

Masoneilan™ 78400/18400 Series LincolnLog™

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

Integrated smart
engineered solutions
for severe service
applications

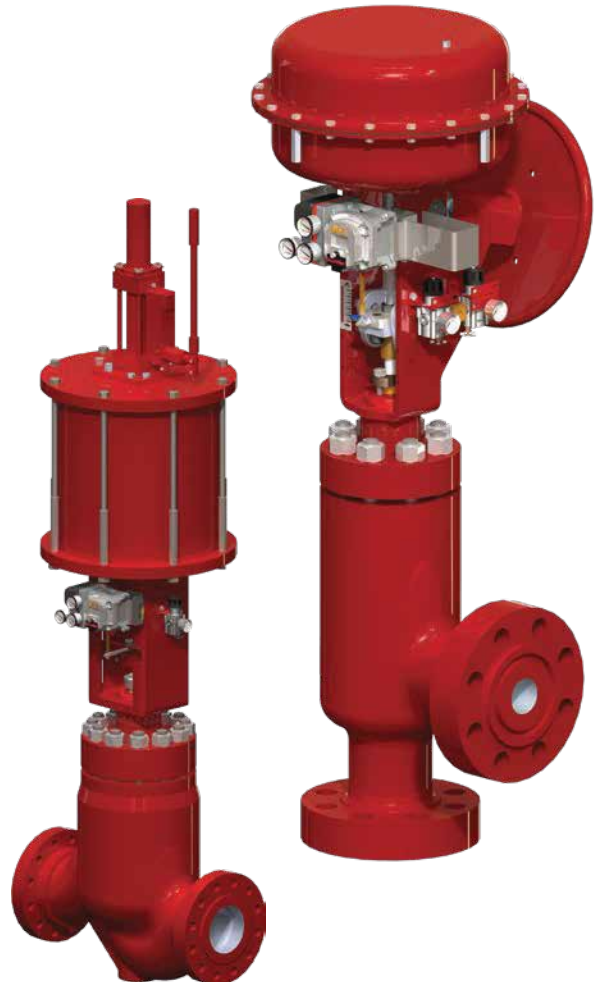
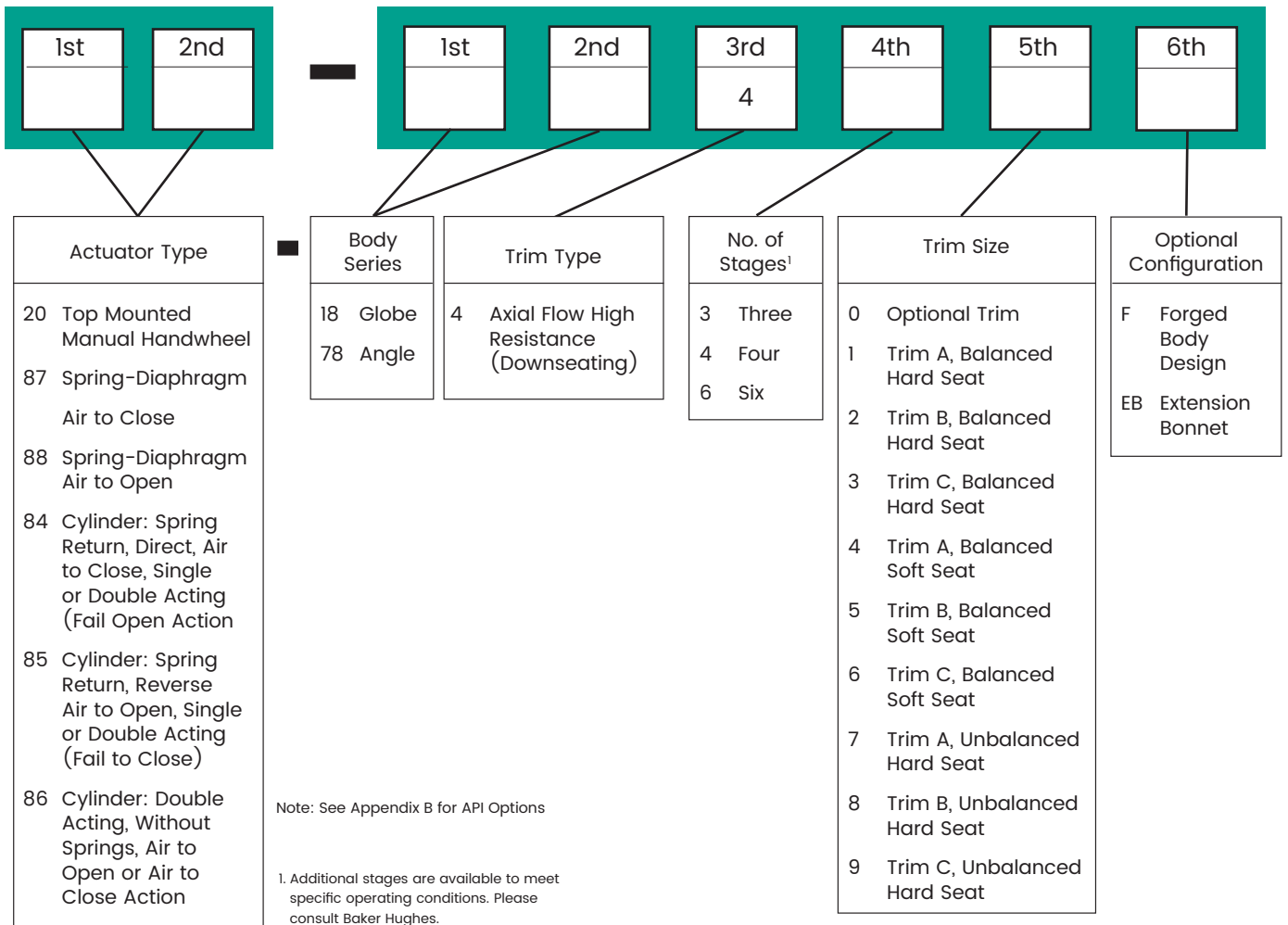


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Numbering System



Temperature Range/Seat Leakage

Valve Sizes		Trim Type	Seat Type	Temperature Range ¹		Seat Leakage Class ²
inches	DN			min.	max. ⁴	
1	25	Unbalanced	Metal Seat	-20°F (-29°C)	600°F (316°C)	V ³
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.

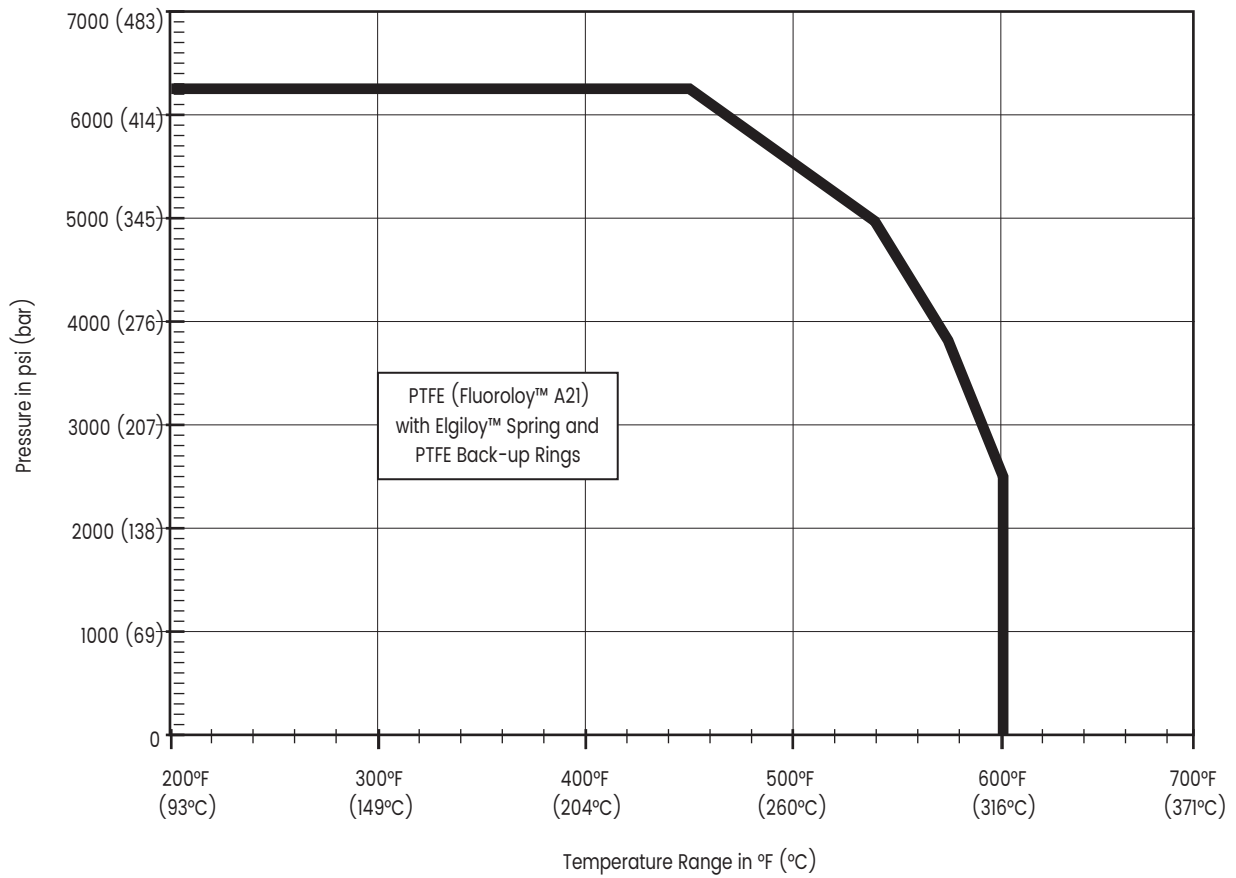
2. Seat leakage class ratings per IEC 534-4 and ASME/FCI 70.2. Class V seat leakage is standard and Class VI is optional.

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 ¹		Pressure Class ²			
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_L

Standard Capacity – 3-Stage Design

Flow Characteristic: Modified Linear

Valve Size		Orifice Diameter		Travel		Trim C		Min. Cont. C_v
inches	DN	inches	mm	inches	mm	C_v	F_L	
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_v
inches	DN	inches	mm	inches	mm	C_v	F_L	C_v	F_L	C_v	F_L	
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

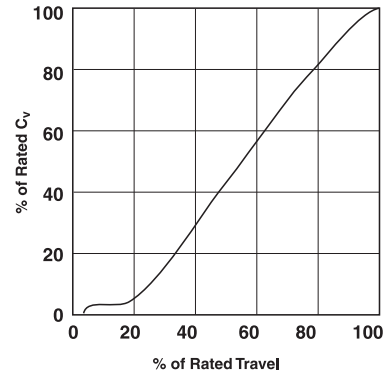
Valve Size		Orifice Diameter		Travel		Trim A		Trim B		Trim C		Min. Cont. C_v
inches	DN	inches	mm	inches	mm	C_v	F_L	C_v	F_L	C_v	F_L	
1	25	.70	17.8	.25	6.35	.80	.998	1.0	.997	1.4	.994	.03
1.5	40	1.00	25.4	.25	6.35	1.4	.998	1.8	.997	2.5	.994	.05
2	50	1.50	38.1	.38	9.65	3.5	.998	4.5	.997	6.5	.994	.08
3	80	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



