ASTM A351 Gr. CF8M



KROMBACH® TUFSEAT™ Performance Series

MAST Class 150

Maximum Allowable Stem Torque Class 150

| DN | NPS | MAST [in-Lb] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 956 | 744 | 948 | 1,080 | 585 | 470 | 779 |
| 20 | 3/4" | 956 | 744 | 948 | 1,080 | 585 | 470 | 779 |
| 25 | 1" | 956 | 744 | 948 | 1,080 | 585 | 470 | 779 |
| 40 | 1 1/2" | 2,443 | 1,895 | 2,434 | 2,753 | 1,390 | 983 | 1,992 |
| 50 | 2" | 2,443 | 1,895 | 2,434 | 2,753 | 1,390 | 983 | 1,992 |
| 80 | 3" | 7,010 | 5,435 | 6,966 | 7,887 | 3,594 | 2,532 | 5,700 |
| 100 | 4" | 19,269 | 14,932 | 19,154 | 21,676 | 10,506 | 7,409 | 15,657 |
| 150 | 6" | 38,545 | 29,872 | 38,298 | 43,360 | 23,605 | 17,552 | 31,314 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 67,346 | 50,282 | 57,805 | 67,346 | 27,385 | 19,304 | 44,900 |
| 250 | 10" | 67,346 | 50,282 | 57,805 | 67,346 | 27,385 | 19,304 | 44,900 |
| 300 | 12" | 130,425 | 97,385 | 111,954 | 130,425 | 53,043 | 37,386 | 86,950 |

| DN | NPS | MAST [Nm] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 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" | 2,177 | 1,687 | 2,164 | 2,449 | 1,187 | 837 | 1,769 |
| 150 | 6" | 4,355 | 3,375 | 4,327 | 4,899 | 2,667 | 1,983 | 3,538 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 7,609 | 5,681 | 6,531 | 7,609 | 3,094 | 2,181 | 5,073 |
| 250 | 10" | 7,609 | 5,681 | 6,531 | 7,609 | 3,094 | 2,181 | 5,073 |
| 300 | 12" | 14,736 | 11,003 | 12,649 | 14,736 | 5,993 | 4,224 | 9,824 |

KROMBACH® TUFSEAT™ Performance Series MAST Class 300

Maximum Allowable Stem Torque Class 300

| DN | NPS | MAST [in-Lb] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 956 | 744 | 948 | 1,080 | 585 | 470 | 779 |
| 20 | 3/4" | 956 | 744 | 948 | 1,080 | 585 | 470 | 779 |
| 25 | 1" | 956 | 744 | 948 | 1,080 | 585 | 470 | 779 |
| 40 | 1 1/2" | 2,443 | 1,895 | 2,434 | 2,753 | 1,390 | 983 | 1,992 |
| 50 | 2" | 7,010 | 5,435 | 6,966 | 7,887 | 3,594 | 2,532 | 5,700 |
| 80 | 3" | 19,269 | 14,932 | 19,154 | 21,676 | 10,506 | 7,409 | 15,657 |
| 100 | 4" | 38,545 | 29,872 | 38,298 | 43,360 | 23,605 | 17,552 | 31,314 |
| 150 | 6" | 121,318 | 97,385 | 111,954 | 121,318 | 53,043 | 37,386 | 86,950 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 104,227 | 97,385 | 104,227 | 104,227 | 53,043 | 37,386 | 86,950 |
| 250 | 10" | 130,425 | 97,385 | 111,954 | 130,425 | 53,043 | 37,386 | 86,950 |
| 300 | 12" | 223,677 | 176,989 | 203,461 | 223,677 | 96,394 | 67,957 | 158,031 |

| DN | NPS | MAST [Nm] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 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" | 2,177 | 1,687 | 2,164 | 2,449 | 1,187 | 837 | 1,769 |
| 100 | 4" | 4,355 | 3,375 | 4,327 | 4,899 | 2,667 | 1,983 | 3,538 |
| 150 | 6" | 13,707 | 11,003 | 12,649 | 13,707 | 5,993 | 4,224 | 9,824 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 11,776 | 11,003 | 11,776 | 11,776 | 5,993 | 4,224 | 9,824 |
| 250 | 10" | 14,736 | 11,003 | 12,649 | 14,736 | 5,993 | 4,224 | 9,824 |
| 300 | 12" | 25,272 | 19,997 | 22,988 | 25,272 | 10,891 | 7,678 | 17,855 |

