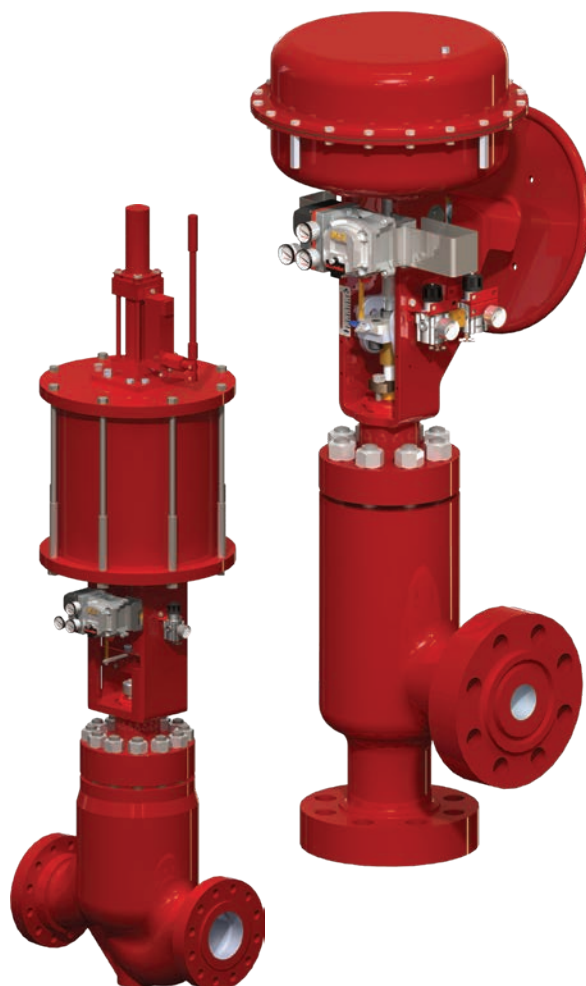


# Masoneilan™ 78400/18400 Series LincolnLog™

**High-pressure,  
anti-cavitation  
control valves**

Integrated smart  
engineered solutions  
for severe service  
applications

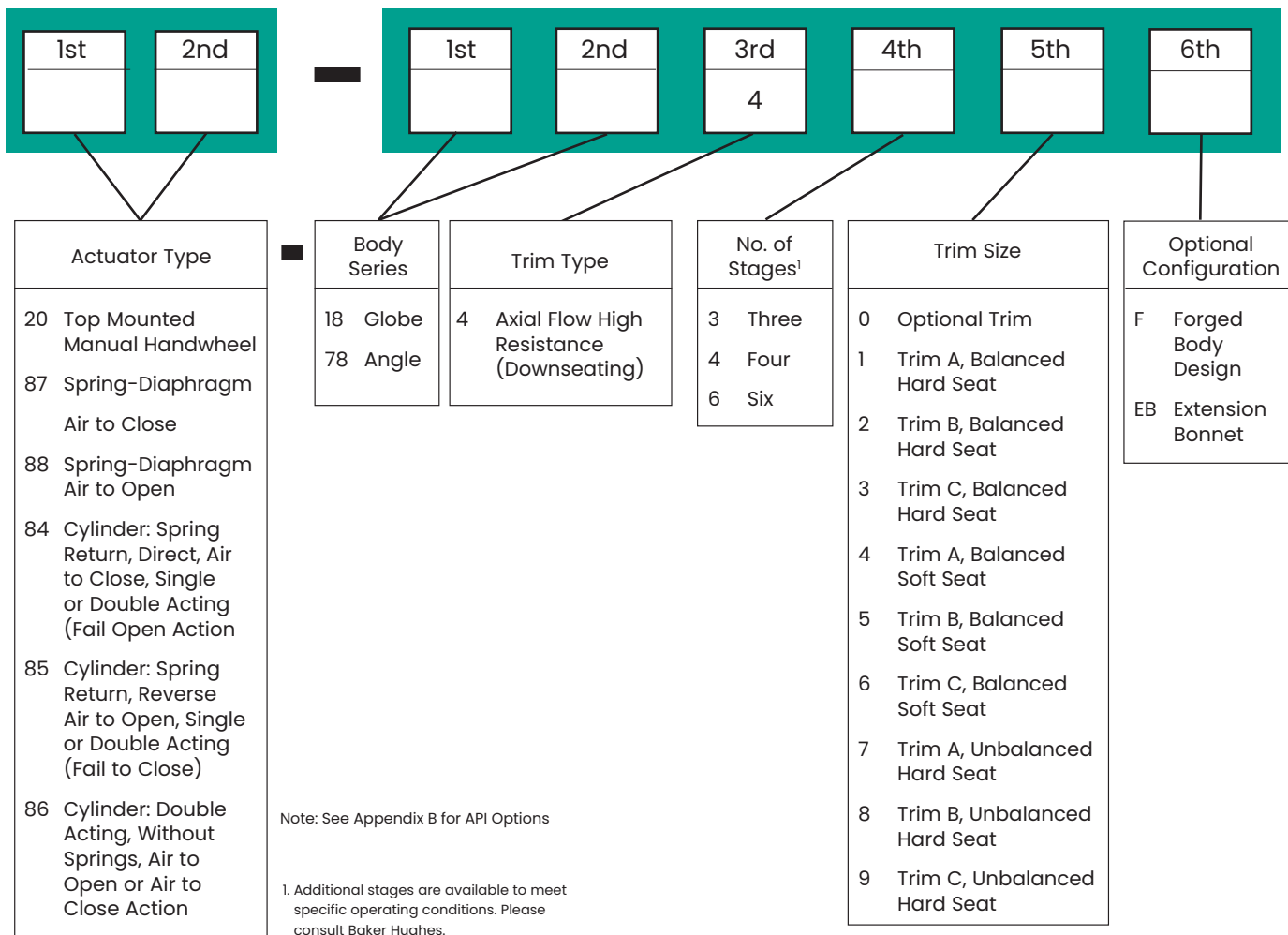


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# Numbering System



## Temperature Range/Seat Leakage

| Valve Sizes |           | Trim Type              | Seat Type  | Temperature Range <sup>1</sup> |                   | Seat Leakage Class <sup>2</sup> |
|-------------|-----------|------------------------|------------|--------------------------------|-------------------|---------------------------------|
| inches      | DN        |                        |            | min.                           | max. <sup>4</sup> |                                 |
| 1           | 25        | Unbalanced             | Metal Seat | -20°F (-29°C)                  | 600°F (316°C)     | V <sup>3</sup>                  |
| 1.5 to 8    | 40 to 200 | Balanced               | Metal Seat | -20°F (-29°C)                  | 600°F (316°C)     |                                 |
|             |           | Unbalanced             | Metal Seat | -20°F (-29°C)                  | 600°F (316°C)     |                                 |
| 2 to 8      | 50 to 200 | Balanced or Unbalanced | Soft Seat  | -20°F (-29°C)                  | 450°F (232°C)     | VI                              |

1. Designs for higher or lower temperatures are available. Please consult Baker Hughes.

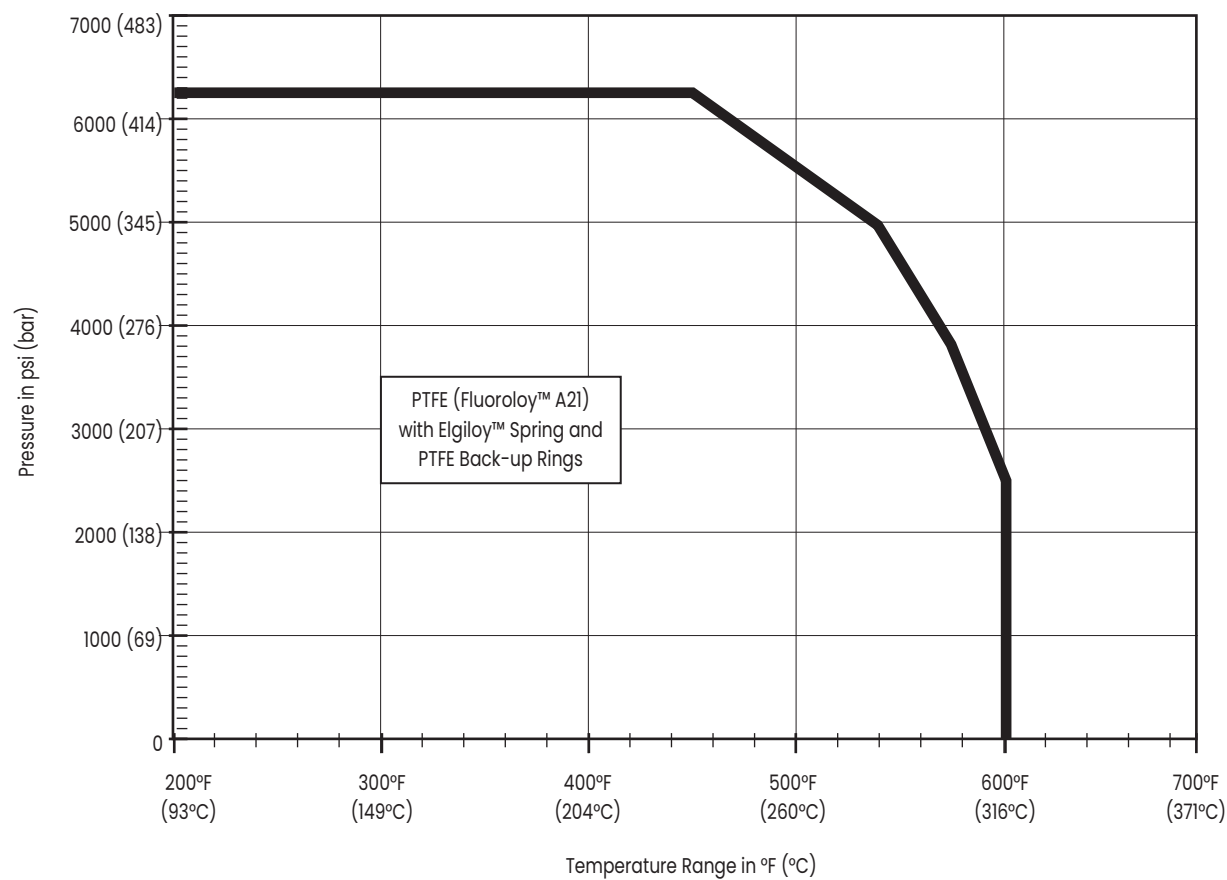
2. Seat leakage class ratings per IEC 534-4 and ASME/FCI 70.2. Class V seat leakage is standard and Class VI is optional.

3. Optional block valve tight shutoff per MSS-SP-61 also available.

4. Max. temp. limit of 600°F (316°C) with unbalanced trim requires use of optional flexible graphite packing or an extension bonnet.

# Balance Seal Pressure and Temperature limits

LincolnLog 78400/18400 Balance Seal Pressure-Temperature Application Range



# Ratings/Connections

◆ RF Flanged    ⚡ Socket Weld    ⚡ Threaded    △ RT Joint    ⇄ Butt Weld

| Valve Size <sup>1</sup> |         | Pressure Class <sup>2</sup> |       |       |       |
|-------------------------|---------|-----------------------------|-------|-------|-------|
| inches                  | DN      | 600                         | 900   | 1500  | 2500  |
| 1 & 1.5                 | 25 & 40 | ◆⚡⚡△⇄                       | ◆⚡⚡△⇄ | ◆⚡⚡△⇄ | ◆⚡⚡△⇄ |
| 2                       | 50      | ◆⚡⚡△⇄                       | ◆⚡⚡△⇄ | ◆⚡⚡△⇄ | ◆⚡⚡△⇄ |
| 3                       | 80      | ◆△⇄                         | ◆△⇄   | ◆△⇄   | ◆△⇄   |
| 4                       | 100     | ◆△⇄                         | ◆△⇄   | ◆△⇄   | ◆△⇄   |
| 6                       | 150     | ◆△⇄                         | ◆△⇄   | ◆△⇄   | ◆△⇄   |
| 8                       | 200     | ◆△⇄                         | ◆△⇄   | ◆△⇄   | ◆△⇄   |

1. Sizes, ratings and end connections are available in both globe and angle body styles.  
2. Pressure classes shown represent ASME ratings and equivalent PN ratings.

# Flow Capacity and F<sub>L</sub>

## Standard Capacity – 3-Stage Design

Flow Characteristic: Modified Linear

| Valve Size |     | Orifice Diameter |      | Travel |      | Trim C         |                | Min. Cont. C <sub>v</sub> |
|------------|-----|------------------|------|--------|------|----------------|----------------|---------------------------|
| inches     | DN  | inches           | mm   | inches | mm   | C <sub>v</sub> | F <sub>L</sub> |                           |
| 1          | 25  | .70              | 17.8 | .25    | 6.35 | 2.0            | .98            | .05                       |
| 1.5        | 40  | 1.00             | 25.4 | .25    | 6.35 | 3.8            | .98            | .10                       |
| 2          | 50  | 1.50             | 38.1 | .38    | 9.65 | 9.6            | .98            | .15                       |
| 3          | 80  | 2.25             | 57.2 | .62    | 15.7 | 24.5           | .98            | .25                       |
| 4          | 100 | 2.88             | 73.2 | .75    | 19.1 | 38             | .98            | .43                       |
| 6          | 150 | 4.12             | 105  | 1.00   | 25.4 | 80             | .98            | .56                       |
| 8          | 200 | 5.38             | 137  | 1.25   | 31.8 | 141.5          | .98            | 1.0                       |

## Standard Capacity – 4-Stage Design

Flow Characteristic: Modified Linear

| Valve Size |     | Orifice Diameter |      | Travel |      | Trim A         |                | Trim B         |                | Trim C         |                | Min.Cont. C <sub>v</sub> |
|------------|-----|------------------|------|--------|------|----------------|----------------|----------------|----------------|----------------|----------------|--------------------------|
| inches     | DN  | inches           | mm   | inches | mm   | C <sub>v</sub> | F <sub>L</sub> | C <sub>v</sub> | F <sub>L</sub> | C <sub>v</sub> | F <sub>L</sub> |                          |
| 1          | 25  | .70              | 17.8 | .25    | 6.35 | 1.0            | .996           | 1.4            | .994           | 1.7            | .991           | .04                      |
| 1.5        | 40  | 1.00             | 25.4 | .25    | 6.35 | 1.9            | .996           | 2.5            | .994           | 3.2            | .991           | .08                      |
| 2          | 50  | 1.50             | 38.1 | .38    | 9.65 | 4.5            | .996           | 7              | .994           | 8.4            | .991           | .12                      |
| 3          | 80  | 2.25             | 57.2 | .62    | 15.7 | 10             | .996           | 13             | .994           | 21             | .991           | .20                      |
| 4          | 100 | 2.88             | 73.2 | .75    | 19.1 | 16.5           | .996           | 22             | .994           | 31.5           | .991           | .35                      |
| 6          | 150 | 4.12             | 105  | 1.00   | 25.4 | 34             | .996           | 45             | .994           | 66             | .991           | .46                      |
| 8          | 200 | 5.38             | 137  | 1.25   | 31.8 | 60             | .996           | 97.5           | .994           | 120            | .991           | .80                      |

## Standard Capacity – 6-Stage Design

Flow Characteristic: Modified Linear

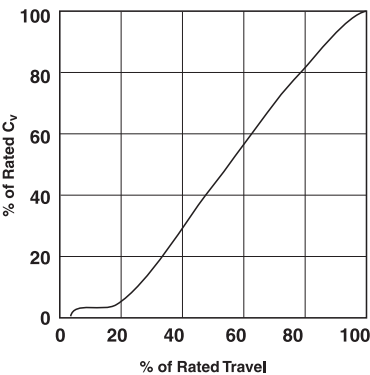
| Valve Size |     | Orifice Diameter |      | Travel |      | Trim A         |                | Trim B         |                | Trim C         |                | Min. Cont. C <sub>v</sub> |
|------------|-----|------------------|------|--------|------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------------|
| inches     | DN  | inches           | mm   | inches | mm   | C <sub>v</sub> | F <sub>L</sub> | C <sub>v</sub> | F <sub>L</sub> | C <sub>v</sub> | F <sub>L</sub> |                           |
| 1          | 25  | .70              | 17.8 | .25    | 6.35 | .80            | .998           | 1.0            | .997           | 1.4            | .994           | .03                       |
| 1.5        | 40  | 1.00             | 25.4 | .25    | 6.35 | 1.4            | .998           | 1.8            | .997           | 2.5            | .994           | .05                       |
| 2          | 50  | 1.50             | 38.1 | .38    | 9.65 | 3.5            | .998           | 4.5            | .997           | 6.5            | .994           | .08                       |
| 3          | 80  | 2.25             | 57.2 | .62    | 15.7 | 7.5            | .998           | 9.5            | .997           | 17             | .994           | .13                       |
| 4          | 100 | 2.88             | 73.2 | .75    | 19.1 | 12             | .998           | 16             | .997           | 25             | .994           | .22                       |
| 6          | 150 | 4.12             | 105  | 1.00   | 25.4 | 25             | .998           | 35             | .997           | 52             | .994           | .30                       |
| 8          | 200 | 5.38             | 137  | 1.25   | 31.8 | 39             | .998           | 75.5           | .997           | 93             | .994           | .65                       |

# Flow Characteristics

The LincolnLog trim provides a smooth modified linear control characteristic with “clearance flow” capacity over the initial 15 percent of valve travel as shown in the generic chart and table at right.

Incorporation of the multi-stage “clearance flow” design concept prevents high pressure drops across the LincolnLog seating area while throttling at low lifts. This feature helps to extend trim life significantly, resulting in dependable and tight shutoff whenever required. It also improves the throttling control stability and performance at low lifts, while providing smooth, accurate and continuous capacity control from 15 percent to 100 percent plug travel. Controllability extends from the Maximum Rated  $C_v$  to the Minimum Controllable  $C_v$  for any valve size resulting in typical turndown ratios of 50:1.

LincolnLog  $C_v$  vs. Travel



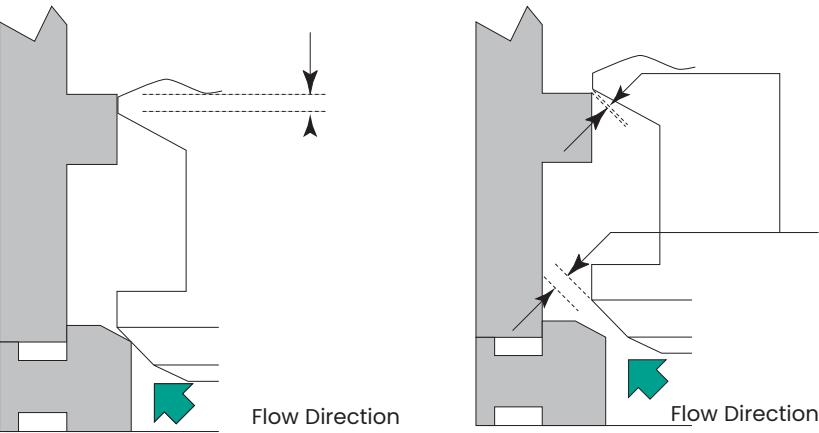
|                      |   |    |    |    |    |    |    |    |    |    |     |
|----------------------|---|----|----|----|----|----|----|----|----|----|-----|
| Percent Max. Opening | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Percent Max. C       | • | •  | 3  | 15 | 27 | 39 | 52 | 64 | 76 | 88 | 100 |

• Clearance Flow Only

# Trim Seat Protection

The “clearance flow” feature described in the previous section is achieved through the trim overlap design illustrated below:

LincolnLog Trim Overlap Seat Protection Feature



## 0 – 15 percent of Plug Travel

Trim overlap with the valve in the closed or low lift positions.

## 15 – 100 percent of Plug Travel

There is much greater flow area through the valve seat versus the plug notches. As a result, pressure drop and velocities across the critical seating surfaces are controlled eliminating seat damage.

# Valve Sizing Guidelines

## General

LincolnLog multi-stage control valves can be sized using either standard IEC/ISA equations or using Baker Hughes latest Masoneilan sizing and selection software program.

## Noise Predictions

Valve noise calculations can be performed using the Baker Hughes Masoneilan sizing and selection program based on the latest IEC equations. The serial stage construction of the LincolnLog design helps to significantly reduce trim noise. Calculating the noise at the last stage of the LincolnLog trim will closely approximate the overall valve noise produced. Pressure drop across the last stage can be derived from the table below and used in the noise calculations.

## Trim Selection

As indicated in the table below, the LincolnLog is available in various standard trim types and number of stages. Each trim style provides different staging ratios and different pressure drop percentages per stage. Recommended limits for  $\Delta P$  per stage are 800 psi (60 bar) for continuous duty cycle applications and up to 1000 psi (70 bar)  $\Delta P$  per stage for intermittent service. The recommended operating throttling  $\Delta P$  limits are also shown in the table below.

## Engineered Solutions

For flashing service, the expansion ratio of the fluid will determine the appropriate staging ratio to apply. Non-standard staging ratios can be supplied for compressible two-phase flow or flashing conditions not covered by the standard trim. Please consult Baker Hughes for proper sizing and design of engineered solutions for these types of applications.

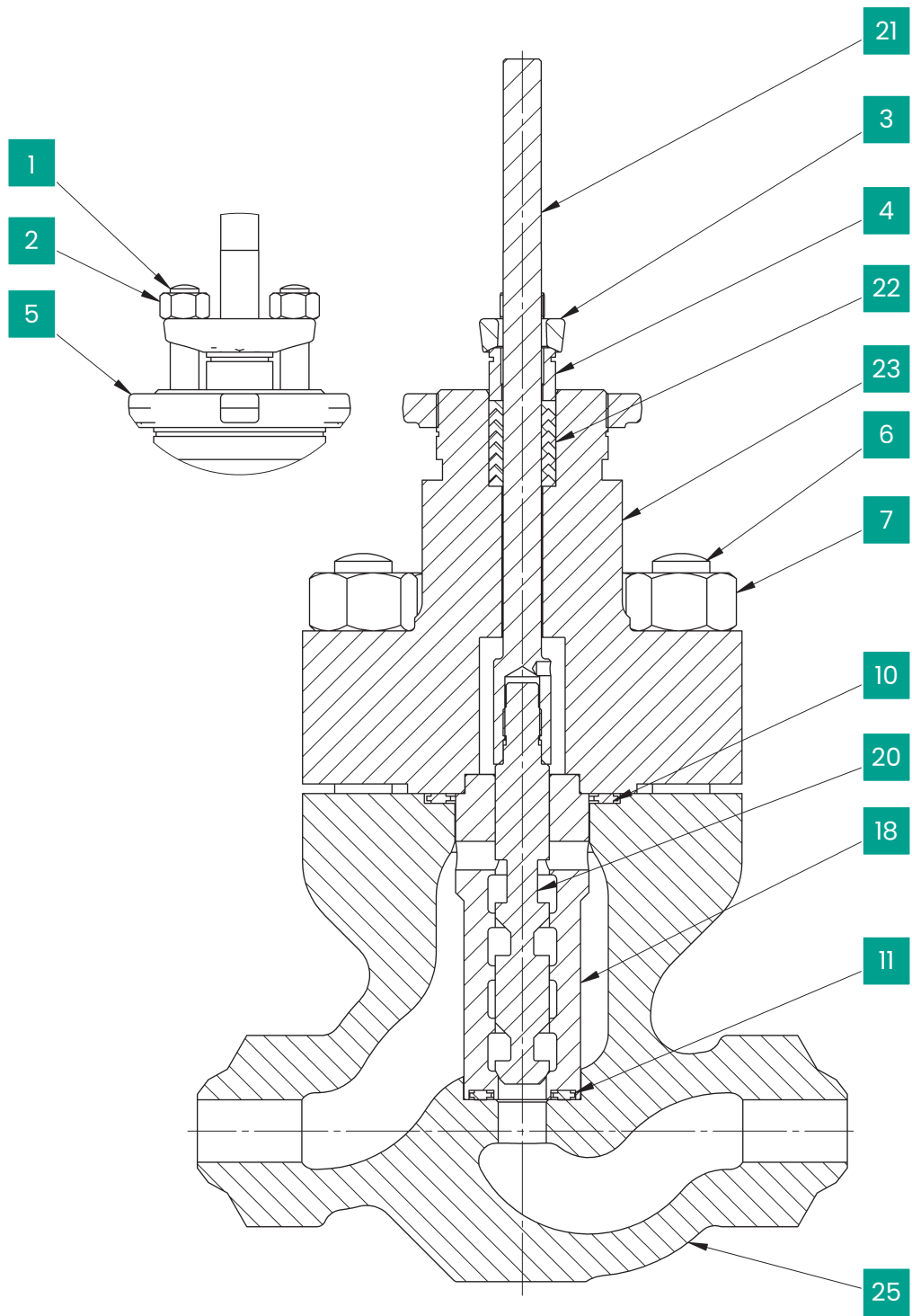
## Staging ratios and pressure drop guidelines

| Trim Type | No. of Stages | Staging Ratios <sup>1 &amp; 2</sup> | Pressure Drop per Stage <sup>3</sup> |                              | Maximum Recommended Throttling $\Delta P$ |     |                      |     |
|-----------|---------------|-------------------------------------|--------------------------------------|------------------------------|-------------------------------------------|-----|----------------------|-----|
|           |               |                                     |                                      |                              | Continuous Service                        |     | Intermittent Service |     |
|           |               |                                     | Stages                               | Fraction of Total $\Delta P$ | psi                                       | bar | psi                  | bar |
| C         | 3             | 1-1-2                               | 1 to 2                               | .44                          | 1595                                      | 110 | 2030                 | 140 |
|           |               |                                     | 3                                    | .11                          |                                           |     |                      |     |
| C         | 4             | 1-1-1-2                             | 1 to 3                               | .31                          | 2248                                      | 155 | 2900                 | 200 |
|           |               |                                     | 4                                    | .08                          |                                           |     |                      |     |
| B         | 4             | 1-1-2-3                             | 1 to 2                               | .42                          | 1885                                      | 130 | 2320                 | 160 |
|           |               |                                     | 3                                    | .11                          |                                           |     |                      |     |
|           |               |                                     | 4                                    | .05                          |                                           |     |                      |     |
| A         | 4             | 1-1-2-4                             | 1 to 2                               | .43                          | 1885                                      | 130 | 2320                 | 160 |
|           |               |                                     | 3                                    | .11                          |                                           |     |                      |     |
|           |               |                                     | 4                                    | .03                          |                                           |     |                      |     |
| C         | 6             | 1-1-1-1-1-2                         | 1 to 5                               | .19                          | 3698                                      | 255 | 4713                 | 325 |
|           |               |                                     | 6                                    | .05                          |                                           |     |                      |     |
| B         | 6             | 1-1-1-1-2-3                         | 1 to 4                               | .23                          | 3480                                      | 240 | 4350                 | 300 |
|           |               |                                     | 5                                    | .06                          |                                           |     |                      |     |
|           |               |                                     | 6                                    | .025                         |                                           |     |                      |     |
| A         | 6             | 1-1-1-1-2-4                         | 1 to 4                               | .23                          | 3408                                      | 235 | 4278                 | 295 |
|           |               |                                     | 5                                    | .06                          |                                           |     |                      |     |
|           |               |                                     | 6                                    | .014                         |                                           |     |                      |     |

1. Staging ratios provide approximations of the relative area ratios for each specific trim type. As an example, a staging ratio of 1-1-2 indicates that the final stage for that trim type has approximately twice the area of the first two stages.
2. Staging ratios do not have any relative correlation between the different trim types.
3. Recommended limits for  $\Delta P$  per stage are 800 psi (60 bar) for continuous duty cycle applications and up to 1000 psi (70 bar)  $\Delta P$  per stage for intermittent service.