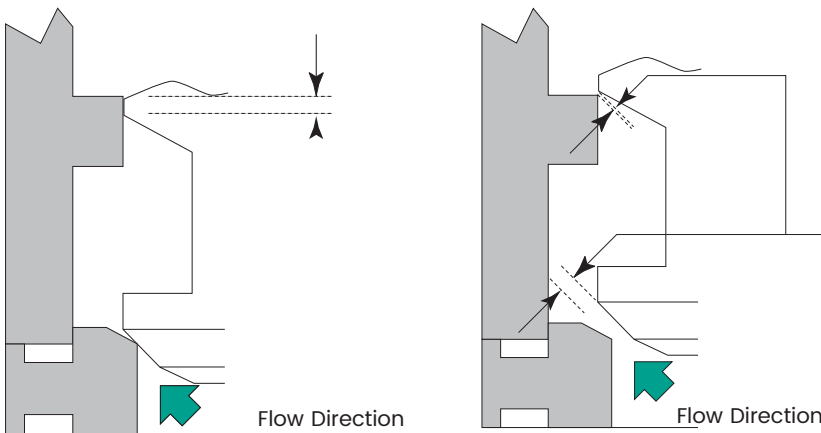
Percent Max. Opening	5	10	20	30	40	50	60	70	80	90	100
Percent Max. C	•	•	3	15	27	39	52	64	76	88	100

• 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 ΔP per stage are 800 psi (60 bar) for continuous duty cycle applications and up to 1000 psi (70 bar) ΔP per stage for intermittent service. The recommended operating throttling ΔP 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

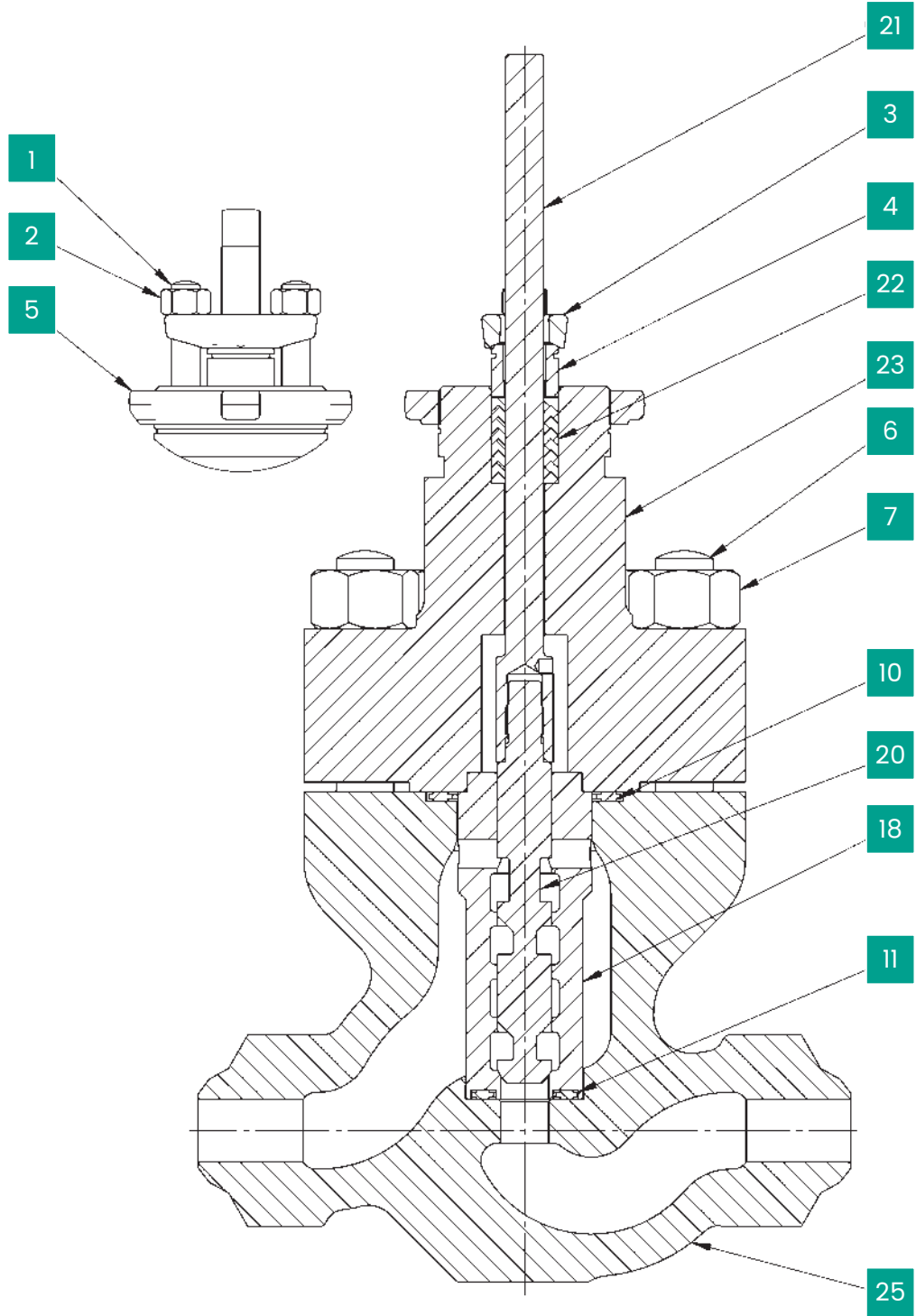
Trim Type	No. of Stages	Staging Ratios ^{1, 2}	Pressure Drop per Stage ³		Maximum Recommended Throttling ΔP			
			Stages	Fraction of Total ΔP	Continuous Service		Intermittent Service	
					psi	bar	psi	bar
C	3	1-1-2	1 to 2	.44	1595	110	2030	140
			3	.11				
C	4	1-1-1-2	1 to 3	.31	2248	155	2900	200
			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.

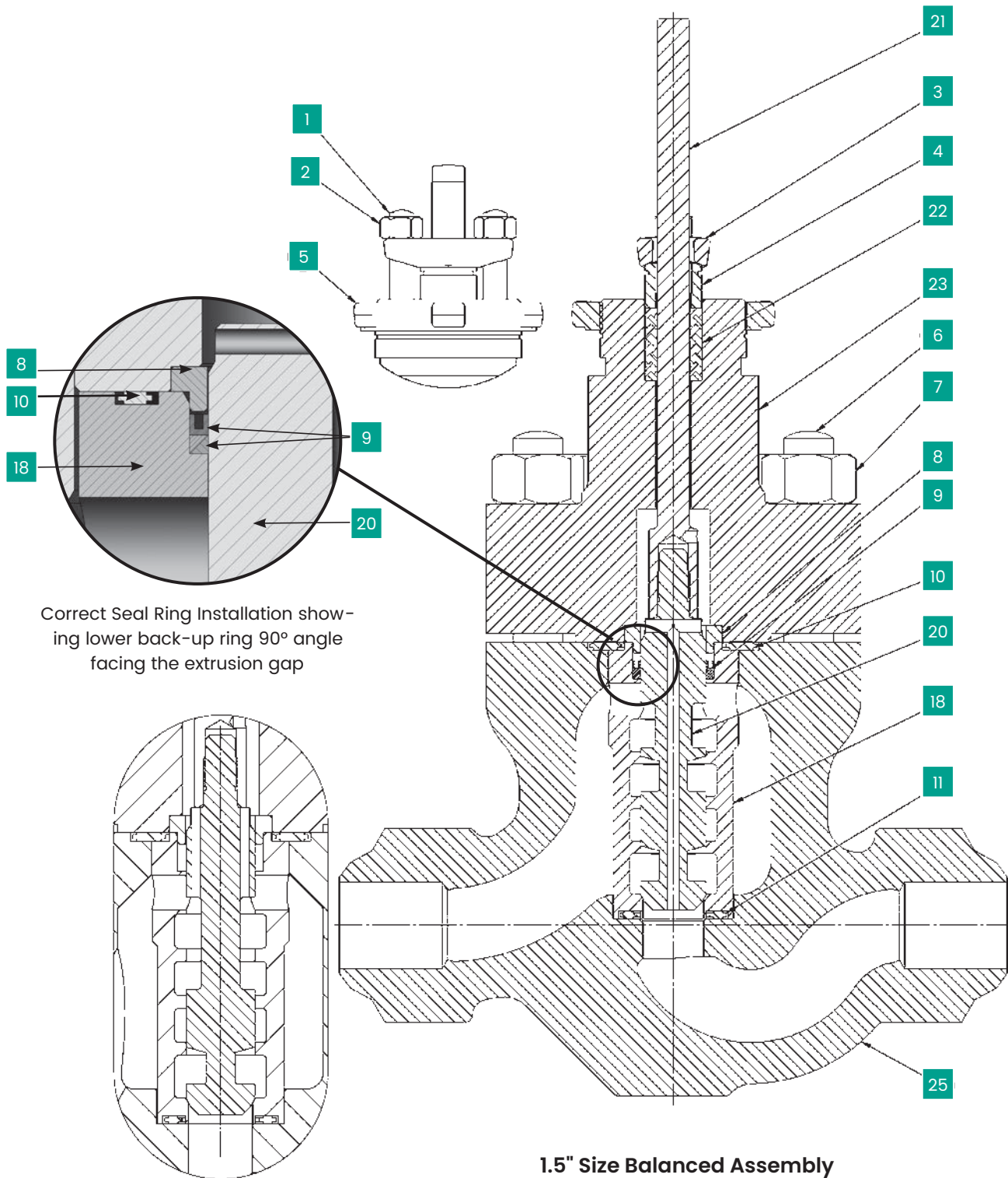
3. Recommended limits for ΔP per stage are 800 psi (60 bar) for continuous duty cycle applications and up to 1000 psi (70 bar) ΔP per stage for intermittent service.

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)¹

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 ²	316 St. St. ASTM A479 TY 316		
9	Balance Seal and Back-up Rings ^{3,4}	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)²

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 ²	316 St. St. ASTM A479 TY 316		
9	Balance Seal and Back-up Rings ^{3&4}	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.

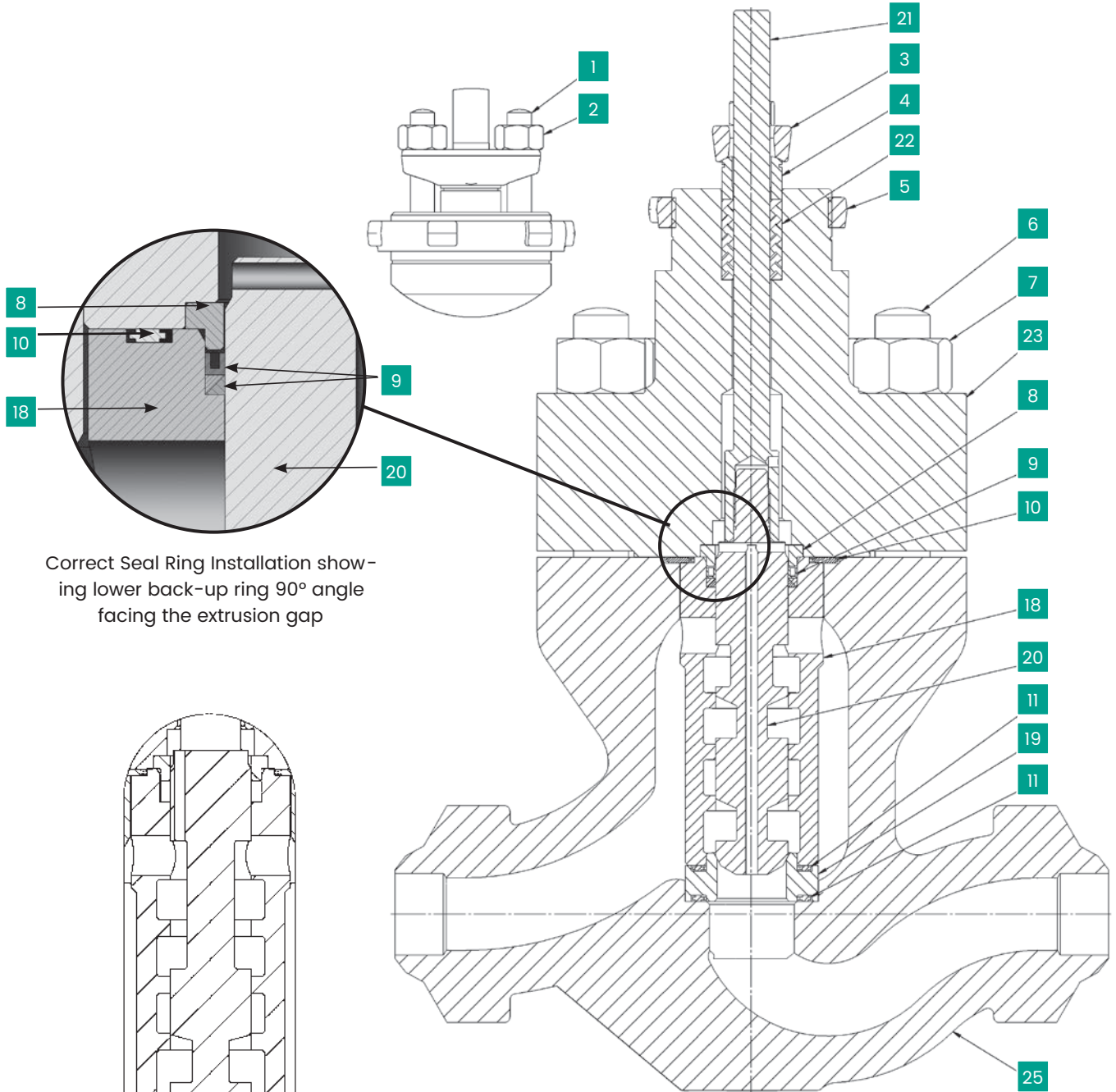
3. The seal retainer is not required for the 1" (DN 25) size.