KROMBACH® TUFSEAT™ Performance Series

Operating Torques

Torques Class 150

| DN | NPS | Torque [in-Lb] | | | | | |
|-----------------------------|--------|----------------|------|------|------|------|------|
| | | BTO | RUN | ETO | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | |
| 15 | 1/2" | 29 | 21 | 24 | 27 | 21 | 30 |
| 20 | 3/4" | 46 | 29 | 33 | 36 | 29 | 41 |
| 25 | 1" | 77 | 43 | 49 | 54 | 43 | 60 |
| 40 | 1 1/2" | 206 | 91 | 101 | 111 | 91 | 133 |
| 50 | 2" | 399 | 166 | 186 | 204 | 166 | 255 |
| 80 | 3" | 1327 | 451 | 498 | 548 | 451 | 737 |
| 100 | 4" | 2852 | 949 | 1033 | 1136 | 949 | 1539 |
| 150 | 6" | 9367 | 3131 | 3472 | 3820 | 3131 | 4183 |
| Trunion Design | | | | | | | |
| 200 | 8" | 5974 | 2288 | 2551 | 2806 | 2288 | 3223 |
| 250 | 10" | 9072 | 3551 | 4023 | 4425 | 3551 | 4948 |
| 300 | 12" | 16640 | 6388 | 7158 | 7874 | 6388 | 9129 |

Torques Class 300

| DN | NPS | Torque [in-Lb] | | | | | |
|-----------------------------|--------|----------------|-------|-------|-------|-------|-------|
| | | BTO | RUN | ETO | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | |
| 15 | 1/2" | 58 | 29 | 32 | 35 | 29 | 52 |
| 20 | 3/4" | 95 | 40 | 43 | 48 | 40 | 74 |
| 25 | 1" | 160 | 60 | 65 | 72 | 60 | 108 |
| 40 | 1 1/2" | 456 | 138 | 148 | 162 | 138 | 251 |
| 50 | 2" | 953 | 297 | 318 | 350 | 297 | 543 |
| 80 | 3" | 3284 | 921 | 969 | 1066 | 921 | 1686 |
| 100 | 4" | 6822 | 1784 | 1868 | 2055 | 1784 | 3343 |
| 150 | 6" | 22574 | 5805 | 6147 | 6762 | 5805 | 8775 |
| Trunion Design | | | | | | | |
| 200 | 8" | 13223 | 4711 | 4973 | 5471 | 4711 | 7544 |
| 250 | 10" | 19702 | 6879 | 7351 | 8086 | 6879 | 11145 |
| 300 | 12" | 36386 | 11690 | 12460 | 13707 | 11690 | 18974 |

| DN | NPS | Torque [Nm] | | | | | |
|-----------------------------|--------|-------------|-----|-----|-----|-----|------|
| | | BTO | RUN | ETO | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | |
| 15 | 1/2" | 3 | 2 | 3 | 3 | 2 | 3 |
| 20 | 3/4" | 5 | 3 | 4 | 4 | 3 | 5 |
| 25 | 1" | 9 | 5 | 6 | 6 | 5 | 7 |
| 40 | 1 1/2" | 23 | 10 | 11 | 13 | 10 | 15 |
| 50 | 2" | 45 | 19 | 21 | 23 | 19 | 29 |
| 80 | 3" | 150 | 51 | 56 | 62 | 51 | 83 |
| 100 | 4" | 322 | 107 | 117 | 128 | 107 | 174 |
| 150 | 6" | 1058 | 354 | 392 | 432 | 354 | 473 |
| Trunion Design | | | | | | | |
| 200 | 8" | 675 | 259 | 288 | 317 | 259 | 364 |
| 250 | 10" | 1025 | 401 | 455 | 500 | 401 | 559 |
| 300 | 12" | 1880 | 722 | 809 | 890 | 722 | 1031 |