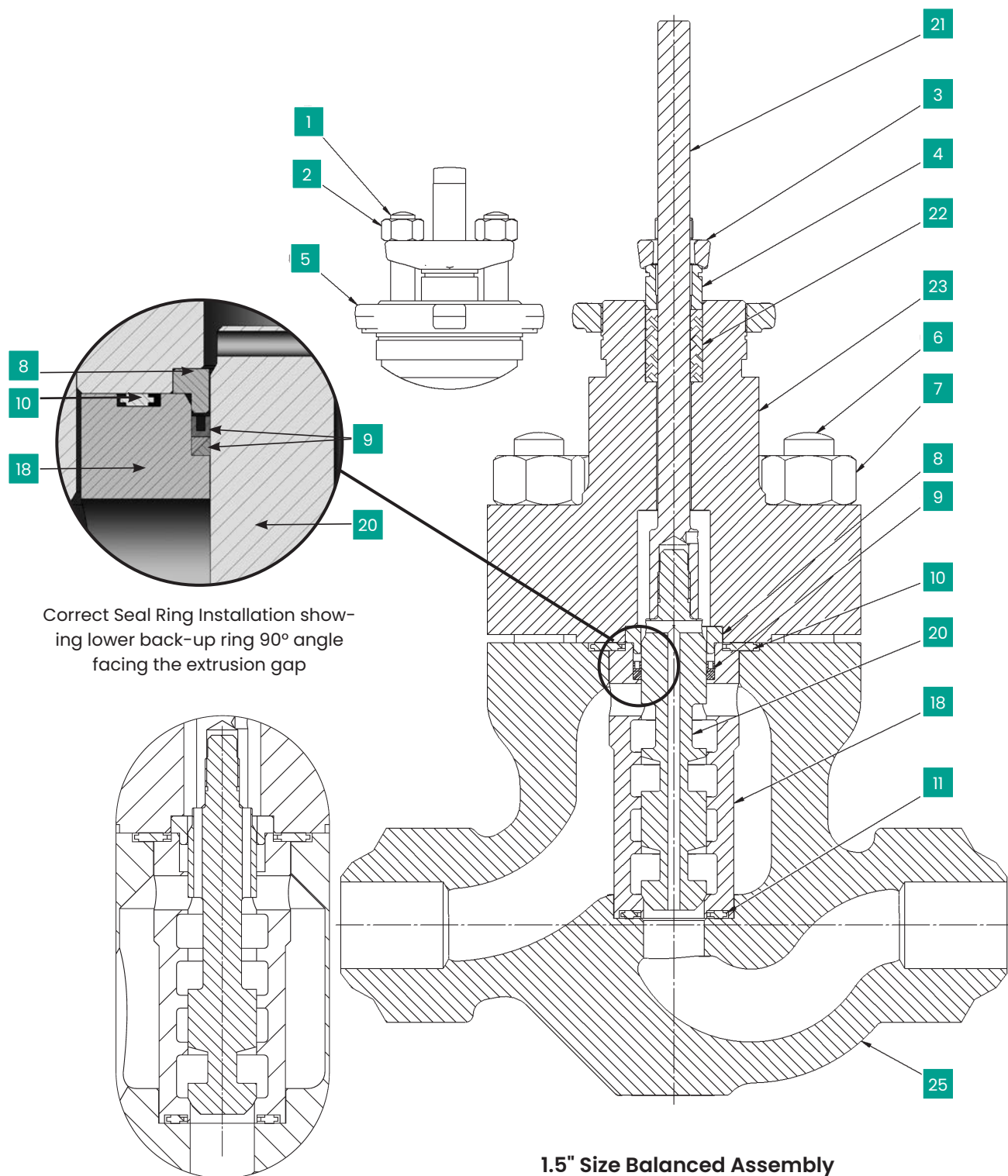


# Materials of Construction



1" Size Unbalanced Assembly

# Materials of Construction



# Materials of Construction

## Standard Construction

### Valve Sizes 1" and 1.5" (DN 25 and 40)<sup>1</sup>

| Ref. No. | Temperature Range                                 | -20°F                                                            | 450°F | 600°F |
|----------|---------------------------------------------------|------------------------------------------------------------------|-------|-------|
|          | Description                                       | Standard Materials                                               |       |       |
| 1        | Packing Flange Stud                               | 304 St. St. ASTM A193 GR B8 Class 2                              |       |       |
| 2        | Packing Flange Nut                                | 304 St. St. ASTM A194 GR 8                                       |       |       |
| 3        | Packing Flange                                    | Carbon Steel ASTM A668 CL B or ASTM A216 GR WCC                  |       |       |
| 4        | Packing Follower                                  | Austenitic 300 Series Stainless Steel                            |       |       |
| 5        | Drive Nut                                         | Carbon Steel SAE 1117 or ASTM A216 GR WCC                        |       |       |
| 6        | Body Stud                                         | Alloy Steel ASTM A193 GR B7                                      |       |       |
| 7        | Body Stud Nut                                     | Carbon Steel ASTM A194 GR 2H                                     |       |       |
| 8        | Seal Retainer <sup>2</sup>                        | 316 St. St. ASTM A479 TY 316                                     |       |       |
| 9        | Balance Seal and Back-up Rings <sup>3&amp;4</sup> | PTFE (Fluoroloy™ A21) with Elgiloy Spring and PTFE Back-up Rings |       |       |
| 10       | Body Gasket                                       | 316L St. St. w/Flexible Graphite Filler (Spiral Wound)           |       |       |
| 11       | Seat Ring Gasket                                  | 316L St. St. w/Flexible Graphite Filler (Spiral Wound)           |       |       |
| 12       | Plug Pin (Not Shown)                              | Austenitic 300 Series Stainless Steel                            |       |       |
| 18       | Liner with Integral Seat                          | 17-4 PH St. St. ASTM A564 GR 630 Cond. H900                      |       |       |
| 20       | Plug                                              | 410 St. St. ASTM A479                                            |       |       |
| 21       | Stem                                              | 17-4 PH St. St. ASTM A564 GR 630 Cond. H1075                     |       |       |
| 22       | Packing                                           | TFE V-Ring with Std. Bonnet                                      |       |       |
|          |                                                   | TFE V-Ring with Ext. Bonnet                                      |       |       |
| 23       | Valve Bonnet                                      | Carbon Steel ASTM A216 Grade WCC                                 |       |       |
| 25       | Valve Body                                        | Carbon Steel ASTM A216 Grade WCC or ASTM A105 (Forging)          |       |       |
| Ref. No. | Temperature Range                                 | -29°C                                                            | 232°C | 316°C |

1. 1" (DN 25) valve size is only available in the unbalanced configuration.

2. The seal retainer is not required for the 1" (DN 25) size.

3. The balance seal is not required for the unbalanced construction.

4. See Page 4 for balance seal pressure and temperature limits.

Review use of optional materials and configurations for temperature ranges indicated. Standard materials listed may still be applicable depending on specific service conditions. Consult Baker Hughes for appropriate material combinations.

# Materials of Construction

## Standard NACE (1) Construction Valve Sizes 1" and 1.5" (DN 25 and 40)<sup>2</sup>

| Ref. No. | Temperature Range                             | -20°F                                                          | 450°F | 600°F |
|----------|-----------------------------------------------|----------------------------------------------------------------|-------|-------|
|          | Description                                   | Standard Materials                                             |       |       |
| 1        | Packing Flange Stud                           | 304 St. St. ASTM A193 GR B8 Class 2                            |       |       |
| 2        | Packing Flange Nut                            | 304 St. St. ASTM A194 GR 8                                     |       |       |
| 3        | Packing Flange                                | Carbon Steel ASTM A668 CL B or ASTM A216 GR WCC                |       |       |
| 4        | Packing Follower                              | Austenitic 300 Series Stainless Steel                          |       |       |
| 5        | Drive Nut                                     | Carbon Steel SAE 1117 or ASTM A216 GR WCC                      |       |       |
| 6        | Body Stud                                     | Alloy Steel ASTM A193 GR B7                                    |       |       |
| 7        | Body Stud Nut                                 | Carbon Steel ASTM A194 GR 2H                                   |       |       |
| 8        | Seal Retainer <sup>2</sup>                    | 316 St. St. ASTM A479 TY 316                                   |       |       |
| 9        | Balance Seal and Back-up Rings <sup>3,4</sup> | PTFE (Fluoroly A21) with Elgiloy Spring and PTFE Back-up Rings |       |       |
| 10       | Body Gasket                                   | 316L St. St. w/Flexible Graphite Filler (Spiral Wound)         |       |       |
| 11       | Seat Ring Gasket                              | 316L St. St. w/Flexible Graphite Filler (Spiral Wound)         |       |       |
| 12       | Plug Pin (Not Shown)                          | Austenitic 300 Series Stainless Steel                          |       |       |
| 18       | Liner with Integral Seat                      | Nitronic 50 ASTM A479 TY XM-19                                 |       |       |
| 20       | Plug                                          | 17-4 PH St. St. ASTM A564 GR 630 Cond. H1150M                  |       |       |
| 21       | Stem                                          | Nitronic 50 ASTM A479 TY XM-19                                 |       |       |
| 22       | Packing                                       | TFE V-Ring with Std. Bonnet                                    |       |       |
|          |                                               | TFE V-Ring with Ext. Bonnet                                    |       |       |
| 23       | Valve Bonnet                                  | Carbon Steel ASTM A216 Grade WCC                               |       |       |
| 25       | Valve Body                                    | Carbon Steel ASTM A216 Grade WCC or ASTM A105 (Forging)        |       |       |
| Ref. No. | Temperature Range                             | -29°C                                                          | 232°C | 316°C |

1. Standard materials and processes are in accordance with the requirements of NACE specification MR0103. Applications requiring compliance to MR0175 – 2003 or ISO 15156 would need to be reviewed by Baker Hughes.

2. 1" (DN 25) valve size is only available in the unbalanced configuration.

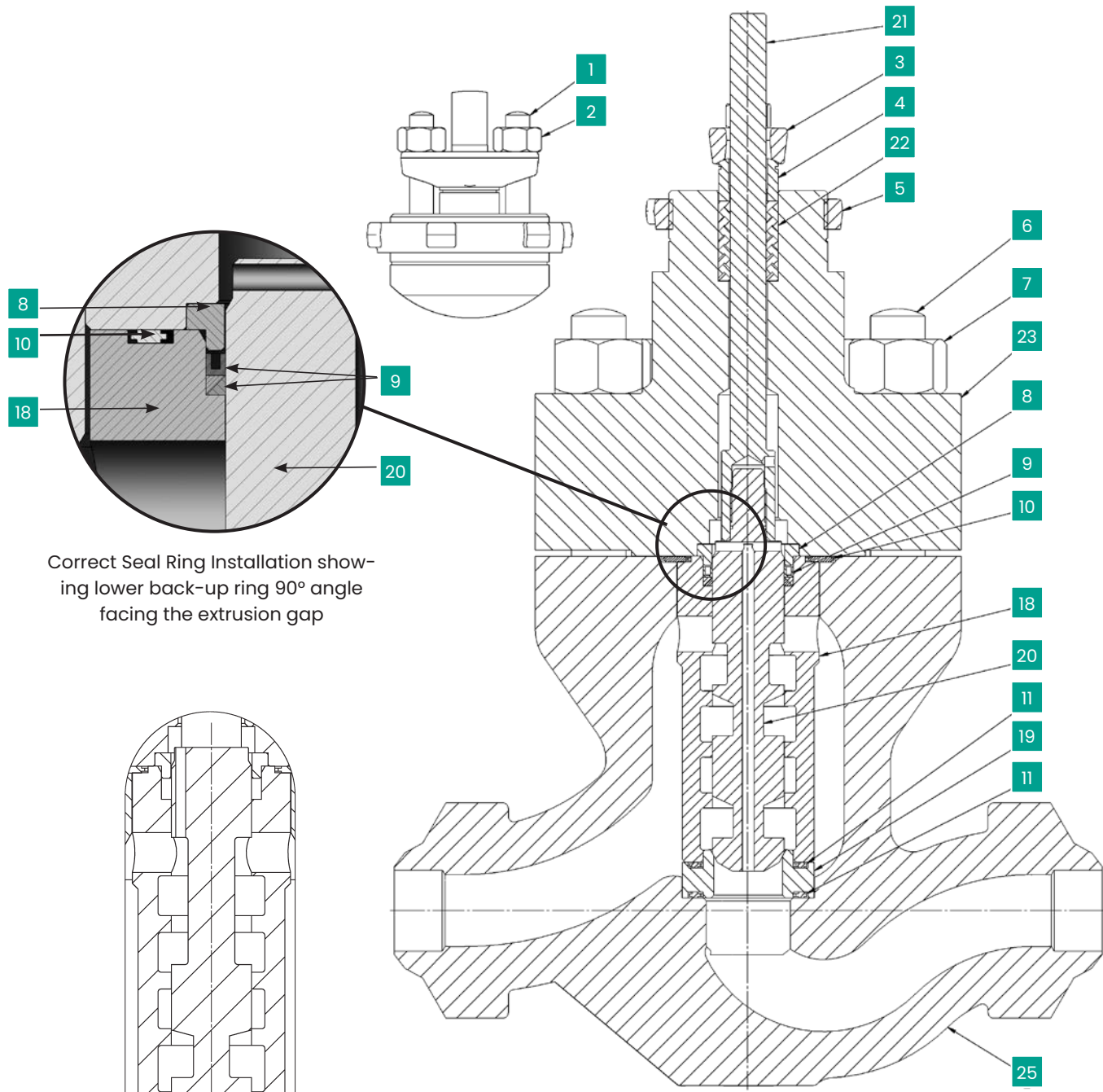
3. The seal retainer is not required for the 1" (DN 25) size.

4. The balance seal is not required for the unbalanced construction.

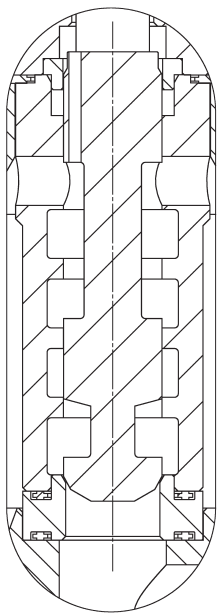
5. See Page 4 for balance seal pressure and temperature limits.

Review use of optional materials and configurations for temperature ranges indicated. Standard materials listed may still be applicable depending on specific service conditions. Consult Baker Hughes for appropriate material combinations.

# Materials of Construction

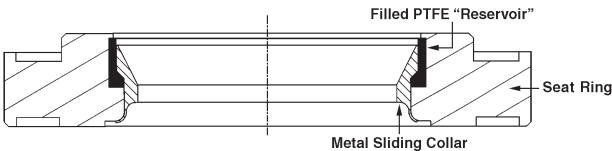


Correct Seal Ring Installation showing lower back-up ring 90° angle facing the extrusion gap

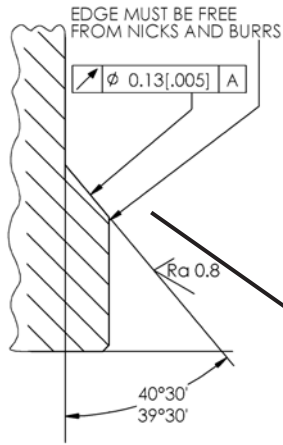


2" Size Unbalanced Trim Detail

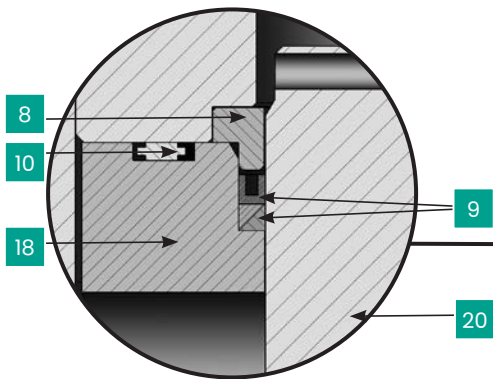
2" Size Balanced Assembly



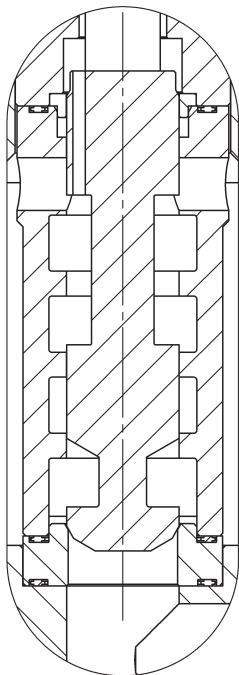
Soft Seat Option



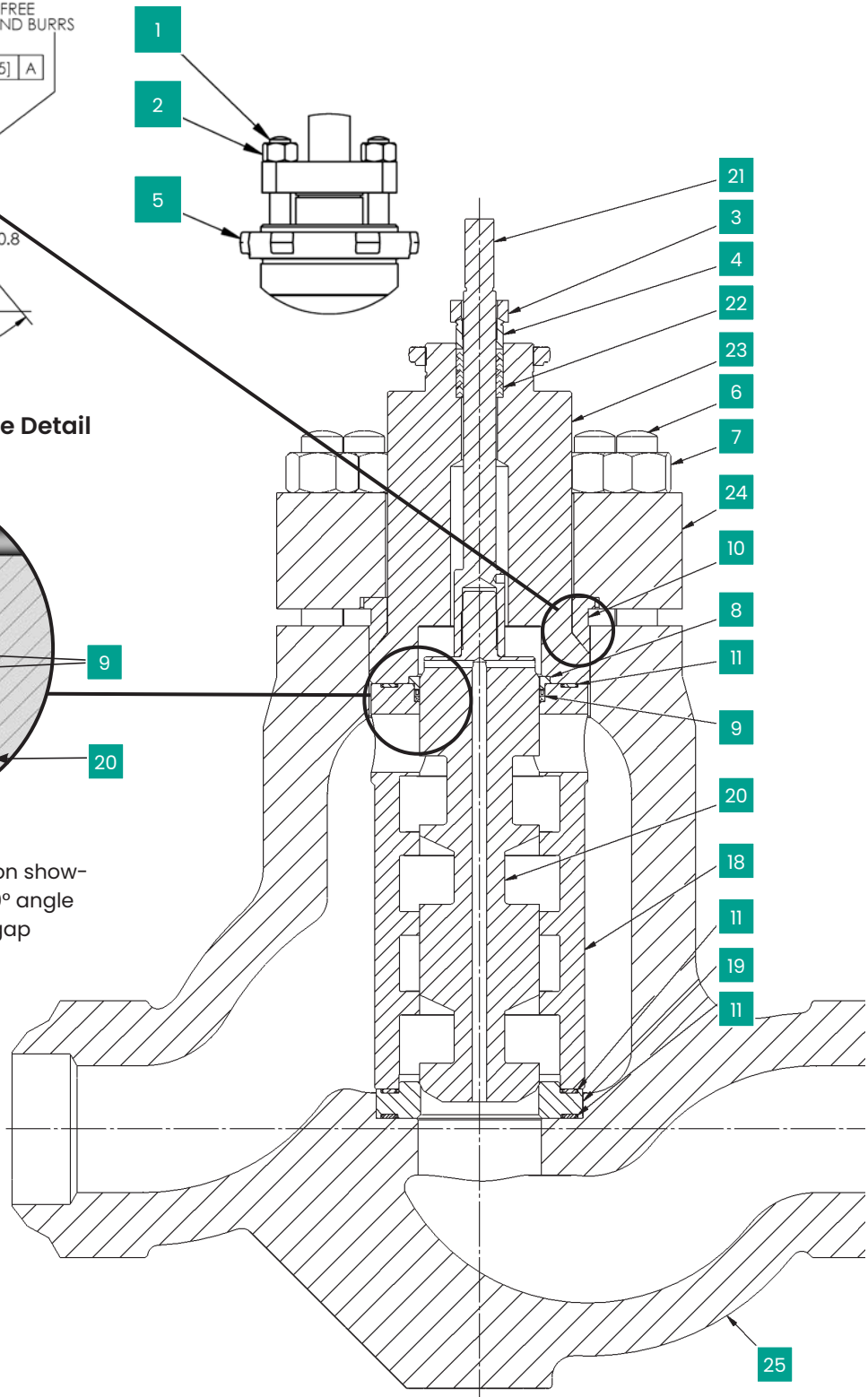
**Bonnet Seating Angle Detail**



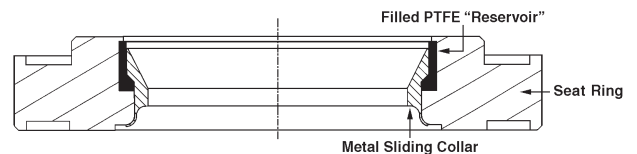
Correct Seal Ring Installation showing lower back-up ring 90° angle facing the extrusion gap



**3" to 8" Size Unbalanced Trim Detail**



**3" to 8" Size Balanced Assembly**



**Soft Seat Option**

# Materials of Construction

## Standard Construction

### Valve Sizes 2" and 8" (DN 50 and 200)

| Ref. No. | Temperature Range                             | -20°F                                                           | 450°F | 600°F |
|----------|-----------------------------------------------|-----------------------------------------------------------------|-------|-------|
|          | Description                                   | Standard Materials                                              |       |       |
| 1        | Packing Flange Stud                           | 304 St. St. ASTM A193 GR B8 Class 2                             |       |       |
| 2        | Packing Flange Nut                            | 304 St. St. ASTM A194 GR 8                                      |       |       |
| 3        | Packing Flange                                | Carbon Steel ASTM A668 CL B or ASTM A216 GR WCC                 |       |       |
| 4        | Packing Follower                              | Austenitic 300 Series Stainless Steel                           |       |       |
| 5        | Drive Nut                                     | Carbon Steel SAE 1117 or ASTM A216 GR WCC                       |       |       |
| 6        | Body Stud                                     | Alloy Steel ASTM A193 GR B7                                     |       |       |
| 7        | Body Stud Nut                                 | Carbon Steel ASTM A194 GR 2H                                    |       |       |
| 8        | Seal Retainer <sup>2</sup>                    | 316 St. St. ASTM A479 TY 316                                    |       |       |
| 9        | Balance Seal and Back-up Rings <sup>3,4</sup> | PTFE (Fluoroloy A21) with Elgiloy Spring and PTFE Back-up Rings |       |       |
| 10       | Body Gasket <sup>3</sup> (2" Size)            | 316L St. St. w/Flexible Graphite Filler (Spiral Wound)          |       |       |
|          | Metal Seal <sup>4</sup> (3" to 8" Sizes)      | 17-4 PH St. St. ASTM A564 GR 630 Cond. H1150M                   |       |       |
| 11       | Seat Ring Gasket                              | 316L St. St. w/Flexible Graphite Filler (Spiral Wound)          |       |       |
| 12       | Plug Pin (Not Shown)                          | Austenitic 300 Series Stainless Steel                           |       |       |
| 18       | Liner                                         | 17-4 PH St. St. ASTM A564 GR 630 Cond. H900                     |       |       |
| 19       | Seat Ring                                     | 316 St. St. ASTM A479 TY 316 with Hardfaced Seat                |       |       |
| 20       | Plug                                          | 410 St. St. ASTM 479                                            |       |       |
| 21       | Stem                                          | 17-4 PH St. St. ASTM A564 GR 630 Cond. H1075                    |       |       |
| 22       | Packing                                       | TFE V-Ring with Std. Bonnet                                     |       |       |
|          |                                               | TFE V-Ring with Ext. Bonnet                                     |       |       |
| 23       | Valve Bonnet <sup>3</sup>                     | Carbon Steel ASTM A216 Grade WCC                                |       |       |
| 24       | Bonnet Flange <sup>4</sup> (3" to 8" Sizes)   | Carbon Steel ASTM A216 Grade WCC                                |       |       |
| 25       | Valve Body                                    | Carbon Steel ASTM A216 Grade WCC or ASTM A105 (Forging)         |       |       |
| Ref. No. | Temperature Range                             | -29°C                                                           | 232°C | 316°C |

1. The balance seal is not required for the unbalanced construction.

2. See Page 4 for balance seal pressure and temperature limits.

3. 2" size valve bonnet includes an integral flange and requires a bonnet gasket.

4. 3" to 8" size valves use separate bonnet flanges and a metal seal joint design.

Review use of optional materials and configurations for temperature ranges indicated. Standard materials listed may still be applicable depending on specific service conditions. Consult Baker Hughes for appropriate material combinations.