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.

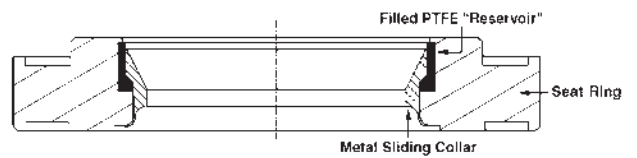
Materials of Construction



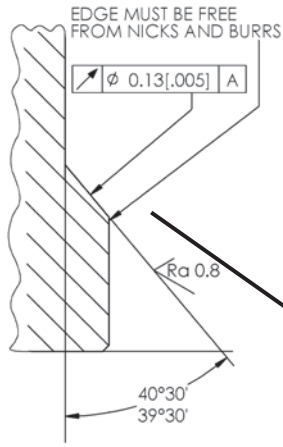
Correct Seal Ring Installation showing lower back-up ring 90° angle facing the extrusion gap

2" Size Unbalanced Trim Detail

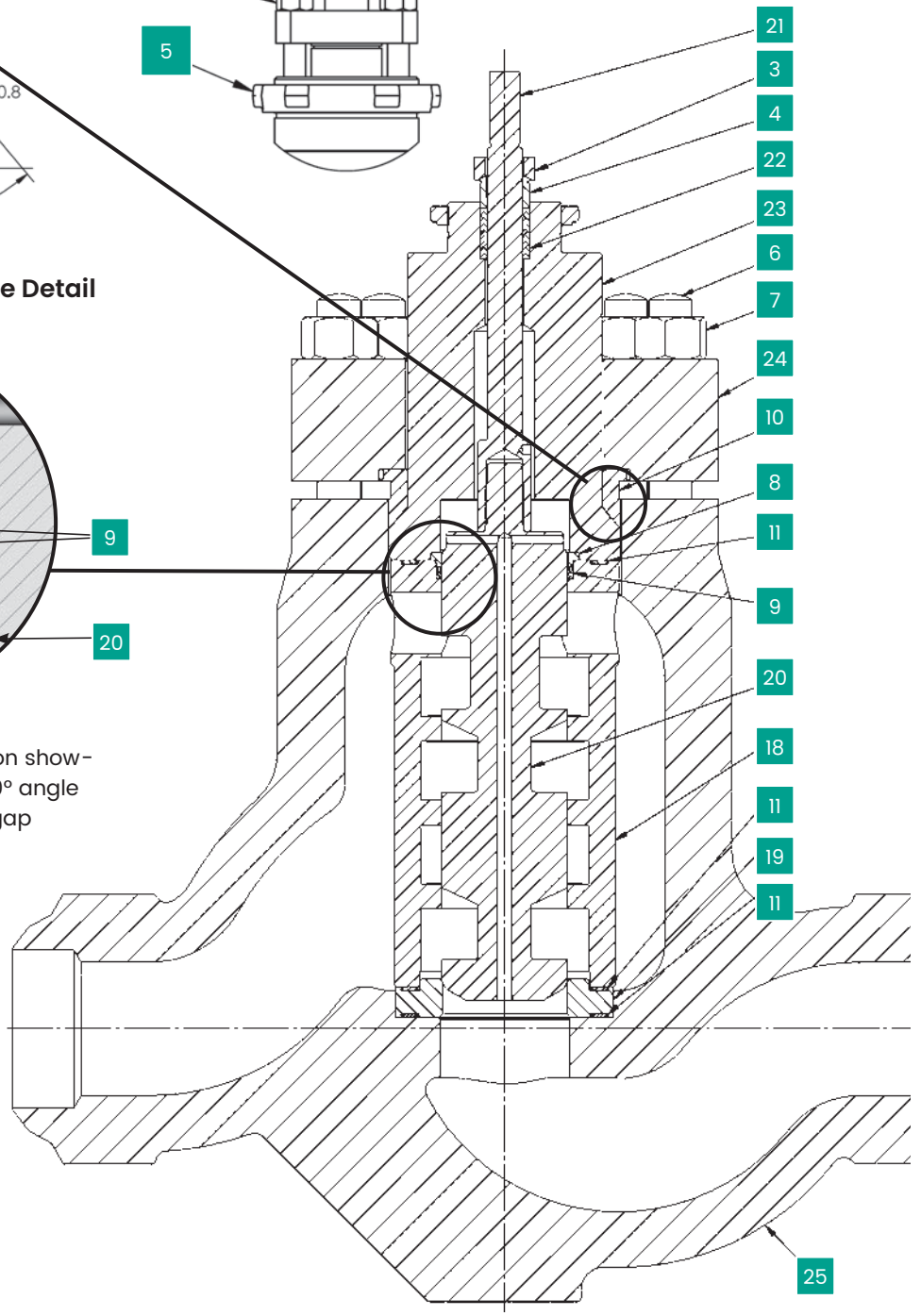
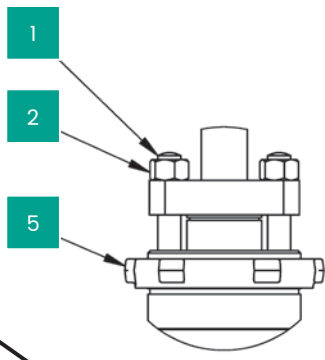
2" Size Balanced Assembly



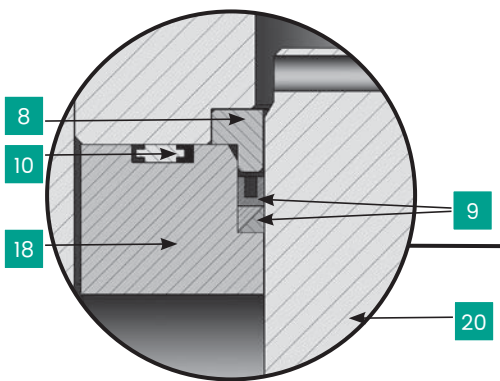
Soft Seat Option



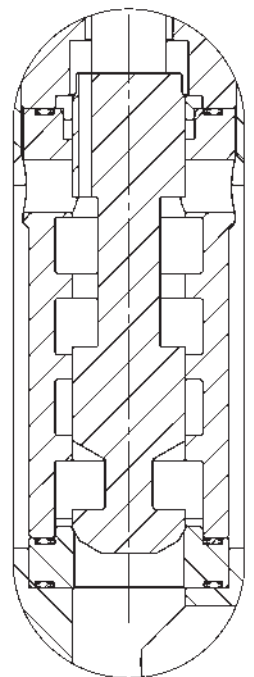
Bonnet Seating Angle Detail



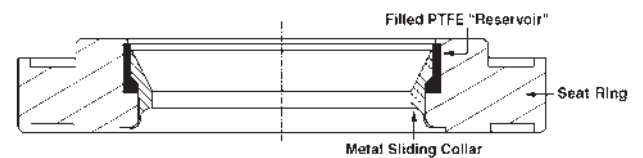
3" to 8" Size Balanced Assembly



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



3" to 8" Size Unbalanced Trim Detail



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 ²	316 St. St. ASTM A479 TY 316		
9	Balance Seal and Back-up Rings ^{3,4}	PTFE (Fluoroloy A21) with Elgiloy Spring and PTFE Back-up Rings		
10	Body Gasket ³ (2" Size)	316L St. St. w/Flexible Graphite Filler (Spiral Wound)		
	Metal Seal ⁴ (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 ³	Carbon Steel ASTM A216 Grade WCC		
24	Bonnet Flange ⁴ (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

- The balance seal is not required for the unbalanced construction.
- See Page 4 for balance seal pressure and temperature limits.
- 2" size valve bonnet includes an integral flange and requires a bonnet gasket.
- 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 NACE¹ 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 ²	316 St. St. ASTM A479 TY 316		
9	Balance Seal and Back-up Rings ^{3&4}	PTFE (Fluoroloy A21) with Elgiloy Spring and PTFE Back-up Rings		
10	Body Gasket ³ (2" Size)	316L St. St. w/Flexible Graphite Filler (Spiral Wound)		
	Metal Seal ⁴ (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 ³	Carbon Steel ASTM A216 Grade WCC		
24	Bonnet Flange ⁴ (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.