| DN | NPS | Torque [Nm] | | | | | |
|-----------------------------|--------|-------------|------|------|------|------|------|
| | | BTO | RUN | ETO | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | |
| 15 | 1/2" | 7 | 3 | 4 | 4 | 3 | 6 |
| 20 | 3/4" | 11 | 5 | 5 | 5 | 5 | 8 |
| 25 | 1" | 18 | 7 | 7 | 8 | 7 | 12 |
| 40 | 1 1/2" | 52 | 16 | 17 | 18 | 16 | 28 |
| 50 | 2" | 108 | 34 | 36 | 40 | 34 | 61 |
| 80 | 3" | 371 | 104 | 109 | 120 | 104 | 190 |
| 100 | 4" | 771 | 202 | 211 | 232 | 202 | 378 |
| 150 | 6" | 2551 | 656 | 695 | 764 | 656 | 991 |
| Trunion Design | | | | | | | |
| 200 | 8" | 1494 | 532 | 562 | 618 | 532 | 852 |
| 250 | 10" | 2226 | 777 | 831 | 914 | 777 | 1259 |
| 300 | 12" | 4111 | 1321 | 1408 | 1549 | 1321 | 2144 |

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

KROMBACH® TUFSEAT™ Performance Series Packing Gland Nut Torques

Packing gland nut torques Class 150

| DN | NPS | Thread Size | Standard Trim | High Temperature Trim |
|-----|--------|-------------|---------------|-----------------------|
| | | | [in-Lb] | [in-Lb] |
| 15 | 1/2" | M30x1 | 222 | 1018 |
| 20 | 3/4" | M30x1 | 222 | 1018 |
| 25 | 1" | M30x1 | 222 | 1018 |
| 40 | 1 1/2" | M36x1,5 | 425 | 1992 |
| 50 | 2" | M36x1,5 | 425 | 1992 |
| 80 | 3" | M48x1,5 | 930 | 3452 |
| 100 | 4" | 3/8-16 UNC | 98 | 213 |
| 150 | 6" | 5/16-18 UNC | 62 | 142 |
| 200 | 8" | 5/8-11 UNC | 399 | 850 |
| 250 | 10" | 5/8-11 UNC | 399 | 850 |
| 300 | 12" | 1-8 UNC | 850 | 3098 |

Packing gland nut torques Class 300

| DN | NPS | Thread Size | Standard Trim | High Temperature Trim |
|-----|--------|-------------|---------------|-----------------------|
| | | | [in-Lb] | [in-Lb] |
| 15 | 1/2" | M30x1 | 222 | 1018 |
| 20 | 3/4" | M30x1 | 222 | 1018 |
| 25 | 1" | M30x1 | 222 | 1018 |
| 40 | 1 1/2" | M36x1,5 | 425 | 1992 |
| 50 | 2" | M48x1,5 | 930 | 3452 |
| 80 | 3" | 3/8-16 UNC | 98 | 213 |
| 100 | 4" | 5/16-18 UNC | 62 | 142 |
| 150 | 6" | 3/8-16 UNC | 107 | 293 |
| 200 | 8" | 1-8 UNC | 850 | 3098 |
| 250 | 10" | 1-8 UNC | 850 | 3098 |
| 300 | 12" | 1-8 UNC | 974 | 3497 |

| DN | NPS | Thread Size | Standard Trim | High Temperature Trim |
|-----|--------|-------------|---------------|-----------------------|
| | | | [in-Lb] | [in-Lb] |
| 15 | 1/2" | M30x1 | 25 | 115 |
| 20 | 3/4" | M30x1 | 25 | 115 |
| 25 | 1" | M30x1 | 25 | 115 |
| 40 | 1 1/2" | M36x1,5 | 48 | 225 |
| 50 | 2" | M36x1,5 | 48 | 225 |
| 80 | 3" | M48x1,5 | 105 | 390 |
| 100 | 4" | 3/8-16 UNC | 11 | 24 |
| 150 | 6" | 5/16-18 UNC | 7 | 16 |
| 200 | 8" | 5/8-11 UNC | 45 | 96 |
| 250 | 10" | 5/8-11 UNC | 45 | 96 |
| 300 | 12" | 1-8 UNC | 96 | 350 |