# Materials of Construction

## Standard NACE<sup>1</sup> Construction Valve Sizes 2" and 8" (DN 50 and 200)

| Ref. No. | Temperature Range                                 | -20°F                                                           | 450°F | 600°F |
|----------|---------------------------------------------------|-----------------------------------------------------------------|-------|-------|
|          | Description                                       | Standard Materials                                              |       |       |
| 1        | Packing Flange Stud                               | 304 St. St. ASTM A193 GR B8 Class 2                             |       |       |
| 2        | Packing Flange Nut                                | 304 St. St. ASTM A194 GR 8                                      |       |       |
| 3        | Packing Flange                                    | Carbon Steel ASTM A668 CL B or ASTM A216 GR WCC                 |       |       |
| 4        | Packing Follower                                  | Austenitic 300 Series Stainless Steel                           |       |       |
| 5        | Drive Nut                                         | Carbon Steel SAE 1117 or ASTM A216 GR WCC                       |       |       |
| 6        | Body Stud                                         | Alloy Steel ASTM A193 GR B7                                     |       |       |
| 7        | Body Stud Nut                                     | Carbon Steel ASTM A194 GR 2H                                    |       |       |
| 8        | Seal Retainer <sup>2</sup>                        | 316 St. St. ASTM A479 TY 316                                    |       |       |
| 9        | Balance Seal and Back-up Rings <sup>3&amp;4</sup> | PTFE (Fluoroloy A21) with Elgiloy Spring and PTFE Back-up Rings |       |       |
| 10       | Body Gasket <sup>3</sup> (2" Size)                | 316L St. St. w/Flexible Graphite Filler (Spiral Wound)          |       |       |
|          | Metal Seal <sup>4</sup> (3" to 8" Sizes)          | 17-4 PH St. St. ASTM A564 GR 630 Cond. H1150M                   |       |       |
| 11       | Seat Ring Gasket                                  | 316L St. St. w/Flexible Graphite Filler (Spiral Wound)          |       |       |
| 12       | Plug Pin (Not Shown)                              | Austenitic 300 Series Stainless Steel                           |       |       |
| 18       | Liner                                             | Nitronic 50 ASTM A479 TY XM-19                                  |       |       |
| 19       | Seat Ring                                         | 316 St. St. ASTM A479 TY 316 with Hardfaced Seat                |       |       |
| 20       | Plug                                              | 17-4 PH St. St. ASTM A564 GR 630 Cond. H1150M                   |       |       |
| 21       | Stem                                              | Nitronic 50 ASTM A479 TY XM-19                                  |       |       |
| 22       | Packing                                           | TFE V-Ring with Std. Bonnet                                     |       |       |
|          |                                                   | TFE V-Ring with Ext. Bonnet                                     |       |       |
| 23       | Valve Bonnet <sup>3</sup>                         | Carbon Steel ASTM A216 Grade WCC                                |       |       |
| 24       | Bonnet Flange <sup>4</sup> (3" to 8" Sizes)       | Carbon Steel ASTM A216 Grade WCC                                |       |       |
| 25       | Valve Body                                        | Carbon Steel ASTM A216 Grade WCC or ASTM A105 (Forging)         |       |       |
| Ref. No. | Temperature Range                                 | -29°C                                                           | 232°C | 316°C |

1. Standard materials and processes are in accordance with the requirements of NACE specification MR0103. Applications requiring compliance to MR0175 - 2003 or ISO 15156 would need to be reviewed by Baker Hughes.

2. The balance seal is not required for the unbalanced construction.

3. See Page 4 for balance seal pressure and temperature limits.

4. 2" size valve bonnet includes an integral flange and requires a bonnet gasket.

5. 3" to 8" size valves use separate bonnet flanges and a metal seal joint design.

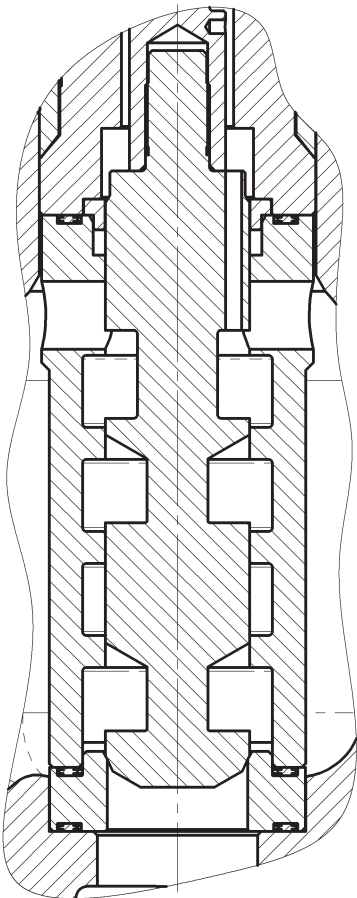
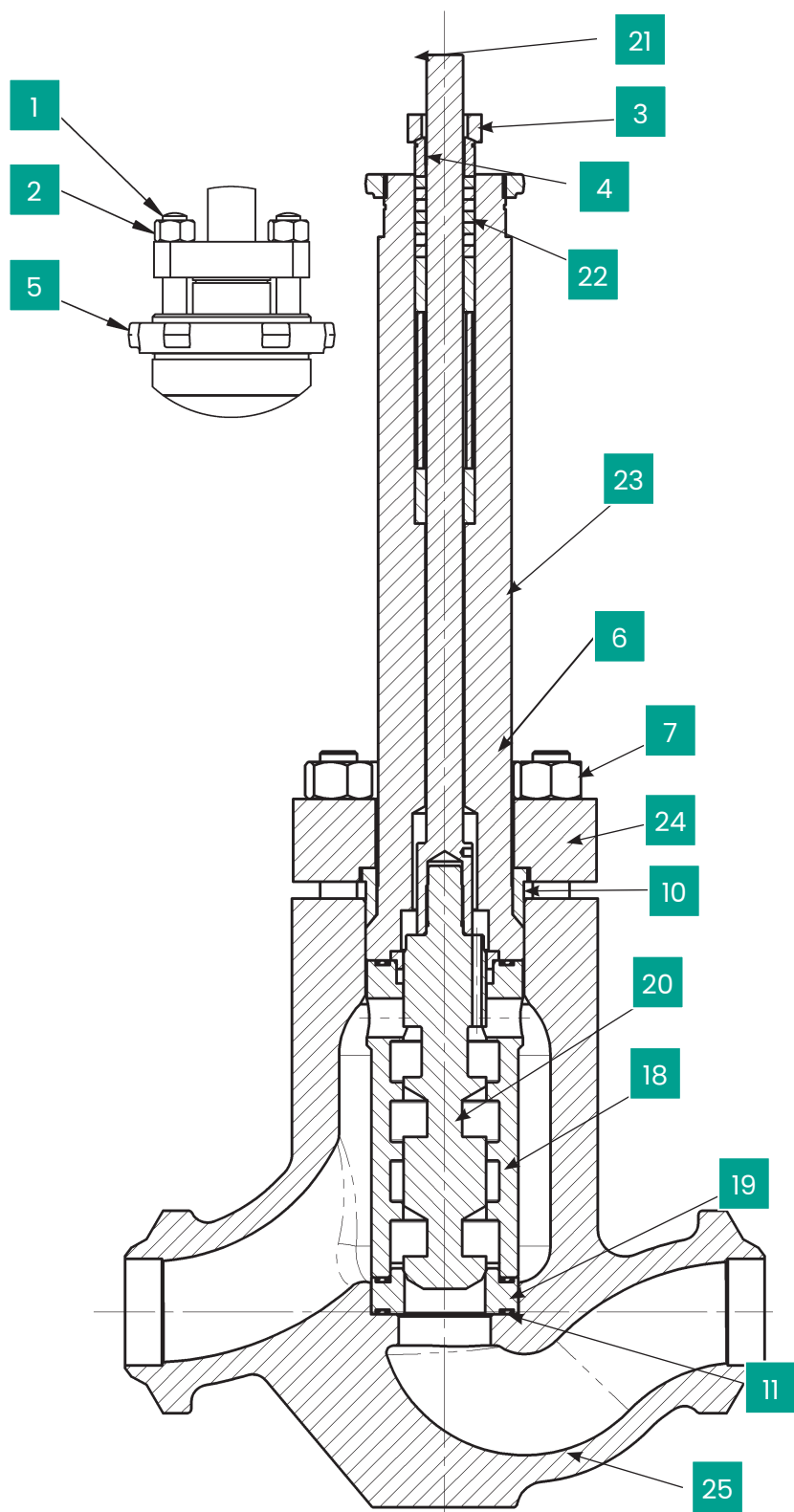


Review use of optional materials and configurations for temperature ranges indicated. Standard materials listed may still be applicable depending on specific service conditions. Consult Baker Hughes for appropriate material combinations.



# Materials of Construction

## Cryogenic Service Configuration



**3" to 8" Size Unbalanced Trim Detail**

# Materials of Construction

## Cryogenic Service Configuration 18400/78400 Series Anti-Cavitation Control Valve Valve Sizes 1" to 1.5" (DN 25 and 40)

| Ref. No. | Description              | Standard Materials                                                        |
|----------|--------------------------|---------------------------------------------------------------------------|
| 1        | Packing Flange Stud      | 304 Stainless Steel ASTM A193 Gr B8 Class 2                               |
| 2        | Packing Flange Nut       | 304 Stainless Steel ASTM A194 Gr 8                                        |
| 3        | Packing Flange           | Austenitic 300 Series Stainless Steel                                     |
| 4        | Packing Follower         | Austenitic 300 Series Stainless Steel                                     |
| 5        | Drive Nut                | Carbon Steel SAE 1117 or ASTM A216 Gr WCC with ENP                        |
| 6        | Valve Body Stud          | 304 Stainless Steel ASTM A193 Gr B8 Class 2                               |
| 7        | Valve Body Nut           | 304 Stainless Steel ASTM A194 Gr 8                                        |
| 10       | Body Gasket              | 316L St. St. w/ Flexible Graphite Filler (Spiral Wound)                   |
| 11       | Seat Ring Gasket         | 316L St. St. w/ Flexible Graphite Filler (Spiral Wound)                   |
| 12       | Plug Pin (Not Shown)     | Austenitic 300 Series Stainless Steel                                     |
| 18       | Liner with Integral Seat | 316 Stainless Steel ASTM A479 TY 316 with Chrome-Plate and Hardfaced Seat |
| 20       | Plug                     | 316 Stainless Steel ASTM A479 TY 316 with Hardfacing                      |
|          |                          | Nitronic 50 with Hardfaced Seat                                           |
| 21       | Plug Stem                | 316 Stainless Steel ASTM A479 TY 316                                      |
|          |                          | Inconel X-750 ASTM B637 Gr 688                                            |
| 22       | Packing                  | Teflon V-Ring                                                             |
| 23       | Valve Bonnet             | 316 Stainless Steel ASTM A351 Gr CF8M                                     |
| 25       | Valve Body               | 316 Stainless Steel ASTM A351 Gr CF8M                                     |

## Valve Sizes 2" to 8" (DN 50 and 400)

| Ref. No. | Description                    | Standard Materials                                       |
|----------|--------------------------------|----------------------------------------------------------|
| 1        | Packing Flange Stud            | 304 Stainless Steel ASTM A193 Gr B8 Class 2              |
| 2        | Packing Flange Nut             | 304 Stainless Steel ASTM A194 Gr 8                       |
| 3        | Packing Flange                 | Austenitic 300 Series Stainless Steel                    |
| 4        | Packing Follower               | Austenitic 300 Series Stainless Steel                    |
| 5        | Drive Nut                      | Carbon Steel SAE 1117 or ASTM A216 Gr WCC with ENP       |
| 6        | Valve Body Stud                | 304 Stainless Steel ASTM A193 Gr B8 Class 2              |
| 7        | Valve Body Nut                 | 304 Stainless Steel ASTM A194 Gr 8                       |
| 10       | Body Gasket (2" Size)          | 316L St. St. w/ Flexible Graphite Filler (Spiral Wound)  |
|          | Metal Seal (3" to 8" Sizes)    | A286 Super Alloy ASTM A638 Gr 660                        |
| 11       | Seat Ring Gasket               | 316L St. St. w/ Flexible Graphite Filler (Spiral Wound)  |
| 12       | Plug Pin (Not Shown)           | Austenitic 300 Series Stainless Steel                    |
| 18       | Liner                          | 316 Stainless Steel ASTM A479 TY 316 with Chrome-Plate   |
| 19       | Seat Ring                      | 316 Stainless Steel ASTM A479 TY 316 with Hardfaced Seat |
| 20       | Plug                           | 316 Stainless Steel ASTM A479 TY 316 with Hardfacing     |
|          |                                | Nitronic 50 with Hardfaced Seat                          |
| 21       | Plug Stem                      | 316 Stainless Steel ASTM A479 TY 316                     |
|          |                                | Inconel X-750 ASTM B637 Gr 688                           |
| 22       | Packing                        | Teflon V-Ring                                            |
| 23       | Valve Bonnet                   | 316 Stainless Steel ASTM A351 Gr CF8M                    |
| 24       | Bonnet Flange (3" to 8" Sizes) | 316 Stainless Steel ASTM A351 Gr CF8M                    |
| 25       | Valve Body                     | 316 Stainless Steel ASTM A351 Gr CF8M                    |

1. Materials focused for cryogenic LNG applications (-196°C). Consult factory for suitability in other cryogenic applications.
2. Consult factory for NACE applications.
3. Trim offerings limited to unbalanced designs.
4. Consult factory for proper actuator sizing to provide correct valve shut-off.
5. JIS and EN equivalents available.

# Materials of Construction

## 78400/18400 Series Optional Materials

| Ref. No. | Temperature Range              | -20°F                                                            | 450°F | 600°F |
|----------|--------------------------------|------------------------------------------------------------------|-------|-------|
|          | Description                    | Standard Materials                                               |       |       |
| 19       | Soft Seat S/A (2" to 8" Sizes) | See Below                                                        |       |       |
| 19A      | Seat Ring                      | Standard - 17-4 PH St. St. ASTM A564 GR 630 Cond. H1075          |       |       |
|          |                                | NACE - 17-4 PH St. St. ASTM A564 GR 630 Cond. H1150M             |       |       |
| 19B      | Soft Seat Insert               | Glass Reinforced PTFE (Fluorogold™)                              |       |       |
| 19C      | Sliding Collar                 | Standard - 17-4 PH St. St. ASTM A564 GR 630 Cond. H1075          |       |       |
|          |                                | NACE - 17-4 PH St. St. ASTM A564 GR 630 Cond. H1150M             |       |       |
| 20       | Plug <sup>2</sup>              | 440B or 440C St. St. ASTM A276                                   |       |       |
| 22       | Packing <sup>3</sup>           | Low-E Packing <sup>4</sup>                                       |       |       |
|          |                                | PTFE with Carbon Fiber                                           |       |       |
|          |                                | Flexible Graphite                                                |       |       |
| 23       | Valve Bonnet <sup>5</sup>      | 316 St. St. ASTM A351 GR CF8M                                    |       |       |
|          |                                | Chrome-Moly Steel ASTM A217 GR WC9                               |       |       |
| 25       | Valve Body <sup>5</sup>        | 316 St. St. ASTM A351 GR CF8M or ASTM A182 GR F316 (Forging)     |       |       |
|          |                                | Chrome-Moly Steel ASTM A217 GR WC9 or ASTM A182 GR F22 (Forging) |       |       |
| Ref. No. | Temperature Range              | -29°C                                                            | 232°C | 316°C |

1. Consult Baker Hughes for material combinations for temperatures below -20°F (-29°C) or above 600°F (316°C).
2. Optional plug designs using hardened 440B or 440C requires stems with male threads and plugs with female threads.
3. Teflon-based packing can also be applied up to 600°F (316°C) with an extension bonnet.
4. Low-E Packing for low emissions applications is limited to maximum operating pressure of 1500 psig (104 bar).
5. Consult factory for trim material requirements for 316 St. St. body and bonnet assemblies relative to application service conditions.

 Review use of optional materials and configurations for temperature ranges indicated. Standard materials listed may still be applicable depending on specific service conditions. Consult Baker Hughes for appropriate material combinations.

## Other Optional Materials<sup>1</sup>

| Ref. No. | Temperature Range                              | -20°F                                       | 600°F |
|----------|------------------------------------------------|---------------------------------------------|-------|
|          | Description                                    | Optional Materials                          |       |
| 18       | Liner <sup>2</sup> or Liner with Integral Seat | Ferralium™ 255 ASTM A479 Duplex St. Steel   |       |
|          |                                                | 316 St. St. ASTM A479 TY316 with Boronizing |       |
|          |                                                | 410 St. St. ASTM A479 TY410 with Boronizing |       |
| 19       | Seat Ring <sup>3</sup>                         | Ferralium 255 ASTM A479 Duplex St. Steel    |       |
|          |                                                | 316 St. St. ASTM A479 TY316 with Boronizing |       |
|          |                                                | 410 St. St. ASTM A479 TY410 with Boronizing |       |
| 20       | Plug <sup>4</sup>                              | Inconel 718 ASTM B637 GR 7178               |       |
|          |                                                | 316 St. St. ASTM A479 TY316 with Boronizing |       |
|          |                                                | 410 St. St. ASTM A479 TY410 with Boronizing |       |
| 21       | Stem                                           | Nitronic 50 ASTM A479 TY XM-19              |       |
| Ref. No. | Temperature Range                              | -29°C                                       | 316°C |

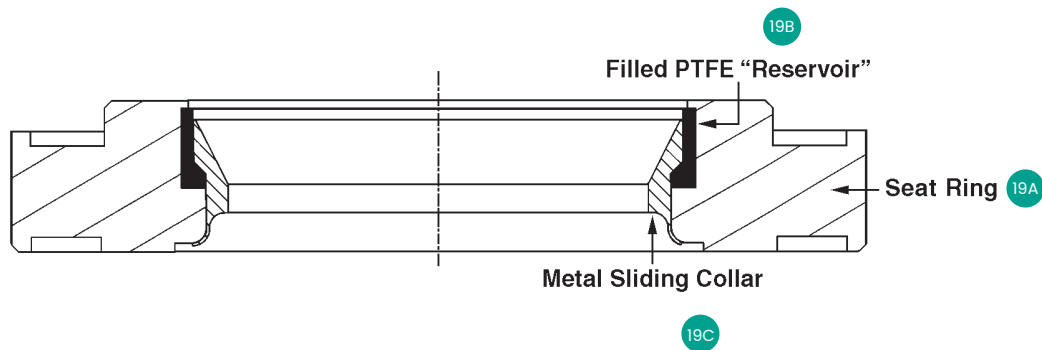
1. Listed are typical optional materials for refining applications, including sour water letdown, cold high-pressure liquid letdown, and amine service.
2. Material noted is recommended for the separate liner (2" to 8" sizes) or the liner with integral seat ring (1" and 1.5" sizes).
3. The standard 316 St. St. hard-faced seat ring can be applied in most of the refining applications noted except for amine service. Ferralium 255 is recommended for the separate seat ring in amine service.
4. Some material combinations may require electroless nickel or hard chrome plating to prevent galling. Consult factory for specific requirements.

# Soft seat design

The LincolnLog is available with an optional soft seat design in valve sizes 2" to 8" (DN 50 to DN 200) providing bubble tight Class VI shutoff seat leakage. This soft seat design includes a patented sliding metal collar feature as shown below.

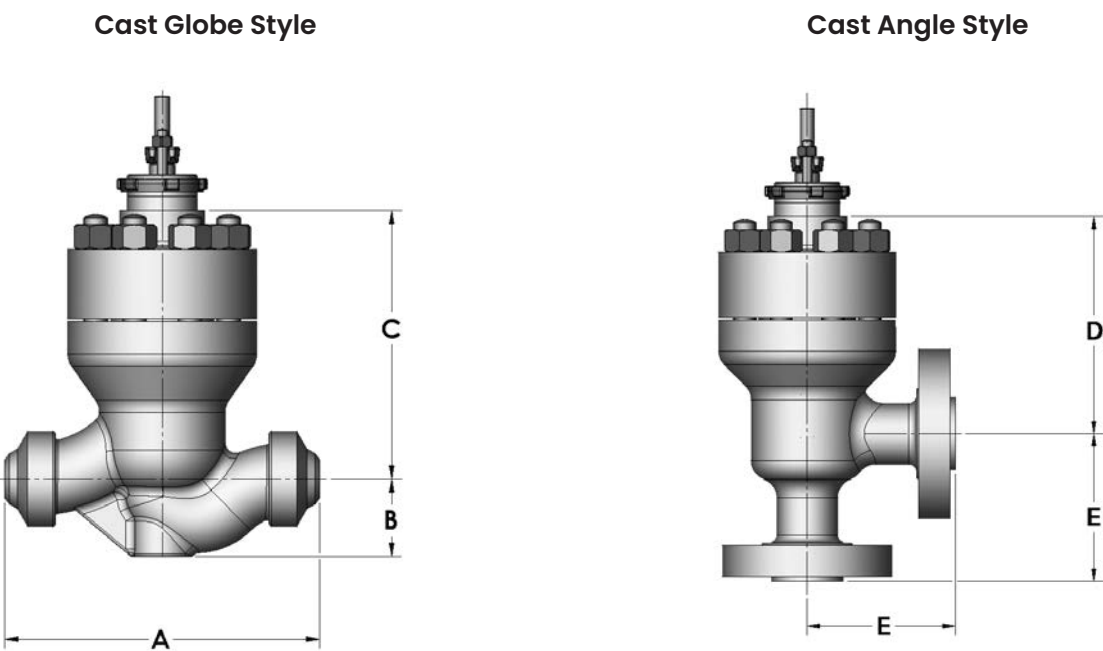
The metal collar holds the PTFE soft seat element in place and prevents it from extruding out during operation. Fluid pressure acts to push the collar up to protect the

elastomer seat as the valve is throttling. As the valve plug returns to the closed position, it moves the metal collar down to expose the filled PTFE "Reservoir" creating the soft seat interface. Combined with the LincolnLog trim overlap feature, the soft seat design will provide long-term dependable tight shutoff with minimal maintenance. The filled PTFE "Reservoir" will also compensate for any potential wear in the seating surfaces.