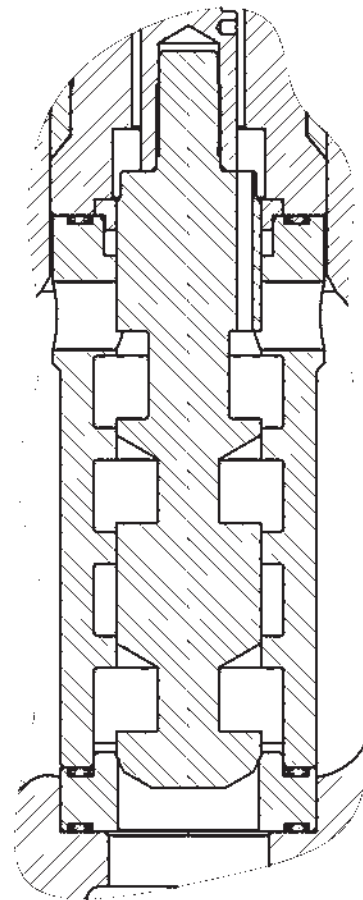
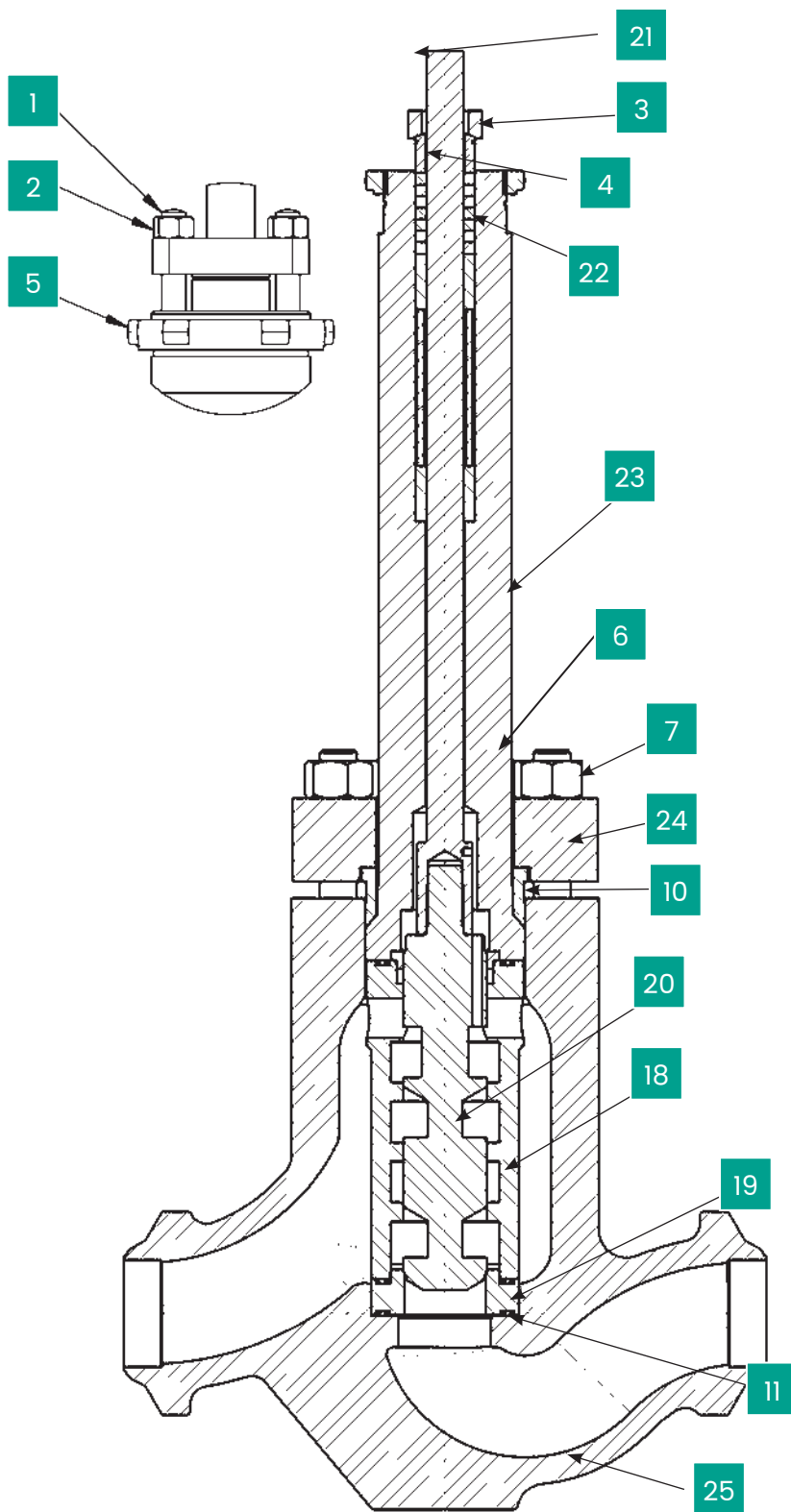
5. 3" to 8" size valves use separate bonnet flanges and a metal seal joint design.



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. HI075		
		NACE - 17-4 PH St. St. ASTM A564 GR 630 Cond. HI150M		
19B	Soft Seat Insert	Glass Reinforced PTFE (Fluorogold™)		
19C	Sliding Collar	Standard - 17-4 PH St. St. ASTM A564 GR 630 Cond. HI075		
		NACE - 17-4 PH St. St. ASTM A564 GR 630 Cond. HI150M		
20	Plug ²	440B or 440C St. St. ASTM A276		
22	Packing ³	Low-E Packing ⁴		
		PTFE with Carbon Fiber		
		Flexible Graphite		
23	Valve Bonnet ⁵	316 St. St. ASTM A351 GR CF8M		
		Chrome-Moly Steel ASTM A217 GR WC9		
25	Valve Body ⁵	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 Materials¹

Ref. No.	Temperature Range	-20°F	600°F
	Description	Optional Materials	
18	Liner ² or Liner with Integral Seat	Ferrallium™ 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 ³	Ferrallium 255 ASTM A479 Duplex St. Steel	
		316 St. St. ASTM A479 TY316 with Boronizing	
		410 St. St. ASTM A479 TY410 with Boronizing	
20	Plug ⁴	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

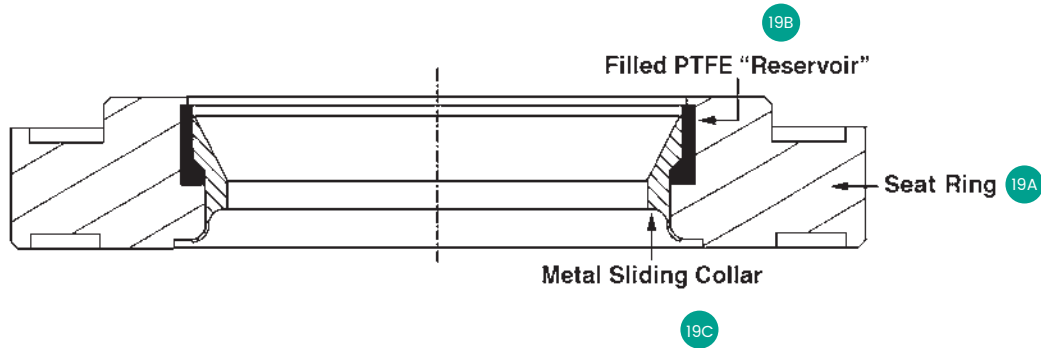
1. Listed are typical optional materials for refining applications, including sour water letdown, cold high-pressure liquid letdown, and amine service.
2. Material noted is recommended for the separate liner (2" to 8" sizes) or the liner with integral seat ring (1" and 1.5" sizes).
3. The standard 316 St. St. hard-faced seat ring can be applied in most of the refining applications noted except for amine service. Ferrallium 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

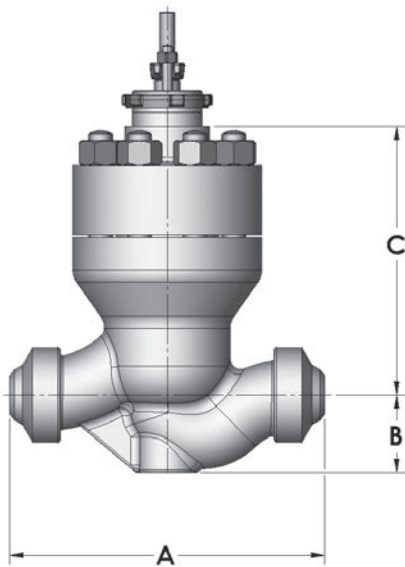
elastomer seat as the valve is throttling. As the valve plug returns to the closed position, it moves the metal collar down to expose the filled PTFE "Reservoir" creating the soft seat interface. Combined with the LincolnLog trim overlap feature, the soft seat design will provide long-term dependable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



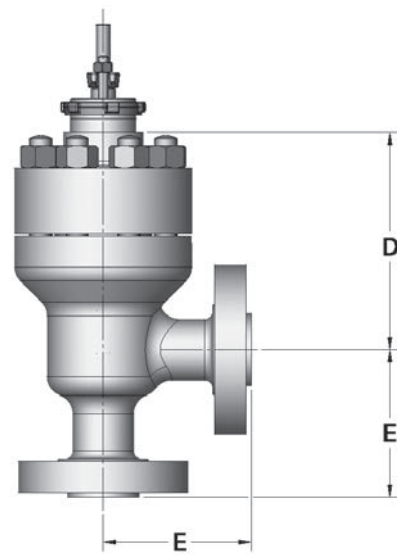
Soft Seat Option

Dimensions (inches)

Cast Globe Style



Cast Angle Style



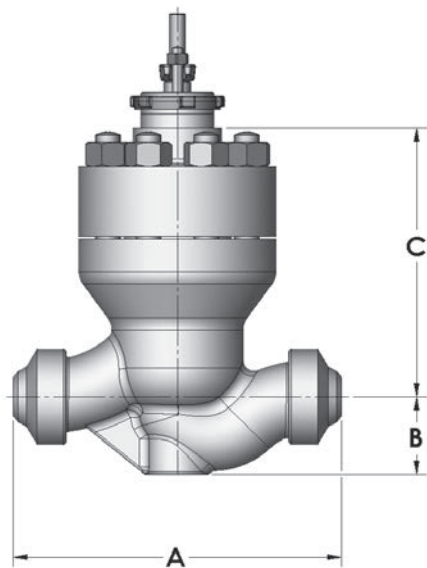
**18400/78400 Series Cast Body Dimensions (inches)
ASME Class 600 through 2500 and equivalent PN**

Valve Size (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

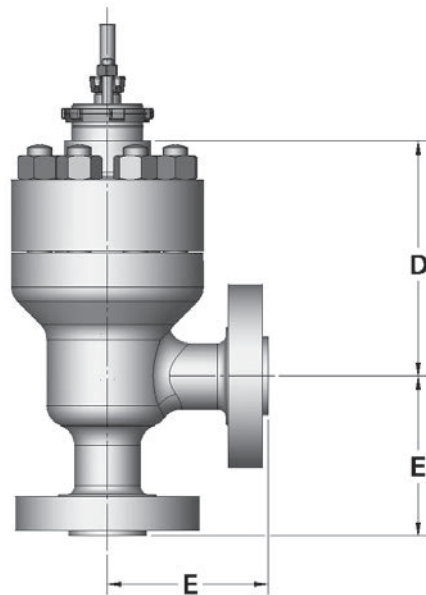
Valve Size (inches)	B							
	ASME Class 600-1500		ASME Class 2500		ASME Class 600	ASME Class 900	ASME Class 1500	ASME Class 2500
	BW	SW & THD	BW	SW & THD	RF & RTJ	RF & RTJ	RF & RTJ	RF & RTJ
1	1.97	1.97	1.97	1.97	2.44	2.94	2.94	3.13
1.5	2.62	2.62	2.62	2.62	3.06	3.50	3.50	4.00
2	3.64	3.64	3.64	3.64	3.25	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



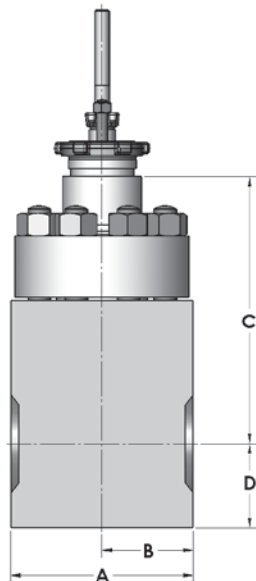
**18400/78400 Series Cast Body Dimensions (inches)
ASME Class 600 through 2500 and equivalent PN**

Valve Size (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

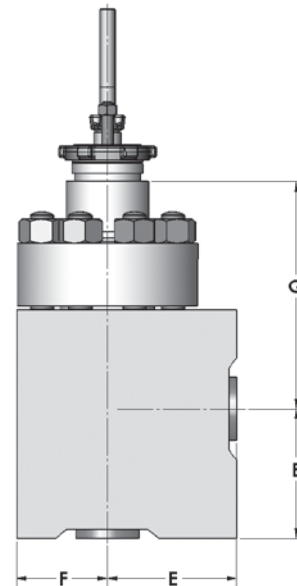
Valve Size (inches)	E													
	ASME Class 600-900		ASME Class 1500		ASME Class 2500		ASME Class 600		ASME Class 900		ASME Class 1500		ASME Class 2500	
	BW	SW & THD	BW	SW & THD	BW	SW & THD	RF	RTJ	RF	RTJ	RF	RTJ	RF	RTJ
1	3.87	3.87	3.87	3.87	4.25	4.25	5.75	5.75	5.75	5.75	5.75	5.75	6.06	6.06
1.5	4.63	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