| DN | NPS | Thread Size | Standard Trim | High Temperature Trim |
|-----|--------|-------------|---------------|-----------------------|
| | | | [in-Lb] | [in-Lb] |
| 15 | 1/2" | M30x1 | 25 | 115 |
| 20 | 3/4" | M30x1 | 25 | 115 |
| 25 | 1" | M30x1 | 25 | 115 |
| 40 | 1 1/2" | M36x1,5 | 48 | 225 |
| 50 | 2" | M48x1,5 | 105 | 390 |
| 80 | 3" | 3/8-16 UNC | 11 | 24 |
| 100 | 4" | 5/16-18 UNC | 7 | 16 |
| 150 | 6" | 3/8-16 UNC | 12 | 33 |
| 200 | 8" | 1-8 UNC | 96 | 350 |
| 250 | 10" | 1-8 UNC | 96 | 350 |
| 300 | 12" | 1-8 UNC | 110 | 395 |

KROMBACH® TUFSEAT™ Performance Series

Body Joint & Cover Torques

Body joint torques Class 150

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|--------|-------------|---------|
| Floating Ball Design | | | |
| 15 | 1/2" | 5/16-18 UNC | 142 |
| 20 | 3/4" | 5/16-18 UNC | 142 |
| 25 | 1" | 5/16-18 UNC | 142 |
| 40 | 1 1/2" | 7/16-14 UNC | 389 |
| 50 | 2" | 7/16-14 UNC | 389 |
| 80 | 3" | 5/8-11 UNC | 1195 |
| 100 | 4" | 1/2-13 UNC | 637 |
| 150 | 6" | 3/4-10 UNC | 2106 |
| Trunion Design | | | |
| 200 | 8" | 3/4-10 UNC | 2106 |
| 250 | 10" | 3/4-10 UNC | 2106 |
| 300 | 12" | 7/8-9 UNC | 3009 |

| DN | NPS | Thread Size | [Nm] |
|--|--------|-------------|------|
| Floating Ball Design Krombach® Performance Series | | | |
| 15 | 1/2" | 5/16-18 UNC | 16 |
| 20 | 3/4" | 5/16-18 UNC | 16 |
| 25 | 1" | 5/16-18 UNC | 16 |
| 40 | 1 1/2" | 7/16-14 UNC | 44 |
| 50 | 2" | 7/16-14 UNC | 44 |
| 80 | 3" | 5/8-11 UNC | 135 |
| 100 | 4" | 1/2-13 UNC | 72 |
| 150 | 6" | 3/4-10 UNC | 238 |
| Trunion Design Krombach® Performance Series | | | |
| 200 | 8" | 3/4-10 UNC | 238 |
| 250 | 10" | 3/4-10 UNC | 238 |
| 300 | 12" | 7/8-9 UNC | 340 |

Cover torques Class 150

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|---------|-------------|---------|
| Floating Ball Design | | | |
| 15-150 | 1/2"-6" | N/A | N/A |
| Trunion Design | | | |
| 200 | 8" | 3/8"-16" | 248 |
| 250 | 10" | 3/8"-16" | 248 |
| 300 | 12" | 3/8"-16" | 248 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------------|---------|-------------|------|
| Floating Ball Design | | | |
| 15-150 | 1/2"-6" | N/A | N/A |
| Trunion Design | | | |
| 200 | 8" | 3/8"-16" | 28 |
| 250 | 10" | 3/8"-16" | 28 |
| 300 | 12" | 3/8"-16" | 28 |