**Soft Seat Option**

# Dimensions (inches)



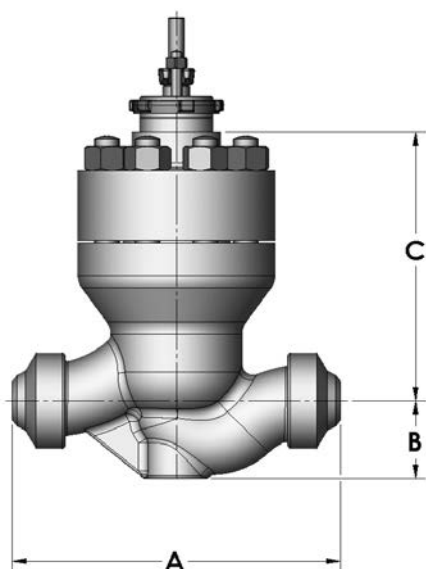
18400/78400 Series Cast Body Dimensions (inches)  
ASME Class 600 through 2500 and equivalent PN

| Valve Size<br>(inches) | A                  |          |                 |          |                 |          |                |       |                |       |                 |       |                 |       |
|------------------------|--------------------|----------|-----------------|----------|-----------------|----------|----------------|-------|----------------|-------|-----------------|-------|-----------------|-------|
|                        | ASME Class 600-900 |          | ASME Class 1500 |          | ASME Class 2500 |          | ASME Class 600 |       | ASME Class 900 |       | ASME Class 1500 |       | ASME Class 2500 |       |
|                        | BW                 | SW & THD | BW              | SW & THD | BW              | SW & THD | RF             | RTJ   | RF             | RTJ   | RF              | RTJ   | RF              | RTJ   |
| 1                      | 7.75               | 7.75     | 7.75            | 7.75     | 8.50            | 8.50     | 11.50          | 11.50 | 11.50          | 11.50 | 11.50           | 11.50 | 12.12           | 12.12 |
| 1.5                    | 9.25               | 9.25     | 9.25            | 9.25     | 10.25           | 10.25    | 12.25          | 12.25 | 12.25          | 12.25 | 12.25           | 12.25 | 14.12           | 14.12 |
| 2                      | 14.75              | 14.75    | 14.75           | 14.75    | 14.75           | 14.75    | 14.75          | 14.87 | 14.75          | 14.87 | 14.75           | 14.87 | 16.25           | 16.37 |
| 3                      | 17.38              |          | 18.12           |          | 19.62           |          | 17.38          | 17.50 | 17.38          | 17.50 | 18.12           | 18.24 | 19.62           | 19.75 |
| 4                      | 20.12              |          | 20.87           |          | 22.62           |          | 20.12          | 20.25 | 20.12          | 20.25 | 20.87           | 21.00 | 29.00           | 29.38 |
| 6                      | 30.25              |          | 30.25           |          | 32.25           |          | 30.25          | 30.37 | 30.25          | 30.37 | 30.25           | 30.62 | 32.25           | 32.75 |
| 8                      | 32.75              |          | 32.75           |          | 40.25           |          | 36.00          | 36.12 | 36.00          | 36.12 | 38.25           | 38.62 | 40.25           | 40.87 |

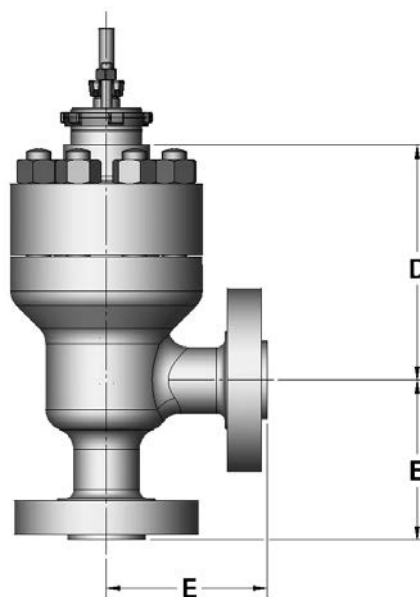
| Valve Size<br>(inches) | B                   |          |                 |          |                |                |                 |                 |
|------------------------|---------------------|----------|-----------------|----------|----------------|----------------|-----------------|-----------------|
|                        | ASME Class 600-1500 |          | ASME Class 2500 |          | ASME Class 600 | ASME Class 900 | ASME Class 1500 | ASME Class 2500 |
|                        | BW                  | SW & THD | BW              | SW & THD | RF & RTJ       | RF & RTJ       | RF & RTJ        | RF & RTJ        |
| 1                      | 1.97                | 1.97     | 1.97            | 1.97     | 2.44           | 2.94           | 2.94            | 3.13            |
| 1.5                    | 2.62                | 2.62     | 2.62            | 2.62     | 3.06           | 3.50           | 3.50            | 4.00            |
| 2                      | 3.64                | 3.64     | 3.64            | 3.64     | 3.25           | 4.25           | 4.25            | 4.63            |
| 3                      | 5.31                |          | 5.37            |          | 4.13           | 4.75           | 5.25            | 6.00            |
| 4                      | 6.28                |          | 7.07            |          | 5.37           | 5.75           | 6.12            | 7.00            |
| 6                      | 8.94                |          | 8.94            |          | 7.00           | 7.50           | 7.75            | 9.50            |
| 8                      | 10.63               |          | 10.63           |          | 8.25           | 9.25           | 9.50            | 10.87           |

# Dimensions (inches)

**Cast Globe Style**



**Cast Angle Style**



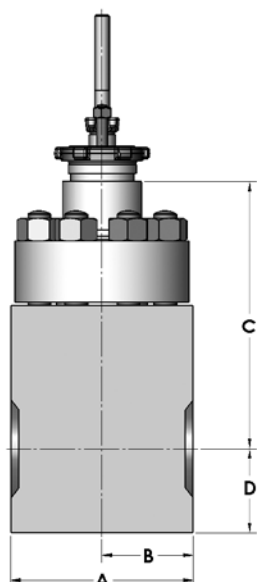
**18400/78400 Series Cast Body Dimensions (inches)**  
**ASME Class 600 through 2500 and equivalent PN**

| Valve Size<br>(inches) | C                   |         |                     |         | D                   |         |                     |         |
|------------------------|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|---------|
|                        | Standard Bonnet     |         | Extension Bonnet    |         | Standard Bonnet     |         | Extension Bonnet    |         |
|                        | ASME Class 600-2500 |         | ASME Class 600-2500 |         | ASME Class 600-2500 |         | ASME Class 600-2500 |         |
|                        | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage |
| 1                      | 8.50                | 9.88    | 12.52               | 13.90   | 7.13                | 8.50    | 11.14               | 12.52   |
| 1.5                    | 8.44                | 9.82    | 12.46               | 13.83   | 7.13                | 8.50    | 11.14               | 12.52   |
| 2                      | 12.56               | 14.69   | 17.70               | 19.82   | 10.85               | 12.98   | 15.98               | 18.11   |
| 3                      | 16.62               | 19.86   | 22.30               | 25.55   | 14.11               | 17.36   | 19.79               | 23.05   |
| 4                      | 19.69               | 23.70   | 24.63               | 28.63   | 15.94               | 19.94   | 20.88               | 24.88   |
| 6                      | 25.48               | 30.98   | 29.48               | 34.98   | 19.91               | 25.41   | 23.91               | 29.41   |
| 8                      | 30.17               | 36.52   | 33.69               | 40.03   | 23.88               | 30.22   | 27.39               | 33.74   |

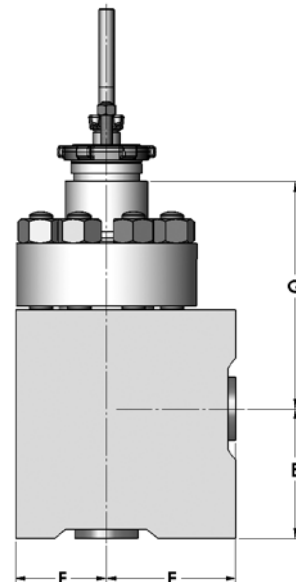
| Valve Size<br>(inches) | E                  |          |                 |          |                 |          |                |       |                |       |                 |       |                 |       |
|------------------------|--------------------|----------|-----------------|----------|-----------------|----------|----------------|-------|----------------|-------|-----------------|-------|-----------------|-------|
|                        | ASME Class 600-900 |          | ASME Class 1500 |          | ASME Class 2500 |          | ASME Class 600 |       | ASME Class 900 |       | ASME Class 1500 |       | ASME Class 2500 |       |
|                        | BW                 | SW & THD | BW              | SW & THD | BW              | SW & THD | RF             | RTJ   | RF             | RTJ   | RF              | RTJ   | RF              | RTJ   |
| 1                      | 3.87               | 3.87     | 3.87            | 3.87     | 4.25            | 4.25     | 5.75           | 5.75  | 5.75           | 5.75  | 5.75            | 5.75  | 6.06            | 6.06  |
| 1.5                    | 4.63               | 4.63     | 4.63            | 4.63     | 5.13            | 5.13     | 6.13           | 6.13  | 6.13           | 6.13  | 6.13            | 6.13  | 7.06            | 7.12  |
| 2                      | 7.38               | 7.38     | 7.38            | 7.38     | 7.38            | 7.38     | 7.38           | 7.44  | 7.38           | 7.44  | 7.38            | 7.44  | 8.13            | 8.19  |
| 3                      | 8.69               |          | 9.06            |          | 9.81            |          | 8.69           | 8.75  | 8.69           | 8.75  | 9.06            | 9.12  | 9.81            | 9.87  |
| 4                      | 10.06              |          | 10.44           |          | 11.31           |          | 10.06          | 10.13 | 10.06          | 10.13 | 10.44           | 10.50 | 14.50           | 14.68 |
| 6                      | 15.13              |          | 15.13           |          | 16.13           |          | 15.13          | 15.19 | 15.13          | 15.19 | 15.13           | 15.31 | 16.13           | 16.37 |
| 8                      | 16.37              |          | 16.37           |          | 20.13           |          | 18.00          | 18.06 | 18.00          | 18.06 | 19.13           | 19.31 | 20.13           | 20.44 |

# Dimensions (inches)

**Forged Globe Style**



**Forged Angle Style**



**18400F Series Forged Globe Style Body Dimensions (inches)**  
ASME Class 600 through 2500 and equivalent PN

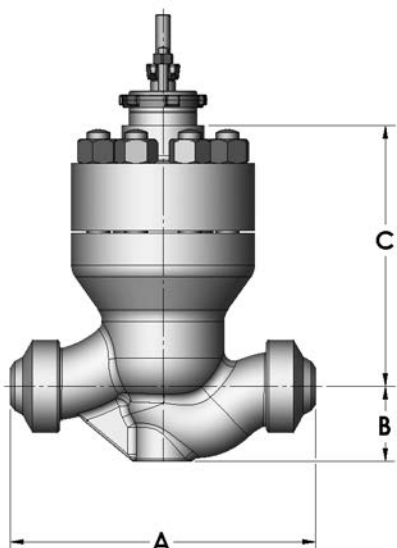
| Valve Size<br>(inches) | A                   |          | B                   |          | C               |         |                  |         | D                   |          |
|------------------------|---------------------|----------|---------------------|----------|-----------------|---------|------------------|---------|---------------------|----------|
|                        | ASME Class 600-2500 |          | ASME Class 600-2500 |          | Standard Bonnet |         | Extension Bonnet |         | ASME Class 600-2500 |          |
|                        | RF, RTJ & BW        | SW & THD | RF, RTJ & BW        | SW & THD | 3 & 4 STAGE     | 6 STAGE | 3 & 4 STAGE      | 6 STAGE | RF, RTJ & BW        | SW & THD |
| 1                      | 6.00                | 6.00     | 3.00                | 3.00     | 8.82            | 10.20   | 11.26            | 14.22   | 2.78                | 2.78     |
| 1.5                    | 8.50                | 8.50     | 4.25                | 4.25     | 9.61            | 10.98   | 13.62            | 15.00   | 3.49                | 3.49     |
| 2                      | 10.00               | 10.00    | 5.00                | 5.00     | 13.43           | 15.55   | 18.56            | 20.69   | 3.76                | 3.76     |
| 3                      | 13.50               |          | 6.75                |          | 18.18           | 21.43   | 23.85            | 27.10   | 5.59                |          |
| 4                      | 18.00               |          | 9.00                |          | 21.70           | 25.70   | 26.63            | 30.64   | 6.25                |          |
| 6                      | 24.00               |          | 12.00               |          | 28.87           | 34.37   | 32.86            | 38.36   | 8.73                |          |
| 8                      | 36.00               |          | 18.00               |          | 33.67           | 40.02   | 37.19            | 43.53   | 10.50               |          |

**78400F Series Forged Angle Style Body Dimensions (inches)**  
ASME Class 600 through 2500 and equivalent PN

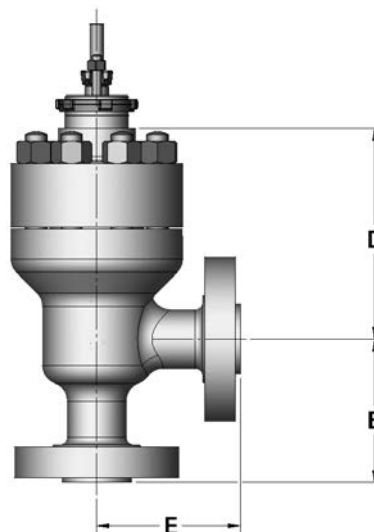
| Valve Size<br>(inches) | E                   |          | F                   |          | G               |         |                  |         |
|------------------------|---------------------|----------|---------------------|----------|-----------------|---------|------------------|---------|
|                        | ASME Class 600-2500 |          | ASME Class 600-2500 |          | Standard Bonnet |         | Extension Bonnet |         |
|                        | RF, RTJ & BW        | SW & THD | RF, RTJ & BW        | SW & THD | 3 & 4 STAGE     | 6 STAGE | 3 & 4 STAGE      | 6 STAGE |
| 1                      | 4.12                | 4.12     | 2.89                | 2.89     | 7.24            | 8.62    | 11.26            | 12.63   |
| 1.5                    | 4.94                | 4.94     | 3.56                | 3.56     | 7.15            | 8.53    | 11.17            | 12.55   |
| 2                      | 5.75                | 5.75     | 4.49                | 4.49     | 10.61           | 12.36   | 15.57            | 17.50   |
| 3                      | 7.50                |          | 53.50               |          | 13.61           | 16.88   | 19.32            | 22.59   |
| 4                      | 9.00                |          | 6.50                |          | 15.95           | 19.95   | 20.89            | 24.89   |
| 6                      | 12.00               |          | 8.50                |          | 18.60           | 24.11   | 22.59            | 28.11   |
| 8                      | 14.00               |          | 10.25               |          | 24.70           | 31.04   | 28.22            | 34.56   |

# Dimensions (mm)

**Cast Globe Style**



**Cast Angle Style**



## 18400/78400 Series Cast Body Dimensions (mm) ASME Class 600 through 2500 and equivalent PN

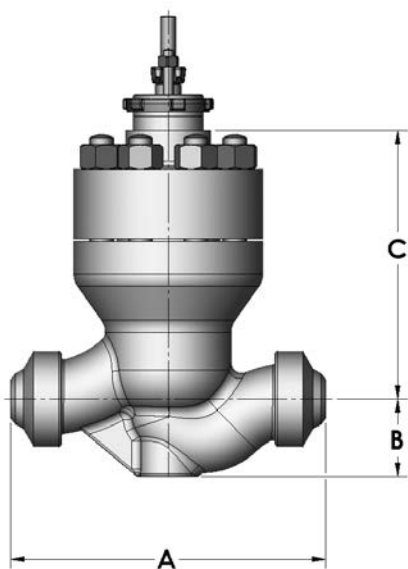
| Valve Size<br>(inches) | A                  |          |     |          |                 |          |     |     |                |     |                 |     |                 |      |
|------------------------|--------------------|----------|-----|----------|-----------------|----------|-----|-----|----------------|-----|-----------------|-----|-----------------|------|
|                        | ASME Class 600-900 |          |     |          | ASME Class 2500 |          |     |     | ASME Class 900 |     | ASME Class 1500 |     | ASME Class 2500 |      |
|                        | BW                 | SW & THD | BW  | SW & THD | BW              | SW & THD | RF  | RTJ | RF             | RTJ | RF              | RTJ | RF              | RTJ  |
| 1                      | 197                | 197      | 197 | 197      | 216             | 216      | 292 | 292 | 292            | 292 | 292             | 292 | 308             | 308  |
| 1.5                    | 235                | 235      | 235 | 235      | 260             | 260      | 311 | 311 | 311            | 311 | 311             | 311 | 359             | 359  |
| 2                      | 375                | 375      | 375 | 375      | 375             | 375      | 375 | 378 | 375            | 378 | 375             | 378 | 413             | 416  |
| 3                      | 441                |          | 460 |          | 498             |          | 441 | 455 | 441            | 445 | 460             | 463 | 498             | 502  |
| 4                      | 511                |          | 530 |          | 575             |          | 511 | 514 | 511            | 514 | 530             | 533 | 737             | 746  |
| 6                      | 768                |          | 769 |          | 819             |          | 768 | 771 | 768            | 771 | 768             | 778 | 819             | 832  |
| 8                      | 832                |          | 832 |          | 1022            |          | 914 | 917 | 914            | 917 | 972             | 981 | 1022            | 1038 |

| Valve Size<br>(inches) | B                   |          |                     |          |                |                |                 |                 |
|------------------------|---------------------|----------|---------------------|----------|----------------|----------------|-----------------|-----------------|
|                        | ASME Class 600-2500 |          | ASME Class 600-2500 |          | ASME Class 600 | ASME Class 900 | ASME Class 1500 | ASME Class 2500 |
|                        | BW                  | SW & THD | BW                  | SW & THD | RF & RTJ       | RF & RTJ       | RF & RTJ        | RF & RTJ        |
| 1                      | 50                  | 50       | 50                  | 50       | 62             | 75             | 75              | 80              |
| 1.5                    | 67                  | 67       | 67                  | 67       | 78             | 89             | 89              | 102             |
| 2                      | 92                  | 92       | 92                  | 92       | 83             | 108            | 108             | 118             |
| 3                      | 135                 |          | 136                 |          | 105            | 121            | 133             | 152             |
| 4                      | 160                 |          | 180                 |          | 136            | 146            | 155             | 178             |
| 6                      | 227                 |          | 227                 |          | 178            | 191            | 197             | 241             |
| 8                      | 270                 |          | 270                 |          | 210            | 235            | 241             | 276             |

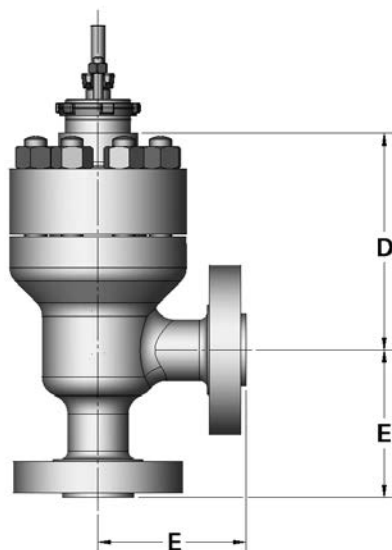


# Dimensions (mm)

Cast Globe Style



Cast Angle Style



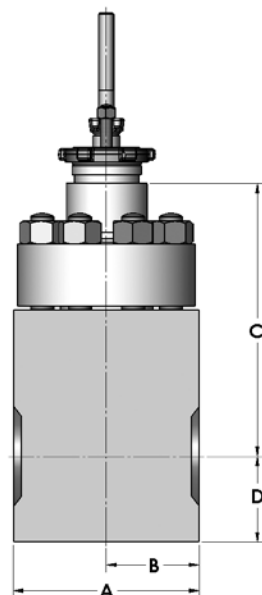
18400/78400 Series Cast Body Dimensions (mm)  
ASME Class 600 through 2500 and equivalent PN

| Valve Size<br>(inches) | C                   |         |                     |         | D                   |         |                     |         |
|------------------------|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|---------|
|                        | Standard Bonnet     |         | Extension Bonnet    |         | Standard Bonnet     |         | Extension Bonnet    |         |
|                        | ASME Class 600-2500 |         | ASME Class 600-2500 |         | ASME Class 600-2500 |         | ASME Class 600-2500 |         |
|                        | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage |
| 1                      | 216                 | 251     | 318                 | 353     | 181                 | 216     | 283                 | 318     |
| 1.5                    | 214                 | 249     | 316                 | 351     | 181                 | 216     | 283                 | 318     |
| 2                      | 319                 | 373     | 450                 | 503     | 276                 | 330     | 406                 | 460     |
| 3                      | 422                 | 504     | 566                 | 649     | 358                 | 441     | 503                 | 585     |
| 4                      | 500                 | 602     | 626                 | 727     | 405                 | 506     | 530                 | 632     |
| 6                      | 647                 | 787     | 749                 | 888     | 506                 | 645     | 607                 | 747     |
| 8                      | 766                 | 928     | 856                 | 1017    | 607                 | 768     | 696                 | 857     |

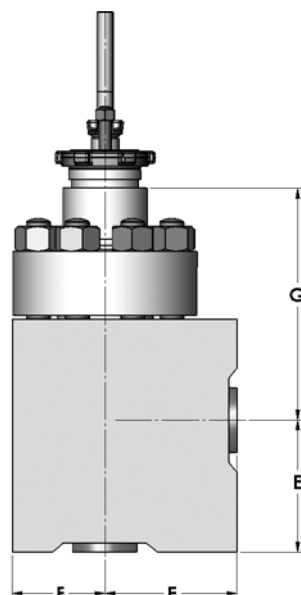
| Valve Size<br>(inches) | E                  |          |                 |          |                 |          |                |     |                |     |                 |     |                 |     |
|------------------------|--------------------|----------|-----------------|----------|-----------------|----------|----------------|-----|----------------|-----|-----------------|-----|-----------------|-----|
|                        | ASME Class 600-900 |          | ASME Class 1500 |          | ASME Class 2500 |          | ASME Class 600 |     | ASME Class 900 |     | ASME Class 1500 |     | ASME Class 2500 |     |
|                        | BW                 | SW & THD | BW              | SW & THD | BW              | SW & THD | RF             | RTJ | RF             | RTJ | RF              | RTJ | RF              | RTJ |
| 1                      | 98                 | 98       | 98              | 98       | 108             | 108      | 146            | 146 | 146            | 146 | 146             | 146 | 154             | 154 |
| 1.5                    | 118                | 118      | 118             | 118      | 130             | 130      | 156            | 156 | 156            | 156 | 156             | 156 | 179             | 181 |
| 2                      | 187                | 187      | 187             | 187      | 187             | 187      | 187            | 189 | 187            | 189 | 187             | 189 | 207             | 208 |
| 3                      | 221                |          | 230             |          | 249             |          | 221            | 222 | 221            | 222 | 230             | 232 | 249             | 251 |
| 4                      | 256                |          | 265             |          | 287             |          | 256            | 257 | 256            | 257 | 265             | 267 | 368             | 373 |
| 6                      | 384                |          | 384             |          | 410             |          | 384            | 386 | 384            | 386 | 384             | 389 | 410             | 416 |
| 8                      | 416                |          | 416             |          | 511             |          | 457            | 459 | 457            | 459 | 486             | 490 | 511             | 519 |

# Dimensions (mm)

**Forged Globe Style**



**Forged Angle Style**



**18400F Series Forged Globe Style Body Dimensions (mm)**  
ASME Class 600 through 2500 and equivalent PN

| Valve Size<br>(inches) | A                   |          | B                   |          | C               |         |                  |         | D                   |          |
|------------------------|---------------------|----------|---------------------|----------|-----------------|---------|------------------|---------|---------------------|----------|
|                        | ASME Class 600-2500 |          | ASME Class 600-2500 |          | Standard Bonnet |         | Extension Bonnet |         | ASME Class 600-2500 |          |
|                        | RF, RTJ & BW        | SW & THD | RF, RTJ & BW        | SW & THD | 3 & 4 STAGE     | 6 STAGE | 3 & 4 STAGE      | 6 STAGE | RF, RTJ & BW        | SW & THD |
| 1                      | 152                 | 152      | 76                  | 76       | 224             | 259     | 286              | 361     | 71                  | 71       |
| 1.5                    | 216                 | 216      | 108                 | 108      | 244             | 279     | 346              | 381     | 89                  | 89       |
| 2                      | 254                 | 254      | 127                 | 127      | 341             | 395     | 471              | 526     | 96                  | 96       |
| 3                      | 343                 |          | 171                 |          | 462             | 544     | 606              | 688     | 142                 |          |
| 4                      | 457                 |          | 229                 |          | 551             | 653     | 676              | 778     | 159                 |          |
| 6                      | 610                 |          | 305                 |          | 733             | 873     | 835              | 974     | 222                 |          |
| 8                      | 914                 |          | 457                 |          | 855             | 1017    | 945              | 1106    | 267                 |          |

**78400F Series Forged Angle Style Body Dimensions (mm)**  
ASME Class 600 through 2500 and equivalent PN

| Valve Size<br>(inches) | E                   |          | F                   |          | G               |         |                  |         |
|------------------------|---------------------|----------|---------------------|----------|-----------------|---------|------------------|---------|
|                        | ASME Class 600-2500 |          | ASME Class 600-2500 |          | Standard Bonnet |         | Extension Bonnet |         |
|                        | RF, RTJ & BW        | SW & THD | RF, RTJ & BW        | SW & THD | 3 & 4 STAGE     | 6 STAGE | 3 & 4 STAGE      | 6 STAGE |
| 1                      | 105                 | 105      | 73                  | 73       | 184             | 219     | 286              | 321     |
| 1.5                    | 125                 | 125      | 90                  | 90       | 182             | 217     | 284              | 319     |
| 2                      | 146                 | 146      | 114                 | 114      | 269             | 314     | 395              | 445     |
| 3                      | 191                 |          | 140                 |          | 346             | 429     | 491              | 574     |
| 4                      | 229                 |          | 165                 |          | 405             | 507     | 531              | 632     |
| 6                      | 305                 |          | 216                 |          | 472             | 612     | 574              | 714     |
| 8                      | 356                 |          | 260                 |          | 627             | 788     | 717              | 878     |

# Weights (lbs)

## 18400 Series Cast Globe Body S/A with Standard Bonnet (lbs)

| Valve Size<br>(inches) | 3 & 4 Stage Design     |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 44                     | 45       | 46              | 46       | 52                | 61                | 61                 | 68                 |
| 1.5                    | 47                     | 48       | 51              | 52       | 62                | 73                | 73                 | 97                 |
| 2                      | 167                    | 169      | 182             | 185      | 179               | 206               | 206                | 242                |
| 3                      | 244                    |          | 293             |          | 264               | 284               | 311                | 420                |
| 4                      | 440                    |          | 565             |          | 481               | 500               | 534                | 804                |
| 6                      | 1104                   |          | 1275            |          | 1215              | 1262              | 1332               | 1794               |
| 8                      | 2204                   |          | 2745            |          | 2401              | 2501              | 2661               | 3490               |

| Valve Size<br>(inches) | 6 Stage Design         |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 47                     | 47       | 48              | 48       | 55                | 64                | 64                 | 70                 |
| 1.5                    | 51                     | 52       | 55              | 55       | 65                | 76                | 76                 | 101                |
| 2                      | 176                    | 178      | 194             | 197      | 189               | 214               | 216                | 254                |
| 3                      | 278                    |          | 331             |          | 298               | 320               | 345                | 457                |
| 4                      | 499                    |          | 631             |          | 541               | 559               | 594                | 866                |
| 6                      | 1287                   |          | 1518            |          | 1398              | 1445              | 1514               | 2036               |
| 8                      | 2513                   |          | 3206            |          | 2714              | 2813              | 2966               | 3950               |

## 18400 Series Cast Globe Body S/A with Extension Bonnet (lbs)

| Valve Size<br>(inches) | 3 & 4 Stage Design     |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 50                     | 51       | 52              | 52       | 59                | 67                | 67                 | 74                 |
| 1.5                    | 53                     | 54       | 57              | 57       | 68                | 78                | 78                 | 103                |
| 2                      | 185                    | 186      | 198             | 203      | 197               | 223               | 223                | 260                |
| 3                      | 258                    |          | 307             |          | 278               | 298               | 325                | 434                |
| 4                      | 461                    |          | 585             |          | 503               | 521               | 556                | 825                |
| 6                      | 1137                   |          | 1307            |          | 1249              | 1296              | 1365               | 1828               |
| 8                      | 2275                   |          | 2815            |          | 2473              | 2572              | 2732               | 3560               |

| Valve Size<br>(inches) | 6 Stage Design         |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 52                     | 53       | 54              | 54       | 61                | 70                | 70                 | 76                 |
| 1.5                    | 57                     | 57       | 61              | 61       | 71                | 82                | 82                 | 107                |
| 2                      | 194                    | 196      | 210             | 215      | 207               | 232               | 232                | 271                |
| 3                      | 292                    |          | 343             |          | 312               | 334               | 359                | 472                |
| 4                      | 525                    |          | 651             |          | 566               | 585               | 619                | 892                |
| 6                      | 1320                   |          | 1550            |          | 1431              | 1478              | 1548               | 2070               |
| 8                      | 2584                   |          | 3278            |          | 2785              | 2884              | 3036               | 4020               |