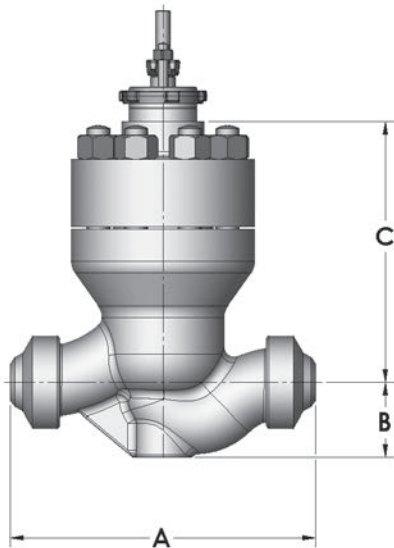
Valve Size (inches)	A		B		C				D	
	ASME Class 600-2500		ASME Class 600-2500		Standard Bonnet		Extension Bonnet		ASME Class 600-2500	
	RF, RTJ & BW	SW & THD	RF, RTJ & BW	SW & THD	3 & 4 STAGE	6 STAGE	3 & 4 STAGE	6 STAGE	RF, RTJ & BW	SW & THD
1	6.00	6.00	3.00	3.00	8.82	10.20	11.26	14.22	2.78	2.78
1.5	8.50	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

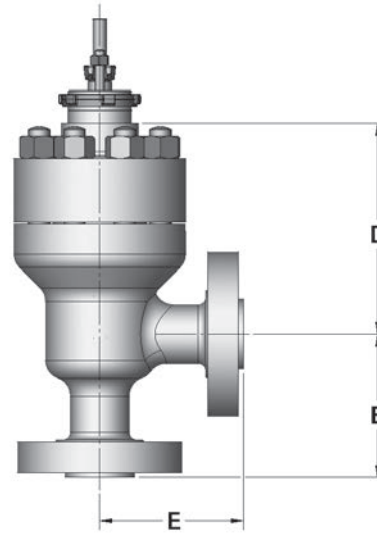
Valve Size (inches)	E		F		G			
	ASME Class 600-2500		ASME Class 600-2500		Standard Bonnet		Extension Bonnet	
	RF, RTJ & BW	SW & THD	RF, RTJ & BW	SW & THD	3 & 4 STAGE	6 STAGE	3 & 4 STAGE	6 STAGE
1	4.12	4.12	2.89	2.89	7.24	8.62	11.26	12.63
1.5	4.94	4.94	3.56	3.56	7.15	8.53	11.17	12.55
2	5.75	5.75	4.49	4.49	10.61	12.36	15.57	17.50
3	7.50		5.35		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



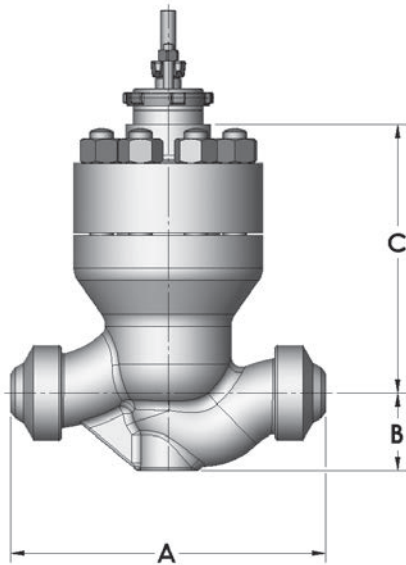
18400/78400 Series Cast Body Dimensions (mm)
ASME Class 600 through 2500 and equivalent PN

Valve Size (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

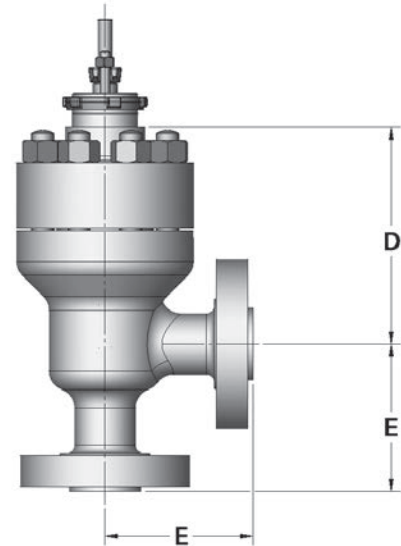
Valve Size (inches)	B							
	ASME Class 600-2500		ASME Class 600-2500		ASME Class 600	ASME Class 900	ASME Class 1500	ASME Class 2500
	BW	SW & THD	BW	SW & THD	RF & RTJ	RF & RTJ	RF & RTJ	RF & RTJ
1	50	50	50	50	62	75	75	80
1.5	67	67	67	67	78	89	89	102
2	92	92	92	92	83	108	108	118
3	135		136		105	121	133	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



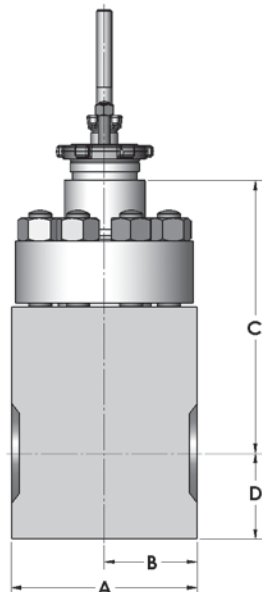
18400/78400 Series Cast Body Dimensions (mm)
ASME Class 600 through 2500 and equivalent PN

Valve Size (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

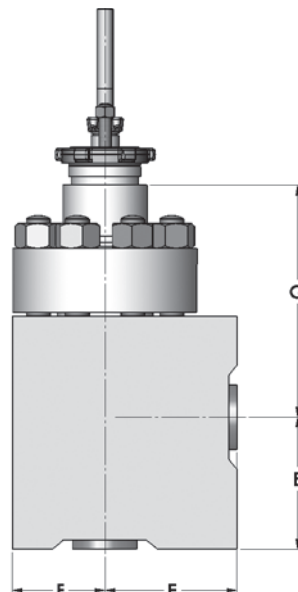
Valve Size (inches)	E													
	ASME Class 600-900		ASME Class 1500		ASME Class 2500		ASME Class 600		ASME Class 900		ASME Class 1500		ASME Class 2500	
	BW	SW & THD	BW	SW & THD	BW	SW & THD	RF	RTJ	RF	RTJ	RF	RTJ	RF	RTJ
1	98	98	98	98	108	108	146	146	146	146	146	146	154	154
1.5	118	118	118	118	130	130	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 (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 (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	ASME Class 600-2500		ASME Class 600-2500	
					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 (inches)	3 & 4 Stage Design							
	ASME Class 600-2500		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	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 (inches)	6 Stage Design							
	ASME Class 600-2500		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	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 (inches)	3 & 4 Stage Design							
	ASME Class 600-2500		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	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 (inches)	6 Stage Design							
	ASME Class 600-2500		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	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 (inches)	3 & 4 Stage Design							
	ASME Class 600-2500		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	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 (inches)	6 Stage Design							
	ASME Class 600-2500		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	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 (inches)	3 & 4 Stage Design							
	ASME Class 600-2500		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	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 (inches)	6 Stage Design							
	ASME Class 600-2500		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	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 (inches)	3 & 4 Stage Design							
	ASME Class 600-2500		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	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 (inches)	6 Stage Design							
	ASME Class 600-2500		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	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 (inches)	3 & 4 Stage Design							
	ASME Class 600-2500		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	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 (inches)	6 Stage Design							
	ASME Class 600-2500		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	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 (inches)	3 & 4 Stage Design							
	ASME Class 600-2500		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	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 (inches)	6 Stage Design							
	ASME Class 600-2500		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	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 (inches)	3 & 4 Stage Design							
	ASME Class 600-2500		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	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 (inches)	6 Stage Design							
	ASME Class 600-2500		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	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 (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 (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.

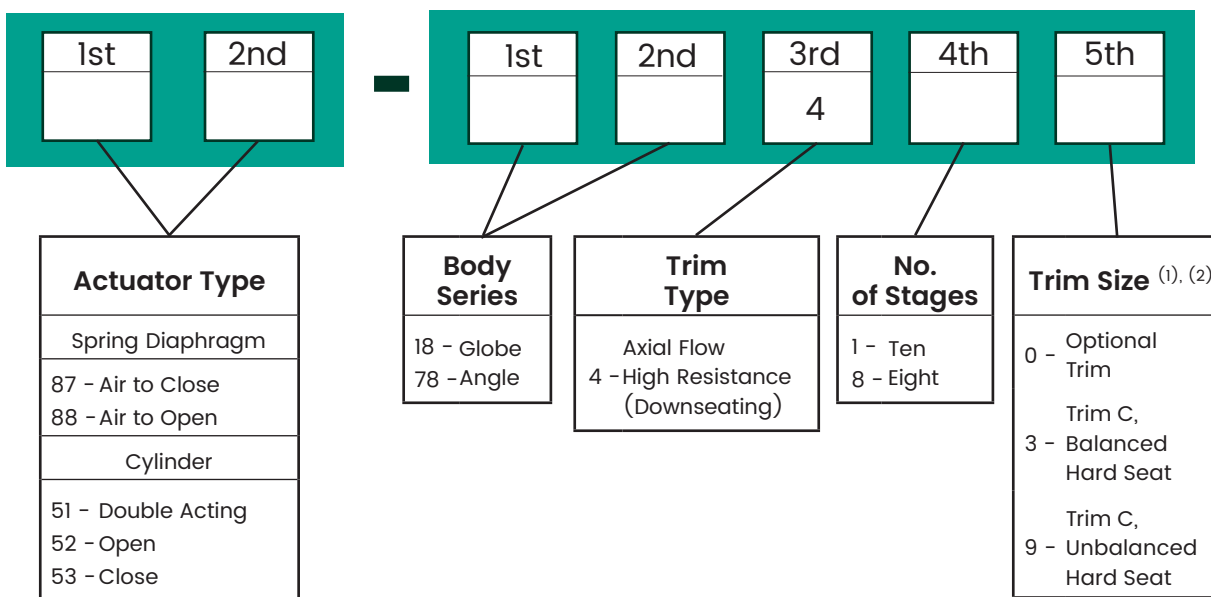
4 Stage Design		Flow Characteristic : Modified Linear							
Valve Size		Orifice Diameter		Travel		Trim		Min Cont.	Remarks
inches	DN	inches	mm	inches	mm	Cv	FL	CV	
1	25	0.2	5.08	0.125	3.175	0.1	0.991	0.04	Flow to Close, Trim C
1	25	0.375	9.525	0.25	6.35	0.2	0.996	0.04	Flow to Close, Trim A
1	25	0.5	12.7	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 C_v 0.4 (1" Size Only)
 - Reduced Area C_v 0.2 (1" Size Only)
- C_v 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 ⁽¹⁾⁽²⁾				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	
		API 10K ⁽¹⁾	API 15K ⁽¹⁾
NPS	6BX ⁽¹⁾		
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_v and F_L 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 _L							0.994	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 _v	Rated C _v									
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

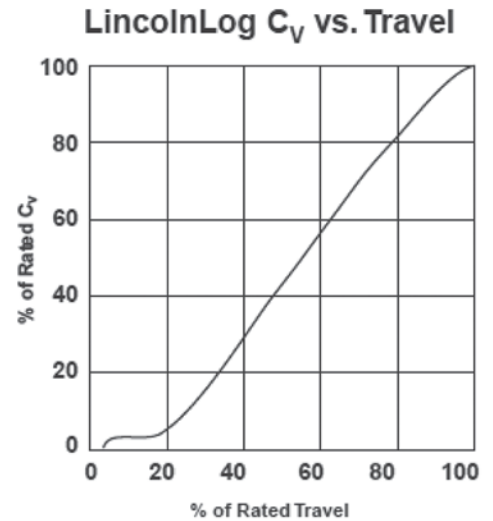
Sizes 1" to 6", 10 STAGE Modified Linear – Flow to Open

Travel (Percent)							10	20	30	40	50	60	70	80	90	100	
F _L							0.994	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 _v	Rated C _v									
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 ΔP ⁽¹⁾			
		Continuous Service		Intermittent Service	
		psi	bar	psi	bar
C	8	5800	400	7250	500
C	10	7400	510	9140	630

Notes:

1. Recommended limits for ΔP per stage are 800 psi (55 bar) for continuous duty cycle applications and up to 1000 psi (69 bar) ΔP per stage for intermittent service.