Body joint torques Class 300

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|--------|-------------|---------|
| Floating Ball Design | | | |
| 15 | 1/2" | 3/8-16 UNC | 248 |
| 20 | 3/4" | 3/8-16 UNC | 248 |
| 25 | 1" | 3/8-16 UNC | 248 |
| 40 | 1 1/2" | 1/2-13 UNC | 637 |
| 50 | 2" | 5/8-11 UNC | 1195 |
| 80 | 3" | 5/8-11 UNC | 1195 |
| 100 | 4" | 5/8-11 UNC | 1195 |
| 150 | 6" | 3/4-10 UNC | 2106 |
| Trunion Design | | | |
| 200 | 8" | 3/4-10 UNC | 2106 |
| 250 | 10" | 7/8-9 UNC | 3009 |
| 300 | 12" | 1-8 UNC | 4425 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------------|--------|-------------|------|
| Floating Ball Design | | | |
| 15 | 1/2" | 3/8-16 UNC | 28 |
| 20 | 3/4" | 3/8-16 UNC | 28 |
| 25 | 1" | 3/8-16 UNC | 28 |
| 40 | 1 1/2" | 1/2-13 UNC | 72 |
| 50 | 2" | 5/8-11 UNC | 135 |
| 80 | 3" | 5/8-11 UNC | 135 |
| 100 | 4" | 5/8-11 UNC | 135 |
| 150 | 6" | 3/4-10 UNC | 238 |
| Trunion Design | | | |
| 200 | 8" | 3/4-10 UNC | 238 |
| 250 | 10" | 7/8-9 UNC | 340 |
| 300 | 12" | 1-8 UNC | 500 |

Cover torques Class 300

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|---------|-------------|---------|
| Floating Ball Design | | | |
| 15-150 | 1/2"-6" | N/A | N/A |
| Trunion Design | | | |
| 200 | 8" | 3/8"-16" | 248 |
| 250 | 10" | 3/8"-16" | 248 |
| 300 | 12" | 3/8"-16" | 248 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------------|---------|-------------|------|
| Floating Ball Design | | | |
| 15-150 | 1/2"-6" | N/A | N/A |
| Trunion Design | | | |
| 200 | 8" | 3/8"-16" | 28 |
| 250 | 10" | 3/8"-16" | 28 |
| 300 | 12" | 3/8"-16" | 28 |

KROMBACH® TUFSEAT™ Performance Series

Kv / Cv Values

Kv / Cv Values Class 150-300

| 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 |
| Floating Ball Design | | | | | | | | | | | | | | | | | |
| 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 |
| Trunion Design | | | | | | | | | | | | | | | | | |
| 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 |

KROMBACH[®] TUFSEAT[™] Performance Series

Product Coding

| PRODUCT LINE | | | | DESIGN | | | | | | |
|-----------------------------|-------------------------------------|----------|----------------------------------|--------|----------------|-----------------------------|---------------------|-----------|-------------------------|-----------------|
| Valve | General Design | Bonnet | Valve Type | Size | Pressure Class | Seat Type | Seat Sealing System | Bore Size | End Type | Face to Face |
| KFO | 1 | 1 | 76 | G | D | B | 3 | 1 | A | 1 |
| Standard Flanged Ball Valve | two piece cast split body, floating | Standard | Performance Series Standard Trim | 2" | Class 150 | Double Seat/ Bi-Directional | Standard Scraping | Full Port | Flanged - ASME B16.5 RF | ASME B16.5 Long |

PRODUCT LINE

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

| General Design | |
|---|---|
| two piece cast split body, floating | 1 |
| two piece forged split body, floating | 5 |
| two piece forged split body, trunnion mounted | 7 |
| two piece cast split body, trunnion mounted | 9 |

| Bonnet | |
|----------------------------|---|
| Standard | 1 |
| Bonnet extension | 2 |
| Cryogenic extension | 3 |
| High temperature extension | 4 |

| Valve Type | |
|----------------------------------|----|
| Severe Service Series | 36 |
| Performance Series (425°C/800°F) | 56 |
| Performance Series (260°C/500°F) | 76 |

DESIGN

| Nominal pipe size | | |
|-------------------|--------|---|
| | DN 10 | A |
| 1/2" | DN 15 | B |
| 3/4" | DN 20 | C |
| 1" | DN 25 | D |
| 1-1/2" | DN 40 | F |
| 2" | DN 50 | G |
| 3" | DN 80 | I |
| 4" | DN 100 | J |
| 6" | DN 150 | L |
| 8" | DN 200 | M |
| 10" | DN 250 | N |
| 12" | DN 300 | O |
| 14" | DN 350 | P |
| 16" | DN 400 | Q |
| | DN 450 | R |
| | DN 500 | S |

| Pressure Class | |
|----------------|---|
| Class 150 | D |
| Class 300 | G |

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

| Standard Sealing System | |
|---|---|
| Standard Sealing System | 1 |
| Protected Backseat/Springs (Slurry/Catylst) | 2 |