# Weights (lbs)

## 78400 Series Cast Angle Body S/A with Standard Bonnet (lbs)

| Valve Size<br>(inches) | 3 & 4 Stage Design     |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 42                     | 44       | 43              | 44       | 51                | 60                | 60                 | 66                 |
| 1.5                    | 46                     | 48       | 48              | 49       | 60                | 71                | 71                 | 94                 |
| 2                      | 159                    | 164      | 172             | 176      | 172               | 197               | 198                | 233                |
| 3                      | 230                    |          | 272             |          | 250               | 269               | 297                | 405                |
| 4                      | 421                    |          | 457             |          | 462               | 481               | 516                | 750                |
| 6                      | 1029                   |          | 1114            |          | 1140              | 1187              | 1256               | 1691               |
| 8                      | 2070                   |          | 2423            |          | 2271              | 2370              | 2530               | 3354               |

| Valve Size<br>(inches) | 6 Stage Design         |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 45                     | 46       | 46              | 46       | 53                | 62                | 62                 | 69                 |
| 1.5                    | 49                     | 51       | 52              | 52       | 64                | 74                | 74                 | 98                 |
| 2                      | 169                    | 174      | 183             | 187      | 182               | 208               | 208                | 244                |
| 3                      | 264                    |          | 310             |          | 284               | 304               | 331                | 443                |
| 4                      | 481                    |          | 543             |          | 522               | 540               | 576                | 815                |
| 6                      | 1214                   |          | 1355            |          | 1322              | 1369              | 1442               | 1934               |
| 8                      | 2382                   |          | 2882            |          | 2583              | 2682              | 2843               | 3814               |

## 78400 Series Cast Angle Body S/A with Extension Bonnet (lbs)

| Valve Size<br>(inches) | 3 & 4 Stage Design     |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 48                     | 50       | 49              | 50       | 57                | 65                | 65                 | 72                 |
| 1.5                    | 51                     | 53       | 54              | 54       | 66                | 76                | 76                 | 100                |
| 2                      | 177                    | 180      | 190             | 194      | 189               | 215               | 215                | 250                |
| 3                      | 242                    |          | 287             |          | 264               | 284               | 311                | 419                |
| 4                      | 443                    |          | 495             |          | 484               | 502               | 538                | 770                |
| 6                      | 1063                   |          | 1145            |          | 1173              | 1220              | 1290               | 1725               |
| 8                      | 2141                   |          | 2493            |          | 2342              | 2441              | 2601               | 3425               |

| Valve Size<br>(inches) | 6 Stage Design         |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 51                     | 52       | 52              | 52       | 59                | 68                | 68                 | 74                 |
| 1.5                    | 55                     | 56       | 57              | 58       | 69                | 80                | 80                 | 104                |
| 2                      | 187                    | 189      | 201             | 205      | 199               | 225               | 225                | 262                |
| 3                      | 276                    |          | 325             |          | 298               | 318               | 345                | 457                |
| 4                      | 506                    |          | 563             |          | 547               | 565               | 600                | 841                |
| 6                      | 1247                   |          | 1390            |          | 1356              | 1403              | 1475               | 1967               |
| 8                      | 2453                   |          | 2952            |          | 2654              | 2754              | 2914               | 3884               |

# Weights (kg)

## 18400 Series Cast Globe Body S/A with Standard Bonnet (kg)

| Valve Size<br>(inches) | 3 & 4 Stage Design     |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 20                     | 20       | 21              | 21       | 24                | 28                | 28                 | 31                 |
| 1.5                    | 21                     | 22       | 23              | 24       | 28                | 33                | 33                 | 44                 |
| 2                      | 76                     | 77       | 83              | 84       | 81                | 94                | 94                 | 110                |
| 3                      | 111                    |          | 134             |          | 120               | 129               | 141                | 191                |
| 4                      | 200                    |          | 258             |          | 218               | 227               | 242                | 364                |
| 6                      | 501                    |          | 578             |          | 552               | 573               | 605                | 814                |
| 8                      | 1001                   |          | 1246            |          | 1090              | 1135              | 1208               | 1582               |

| Valve Size<br>(inches) | 6 Stage Design         |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 21                     | 21       | 22              | 22       | 25                | 29                | 29                 | 32                 |
| 1.5                    | 23                     | 24       | 25              | 25       | 30                | 35                | 35                 | 46                 |
| 2                      | 80                     | 81       | 88              | 89       | 86                | 97                | 98                 | 115                |
| 3                      | 126                    |          | 151             |          | 135               | 145               | 157                | 207                |
| 4                      | 227                    |          | 287             |          | 246               | 254               | 270                | 393                |
| 6                      | 584                    |          | 688             |          | 635               | 656               | 687                | 924                |
| 8                      | 1141                   |          | 1455            |          | 132               | 1277              | 1347               | 1791               |

## 18400 Series Cast Globe Body S/A with Extension Bonnet (kg)

| Valve Size<br>(inches) | 3 & 4 Stage Design     |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 23                     | 3        | 24              | 24       | 27                | 30                | 30                 | 34                 |
| 1.5                    | 24                     | 36       | 26              | 26       | 31                | 35                | 35                 | 47                 |
| 2                      | 84                     | 84       | 90              | 92       | 89                | 101               | 101                | 118                |
| 3                      | 117                    |          | 140             |          | 126               | 135               | 148                | 198                |
| 4                      | 209                    |          | 268             |          | 228               | 237               | 252                | 373                |
| 6                      | 516                    |          | 594             |          | 567               | 588               | 620                | 829                |
| 8                      | 1033                   |          | 1278            |          | 1123              | 1168              | 1240               | 1614               |

| Valve Size<br>(inches) | 6 Stage Design         |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 24                     | 24       | 25              | 25       | 28                | 32                | 32                 | 35                 |
| 1.5                    | 26                     | 26       | 28              | 28       | 32                | 37                | 37                 | 49                 |
| 2                      | 88                     | 89       | 95              | 98       | 94                | 105               | 105                | 123                |
| 3                      | 133                    |          | 157             |          | 142               | 163               | 163                | 214                |
| 4                      | 238                    |          | 297             |          | 257               | 281               | 281                | 405                |
| 6                      | 599                    |          | 703             |          | 650               | 703               | 703                | 940                |
| 8                      | 1173                   |          | 1490            |          | 1264              | 1378              | 1378               | 1823               |

# Weights (kg)

## 78400 Series Cast Angle Body S/A with Standard Bonnet (kg)

| Valve Size<br>(inches) | 3 & 4 Stage Design     |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 19                     | 20       | 20              | 20       | 23                | 27                | 27                 | 30                 |
| 1.5                    | 21                     | 22       | 22              | 22       | 27                | 32                | 32                 | 43                 |
| 2                      | 72                     | 74       | 78              | 80       | 78                | 89                | 90                 | 106                |
| 3                      | 104                    |          | 124             |          | 114               | 122               | 135                | 184                |
| 4                      | 191                    |          | 216             |          | 210               | 218               | 234                | 341                |
| 6                      | 467                    |          | 506             |          | 518               | 539               | 570                | 767                |
| 8                      | 940                    |          | 1098            |          | 1031              | 1076              | 1149               | 1521               |

| Valve Size<br>(inches) | 6 Stage Design         |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 20                     | 21       | 21              | 21       | 24                | 28                | 28                 | 31                 |
| 1.5                    | 22                     | 23       | 24              | 24       | 29                | 34                | 34                 | 44                 |
| 2                      | 77                     | 79       | 83              | 85       | 83                | 94                | 94                 | 111                |
| 3                      | 120                    |          | 141             |          | 129               | 138               | 150                | 210                |
| 4                      | 218                    |          | 245             |          | 237               | 245               | 262                | 370                |
| 6                      | 551                    |          | 615             |          | 600               | 622               | 655                | 877                |
| 8                      | 1081                   |          | 1308            |          | 1173              | 1218              | 1291               | 1730               |

## 78400 Series Cast Angle Body S/A with Extension Bonnet (kg)

| Valve Size<br>(inches) | 3 & 4 Stage Design     |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 22                     | 23       | 22              | 23       | 26                | 30                | 30                 | 33                 |
| 1.5                    | 23                     | 24       | 25              | 25       | 30                | 35                | 35                 | 45                 |
| 2                      | 80                     | 82       | 86              | 88       | 86                | 98                | 98                 | 114                |
| 3                      | 110                    |          | 131             |          | 120               | 129               | 141                | 191                |
| 4                      | 201                    |          | 226             |          | 220               | 228               | 244                | 350                |
| 6                      | 483                    |          | 520             |          | 533               | 554               | 586                | 773                |
| 8                      | 972                    |          | 1130            |          | 1063              | 1108              | 1181               | 1553               |

| Valve Size<br>(inches) | 6 Stage Design         |          |                 |          |                   |                   |                    |                    |
|------------------------|------------------------|----------|-----------------|----------|-------------------|-------------------|--------------------|--------------------|
|                        | ASME Class<br>600-2500 |          | ASME Class 2500 |          | ASME Class<br>600 | ASME Class<br>900 | ASME Class<br>1500 | ASME Class<br>2500 |
|                        | BW                     | SW & THD | BW              | SW & THD | RF & RTJ          | RF & RTJ          | RF & RTJ           | RF & RTJ           |
| 1                      | 23                     | 24       | 24              | 24       | 27                | 31                | 31                 | 34                 |
| 1.5                    | 25                     | 25       | 26              | 26       | 31                | 36                | 36                 | 47                 |
| 2                      | 85                     | 86       | 91              | 93       | 90                | 102               | 102                | 119                |
| 3                      | 125                    |          | 147             |          | 135               | 144               | 157                | 207                |
| 4                      | 230                    |          | 256             |          | 248               | 257               | 272                | 381                |
| 6                      | 566                    |          | 631             |          | 616               | 637               | 670                | 892                |
| 8                      | 1114                   |          | 1340            |          | 1205              | 1250              | 1323               | 1762               |

# Weights (lbs & kg)

## 18400F Series Forged Globe Body S/A

| Valve Size<br>(inches) | Weight (lbs)        |         |                     |         | Weight (kg)         |         |                     |         |
|------------------------|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|---------|
|                        | Standard Bonnet     |         | Extension Bonnet    |         | Standard Bonnet     |         | Extension Bonnet    |         |
|                        | ASME Class 600-2500 |         | ASME Class 600-2500 |         | ASME Class 600-2500 |         | ASME Class 600-2500 |         |
|                        | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage |
| 1                      | 86                  | 98      | 92                  | 104     | 39                  | 44      | 42                  | 47      |
| 1.5                    | 156                 | 178     | 162                 | 184     | 71                  | 81      | 74                  | 84      |
| 2                      | 344                 | 392     | 362                 | 410     | 156                 | 178     | 164                 | 186     |
| 3                      | 748                 | 874     | 762                 | 886     | 340                 | 397     | 346                 | 402     |
| 4                      | 1402                | 1636    | 1424                | 1658    | 637                 | 743     | 646                 | 753     |
| 6                      | 3212                | 3764    | 3242                | 3790    | 1458                | 1709    | 1472                | 1721    |
| 8                      | 6960                | 8086    | 7031                | 8132    | 3160                | 3671    | 3192                | 3692    |

## 78400F Series Forged Angle Body S/A

| Valve Size<br>(inches) | Weight (lbs)        |         |                     |         | Weight (kg)         |         |                     |         |
|------------------------|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|---------|
|                        | Standard Bonnet     |         | Extension Bonnet    |         | Standard Bonnet     |         | Extension Bonnet    |         |
|                        | ASME Class 600-2500 |         | ASME Class 600-2500 |         | ASME Class 600-2500 |         | ASME Class 600-2500 |         |
|                        | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage | 3 & 4 Stage         | 6 Stage |
| 1                      | 96                  | 110     | 102                 | 116     | 44                  | 50      | 46                  | 53      |
| 1.5                    | 140                 | 162     | 150                 | 167     | 64                  | 74      | 68                  | 76      |
| 2                      | 330                 | 374     | 350                 | 390     | 150                 | 170     | 159                 | 177     |
| 3                      | 626                 | 746     | 640                 | 758     | 284                 | 339     | 291                 | 344     |
| 4                      | 1060                | 1264    | 1082                | 1286    | 481                 | 574     | 491                 | 584     |
| 6                      | 2120                | 2584    | 2154                | 2610    | 962                 | 1173    | 978                 | 1185    |
| 8                      | 4050                | 4734    | 4122                | 4802    | 1839                | 2149    | 1871                | 2180    |

# Accessories and options

- Extension Bonnets
- Environmental Capabilities (Low-E Packing)
- Lubricator & Isolation Valve
- Other Flange Facings
- Limit Stops
- Body Drain Plug
- Reducer and Nipple Connections
- U.O.P. Trim Materials
- High Temperature Materials
- Cryogenic Service Materials
- Electric Actuators

For additional accessories and options, consult Baker Hughes.

# Appendix A: Available Engineered to Order Trim

The trim configurations in the tables below are available upon request in addition to our standard trim configuration offering.

| 4 Stage Design |    | Flow Characteristic : Modified Linear |       |        |       |      |       |           |                       |
|----------------|----|---------------------------------------|-------|--------|-------|------|-------|-----------|-----------------------|
| Valve Size     |    | Orifice Diameter                      |       | Travel |       | Trim |       | Min Cont. | Remarks               |
| inches         | DN | inches                                | mm    | inches | mm    | Cv   | FL    | CV        |                       |
| 1              | 25 | 0.2                                   | 5.08  | 0.125  | 3.175 | 0.1  | 0.991 | 0.04      | Flow to Close, Trim C |
| 1              | 25 | 0.375                                 | 9.525 | 0.25   | 6.35  | 0.2  | 0.996 | 0.04      | Flow to Close, Trim A |
| 1              | 25 | 0.5                                   | 12.7  | 0.25   | 6.35  | 0.4  | 0.996 | 0.04      | Trim A                |
| 1              | 25 | 0.5                                   | 12.7  | 0.25   | 6.35  | 0.6  | 0.991 | 0.04      | Trim C                |

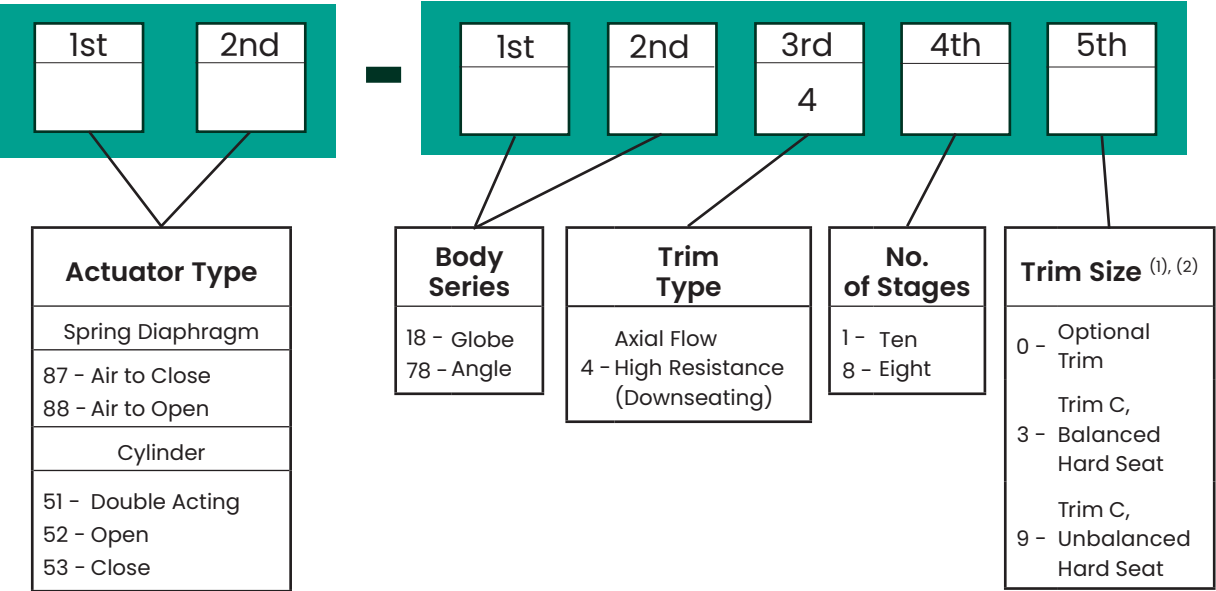
| 6 Stage Design |    | Flow Characteristic : Modified Linear |       |        |       |      |       |           |                       |
|----------------|----|---------------------------------------|-------|--------|-------|------|-------|-----------|-----------------------|
| Valve Size     |    | Orifice Diameter                      |       | Travel |       | Trim |       | Min Cont. | Remarks               |
| inches         | DN | inches                                | mm    | inches | mm    | Cv   | FL    | CV        |                       |
| 1              | 25 | 0.12                                  | 3.048 | 0.125  | 3.175 | 0.02 | 0.998 | 0.004     | Flow to Close, Trim A |
| 1              | 25 | 0.2                                   | 5.08  | 0.125  | 3.175 | 0.04 | 0.998 | 0.008     | Flow to Close, Trim A |
| 1              | 25 | 0.2                                   | 5.08  | 0.125  | 3.175 | 0.08 | 0.994 | 0.016     | Flow to Close, Trim C |
| 1              | 25 | 0.3                                   | 7.62  | 0.25   | 6.35  | 0.2  | 0.994 | 0.03      | Flow to Close, Trim C |
| 1              | 25 | 0.5                                   | 12.7  | 0.25   | 6.35  | 0.3  | 0.998 | 0.024     | Trim A                |
| 1              | 25 | 0.5                                   | 12.7  | 0.25   | 6.35  | 0.4  | 0.998 | 0.03      | Trim A                |
| 1              | 25 | 0.5                                   | 12.7  | 0.25   | 6.35  | 0.5  | 0.994 | 0.03      | Trim C                |



# Appendix B: 78400/18400 API 6A Valves

78400/18400 API 6A Series severe service control valves are designed to meet API 6A standard for high pressure applications.

## Numbering system



- Notes:
1. Balanced Trim not available for 1" 78400/18400 API Valves
  2. Unbalanced Trim not available for 6" 78400/18400 API Valves

# General Information

## Body:

- Type:
  - Forged Globe Body
  - Forged Angle Body
- Materials:
  - F6NM Martensitic Stainless Steel
  - F51 Duplex Stainless Steel
  - F55 Duplex Stainless Steel
  - Nickel-Alloy Inconel 718

## Trim

- Plug Type:
  - Balanced
  - Unbalanced
- Trim Type:
  - C

- Capacity:
  - Full Area
  - Reduced Area Cv 0.4 (1" Size Only)
  - Reduced Area Cv 0.2 (1" Size Only)
- Cv Ratio:
  - See "Staging Ratios & Pressure Drop Guidelines" Tables
- Flow Characteristic:
  - Modified Linear

## Actuator

- Type:
  - Spring Diaphragm (standard 87/88) or Cylinder (51/52/53)
- Handwheel
  - Optional

# API 6A Temperature Ratings and Seat Leakage

| Temp. Class | Temperature Range <sup>(1)(2)</sup> |      |      |      | Seat Leakage Class IEC 60534-4 / ANSI/FCI 70-2 |   |
|-------------|-------------------------------------|------|------|------|------------------------------------------------|---|
|             | °C                                  |      | °F   |      |                                                |   |
|             | Min.                                | Max. | Min. | Max. |                                                |   |
| K           | -60                                 | 82   | -75  | 180  | IV                                             | V |
| L           | -46                                 | 82   | -50  | 180  |                                                |   |
| N           | -46                                 | 60   | -50  | 140  |                                                |   |
| P           | -29                                 | 82   | -20  | 180  |                                                |   |
| S           | -18                                 | 60   | 0    | 140  |                                                |   |
| T           | -18                                 | 82   | 0    | 180  |                                                |   |
| U           | -18                                 | 121  | 0    | 250  |                                                |   |
| V           | 2                                   | 121  | 35   | 250  |                                                |   |
| X           | -18                                 | 180  | 0    | 350  |                                                |   |

## Notes:

- Valve end size complies with API 6A standard for 6BX flanges.
- For temperature rating selection, fluid temperature and ambient temperature should be compared and the minimum value of those two should be used to select the proper temperature rating.
  - If  $\min T^{\circ}_{\text{fluid}} > \min T^{\circ}_{\text{ambient}} \rightarrow \min T^{\circ}_{\text{Class}} = \min T^{\circ}_{\text{ambient}}$
  - If  $\min T^{\circ}_{\text{fluid}} < \min T^{\circ}_{\text{ambient}} \rightarrow \min T^{\circ}_{\text{Class}} = \min T^{\circ}_{\text{fluid}}$

# Ratings / Connections

Valve end connections are designed to meet the API 6A standard for API 6BX printed flange.

| Valve Body Size | Valve Ends Size    | Pressure Class         |                        |
|-----------------|--------------------|------------------------|------------------------|
| NPS             | 6BX <sup>(1)</sup> | API 10K <sup>(1)</sup> | API 15K <sup>(1)</sup> |
| 1               | 1-13/16" (1.8125)  | X                      | X                      |
| 6               | 7"1/16 (7.0625)    | X                      | X                      |

- API 6BX printed flanges are standard. Consult factory for availability of other end connection options.

# C<sub>v</sub> and F<sub>L</sub> Versus Travel

## API 6A 10K & 15K

### Sizes 1"–6", 8 STAGE Modified Linear – Flow to Open

| Travel (Percent)      |       |              |       |        |      |              | 10                              | 20                   | 30    | 40    | 50    | 60    | 70    | 80    | 90    | 100   |
|-----------------------|-------|--------------|-------|--------|------|--------------|---------------------------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| F <sub>L</sub>        |       |              |       |        |      |              | 0.994                           | 0.994                | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 |
| Valve Body Size (NPS) |       | Orifice Dia. |       | Travel |      | Trim         | Minimum Operable C <sub>v</sub> | Rated C <sub>v</sub> |       |       |       |       |       |       |       |       |
| Inch                  | mm    | inch         | mm    | inch   | mm   |              |                                 |                      |       |       |       |       |       |       |       |       |
| 1                     | 25.4  | 0.7          | 17.78 | 0.25   | 6.35 | Full         | 0.019                           | 0.071                | 0.18  | 0.32  | 0.46  | 0.67  | 0.88  | 1.11  | 1.28  | 1.34  |
|                       |       |              |       |        |      | Micro Cv 0.4 | 0.014                           | 0.043                | 0.06  | 0.11  | 0.17  | 0.22  | 0.29  | 0.35  | 0.41  | 0.47  |
|                       |       |              |       |        |      | Micro Cv 0.2 | 0.012                           | 0.019                | 0.03  | 0.06  | 0.09  | 0.11  | 0.14  | 0.16  | 0.19  | 0.21  |
| 6                     | 152.4 | 4.12         | 104.6 | 1      | 25.4 | Full         | 0.133                           | 1.7                  | 6.0   | 11.5  | 17.0  | 23.6  | 30.2  | 36.8  | 38.1  | 39.5  |

Note: Throttling at or below minimum operable Cv levels for extended periods of time can result in trim damage.

## API 6A 10K & 15K

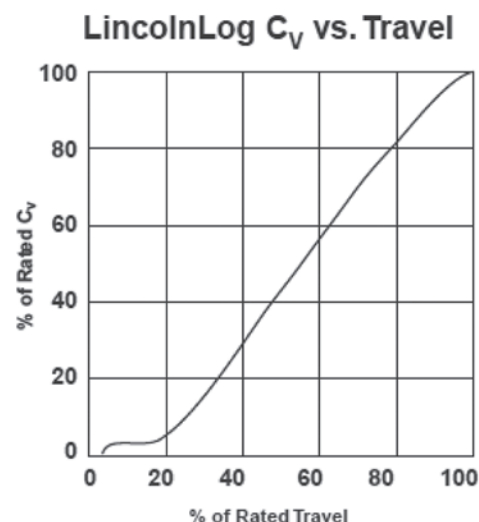
### Sizes 1" to 6", 10 STAGE Modified Linear – Flow to Open

| Travel (Percent)      |       |              |       |        |      |              | 10                              | 20                   | 30    | 40    | 50    | 60    | 70    | 80    | 90    | 100   |
|-----------------------|-------|--------------|-------|--------|------|--------------|---------------------------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| F <sub>L</sub>        |       |              |       |        |      |              | 0.994                           | 0.994                | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 | 0.994 |
| Valve Body Size (NPS) |       | Orifice Dia. |       | Travel |      | Trim         | Minimum Operable C <sub>v</sub> | Rated C <sub>v</sub> |       |       |       |       |       |       |       |       |
| Inch                  | mm    | inch         | mm    | inch   | mm   |              |                                 |                      |       |       |       |       |       |       |       |       |
| 1                     | 25.4  | 0.7          | 17.78 | 0.25   | 6.35 | Full         | 0.016                           | 0.070                | 0.17  | 0.31  | 0.44  | 0.63  | 0.81  | 1.00  | 1.10  | 1.19  |
|                       |       |              |       |        |      | Micro Cv 0.4 | 0.011                           | 0.02                 | 0.05  | 0.09  | 0.14  | 0.19  | 0.25  | 0.30  | 0.36  | 0.41  |
|                       |       |              |       |        |      | Micro Cv 0.2 | 0.009                           | 0.15                 | 0.03  | 0.05  | 0.07  | 0.09  | 0.12  | 0.14  | 0.16  | 0.19  |
| 6                     | 152.4 | 4.12         | 104.6 | 1      | 25.4 | Full         | 0.110                           | 1.8                  | 5.4   | 10.3  | 15.2  | 21.0  | 26.9  | 32.7  | 34.2  | 35.7  |

Note: Throttling at or below minimum operable Cv levels for extended periods of time can result in trim damage. Additional sizes are available, consult factory.

# Flow Characteristics

The Lincoln Log trim provides a smooth modified linear control characteristic with “clearance flow” capacity over the initial 15% of valve travel as shown in the generic chart at right. Incorporation of the multistage “clearance flow” design concept prevents high pressure drops across the Lincoln Log seating area while throttling at low lifts. This feature helps to extend trim life significantly, resulting in dependable and tight shutoff whenever required. It also improves the throttling control stability and performance at low lifts, while providing smooth, accurate and continuous capacity control from 15% to 100% plug travel. Controllability extends from the Maximum Rated  $C_V$  to the Minimum Controllable  $C_V$  for any valve size resulting in typical turndown ratios of 50:1.