Staging Ratios & Pressure Drop Guidelines for Upgraded Trim ⁽¹⁾

Trim Type	No. of Stages	Maximum Recommended Throttling ΔP	
		Continuous Service	
		psi	bar
C	8	7250	500
C	10	9140	630

Notes:

1. 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 ⁽¹⁾				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 $\min T_{\text{fluid}}^{\circ} > \min T_{\text{ambient}}^{\circ} \rightarrow \min T_{\text{Class}}^{\circ} = \min T_{\text{ambient}}^{\circ}$
- If $\min T_{\text{fluid}}^{\circ} < \min T_{\text{ambient}}^{\circ} \rightarrow \min T_{\text{Class}}^{\circ} = \min T_{\text{fluid}}^{\circ}$

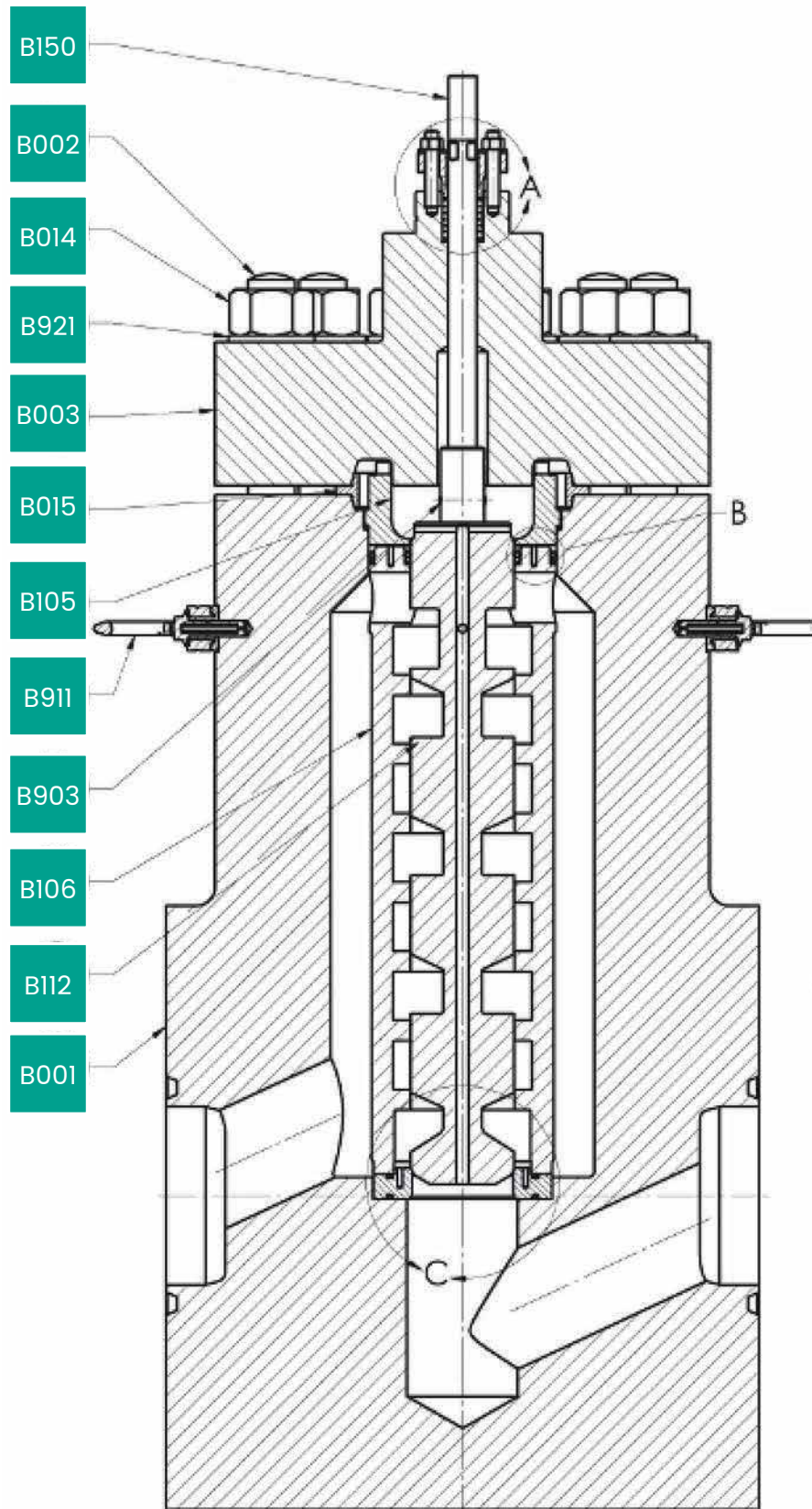
Operating Pressure vs Material of Construction

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

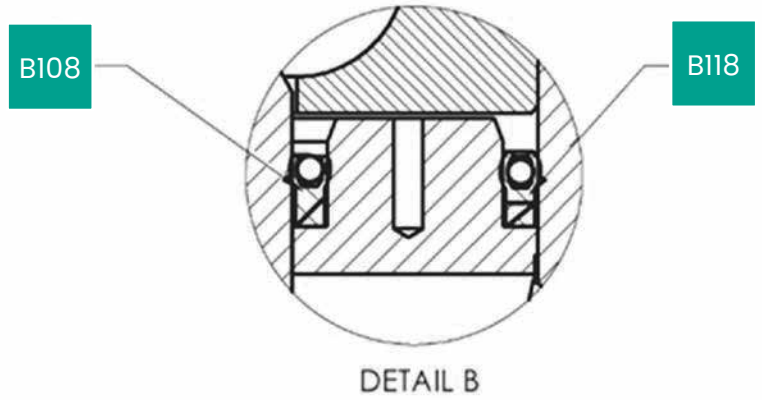
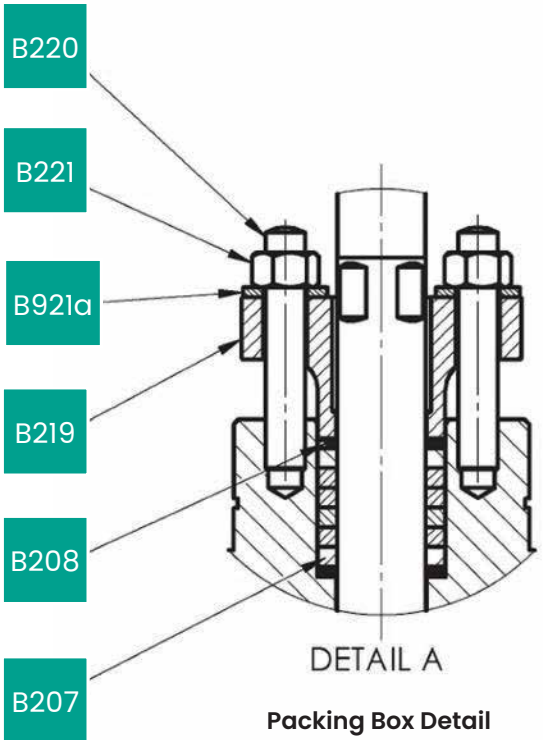
Material Class			NACE MR0175/ISO 15156	Material of Construction Availability			
				Martensitic NACE Non-Exposed	Duplex NACE Non-Exposed	Super Duplex NACE Non-Exposed	Inconel 718 NACE Non-Exposed
AA	General Service	Non-Exposed		X	X	X	X
BB	General Service	Non-Exposed		X	X	X	X
CC	General Service	Non-Exposed		X	X	X	X
Material Class			NACE MR0175/ISO 15156	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

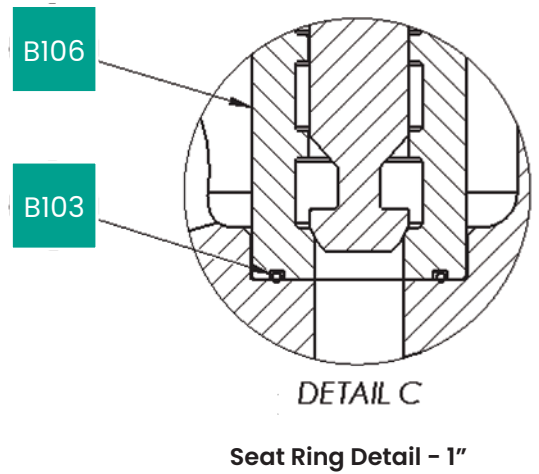
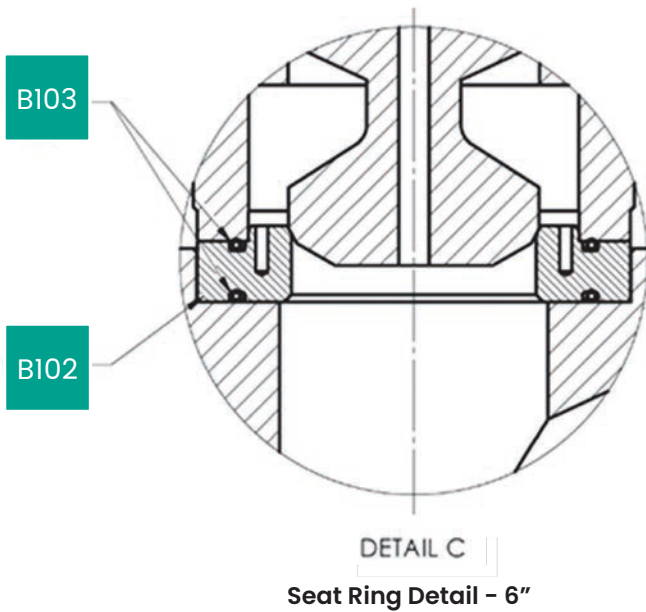


18400 Series API 6A Design

Standard Construction Assembly



Static & Dynamic Seals Design
(Balanced Design Only)