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

| Connection | |
|-------------------------|---|
| Flanged - ASME B16.5 RF | A |
| Other | I |

| Face to Face | |
|-----------------|---|
| ASME B16.5 Long | 1 |

KROMBACH® TUFSEAT™ Performance Series

Product Coding

| MATERIAL | | | | | | OTHER | | | | OPERATION |
|-------------------|--------------------------------|-------------------|----------------------------------|----------------------------------|------------------------|---------------------|--------|--------------------|---------|-----------|
| Body Material | Stem Material | Stem Seal | Ball Base Material | Seat Base Material | Coating System | Maximum Temperature | Jacket | Drain/ Purge Ports | Options | Operator |
| A | D | 1 | X | X | 1 | B | 0 | 0 | 0 | F |
| ASTM A216 Gr. WCB | ASTM A182 Gr. F51 (UNS S31803) | Standard Graphite | ASTM A182 Gr. F316L (UNS S31603) | ASTM A182 Gr. F316L (UNS S31603) | H11 Hard Chromium (Cr) | 260°C / 500°F | none | none | none | Bare Stem |

MATERIAL

| Body Material | |
|--------------------------------|---|
| ASTM A216 Gr. WCB | A |
| ASTM A351 Gr. CF8M | B |
| ASTM A995 Gr. 5A - Superduplex | C |
| ASTM A352 Gr. LCB | E |
| ASTM A352 Gr. LCC | F |
| ASTM A217 Gr. WC6 | G |
| ASTM A351 Gr. CT15C | L |
| ASTM A494 Gr. CY40 | J |
| ASTM A351 Gr. CN7M | K |
| ASTM A494 Gr. CX2MW | H |
| ASTM A494 Gr. M35-1 | M |
| ASTM A351 Gr. CF3M | N |
| Other | X |

| Seat Base Material | |
|----------------------------------|---|
| ASTM A276 Gr 316Ti (UNS S31635) | C |
| ASTM A182 Gr. F51 (UNS S31803) | D |
| ASTM A543 Gr. 660 (UNS S66286) | E |
| ASTM A182 Gr. F316L (UNS S31603) | F |

| Coating System | |
|--|---|
| H3 Nickel/Chrome (NiCr) | 2 |
| H4 Nickel/Chrome/Tungsten Carbide (NiCrW) | 3 |
| H5 Cobalt Based (Stellite SF20) | 4 |
| H6 Chromium/Carbide-Nickel/Chromium (Cr3C2-NiCr) | 5 |
| H10 Tungsten Carbide | 6 |
| H11 Hard Chromium (Cr) | 7 |

| Stem Material | |
|--------------------------------------|---|
| ASTM A276 Gr 316Ti (UNS S31635) | C |
| ASTM A182 Gr. F51 (UNS S31803) | D |
| ASTM A543 Gr. 660 (UNS S66286) | E |
| ASTM A276 Gr. 420 (UNS S42000) | B |
| ASTM A564 Gr. 630 (17-4 PH), H1150-D | A |
| ASTM A286 Gr. XM-19 | F |
| ASTM A276 Gr. 431 (UNS S43100) | H |

| Stem Seal (Packing) | |
|---------------------|---|
| Standard Graphite | 1 |

| Ball Base Material | |
|----------------------------------|---|
| ASTM A276 Gr 316Ti (UNS S31635) | C |
| ASTM A182 Gr. F51 (UNS S31803) | D |
| ASTM A543 Gr. 660 (UNS S66286) | E |
| ASTM A182 Gr. F316L (UNS S31603) | F |

OTHER

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

| Jacket | |
|--------|---|
| none | 0 |

| Drain/Purge Ports | |
|-------------------|---|
| none | 0 |

| Options | |
|----------------------|---|
| none | 0 |
| NACE MR 0103 or 1075 | 1 |

OPERATION

| Operator | |
|-----------|---|
| Bare Stem | F |
| Lever | L |
| Gear | G |
| Actuated | A |

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