## Staging Ratios and Pressure Drop Guidelines

| Trim Type | No. of Stages | Maximum Recommended Throttling $\Delta P$ <sup>(1)</sup> |     |                      |     |
|-----------|---------------|----------------------------------------------------------|-----|----------------------|-----|
|           |               | Continuous Service                                       |     | Intermittent Service |     |
|           |               | psi                                                      | bar | psi                  | bar |
| C         | 8             | 5800                                                     | 400 | 7250                 | 500 |
| C         | 10            | 7400                                                     | 510 | 9140                 | 630 |

Notes:

- Recommended limits for  $\Delta P$  per stage are 800 psi (55 bar) for continuous duty cycle applications and up to 1000 psi (69 bar)  $\Delta P$  per stage for intermittent service.

### Staging Ratios & Pressure Drop Guidelines for Upgraded Trim <sup>(1)</sup>

| Trim Type | No. of Stages | Maximum Recommended Throttling $\Delta P$ |     |
|-----------|---------------|-------------------------------------------|-----|
|           |               | Continuous Service                        |     |
|           |               | psi                                       | bar |
| C         | 8             | 7250                                      | 500 |
| C         | 10            | 9140                                      | 630 |

Notes:

- Upgraded trim includes a Kolsterised Inconel 718 plug and liner (API 6A CRA).

# Materials and Temperatures

## Temperature Rating vs. Material of Construction

| Temperature Ratings | Temperature Range <sup>(1)</sup> |        |        |        | Material of Construction Availability |        |              |             |
|---------------------|----------------------------------|--------|--------|--------|---------------------------------------|--------|--------------|-------------|
|                     | Min °C                           | Max °C | Min °F | Max °F | Martensitic                           | Duplex | Super Duplex | Inconel 718 |
| K                   | -60                              | 82     | -75    | 180    | X                                     |        |              | X           |
| L                   | -46                              | 82     | -50    | 180    | X                                     | X      | X            | X           |
| N                   | -46                              | 60     | -50    | 140    | X                                     | X      | X            | X           |
| P                   | -29                              | 82     | -20    | 180    | X                                     | X      | X            | X           |
| S                   | -18                              | 60     | 0      | 140    | X                                     | X      | X            | X           |
| T                   | -18                              | 82     | 0      | 180    | X                                     | X      | X            | X           |
| U                   | -18                              | 121    | 0      | 250    | X                                     | X      | X            | X           |
| V                   | 2                                | 121    | 35     | 250    | X                                     | X      | X            | X           |
| X                   | -18                              | 180    | 0      | 350    | X                                     | X      | X            | X           |

Note:

1. Minimum temperature of valve design is defined as the minimum between fluid temperature and ambient temperature.

- If  $\min T^{\circ}_{\text{fluid}} > \min T^{\circ}_{\text{ambient}} \rightarrow \min T^{\circ}_{\text{Class}} = \min T^{\circ}_{\text{ambient}}$
- If  $\min T^{\circ}_{\text{fluid}} < \min T^{\circ}_{\text{ambient}} \rightarrow \min T^{\circ}_{\text{Class}} = \min T^{\circ}_{\text{fluid}}$

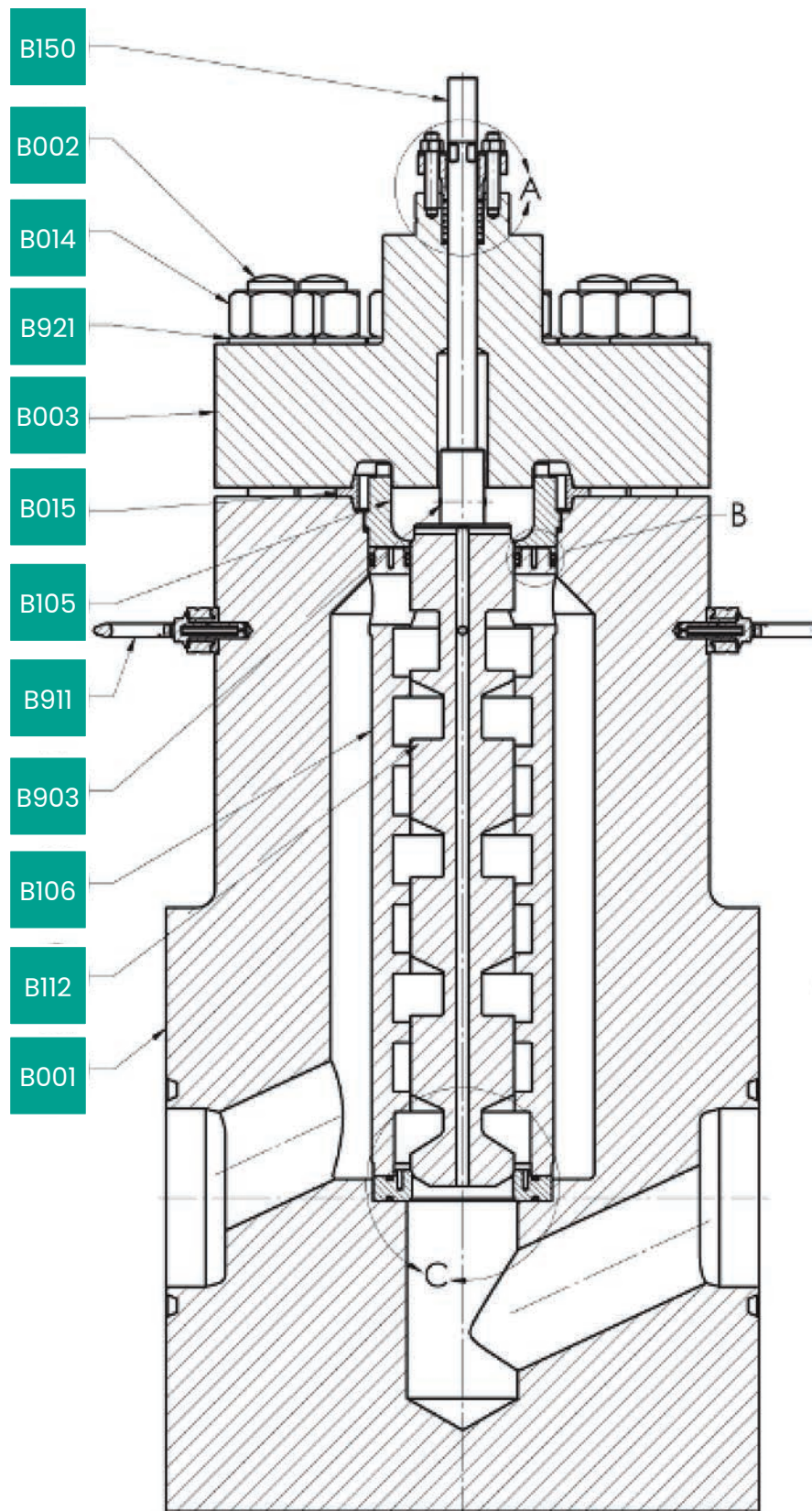
## Operating Pressure vs Material of Construction

| Max Operating Pressure | Max Inlet Pressure |      | Material of Construction Availability |        |              |             |
|------------------------|--------------------|------|---------------------------------------|--------|--------------|-------------|
|                        | bar                | kPSI | Martensitic                           | Duplex | Super Duplex | Inconel 718 |
| API 10K                | 690                | 10   | X                                     | X      | X            | X           |
| API 15K                | 1034               | 15   | X                                     |        | X            | X           |

## Material Class vs Material of Construction

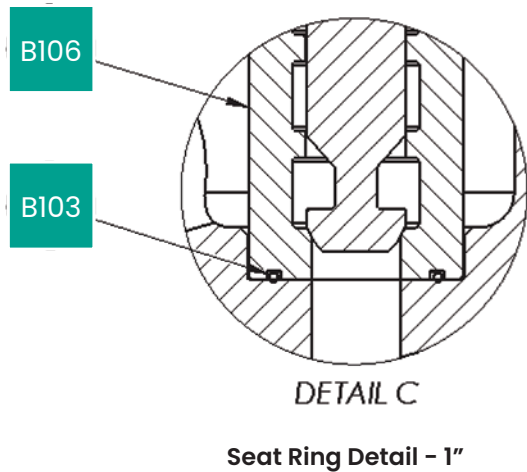
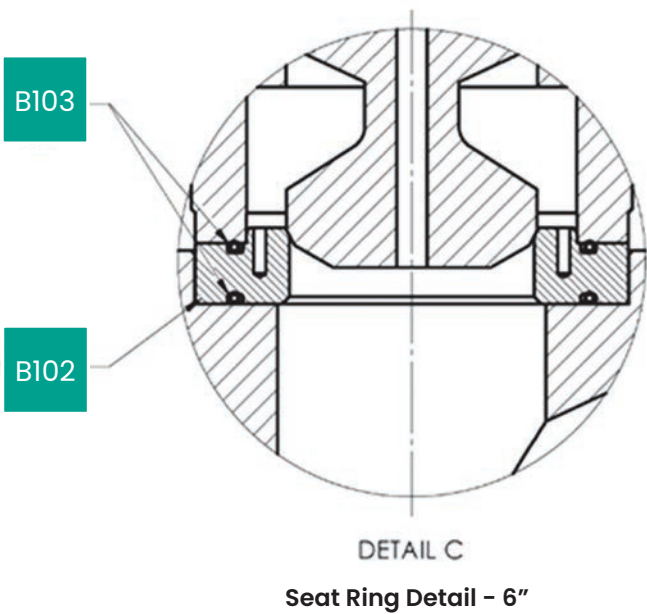
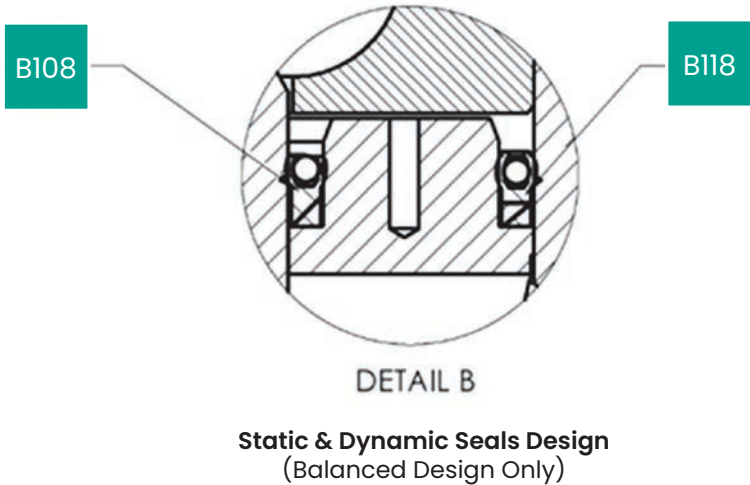
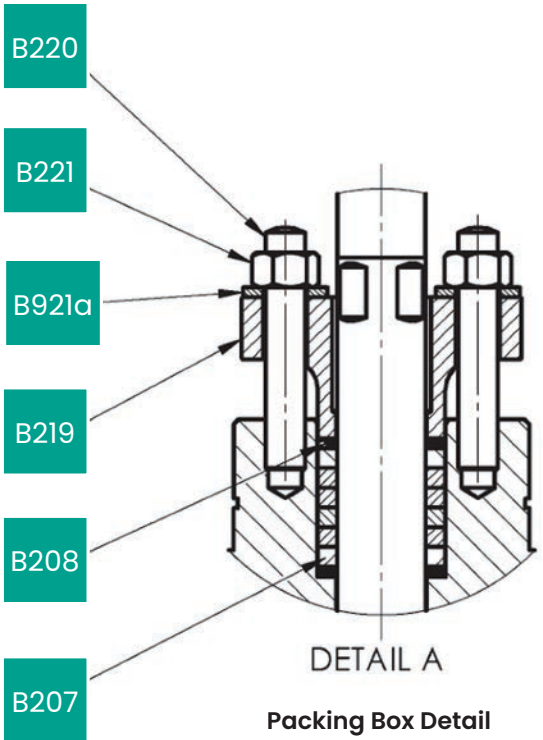
| Material Class |                 |             | Material of Construction Availability |                         |                               |                              |
|----------------|-----------------|-------------|---------------------------------------|-------------------------|-------------------------------|------------------------------|
|                |                 |             | Martensitic NACE Non-Exposed          | Duplex NACE Non-Exposed | Super Duplex NACE Non-Exposed | Inconel 718 NACE Non-Exposed |
| AA             | General Service | Non-Exposed | X                                     | X                       | X                             | X                            |
| BB             | General Service | Non-Exposed | X                                     | X                       | X                             | X                            |
| CC             | General Service | Non-Exposed | X                                     | X                       | X                             | X                            |
| Material Class |                 |             | Material of Construction Availability |                         |                               |                              |
|                |                 |             | Martensitic NACE Exposed              | Duplex NACE Exposed     | Super Duplex NACE Exposed     | Inconel 718 NACE Exposed     |
| DD             | Sour Service    | Exposed     |                                       |                         |                               | X                            |
| EE             | Sour Service    | Exposed     |                                       |                         |                               | X                            |
| FF             | Sour Service    | Exposed     | X                                     | X                       | X                             | X                            |
| HH             | Sour Service    | Exposed     |                                       |                         |                               | X                            |

# Standard Construction Assembly



18400 Series API 6A Design

# Standard Construction Assembly





# Materials of Construction

## 78400/18400 API 6A Martensitic Stainless Steel Construction:

- Max operating pressure up to 15 kPSI [1034 bar]
- Temperature ratings: K/L/N/P/S/T/U/V/X (see page 37)
- Material classes: AA/BB/CC/FF (see page 37)

| Ref. No. | Temperature Range           | -60°C<br>[-76°F]                                                                           | 29°C<br>[20°F]                                                                          | 121°C<br>[250°F] | 180°C<br>[356°F] |
|----------|-----------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|------------------|
|          | Description                 | Materials                                                                                  |                                                                                         |                  |                  |
| B001     | Valve Body                  | ASTM A182 GR F6NM                                                                          |                                                                                         |                  |                  |
| B002     | Body Stud                   |                                                                                            | ASTM A193 GRADE B7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                    |                  |                  |
|          |                             |                                                                                            | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>       |                  |                  |
|          |                             |                                                                                            | ASTM A320 Gr L7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                       |                  |                  |
|          |                             |                                                                                            | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>       |                  |                  |
| B003     | Bonnet                      | ASTM A182 GR F6NM                                                                          |                                                                                         |                  |                  |
| B014     | Body Nut                    |                                                                                            | ASTM A 194 GR 2H ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                      |                  |                  |
|          |                             |                                                                                            | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>      |                  |                  |
|          |                             |                                                                                            | ASTM A194 Gr 7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                        |                  |                  |
|          |                             |                                                                                            | ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING as per + PTFE COATING <sup>(2 &amp; 3)</sup> |                  |                  |
| B015     | Body Gasket                 | ALLOY 718 + MOS2 COATING                                                                   |                                                                                         |                  |                  |
| B102     | Seat Ring                   | HARDFACING STELLITE NO.6 ON 6NM                                                            |                                                                                         |                  |                  |
| B103     | Seat Ring Gasket            | INCONEL 718 + SILVER PLATING                                                               |                                                                                         |                  |                  |
| B105     | Retainer                    | SUPER AUSTENITIC STAINLESS STEEL UNS S20910 (NITRONIC 50) 35 HRC MAXIMUM                   |                                                                                         |                  |                  |
| B106     | Liner                       | CA6NM CL. B STAINLESS STEEL 23 HRC MAXIMUM HARDNESS WITH “DIFFUSED KANIGEN” NICKEL COATING |                                                                                         |                  |                  |
| B108     | Liner Gasket                | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                           |                                                                                         |                  |                  |
| B112     | Plug (Balanced)             | CA6NM CL. B STAINLESS STEEL 23 HRC MAXIMUM HARDNESS WITH “DIFFUSED KANIGEN” NICKEL COATING |                                                                                         |                  |                  |
|          | Plug (Un-Balanced)          |                                                                                            |                                                                                         |                  |                  |
| B118     | Plug Balanced Seal          | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                           |                                                                                         |                  |                  |
| B150     | Plug Stem                   | ASTM A182 GR F6NM                                                                          |                                                                                         |                  |                  |
| B207     | Packing Ring                | CARBON CORE PTFE <sup>(4)</sup>                                                            |                                                                                         |                  |                  |
| B208     | Anti Extrusion Ring         | CARBON-GRAPHITE BRAIDED <sup>(4)</sup>                                                     |                                                                                         |                  |                  |
| B219     | Packing Flange/<br>Follower | ASTM A182 GR F6NM                                                                          |                                                                                         |                  |                  |
| B220     | Packing Stud                |                                                                                            | ASTM A193 GRADE B7 ZINC PLATED <sup>(1)</sup>                                           |                  |                  |
|          |                             |                                                                                            | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                              |                  |                  |
|          |                             |                                                                                            | ASTM A320 Gr L7 ZINC PLATED <sup>(1)</sup>                                              |                  |                  |
|          |                             |                                                                                            | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                              |                  |                  |
| B221     | Packing Nut                 |                                                                                            | ASTM A 194 GR 2H ZINC PLATED <sup>(1)</sup>                                             |                  |                  |
|          |                             |                                                                                            | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING <sup>(2)</sup>                             |                  |                  |
|          |                             |                                                                                            | ASTM A194 GR 7 ZINC PLATED <sup>(1)</sup>                                               |                  |                  |
|          |                             |                                                                                            | ASTM A194 GR 7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                               |                  |                  |
| B903     | Plug Pin                    | SOLUTION ANNEALED 316 STAINLESS STEEL HRc 22 MAXIMUM                                       |                                                                                         |                  |                  |
| B921     | Body plain Washer           | ASTM F436 ZINC PLATED                                                                      |                                                                                         |                  |                  |
|          |                             | 410 ST ST HRC 35-45                                                                        |                                                                                         |                  |                  |
| B921a    | Packing Plain Washer        | ASTM F436 ZINC PLATED                                                                      |                                                                                         |                  |                  |
|          |                             | 410 ST ST HRC 35-45                                                                        |                                                                                         |                  |                  |

### Notes:

1. For General Service only: Nace Non-Exposed per ANSI/NACE MR0175/ISO 15156-1.
2. For Sour Service only: Nace Exposed per ANSI/NACE MR0175/ISO 15156-1.
3. Blue is the standard coating color.
4. No equivalents allowed to maintain fugitive emissions certification and performance.



# Materials of Construction (cont.)

## 18400/78400 API 6A Duplex F51 Stainless Steel Construction:

- Max operating pressure up to 10 kPSI [690 bar]
- Temperature class: L/N/P/S/T/U/V/X (see page 37)
- Material class: AA/BB/CC/FF (see page 37)

| Ref. No. | Temperature Range        | -46°C<br>[-50°F]                                                                    | 29°C<br>[20.2°F]                                                                   | 121°C<br>[250°F] | 180°C<br>[356°F] |
|----------|--------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------|------------------|
|          | Description              | Materials                                                                           |                                                                                    |                  |                  |
| B001     | Valve Body               | ASTM A182 GR F51                                                                    |                                                                                    |                  |                  |
| B002     | Body Stud                |                                                                                     | ASTM A193 GRADE B7 ZINC PLATED + PTFE COATING <sup>(3)</sup>                       |                  |                  |
|          |                          |                                                                                     | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>  |                  |                  |
|          |                          |                                                                                     | ASTM A320 Gr L7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                  |                  |                  |
|          |                          |                                                                                     | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>  |                  |                  |
| B003     | Bonnet                   | ASTM A182 GR F51                                                                    |                                                                                    |                  |                  |
| B014     | Body Nut                 |                                                                                     | ASTM A 194 GR 2H ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                 |                  |                  |
|          |                          |                                                                                     | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup> |                  |                  |
|          |                          |                                                                                     | ASTM A194 Gr 7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                   |                  |                  |
|          |                          |                                                                                     | ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>   |                  |                  |
| B015     | Body Gasket              | ALLOY 718 + MOS2 COATING                                                            |                                                                                    |                  |                  |
| B102     | Seat Ring                | 2205 ST. ST. (DUPLEX) HRC 28 MAXIMUM + HARDFACING STELLITE NO.6                     |                                                                                    |                  |                  |
| B103     | Seat Ring Gasket         | INCONEL 718 + SILVER PLATING                                                        |                                                                                    |                  |                  |
| B105     | Retainer                 | SUPER AUSTENITIC STAINLESS STEEL UNS S20910 (NITRONIC 50) 35 HRC MAXIMUM            |                                                                                    |                  |                  |
| B106     | Liner                    | SOLUTION ANNEALED 2205 ST. ST. (DUPLEX) 28 HRC MAXIMUM + ELECTROLESS NICKEL PLATING |                                                                                    |                  |                  |
| B108     | Liner Gasket             | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                    |                                                                                    |                  |                  |
| B112     | Plug (Balanced)          | SOLUTION ANNEALED 2205 ST. ST. (DUPLEX) 28 HRC MAXIMUM + ELECTROLESS NICKEL PLATING |                                                                                    |                  |                  |
|          | Plug (Un-Balanced)       |                                                                                     |                                                                                    |                  |                  |
| B118     | Plug Balanced Seal       | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                    |                                                                                    |                  |                  |
| B150     | Plug Stem                | ASTM A182 GR F5                                                                     |                                                                                    |                  |                  |
| B207     | Packing Ring             | CARBON CORE PTFE <sup>(4)</sup>                                                     |                                                                                    |                  |                  |
| B208     | Anti Extrusion Ring      | CARBON-GRAPHITE BRAIDED <sup>(4)</sup>                                              |                                                                                    |                  |                  |
| B219     | Packing Flange/ Follower | ASTM A182 GR F51                                                                    |                                                                                    |                  |                  |
| B220     | Packing Stud             |                                                                                     | ASTM A193 GRADE B7 ZINC PLATED <sup>(1)</sup>                                      |                  |                  |
|          |                          |                                                                                     | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                         |                  |                  |
|          |                          |                                                                                     | ASTM A320 Gr L7 ZINC PLATED <sup>(1)</sup>                                         |                  |                  |
|          |                          |                                                                                     | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                         |                  |                  |
| B221     | Packing Nut              |                                                                                     | ASTM A 194 GR 2H ZINC PLATED <sup>(1)</sup>                                        |                  |                  |
|          |                          |                                                                                     | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING <sup>(2)</sup>                        |                  |                  |
|          |                          |                                                                                     | ASTM A194 GR 7 ZINC PLATED <sup>(1)</sup>                                          |                  |                  |
|          |                          |                                                                                     | ASTM A194 GR 7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                          |                  |                  |
| B903     | Plug Pin                 | SOLUTION ANNEALED 2205 STAINLESS STEEL (DUPLEX) HRC 28 MAXIMUM                      |                                                                                    |                  |                  |
| B921     | Body plain Washer        | ASTM F436 ZINC PLATED                                                               |                                                                                    |                  |                  |
|          |                          | 410 ST ST HRC 35-45                                                                 |                                                                                    |                  |                  |
| B921a    | Packing Plain Washer     | ASTM F436 ZINC PLATED                                                               |                                                                                    |                  |                  |
|          |                          | 410 ST ST HRC 35-45                                                                 |                                                                                    |                  |                  |

### Notes:

1. For General Service only: Nace Non-Exposed per ANSI/NACE MR0175/ISO 15156-1.
2. For Sour Service only: Nace Exposed per ANSI/NACE MR0175/ISO 15156-1.
3. Blue is the standard coating color.
4. No equivalents allowed to maintain fugitive emissions certification and performance.