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	29°C	121°C	180°C
		[-76°F]	[20°F]	[250°F]	[356°F]
Description		Materials			
B001	Valve Body				ASTM A182 GR F6NM
B002	Body Stud				ASTM A193 GRADE B7 ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A193 GR B7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
					ASTM A320 Gr L7 ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
B003	Bonnet				ASTM A182 GR F6NM
B014	Body Nut				ASTM A 194 GR 2H ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
					ASTM A194 Gr 7 ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING as per + PTFE COATING ^(2 & 3)
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 ⁽⁴⁾
B208	Anti Extrusion Ring				CARBON-GRAPHITE BRAIDED ⁽⁴⁾
B219	Packing Flange/ Follower				ASTM A182 GR F6NM
B220	Packing Stud				ASTM A193 GRADE B7 ZINC PLATED ⁽¹⁾
					ASTM A193 GR B7M ELECTROLESS NICKEL PLATING ⁽²⁾
					ASTM A320 Gr L7 ZINC PLATED ⁽¹⁾
					ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING ⁽²⁾
B221	Packing Nut				ASTM A 194 GR 2H ZINC PLATED ⁽¹⁾
					ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING ⁽²⁾
					ASTM A194 GR 7 ZINC PLATED ⁽¹⁾
					ASTM A194 GR 7M ELECTROLESS NICKEL PLATING ⁽²⁾
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	29°C	121°C	180°C
		[-50°F]	[20.2°F]	[250°F]	[356°F]
Description		Materials			
B001	Valve Body				ASTM A182 GR F51
B002	Body Stud				ASTM A193 GRADE B7 ZINC PLATED + PTFE COATING ⁽³⁾
					ASTM A193 GR B7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
					ASTM A320 Gr L7 ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
B003	Bonnet				ASTM A182 GR F51
B014	Body Nut				ASTM A 194 GR 2H ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
					ASTM A194 Gr 7 ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
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 ⁽⁴⁾
B208	Anti Extrusion Ring				CARBON-GRAPHITE BRAIDED ⁽⁴⁾
B219	Packing Flange/ Follower				ASTM A182 GR F51
B220	Packing Stud				ASTM A193 GRADE B7 ZINC PLATED ⁽¹⁾
					ASTM A193 GR B7M ELECTROLESS NICKEL PLATING ⁽²⁾
					ASTM A320 Gr L7 ZINC PLATED ⁽¹⁾
					ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING ⁽²⁾
B221	Packing Nut				ASTM A 194 GR 2H ZINC PLATED ⁽¹⁾
					ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING ⁽²⁾
					ASTM A194 GR 7 ZINC PLATED ⁽¹⁾
					ASTM A194 GR 7M ELECTROLESS NICKEL PLATING ⁽²⁾
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 [-50°F]	29°C [20.2°F]	121°C [250°F]	180°C [356°F]
		Materials			
B001	Valve Body				ASTM A182 GR F55
B002	Body Stud				ASTM A193 GRADE B7 ZINC PLATED + PTFE COATING API 6A ^(1 & 3)
					ASTM A193 GR B7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
					ASTM A320 Gr L7 ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
B003	Bonnet				ASTM A182 GR F55
B014	Body Nut				ASTM A 194 GR 2H ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
					ASTM A194 Gr 7 ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
B015	Body Gasket				ALLOY 718 + MOS2 COATING
B102	Seat Ring				HARDFACING STEEL 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 ⁽⁴⁾
B208	Anti Extrusion Ring				CARBON-GRAPHITE BRAIDED ⁽⁴⁾
B219	Packing Flange/Follower				ASTM A182 GR F55
B220	Packing Stud				ASTM A193 GRADE B7 ZINC PLATED ⁽¹⁾
					ASTM A193 GR B7M ELECTROLESS NICKEL PLATING ⁽²⁾
					ASTM A320 Gr L7 ZINC PLATED ⁽¹⁾
					ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING ⁽²⁾
B221	Packing Nut				ASTM A 194 GR 2H ZINC PLATED ⁽¹⁾
					ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING ⁽²⁾
					ASTM A194 GR 7 ZINC PLATED ⁽¹⁾
					ASTM A194 GR 7M ELECTROLESS NICKEL ⁽²⁾
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	29°C	121°C	180°C
		[-76°F]	[20.2°F]	[250°F]	[356°F]
Description		Materials			
B001	Valve Body				UNS N07718
B002	Body Stud				ASTM A193 GRADE B7 ZINC PLATED + PTFE COATING API6A ^(1 & 3)
					ASTM A193 GR B7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
					ASTM A320 Gr L7 ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
B003	Bonnet				UNS N07718
B014	Body Nut				ASTM A 194 GR 2H ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
					ASTM A194 Gr 7 ZINC PLATED + PTFE COATING ^(1 & 3)
					ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)
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 ⁽⁴⁾
B208	Anti Extrusion Ring				CARBON-GRAPHITE BRAIDED ⁽⁴⁾
B219	Packing Flange/ Follower				UNS N07718
B220	Packing Stud				ASTM A193 GRADE B7 ZINC PLATED ⁽¹⁾
					ASTM A193 GR B7M ELECTROLESS NICKEL PLATING ⁽²⁾
					ASTM A320 Gr L7 ZINC PLATED ⁽¹⁾
					ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING ⁽²⁾
B221	Packing Nut				ASTM A 194 GR 2H ZINC PLATED ⁽¹⁾
					ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING ⁽²⁾
					ASTM A194 GR 7 ZINC PLATED ⁽¹⁾
					ASTM A194 GR 7M ELECTROLESS NICKEL PLATING ⁽²⁾
B903	Plug Pin				ASTM B637 GRADE NO7718 (UNS 07718) HRC 40 MAXIMUM HARDNESS COMPLIANCE WITH NACE MR0103 SHALL BE CERTIFIED
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.)

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	29°C	121°C	180°C
		[-76°F]	[20.2°F]	[250°F]	[356°F]
Description		Materials			
B001	Valve Body			UNS N07718	
B002	Body Stud ⁽⁴⁾			ASTM A193 GRADE B7 ZINC PLATED PTFE COATING API 6A ^(1 & 3)	
				ASTM A193 GR B7M ELECTROLESS NICKEL PLATING PTFE COATING ^(2 & 3)	
				ASTM A320 Gr L7 ZINC PLATED PTFE COATING ^(1 & 3)	
				ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING PTFE COATING ^(2 & 3)	
B003	Bonnet			UNS N07718	
B014	Body Nut ⁽⁴⁾			ASTM A 194 GR 2H ZINC PLATED + PTFE COATING ^(1 & 3)	
				ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING PTFE COATING ^(2 & 3)	
				ASTM A194 Gr 7 ZINC PLATED + PTFE COATING ^(1 & 3)	
				ASTM A194 Gr 7M ELECTROLESS NICKEL PLATING + PTFE COATING ^(2 & 3)	
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 ⁽³⁾			UNS N07718	
B207	Packing Ring			CARBON CORE PTFE ⁽⁴⁾	
B208	Anti Extrusion Ring			CARBON-GRAPHITE BRAIDED ⁽⁴⁾	
B219	Packing Flange/ Follower ⁽³⁾			UNS N07718	
B220	Packing Stud ⁽⁴⁾			ASTM A193 GRADE B7 ZINC PLATED ⁽¹⁾	
				ASTM A193 GR B7M ELECTROLESS NICKEL PLATING ⁽²⁾	
				ASTM A320 Gr L7 ZINC PLATED ⁽¹⁾	
				ASTM A320 Gr L7M ELECTROLESS NICKEL PLATING ⁽²⁾	
B221	Packing Nut ⁽⁴⁾			ASTM A 194 GR 2H ZINC PLATED ⁽¹⁾	
				ASTM A194 GR 2HM, ELECTROLESS NICKEL PLATING ⁽²⁾	
				ASTM A194 GR 7 ZINC PLATED as per CES 1041 ⁽¹⁾	
				ASTM A194 GR 7M ELECTROLESS NICKEL PLATING ⁽²⁾	
B903	Plug Pin			ASTM B637 GRADE NO7718 (UNS 07718) Hrc 40 MAXIMUM	
B921	Body plain Washer ⁽⁴⁾			ASTM F436 ZINC PLATED	
				410 ST ST HRC 35-45	
B921a	Packing Plain Washer ⁽⁴⁾			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 [-76°F]	Materials	180°C [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								10.78										
				10								12.15										
			18K Globe	API 10K								8		10.78								
												10		12.15								
		API 15K		8						10.78												
				10						12.15												
		6		7-1/16" (7.0625)						78K Angle	API 10K	8		1.125	7.09	7.09	3.75-12 UN	23.62	19.57	11.81	38.70	11.81
												10									44.20	
			API 15K								8	38.70										
											10	44.20										
18K Globe	API 10K		8		38.70																	
			10		44.20																	
	API 15K		8		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								273.8										
				10								308.6										
			18K Globe	API 10K								8		273.8								
												10		308.6								
		API 15K		8						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	983.0										
											10	1122.7										
18K Globe	API 10K		8		983.0																	
			10		1122.7																	
	API 15K		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

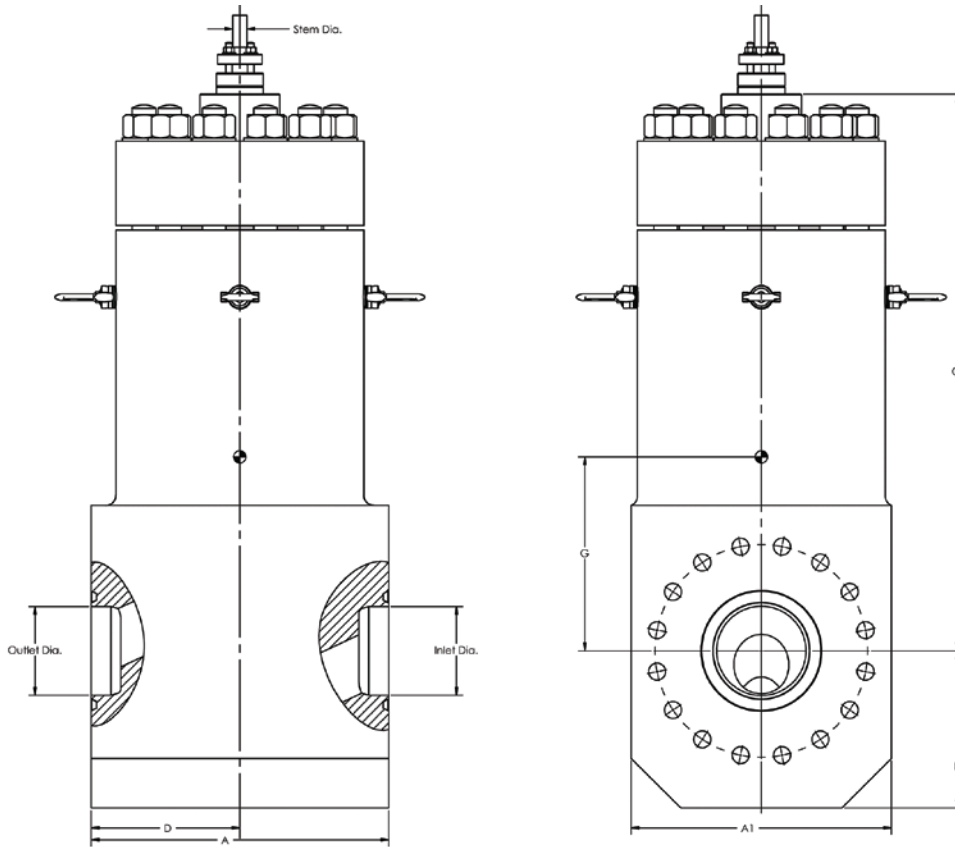
Note: Values in this table are estimates. Consult factory for detailed data.