# Materials of Construction (cont.)

## 18400/78400 API 6A Super Duplex F55 Stainless-Steel Construction:

- Max operating pressure up to 15 kPSI [1034 bar]
- Temperature class: L/N/P/S/T/U/V/X (see page 37)
- Material class: AA/BB/CC/FF (see page 37)

| Ref. No. | Temperature Range        | -46°C<br>[-50°F]                                                                                                           | 29°C<br>[20.2°F]                                                                   | 121°C<br>[250°F] | 180°C<br>[356°F] |
|----------|--------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------|------------------|
|          | Description              | Materials                                                                                                                  |                                                                                    |                  |                  |
| B001     | Valve Body               | ASTM A182 GR F55                                                                                                           |                                                                                    |                  |                  |
| B002     | Body Stud                |                                                                                                                            | ASTM A193 GRADE B7 ZINC PLATED + PTFE COATING API 6A <sup>(1 &amp; 3)</sup>        |                  |                  |
|          |                          |                                                                                                                            | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>  |                  |                  |
|          |                          | ASTM A320 Gr L7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                                                          |                                                                                    |                  |                  |
|          |                          | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>                                          |                                                                                    |                  |                  |
| B003     | Bonnet                   | ASTM A182 GR F55                                                                                                           |                                                                                    |                  |                  |
| B014     | Body Nut                 |                                                                                                                            | ASTM A 194 GR 2H ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                 |                  |                  |
|          |                          |                                                                                                                            | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup> |                  |                  |
|          |                          | ASTM A194 Gr 7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                                                           |                                                                                    |                  |                  |
|          |                          | ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>                                           |                                                                                    |                  |                  |
| B015     | Body Gasket              | ALLOY 718 + MOS2 COATING                                                                                                   |                                                                                    |                  |                  |
| B102     | Seat Ring                | HARDFACING STELL N°6 ON SOLUTION ANNEALED SUPER DUPLEX AUSTENO-FERRITIQUE STAINLESS STEEL (TYPE UNS S32760) HRC 32 MAXIMUM |                                                                                    |                  |                  |
| B103     | Seat Ring Gasket         | INCONEL 718 + SILVER PLATING                                                                                               |                                                                                    |                  |                  |
| B105     | Retainer                 | SUPER AUSTENITIC STAINLESS STEEL UNS S20910 (NITRONIC 50) 35 HRC MAXIMUM                                                   |                                                                                    |                  |                  |
| B106     | Liner                    | SUPER DUPLEX AUSTENO-FERRITIQUE STAINLESS STEEL (TYPE UNS S32760) HRc 32 MAXIMUM + HARD ELECTROLESS NICKEL PLATING         |                                                                                    |                  |                  |
| B108     | Liner Gasket             | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                                                           |                                                                                    |                  |                  |
| B112     | Plug (Balanced)          | SUPER DUPLEX AUSTENO-FERRITIQUE STAINLESS STEEL (TYPE UNS S32760) HRc 32 MAXIMUM + HARD ELECTROLESS NICKEL PLATING         |                                                                                    |                  |                  |
|          | Plug (Un-Balanced)       |                                                                                                                            |                                                                                    |                  |                  |
| B118     | Plug Balanced Seal       | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                                                           |                                                                                    |                  |                  |
| B150     | Plug Stem                | ASTM A182 GR F55                                                                                                           |                                                                                    |                  |                  |
| B207     | Packing Ring             | CARBON CORE PTFE <sup>(4)</sup>                                                                                            |                                                                                    |                  |                  |
| B208     | Anti Extrusion Ring      | CARBON-GRAPHITE BRAIDED <sup>(4)</sup>                                                                                     |                                                                                    |                  |                  |
| B219     | Packing Flange/ Follower | ASTM A182 GR F55                                                                                                           |                                                                                    |                  |                  |
| B220     | Packing Stud             |                                                                                                                            | ASTM A193 GRADE B7 ZINC PLATED <sup>(1)</sup>                                      |                  |                  |
|          |                          |                                                                                                                            | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                         |                  |                  |
|          |                          | ASTM A320 Gr L7 ZINC PLATED <sup>(1)</sup>                                                                                 |                                                                                    |                  |                  |
|          |                          | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                                                                 |                                                                                    |                  |                  |
| B221     | Packing Nut              |                                                                                                                            | ASTM A 194 GR 2H ZINC PLATED <sup>(1)</sup>                                        |                  |                  |
|          |                          |                                                                                                                            | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING <sup>(2)</sup>                        |                  |                  |
|          |                          | ASTM A194 GR 7 ZINC PLATED <sup>(1)</sup>                                                                                  |                                                                                    |                  |                  |
|          |                          | ASTM A194 GR 7M ELECTROLESS NICKEL <sup>(2)</sup>                                                                          |                                                                                    |                  |                  |
| B903     | Plug Pin                 | SUPER DUPLEX AUSTENO-FERRITIQUE STAINLESS STEEL (TYPE UNS S32760) HRc 32 MAXIMUM                                           |                                                                                    |                  |                  |
| B921     | Body plain Washer        | ASTM F436 ZINC PLATED                                                                                                      |                                                                                    |                  |                  |
|          |                          | 410 ST ST HRC 35-45                                                                                                        |                                                                                    |                  |                  |
| B921a    | Packing Plain Washer     | ASTM F436 ZINC PLATED                                                                                                      |                                                                                    |                  |                  |
|          |                          | 410 ST ST HRC 35-45                                                                                                        |                                                                                    |                  |                  |

### Notes:

1. For General Service only: Nace Non-Exposed per ANSI/NACE MR0175/ISO 15156-1.
2. For Sour Service only: Nace Exposed per ANSI/NACE MR0175/ISO 15156-1.
3. Blue is the standard coating color.
4. No equivalents allowed to maintain fugitive emissions certification and performance.

# Materials of Construction (cont.)

## 18400/78400 API 6A CRA Inconel 718 Construction:

- Max operating pressure is up to 15 kPSI [1034 bar]
- Temperature class: K/L/N/P/S/T/U/V/X (see page 37)
- Material class: AA/BB/CC/DD/EE/FF/HH (see page 37)

| Ref. No. | Temperature Range            | -60°C<br>[-76°F]                                                                                             | 29°C<br>[20.2°F]                                                                   | 121°C<br>[250°F] | 180°C<br>[356°F] |
|----------|------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------|------------------|
|          | Description                  | Materials                                                                                                    |                                                                                    |                  |                  |
| B001     | Valve Body                   | UNS N07718                                                                                                   |                                                                                    |                  |                  |
| B002     | Body Stud                    |                                                                                                              | ASTM A193 GRADE B7 ZINC PLATED + PTFE COATING API6A <sup>(1 &amp; 3)</sup>         |                  |                  |
|          |                              |                                                                                                              | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>  |                  |                  |
|          |                              | ASTM A320 Gr L7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                                            |                                                                                    |                  |                  |
|          |                              | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>                            |                                                                                    |                  |                  |
| B003     | Bonnet                       | UNS N07718                                                                                                   |                                                                                    |                  |                  |
| B014     | Body Nut                     |                                                                                                              | ASTM A 194 GR 2H ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                 |                  |                  |
|          |                              |                                                                                                              | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup> |                  |                  |
|          |                              | ASTM A194 Gr 7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                                             |                                                                                    |                  |                  |
|          |                              | ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup>                             |                                                                                    |                  |                  |
| B015     | Body Gasket                  | ALLOY 718 + MOS2 COATING                                                                                     |                                                                                    |                  |                  |
| B102     | Seat Ring                    | UNS N07718                                                                                                   |                                                                                    |                  |                  |
| B103     | Seat Ring Gasket             | INCONEL 718 + SILVER PLATING                                                                                 |                                                                                    |                  |                  |
| B105     | Retainer                     | SUPER AUSTENITIC STAINLESS STEEL UNS S20910 (NITRONIC 50) 35 HRC MAXIMUM                                     |                                                                                    |                  |                  |
| B106     | Liner                        | UNS N07718                                                                                                   |                                                                                    |                  |                  |
| B108     | Liner Gasket                 | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                                             |                                                                                    |                  |                  |
| B112     | Plug (Balanced, Un-Balanced) | UNS N07718                                                                                                   |                                                                                    |                  |                  |
| B118     | Plug Balanced Seal           | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                                             |                                                                                    |                  |                  |
| B150     | Plug Stem                    | UNS N07718 +KOLSTERISATION                                                                                   |                                                                                    |                  |                  |
| B207     | Packing Ring                 | CARBON CORE PTFE <sup>(4)</sup>                                                                              |                                                                                    |                  |                  |
| B208     | Anti Extrusion Ring          | CARBON-GRAPHITE BRAIDED <sup>(4)</sup>                                                                       |                                                                                    |                  |                  |
| B219     | Packing Flange/ Follower     | UNS N07718                                                                                                   |                                                                                    |                  |                  |
| B220     | Packing Stud                 |                                                                                                              | ASTM A193 GRADE B7 ZINC PLATED <sup>(1)</sup>                                      |                  |                  |
|          |                              |                                                                                                              | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                         |                  |                  |
|          |                              | ASTM A320 Gr L7 ZINC PLATED <sup>(1)</sup>                                                                   |                                                                                    |                  |                  |
|          |                              | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                                                   |                                                                                    |                  |                  |
| B221     | Packing Nut                  |                                                                                                              | ASTM A 194 GR 2H ZINC PLATED <sup>(1)</sup>                                        |                  |                  |
|          |                              |                                                                                                              | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING <sup>(2)</sup>                        |                  |                  |
|          |                              | ASTM A194 GR 7 ZINC PLATED <sup>(1)</sup>                                                                    |                                                                                    |                  |                  |
|          |                              | ASTM A194 GR 7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                                                    |                                                                                    |                  |                  |
| B903     | Plug Pin                     | ASTM B637 GRADE NO7718 (UNS 07718) Hrc 40 MAXIMUM<br>HARDNESS COMPLIANCE WITH NACE MR0103 SHALL BE CERTIFIED |                                                                                    |                  |                  |
| B921     | Body plain Washer            | ASTM F436 ZINC PLATED<br>410 ST ST HRC 35-45                                                                 |                                                                                    |                  |                  |
| B921a    | Packing Plain Washer         | ASTM F436 ZINC PLATED<br>410 ST ST HRC 35-45                                                                 |                                                                                    |                  |                  |

### Notes:

1. For General Service only: NACE Non-Exposed per ANSI/NACE MR0175/ISO 15156-1.
2. For Sour Service only: NACE Exposed per ANSI/NACE MR0175/ISO 15156-1.
3. Blue is the standard coating color.
4. No equivalents allowed to maintain fugitive emissions certification and performance.

# Materials of Construction (cont.)

## High Pressure (>800 psi/Stage) API 6A CRA Inconel 718 Construction:

- Max operating pressure is up to 15 kPSI [1034 bar]
- Temperature class: K/L/N/P/S/T/U/V/X (see page 37)
- Material class: AA/BB/CC/DD/EE/FF/HH(see page 37)

| Ref. No. | Temperature Range                       | -60°C<br>[-76°F] | 29°C<br>[20.2°F] | 121°C<br>[250°F]                                                                 | 180°C<br>[356°F] |
|----------|-----------------------------------------|------------------|------------------|----------------------------------------------------------------------------------|------------------|
|          |                                         | Materials        |                  |                                                                                  |                  |
| B001     | Valve Body                              |                  |                  | UNS N07718                                                                       |                  |
| B002     | Body Stud <sup>(4)</sup>                |                  |                  | ASTM A193 GRADE B7 ZINC PLATED PTFE COATING API 6A <sup>(1 &amp; 3)</sup>        |                  |
|          |                                         |                  |                  | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING PTFE COATING <sup>(2 &amp; 3)</sup>  |                  |
|          |                                         |                  |                  | ASTM A320 Gr L7 ZINC PLATED PTFE COATING <sup>(1 &amp; 3)</sup>                  |                  |
|          |                                         |                  |                  | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING PTFE COATING <sup>(2 &amp; 3)</sup>  |                  |
| B003     | Bonnet                                  |                  |                  | UNS N07718                                                                       |                  |
| B014     | Body Nut <sup>(4)</sup>                 |                  |                  | ASTM A 194 GR 2H ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>               |                  |
|          |                                         |                  |                  | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING PTFE COATING <sup>(2 &amp; 3)</sup> |                  |
|          |                                         |                  |                  | ASTM A194 Gr 7 ZINC PLATED + PTFE COATING <sup>(1 &amp; 3)</sup>                 |                  |
|          |                                         |                  |                  | ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING + PTFE COATING <sup>(2 &amp; 3)</sup> |                  |
| B015     | Body Gasket                             |                  |                  | ALLOY 718 + MOS2 COATING                                                         |                  |
| B102     | Seat Ring                               |                  |                  | UNS N07718 + KOLSTERISATION                                                      |                  |
| B103     | Seat Ring Gasket                        |                  |                  | INCONEL 718 + SILVER PLATING                                                     |                  |
| B105     | Retainer                                |                  |                  | SUPER AUSTENITIC STAINLESS STEEL UNS S20910 (NITRONIC 50) 35 HRC MAXIMUM         |                  |
| B106     | Liner                                   |                  |                  | UNS N07718 + KOLSTERISATION                                                      |                  |
| B108     | Liner Gasket                            |                  |                  | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                 |                  |
| B112     | Plug (Balanced, Un-Balanced)            |                  |                  | UNS N07718 + Kolsterisation                                                      |                  |
| B118     | Plug Balanced Seal                      |                  |                  | FLUOROPOLYMER JACKET/ COBALT NICKEL ALLOY SPRING                                 |                  |
| B150     | Plug Stem <sup>(3)</sup>                |                  |                  | UNS N07718                                                                       |                  |
| B207     | Packing Ring                            |                  |                  | CARBON CORE PTFE <sup>(4)</sup>                                                  |                  |
| B208     | Anti Extrusion Ring                     |                  |                  | CARBON-GRAPHITE BRAIDED <sup>(4)</sup>                                           |                  |
| B219     | Packing Flange/ Follower <sup>(3)</sup> |                  |                  | UNS N07718                                                                       |                  |
| B220     | Packing Stud <sup>(4)</sup>             |                  |                  | ASTM A193 GRADE B7 ZINC PLATED <sup>(1)</sup>                                    |                  |
|          |                                         |                  |                  | ASTM A193 GR B7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                       |                  |
|          |                                         |                  |                  | ASTM A320 Gr L7 ZINC PLATED <sup>(1)</sup>                                       |                  |
|          |                                         |                  |                  | ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                       |                  |
| B221     | Packing Nut <sup>(4)</sup>              |                  |                  | ASTM A 194 GR 2H ZINC PLATED <sup>(1)</sup>                                      |                  |
|          |                                         |                  |                  | ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING <sup>(2)</sup>                      |                  |
|          |                                         |                  |                  | ASTM A194 GR 7 ZINC PLATED as per CES 1041 <sup>(1)</sup>                        |                  |
|          |                                         |                  |                  | ASTM A194 GR 7M ELECTROLESS NICKEL PLATING <sup>(2)</sup>                        |                  |
| B903     | Plug Pin                                |                  |                  | ASTM B637 GRADE N07718 (UNS 07718) HRC 40 MAXIMUM                                |                  |
| B921     | Body plain Washer <sup>(4)</sup>        |                  |                  | ASTM F436 ZINC PLATED                                                            |                  |
|          |                                         |                  |                  | 410 ST ST HRC 35-45                                                              |                  |
| B921a    | Packing Plain Washer <sup>(4)</sup>     |                  |                  | ASTM F436 ZINC PLATED                                                            |                  |
|          |                                         |                  |                  | 410 ST ST HRC 35-45                                                              |                  |

### Notes:

1. For General Service only: Nace Non-Exposed per ANSI/NACE MR0175/ISO 15156-1.
2. For Sour Service only: Nace Exposed per ANSI/NACE MR0175/ISO 15156-1.
3. Blue is the standard coating color.
4. No equivalents allowed to maintain fugitive emissions certification and performance.

# Common Parts

| Ref. No. | Description       | -60°C<br>[-76°F] | Materials                                            | 180°C<br>[356°F] |
|----------|-------------------|------------------|------------------------------------------------------|------------------|
| B017     | Drive Nut         |                  | SOLUTION ANNEALED 316 STAINLESS STEEL HRc 22 MAXIMUM |                  |
| B703     | Serial Plate      |                  | GENERAL SERVICE ANNEALED 316L ST ST HRc 22 MAX       |                  |
| B704     | Flow Arrow        |                  | AUSTENITIC STAINLESS STEEL                           |                  |
| B902     | Drive Screw       |                  | AUSTENITIC STAINLESS STEEL                           |                  |
| B911     | Lifting Lugs      |                  | STAINLESS STEEL                                      |                  |
| B913     | Yoke/Bonnet Screw |                  | A4-80 (ISO 3506) 316L                                |                  |

## Dimensions

### API 10K & 15K Body S/A dimensions (inch)

| Valve body Size (NPS) | Valve Ends Size (NPS) | Body Type | Pressure Class | Number of Stages | Stem Dia. | Inlet Dia. | Outlet Dia. | Spud Dia.  | A    | A1    | B     | C     | D     |
|-----------------------|-----------------------|-----------|----------------|------------------|-----------|------------|-------------|------------|------|-------|-------|-------|-------|
| 1                     | 1-13/16" (1.8125)     | 78K Angle | API 10K        | 8                | 0.50      | 1.83       | 1.83        | 2.25-16 UN | 7.28 | 6.73  | 4.93  | 10.78 | 3.64  |
|                       |                       |           |                | 10               |           |            |             |            |      |       |       | 12.15 |       |
|                       |                       |           | API 15K        | 8                |           |            |             |            |      | 7.28  | 5.56  | 10.78 |       |
|                       |                       |           |                | 10               |           |            |             |            |      |       |       | 12.15 |       |
|                       |                       | 18K Globe | API 10K        | 8                |           |            |             |            |      | 6.73  | 3.91  | 10.78 |       |
|                       |                       |           |                | 10               |           |            |             |            |      |       |       | 12.15 |       |
|                       |                       |           | API 15K        | 8                |           |            |             |            |      | 7.28  | 4.65  | 10.78 |       |
|                       |                       |           |                | 10               |           |            |             |            |      |       |       | 12.15 |       |
|                       |                       |           | API 10K        | 8                |           |            |             |            |      |       |       | 38.70 | 11.81 |
|                       |                       |           |                | 10               |           |            |             |            |      |       |       | 44.20 |       |
|                       |                       |           |                | 8                |           |            |             |            |      | 20.67 | 11.81 | 38.70 |       |
|                       |                       |           |                | 10               |           |            |             |            |      |       |       | 44.20 |       |
|                       |                       |           | API 15K        | 8                |           |            |             |            |      | 19.57 | 12.48 | 38.70 |       |
|                       |                       |           |                | 10               |           |            |             |            |      |       |       | 44.20 |       |
|                       |                       |           |                | 8                |           |            |             |            |      | 20.67 | 12.51 | 38.70 |       |
|                       |                       |           |                | 10               |           |            |             |            |      |       |       | 44.20 |       |

### API 10K & 15K Body S/A dimensions (millimeter)

| Valve body Size (NPS) | Valve Ends Size (NPS) | Body Type | Pressure Class   | Number of Stages | Stem Dia. | Inlet Dia. | Outlet Dia. | Spud Dia.  | A      | A1      | B     | C     | D    |       |       |            |       |       |       |        |       |       |
|-----------------------|-----------------------|-----------|------------------|------------------|-----------|------------|-------------|------------|--------|---------|-------|-------|------|-------|-------|------------|-------|-------|-------|--------|-------|-------|
| 1                     | 1-13/16" (1.8125)     | 78K Angle | API 10K          | 8                | 12.7      | 46.5       | 46.5        | 2.25-16 UN | 184.9  | 171.0   | 125.2 | 273.8 | 92.5 |       |       |            |       |       |       |        |       |       |
|                       |                       |           |                  | 10               |           |            |             |            |        |         |       | 308.6 |      |       |       |            |       |       |       |        |       |       |
|                       |                       |           | API 15K          | 8                |           |            |             |            |        |         |       | 185.0 |      | 141.2 | 273.8 |            |       |       |       |        |       |       |
|                       |                       |           |                  | 10               |           |            |             |            |        |         |       |       |      |       | 308.6 |            |       |       |       |        |       |       |
|                       |                       | 18K Globe | API 10K          | 8                |           |            |             |            |        | 171.0   | 99.3  | 273.8 |      |       |       |            |       |       |       |        |       |       |
|                       |                       |           |                  | 10               |           |            |             |            |        |         |       | 308.6 |      |       |       |            |       |       |       |        |       |       |
|                       |                       |           | API 15K          | 8                |           |            |             |            |        |         |       | 185.0 |      | 118.1 | 273.8 |            |       |       |       |        |       |       |
|                       |                       |           |                  | 10               |           |            |             |            |        |         |       |       |      |       | 308.6 |            |       |       |       |        |       |       |
|                       |                       | 6         | 7-1/16" (7.0625) | 78K Angle        |           |            |             |            |        | API 10K | 8     | 28.6  |      | 180.1 | 180.1 | 3.75-12 UN | 600.0 | 497.0 | 300.0 | 983.0  | 300.0 |       |
|                       |                       |           |                  |                  |           |            |             |            |        |         | 10    |       |      |       |       |            |       |       |       | 1122.7 |       |       |
|                       |                       |           |                  |                  |           |            |             |            |        | API 15K | 8     |       |      |       |       |            |       |       |       | 525.0  |       | 983.0 |
|                       |                       |           |                  |                  |           |            |             |            |        |         | 10    |       |      |       |       |            |       |       |       |        |       |       |
| 18K Globe             | API 10K               |           |                  | 8                | 497.0     | 317.0      | 983.0       |            |        |         |       |       |      |       |       |            |       |       |       |        |       |       |
|                       |                       |           |                  | 10               |           |            | 1122.7      |            |        |         |       |       |      |       |       |            |       |       |       |        |       |       |
|                       | API 15K               |           |                  | 8                |           |            | 525.0       | 317.8      | 983.0  |         |       |       |      |       |       |            |       |       |       |        |       |       |
|                       |                       |           |                  | 10               |           |            |             |            | 1122.7 |         |       |       |      |       |       |            |       |       |       |        |       |       |

# Weights and Center of Gravity

## Body S/A (lbs) / Center of Gravity (inches)

| Valve Body Size (NPS) | Valve Ends Size (NPS) | Body Type | Number of Stages | API 10K            |      |      | API 15K            |      |      |
|-----------------------|-----------------------|-----------|------------------|--------------------|------|------|--------------------|------|------|
|                       |                       |           |                  | 6BX Printed Flange |      |      | 6BX Printed Flange |      |      |
|                       |                       |           |                  | G                  | H    | Mass | G                  | H    | Mass |
| 1                     | 1-13/16" (1.8125)     | 78K Angle | 8                | 1.81               | 0.04 | 143  | 1.18               | 0.04 | 181  |
|                       |                       |           | 10               | 1.73               | 0.03 | 178  | 1.65               | 0.04 | 190  |
|                       |                       | 18K Globe | 8                | 2.27               | -    | 141  | 1.79               | -    | 161  |
|                       |                       |           | 10               | 2.81               | -    | 150  | 2.32               | -    | 170  |
| 6                     | 7"1/16 (7.0625)       | 78K Angle | 8                | 7.91               | 0.14 | 4111 | 9.16               | 0.13 | 4661 |
|                       |                       |           | 10               | 10.06              | 0.13 | 4440 | 11.57              | 0.12 | 5107 |
|                       |                       | 18K Globe | 8                | 5.28               | -    | 3666 | 9.13               | -    | 4636 |
|                       |                       |           | 10               | 7.60               | -    | 4032 | 11.69              | -    | 5079 |

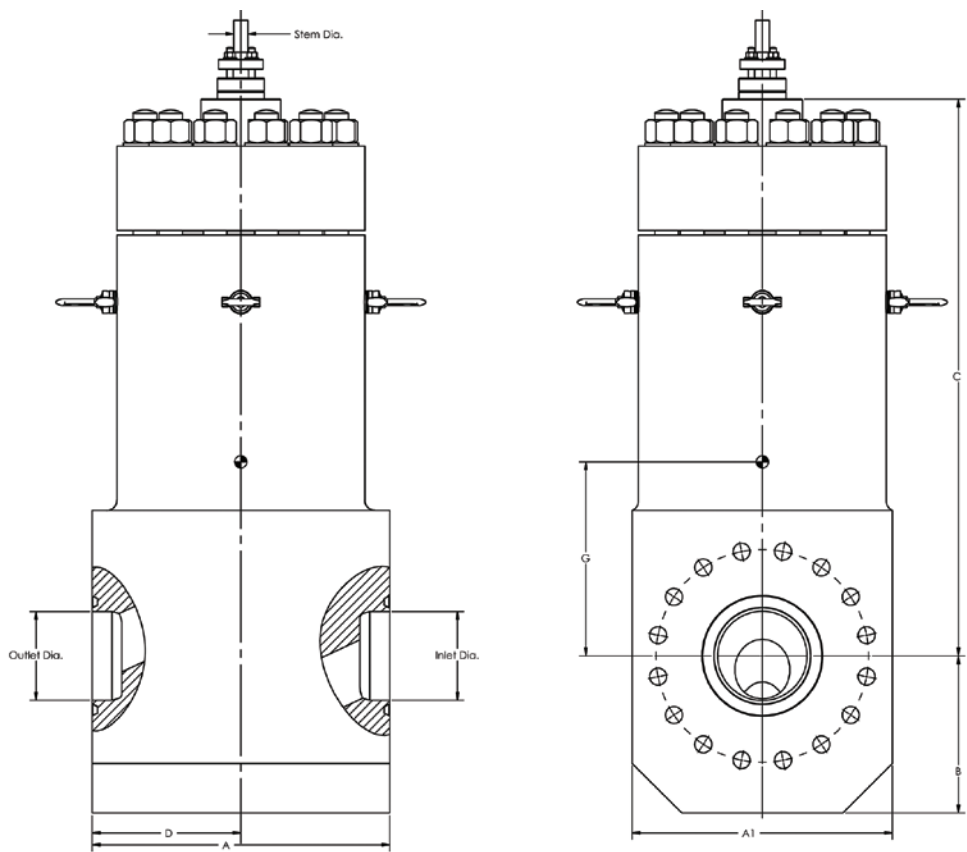
Note: Values in this table are estimates. Consult factory for detailed data.

## Body S/A (kg) / Center of Gravity (mm)

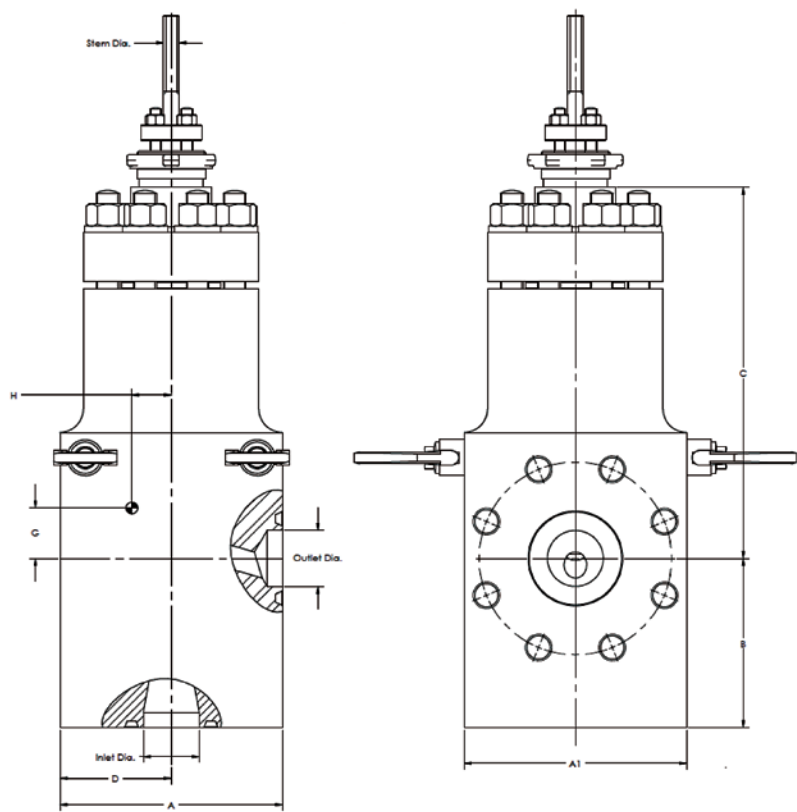
| Valve Body Size (NPS) | Valve Ends Size (NPS) | Body Type | Number of Stages | API 10K            |     |      | API 15K            |     |      |
|-----------------------|-----------------------|-----------|------------------|--------------------|-----|------|--------------------|-----|------|
|                       |                       |           |                  | 6BX Printed Flange |     |      | 6BX Printed Flange |     |      |
|                       |                       |           |                  | G                  | H   | Mass | G                  | H   | Mass |
| 1                     | 1-13/16" (1.8125)     | 78K Angle | 8                | 46                 | 1.0 | 65   | 30                 | 1.1 | 82   |
|                       |                       |           | 10               | 44                 | 0.9 | 81   | 42                 | 1.1 | 86   |
|                       |                       | 18K Globe | 8                | 58                 | -   | 64   | 46                 | -   | 73   |
|                       |                       |           | 10               | 161                | -   | 68   | 59                 | -   | 77   |
| 6                     | 7"1/16 (7.0625)       | 78K Angle | 8                | 201                | 3.5 | 1865 | 233                | 3.3 | 2114 |
|                       |                       |           | 10               | 256                | 3.3 | 2014 | 294                | 3.0 | 2316 |
|                       |                       | 18K Globe | 8                | 134                | -   | 1663 | 232                | -   | 2103 |
|                       |                       |           | 10               | 193                | -   | 1829 | 297                | -   | 2304 |

Note: Values in this table are estimates. Consult factory for detailed data.