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

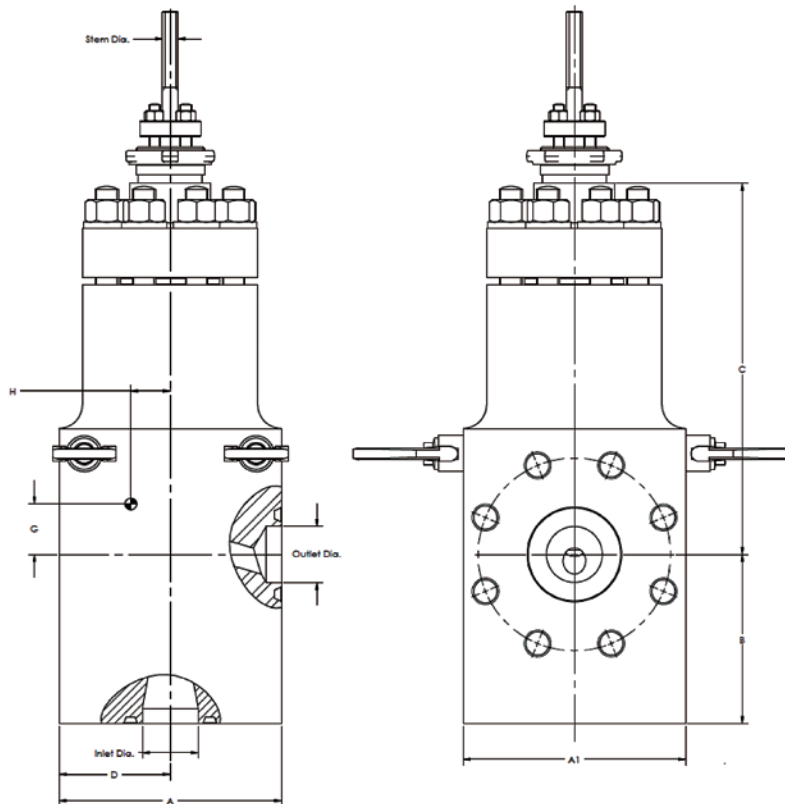
Valve Body Size (NPS)	Valve Ends Size (NPS)	Body Type	Number of Stages	API 10K			API 15K		
				6BX Printed Flange			6BX Printed Flange		
				G	H	Mass	G	H	Mass
1	1-13/16" (1.8125)	78K Angle	8	46	1.0	65	30	1.1	82
			10	44	0.9	81	42	1.1	86
		18K Globe	8	58	-	64	46	-	73
			10	161	-	68	59	-	77
6	7 ¹ / ₁₆ " (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

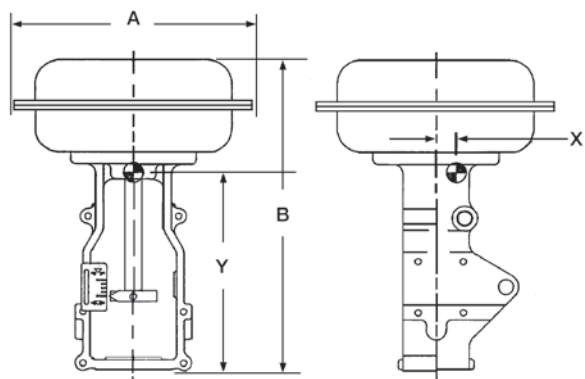


18400 Series API 6A Dimensions

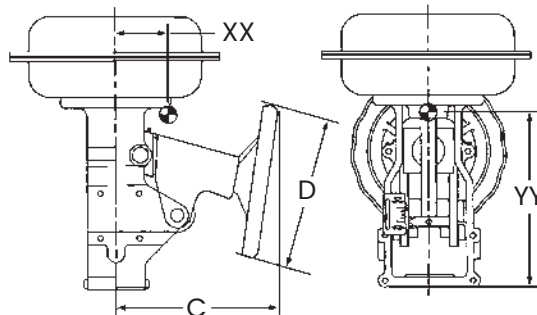


78400 Series API 6A Dimensions

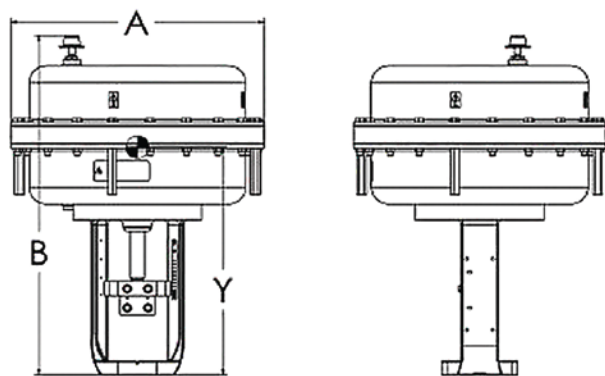
87/88 Series Actuator Weights & Dimensions (inches)



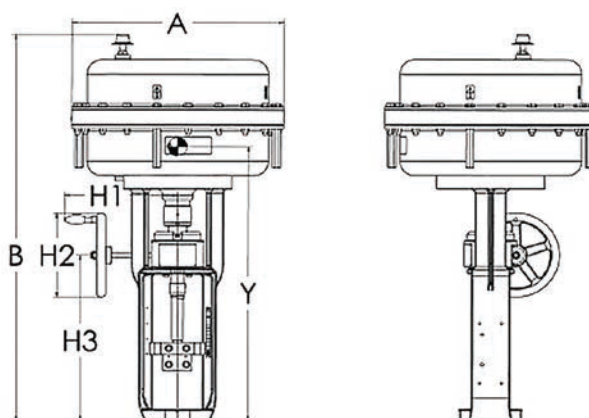
Shown without optional Handwheel



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 ¹	0.0	20.1
23L ²	0.0	21.9

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 ¹	0.0	28.9
23L ²	0.0	30.7

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

87/88 Series Actuator Weights & Dimensions (inches)

Limit Stops (inches)

Up Stop

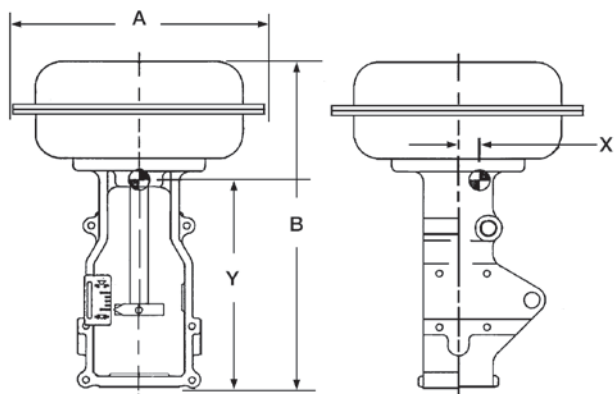
Size	Spring Range	Model	Overall Height B
6	All	87	19.5
10	All		25.4
16	All		36.4
23	All		38.8
23L ¹	3-15, 6-30		38.4
23L ¹	11-23, 21-45		41.3
23L ²	3-15, 6-30		49.1
23L ²	11-23, 21-45		52.1
6	All	88	19.2
10	All		25.1
16	All		35.5
23	All		35.5
23L ¹	3-15, 6-30		38.4
23L ¹	11-23, 21-45		41.3
23L ²	3-15,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

Down Stop

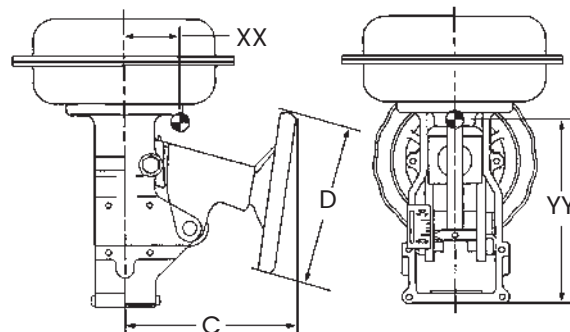
Size	Spring Range	Model	Overall Height B
6	All	87	19.8
10	All		26.0
16	All		37.2
23	All		39.9
23L ¹	3-15, 6-30		39.9
23L ¹	11-23, 21-45		42.8
23L ²	3-15, 6-30		50.6
23L ²	11-23, 21-45		53.6
6	All	88	19.7
10	All		25.9
16	All		37.5
23	All		40.3
23L ¹	3-15, 6-30		39.9
23L ¹	11-23, 21-45		42.8
23L ²	3-15,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

1. Without Handwheel
2. With Handwheel

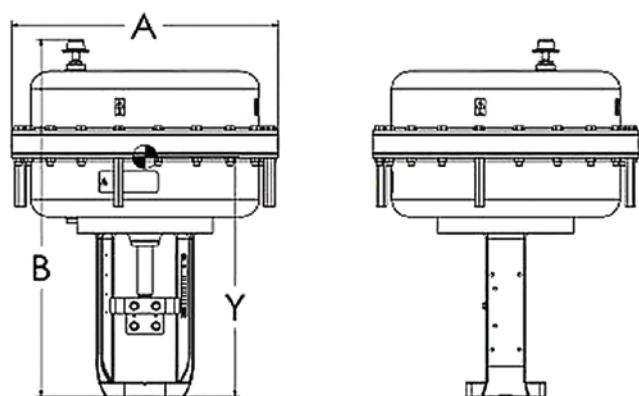
87/88 Series Actuator Weights & Dimensions (mm)



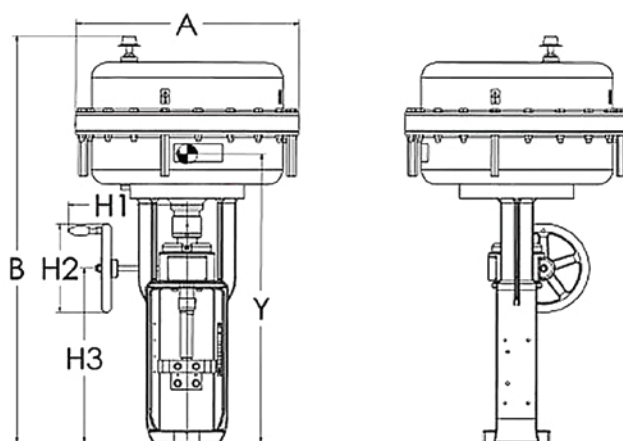
Shown without optional Handwheel



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 ¹	0	511
23L ²	0	557

With Handwheel

Size	XX	YY
6	32	232
10	22	305
16	35	425
23	35	483
23L ¹	0	734
23L ²	0	780

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

87/88 Series Actuator Weights & Dimensions (mm)

Limit Stops (mm)

Up Stop

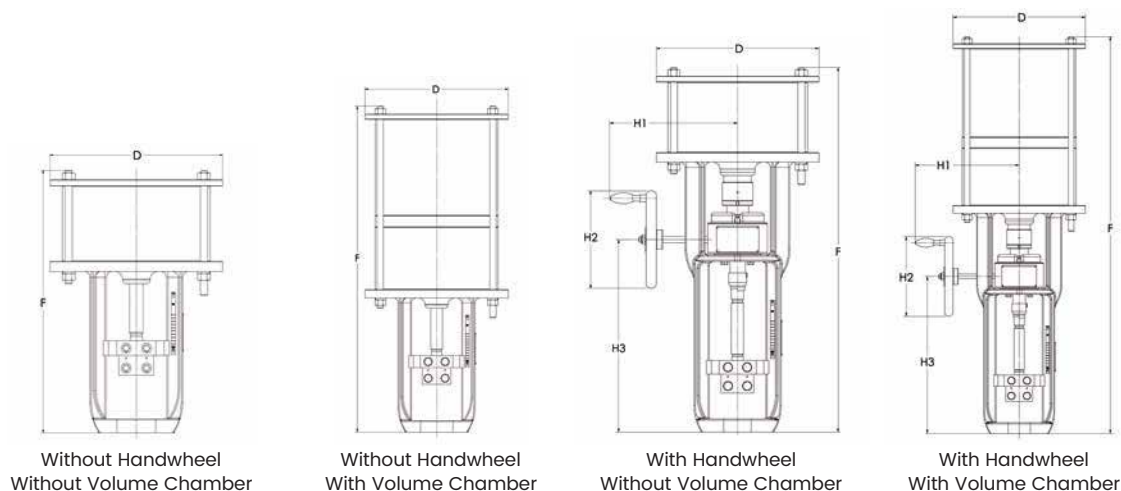
Size	Spring Range	Model	Overall Height B	
6	All	87	494	
10	All		646	
16	All		925	
23	All		987	
23L ¹	3-15, 6-30		975	
23L ¹	11-23, 21-45		1050	
23L ²	3-15, 6-30		1248	
23L ²	11-23, 21-45		1323	
6	All		88	487
10	All			636
16	All	901		
23	All	982		
23L ¹	3-15, 6-30	975		
23L ¹	11-23, 21-45	1050		
23L ²	3-15, 6-30	1248		
23L ²	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 ¹	3-15, 6-30		1013	
23L ¹	11-23, 21-45		1088	
23L ²	3-15, 6-30		1286	
23L ²	11-23, 21-45		1361	
6	All		88	501
10	All			657
16	All	952		
23	All	1024		
23L ¹	3-15, 6-30	1013		
23L ¹	11-23, 21-45	1088		
23L ²	3-15, 6-30	1286		
23L ²	11-23, 21-45	1361		

51/52/53 Series Actuator Weights & Dimensions



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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