# Dimensions

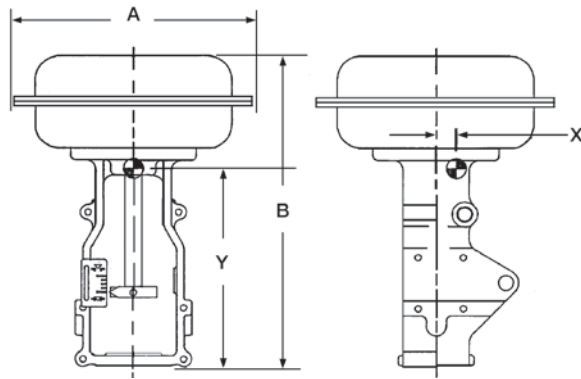


18400 Series API 6A Dimensions

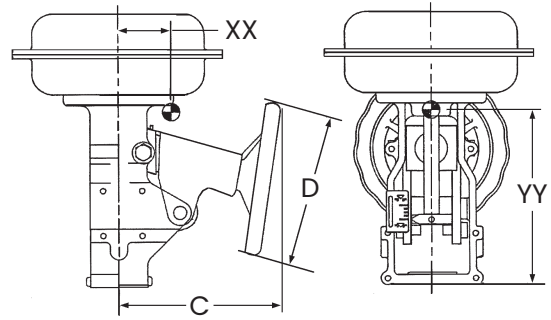


78400 Series API 6A Dimensions

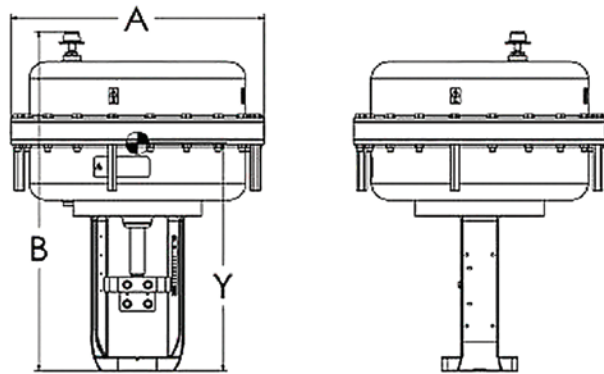
# 87/88 Series Actuator Weights & Dimensions (inches)



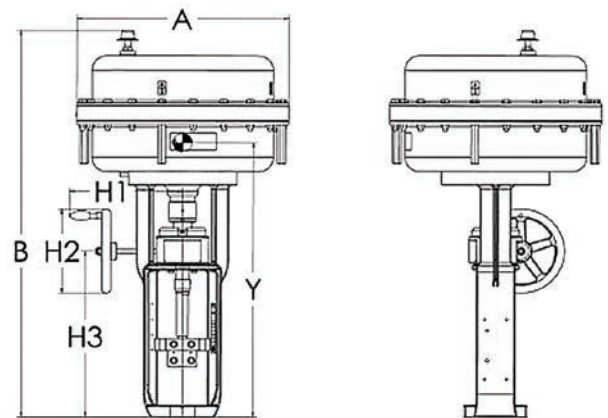
Shown without optional Handwheel



Shown with optional Handwheel



23L Shown without optional Handwheel



23L Shown with optional Handwheel

## Dimensions and Weights

| Actuator Size | Spring Range | Actuator Dimensions (inches) |               |      |    | H1   | H2  | Weights (lbs.) |             |
|---------------|--------------|------------------------------|---------------|------|----|------|-----|----------------|-------------|
|               |              | A                            | B (Model 88)  | C    | D  |      |     | Standard       | w/Handwheel |
| 6             | All          | 11.5                         | 15.54 (17.52) | 10   | 9  | -    | -   | 45             | 60          |
| 10            | All          | 14.5                         | 19.58 (21.54) | 10.9 | 12 | -    | -   | 85             | 105         |
| 16            | All          | 18.75                        | 28.22 (30.79) | 14   | 18 | -    | -   | 210            | 245         |
| 23            | All          | 21.63                        | 30.71 (33.27) | 16   | 18 | -    | -   | 265            | 320         |
| 23L           | 3-15, 6-30   | 21.63                        | 27.8 (30.00)  | -    | -  | 11.5 | 8.9 | 375            | 417         |
| 23L           | 11-23, 21-45 | 21.63                        | 38.55 (40.75) | -    | -  | 11.5 | 8.9 | 507            | 549         |

Actuator Removal Clearance = 6 inches

## Center of Gravity (inches) Without Handwheel

| Size             | X   | Y    |
|------------------|-----|------|
| 6                | 0.2 | 9.8  |
| 10               | 0.0 | 12.9 |
| 16               | 0.1 | 18.5 |
| 23               | 0.1 | 21.1 |
| 23L <sup>1</sup> | 0.0 | 20.1 |
| 23L <sup>2</sup> | 0.0 | 21.9 |

- Nominal spring ranges 3-15 & 6-30
- Nominal spring ranges 11-23 & 21-45

## With Handwheel

| Size             | XX  | YY   |
|------------------|-----|------|
| 6                | 1.3 | 9.1  |
| 10               | 0.9 | 12.0 |
| 16               | 1.4 | 16.7 |
| 23               | 1.4 | 19.0 |
| 23L <sup>1</sup> | 0.0 | 28.9 |
| 23L <sup>2</sup> | 0.0 | 30.7 |



# 87/88 Series Actuator Weights & Dimensions (inches)

## Limit Stops (inches)

### Up Stop

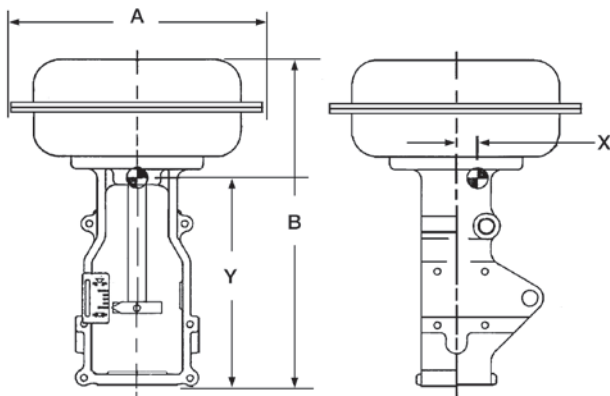
| Size             | Spring Range | Model | Overall Height B |
|------------------|--------------|-------|------------------|
| 6                | All          | 87    | 19.5             |
| 10               | All          |       | 25.4             |
| 16               | All          |       | 36.4             |
| 23               | All          |       | 38.8             |
| 23L <sup>1</sup> | 3-15, 6-30   |       | 38.4             |
| 23L <sup>1</sup> | 11-23, 21-45 |       | 41.3             |
| 23L <sup>2</sup> | 3-15, 6-30   |       | 49.1             |
| 23L <sup>2</sup> | 11-23, 21-45 |       | 52.1             |
| 6                | All          | 88    | 19.2             |
| 10               | All          |       | 25.1             |
| 16               | All          |       | 35.5             |
| 23               | All          |       | 35.5             |
| 23L <sup>1</sup> | 3-15, 6-30   |       | 38.4             |
| 23L <sup>1</sup> | 11-23, 21-45 |       | 41.3             |
| 23L <sup>2</sup> | 3-15, 6-30   |       | 49.1             |
| 23L <sup>2</sup> | 11-23, 21-45 |       | 52.1             |

1. Without Handwheel  
2. With Handwheel

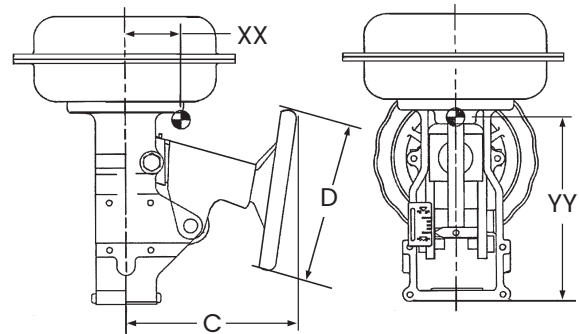
### Down Stop

| Size             | Spring Range | Model | Overall Height B |
|------------------|--------------|-------|------------------|
| 6                | All          | 87    | 19.8             |
| 10               | All          |       | 26.0             |
| 16               | All          |       | 37.2             |
| 23               | All          |       | 39.9             |
| 23L <sup>1</sup> | 3-15, 6-30   |       | 39.9             |
| 23L <sup>1</sup> | 11-23, 21-45 |       | 42.8             |
| 23L <sup>2</sup> | 3-15, 6-30   |       | 50.6             |
| 23L <sup>2</sup> | 11-23, 21-45 |       | 53.6             |
| 6                | All          | 88    | 19.7             |
| 10               | All          |       | 25.9             |
| 16               | All          |       | 37.5             |
| 23               | All          |       | 40.3             |
| 23L <sup>1</sup> | 3-15, 6-30   |       | 39.9             |
| 23L <sup>1</sup> | 11-23, 21-45 |       | 42.8             |
| 23L <sup>2</sup> | 3-15, 6-30   |       | 50.6             |
| 23L <sup>2</sup> | 11-23, 21-45 |       | 53.6             |

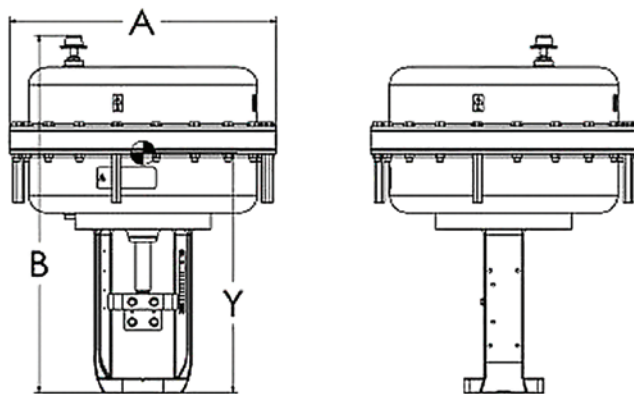
# 87/88 Series Actuator Weights & Dimensions (mm)



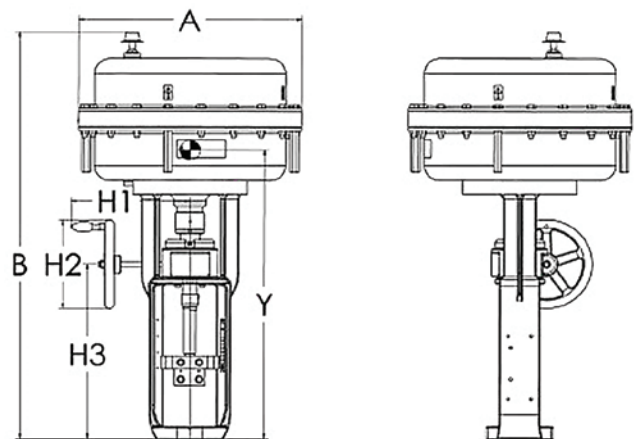
Shown without optional Handwheel



Shown with optional Handwheel



23L Shown without optional Handwheel



23L Shown with optional Handwheel

## Dimensions and Weights

| Actuator Size | Spring Range | Actuator Dimensions (mm) |              |     |     | H1  | H2  | Weights (kg) |             |
|---------------|--------------|--------------------------|--------------|-----|-----|-----|-----|--------------|-------------|
|               |              | A                        | B (Model 88) | C   | D   |     |     | Standard     | w/Handwheel |
| 6             | All          | 302                      | 395 (445)    | 254 | 229 | -   | -   | 20           | 27          |
| 10            | All          | 373                      | 497 (547)    | 277 | 305 | -   | -   | 39           | 48          |
| 16            | All          | 476                      | 717 (782)    | 356 | 457 | -   | -   | 95           | 111         |
| 23            | All          | 549                      | 780 (845)    | 406 | 457 | -   | -   | 120          | 145         |
| 23L           | 3-15, 6-30   | 549                      | 706 (762)    | -   | -   | 292 | 225 | 170          | 189         |
| 23L           | 11-23, 21-45 | 549                      | 781 (837)    | -   | -   | 292 | 225 | 230          | 249         |

Actuator Removal Clearance = 150 mm

## Center of Gravity (mm)

### Without Handwheel

| Size             | X | Y   |
|------------------|---|-----|
| 6                | 5 | 248 |
| 10               | 0 | 327 |
| 16               | 3 | 470 |
| 23               | 2 | 537 |
| 23L <sup>1</sup> | 0 | 511 |
| 23L <sup>2</sup> | 0 | 557 |

- Nominal spring ranges 3-15 & 6-30
- Nominal spring ranges 11-23 & 21-45

### With Handwheel

| Size             | XX | YY  |
|------------------|----|-----|
| 6                | 32 | 232 |
| 10               | 22 | 305 |
| 16               | 35 | 425 |
| 23               | 35 | 483 |
| 23L <sup>1</sup> | 0  | 734 |
| 23L <sup>2</sup> | 0  | 780 |

# 87/88 Series Actuator Weights & Dimensions (mm)

## Limit Stops (mm)

### Up Stop

| Size             | Spring Range | Model | Overall Height B |
|------------------|--------------|-------|------------------|
| 6                | All          | 87    | 494              |
| 10               | All          |       | 646              |
| 16               | All          |       | 925              |
| 23               | All          |       | 987              |
| 23L <sup>1</sup> | 3-15, 6-30   |       | 975              |
| 23L <sup>1</sup> | 11-23, 21-45 |       | 1050             |
| 23L <sup>2</sup> | 3-15, 6-30   |       | 1248             |
| 23L <sup>2</sup> | 11-23, 21-45 |       | 1323             |
| 6                | All          | 88    | 487              |
| 10               | All          |       | 636              |
| 16               | All          |       | 901              |
| 23               | All          |       | 982              |
| 23L <sup>1</sup> | 3-15, 6-30   |       | 975              |
| 23L <sup>1</sup> | 11-23, 21-45 |       | 1050             |
| 23L <sup>2</sup> | 3-15, 6-30   |       | 1248             |
| 23L <sup>2</sup> | 11-23, 21-45 |       | 1323             |

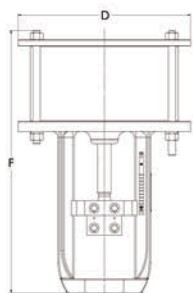
1. Without Handwheel

2. With Handwheel

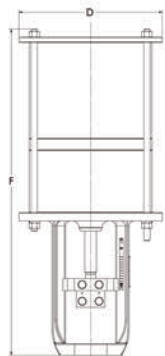
### Down Stop

| Size             | Spring Range | Model | Overall Height B |
|------------------|--------------|-------|------------------|
| 6                | All          | 87    | 503              |
| 10               | All          |       | 660              |
| 16               | All          |       | 945              |
| 23               | All          |       | 1014             |
| 23L <sup>1</sup> | 3-15, 6-30   |       | 1013             |
| 23L <sup>1</sup> | 11-23, 21-45 |       | 1088             |
| 23L <sup>2</sup> | 3-15, 6-30   |       | 1286             |
| 23L <sup>2</sup> | 11-23, 21-45 |       | 1361             |
| 6                | All          | 88    | 501              |
| 10               | All          |       | 657              |
| 16               | All          |       | 952              |
| 23               | All          |       | 1024             |
| 23L <sup>1</sup> | 3-15, 6-30   |       | 1013             |
| 23L <sup>1</sup> | 11-23, 21-45 |       | 1088             |
| 23L <sup>2</sup> | 3-15, 6-30   |       | 1286             |
| 23L <sup>2</sup> | 11-23, 21-45 |       | 1361             |

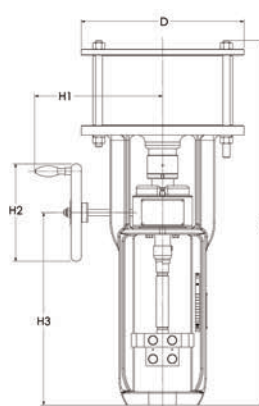
# 51/52/53 Series Actuator Weights & Dimensions



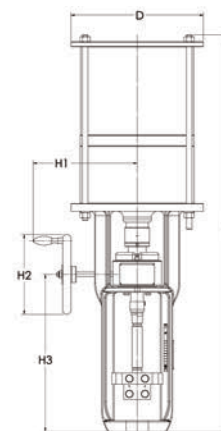
Without Handwheel  
Without Volume Chamber



Without Handwheel  
With Volume Chamber



With Handwheel  
Without Volume Chamber



With Handwheel  
With Volume Chamber

## Model 51 Dimensional Data

Inches (mm)

| Size | D          | H1         | H2        | H3         |
|------|------------|------------|-----------|------------|
| 12   | 14.7 (373) | 11.5 (292) | 8.9 (225) | 17.4 (443) |
| 16   | 18.1 (461) | 13.4 (340) | 11 (280)  | 21.7 (553) |
| 20   | 22.6 (573) | 13.4 (340) | 11 (280)  | 22.1 (563) |
| 24   | 18.1 (461) | 13.4 (340) | 11 (280)  | 22.1 (563) |
| 28   | 22.6 (573) | 13.4 (340) | 11 (280)  | 22.1 (563) |
| 32   | 26.4 (670) | 13.4 (340) | 11 (280)  | 22.2 (564) |

| Actuator Type                                    | Actuator Size | Dimension F inches (mm)             |             |             |             |             |             |
|--------------------------------------------------|---------------|-------------------------------------|-------------|-------------|-------------|-------------|-------------|
|                                                  |               | Nominal Actuator Travel inches (mm) |             |             |             |             |             |
|                                                  |               | 2.5 (63.5)                          | 4 (101.6)   | 6 (152.4)   | 8 (203.2)   | 10 (254)    | 12 (304.8)  |
| Standard                                         | 12            | -                                   | 23.0 (584)  | -           | -           | -           | -           |
|                                                  | 16            | 24.7 (628)                          | 26.2 (666)  | 28.2 (717)  | 36.2 (920)  | 38.2 (971)  | 42.2 (1073) |
|                                                  | 20            | 25.4 (645)                          | 26.9 (683)  | 28.9 (734)  | 36.7 (931)  | 38.7 (982)  | 45.0 (1142) |
|                                                  | 24            | 33.1 (842)                          | 36.1 (918)  | 40.1 (1020) | 48.1 (123)  | 52.1 (1324) | 60.2 (1528) |
|                                                  | 28            | 34.3 (870)                          | 37.3 (946)  | 52.2 (1326) | 49.3 (1251) | 53.3 (1353) | 61.3 (1556) |
|                                                  | 32            | 42.7 (1085)                         | 45.7 (1161) | 49.7 (1262) | 57.8 (1467) | 61.8 (1569) | 69.8 (1773) |
| Standard with Integral Volume Tank               | 12            | -                                   | 34.0 (864)  | -           | -           | -           | -           |
|                                                  | 16            | 35.8 (908)                          | 37.3 (946)  | 39.3 (997)  | -           | -           | -           |
|                                                  | 20            | 36.0 (915)                          | 37.5 (953)  | 39.5 (1004) | -           | -           | -           |
| Standard with Handwheel                          | 12            | -                                   | 33.7 (857)  | -           | -           | -           | -           |
|                                                  | 16            | 40.6 (1031)                         | 42.1 (1069) | 44.1 (1119) | 59.3 (1506) | 61.3 (1557) | 69.3 (1760) |
|                                                  | 20            | 41.2 (1048)                         | 42.7 (1086) | 44.7 (1136) | 59.6 (1513) | 61.6 (1564) | 69.6 (1767) |
|                                                  | 24            | 48.2 (1224)                         | 51.2 (1301) | 55.2 (1402) | 71.2 (1808) | 75.2 (1910) | 85.2 (2164) |
|                                                  | 28            | 49.2 (1249)                         | 52.2 (1326) | 53.2 (1427) | 72.1 (1831) | 76.1 (1933) | 86.1 (2187) |
|                                                  | 32            | 56.6 (1440)                         | 59.7 (1516) | 63.7 (1617) | 79.7 (2025) | 83.7 (2126) | 93.7 (2381) |
| Standard with Integral Volume Tank and Handwheel | 12            | -                                   | 44.8 (1137) | -           | -           | -           | -           |
|                                                  | 16            | 51.6 (1311)                         | 53.1 (1349) | 55.1 (1399) | -           | -           | -           |
|                                                  | 20            | 51.9 (1318)                         | 53.4 (1356) | 55.4 (1406) | -           | -           | -           |

# 51/52/53 Series Actuator Weights & Dimensions

## Model 52 and 53 Dimensional Data

Inches (mm)

| Size | D           | H1          | H2          | H3          |
|------|-------------|-------------|-------------|-------------|
| 12   | 14.69 (373) | 11.50 (292) | 8.86 (225)  | 17.44 (443) |
| 16   | 18.15 (461) | 13.39 (340) | 11.02 (280) | 21.77 (553) |
| 20   | 22.56 (573) | 13.39 (340) | 11.02 (280) | 22.17 (563) |

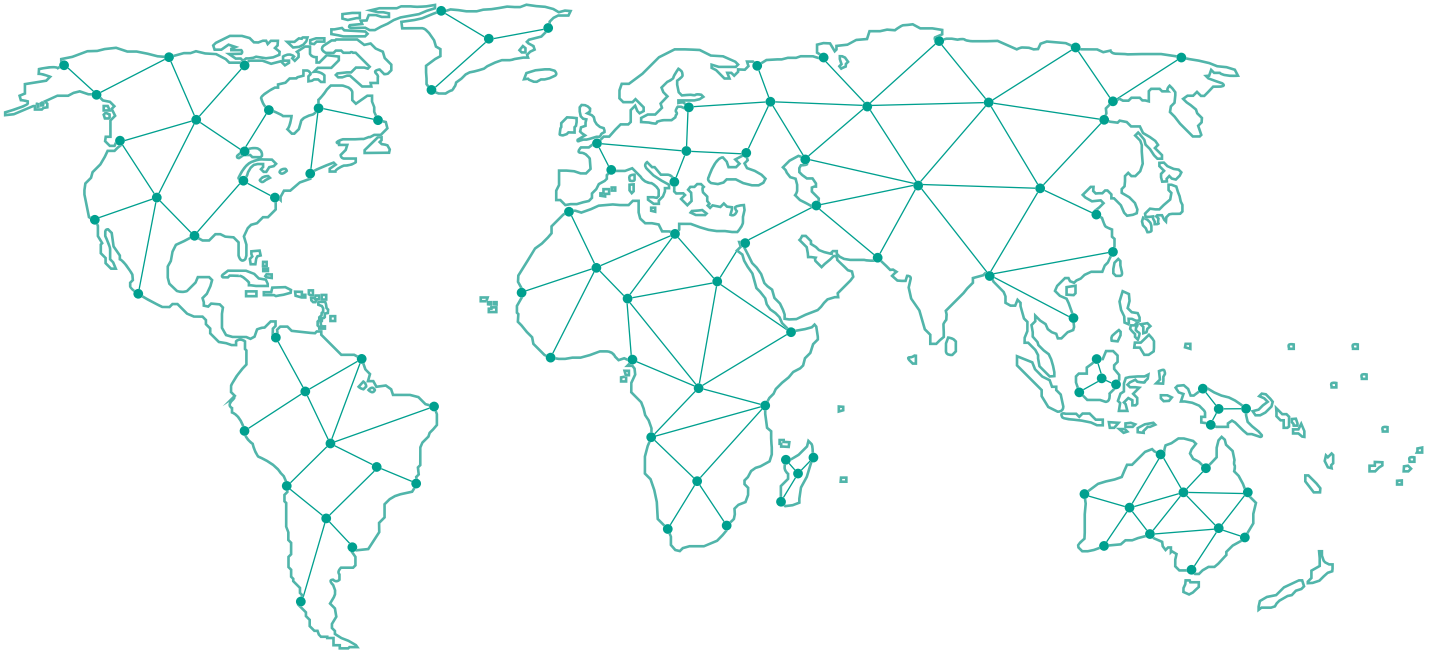
| Actuator Type           | Actuator Size | Dimension F in (mm)              |              |              |
|-------------------------|---------------|----------------------------------|--------------|--------------|
|                         |               | Nominal Actuator Travel In. (mm) |              |              |
|                         |               | 2.5 (63.5)                       | 4 (101.6)    | 6 (152.4)    |
| Standard                | 12            | -                                | 39.1 (993.8) | -            |
|                         | 16            | 39.5 (1003)                      | 44 (1117)    | 50 (1269)    |
|                         | 20            | 41.1 (1045)                      | 45.6 (1159)  | 51.6 (1311)  |
| Standard with Handwheel | 12            | -                                | 49.9 (1267)  | -            |
|                         | 16            | 55.3 (1406)                      | 59.8 (1520)  | 65.8 (1671)  |
|                         | 20            | 64.6 (1642)                      | 69.1 (1756)  | 75.11 (1908) |





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