

Model 590 Control Valves

Technical Sales Bulletin

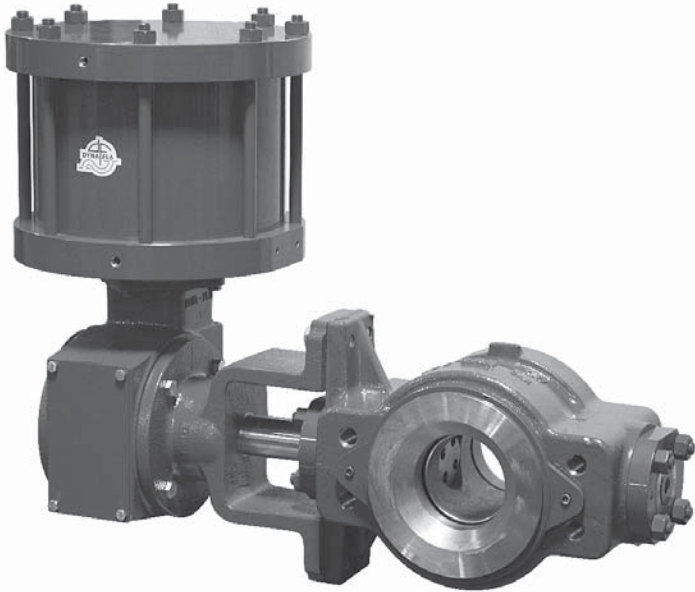


Figure 1 Dyna-Flo Model 590 6 inch Rotary Control Valve with Size 112 DFRP Actuator

The Model 590 series rotary ball style control valve is used in all kinds of demanding applications, in oil and gas production and chemical process industries. It is also suited to high flow, low pressure drop services. The 590 series is used in both throttling and on/off control of liquids or gases.

The straight through unrestricted flow path provides higher capacity than globe style valves. A splined shaft provides accurate control in throttling operations and flexibility in actuation options. The 590 series, when combined with a Model DFRP piston actuator, is a rugged control valve assembly, to which a wide variety of positioners and accessories can be mounted.

The Model 590 control valve is manufactured to a high level of quality specifications to ensure superior performance and customer satisfaction.

Features

Higher Flow Capacity

The straight through flow path allows increased capacity and minimum pressure drop compared to conventional globe style valves.

Full ASME Class Shutoff Capabilities

In most applications the Model 590 is capable of full static differential pressure shutoff.

Simplified Maintenance

Precise machined tolerances allow for easy replacement of the ball seal. Shaft seals can be easily replaced without the removal of the shafts.

Positive Ball to Shaft Connection

A tapered tri-lobe polygon facilitates a positive connection at the ball for more precise and reliable control.

High Cycle Life

High cycle PTFE lined bearings allow for minimum wear in control applications. The balanced shaft design reduces wear caused by end thrust especially with higher pressures.

Tight Shutoff

Standard shutoff capabilities are 0.0001 percent of maximum rated capacity.

Precise Flow Control

The Model 590 offers a good balance of high flow capacity and control.

NACE Compliant

NACE MR0175 standard construction.



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SPECIFICATIONS

Available Valve Configurations

The 4", 6", 8", 10", 12", and 16" flangeless valves will mate ASME Class 600 and 900. See Table 1.

Rotary ball valve assembly available with:

- Single Ball Seal
- Dual Ball Seal
- Flow Ring

Maximum Inlet Pressure

4 through 12 inch valve body consistent with Class 600 and 900 ASME B16.34.

16 inch valve body consistent with Class 600 ASME B16.34.

Maximum Allowable Shutoff Pressure Drop

Single Seal and Dual Seal: See Figure 10.

Flow Ring: Limited by the pressure/temperature rating of the valve body.

Material Temperature Capabilities

Single Seal and Dual Seal:

- 50°F to 180°F (-46°C to 82°C) LCC Body.
- 20°F to 180°F (-29°C to 82°C) WCC* Body.
- 20°F to 180°F (-29°C to 82°C) CF8M Body.

Flow Ring with Fluorocarbon O-Rings:

- 50°F to 400°F (-46°C to 204°C) LCC Body.
- 20°F to 400°F (-29°C to 204°C) WCC* Body.
- 20°F to 400°F (-29°C to 204°C) CF8M Body.

***Note:** WCC body material is special order.

Construction Materials

See Table 7 & 8 for construction materials. Contact your Dyna-Flo sales office for more information and other options.

Flow Direction (See Figures 3, 4, 8, & 9)

Single Seal Configuration: Forward flow only.

Dual Seal Configuration: Required for bi-directional flow shutoff.

Flow Ring Configuration: Forward or reverse flow.

Actuator Mounting

Right-hand, or Left-hand (as viewed from seal end of valve).
In one of 4 positions (12 (Std.), 3, 6, and 9 o'clock) with respect to the valve body in a horizontal pipe.

Maximum Ball Rotation

90 degrees.

Shutoff Classification

Single Seal and Dual Seal: 0.0001% of maximum valve capacity (less than 1% of Class IV, ANSI/FCI 70-2 and IEC 60534-4).

Flow Ring: 1% of maximum valve capacity

Flow Characteristic

Modified Equal Percentage

Valve Dimensions

See Figure 2 for valve diagram.

See Tables 3, 4, 5, & 6 for valve dimensions.

See Table 3 for shaft & bore diameters.

Approximate Valve Weight

See Table 2.

Valve Sizing Coefficients

See Table 9.

For more information and other options contact your Dyna-Flo sales office.

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Table 1

Model 590 Available Valve Size and ASME Rating

Valve Size Inch	ASME Rating	
4	600	900
6	600	900
8	600	900
10	600	900
12	600	900
16	600	

Table 2

Model 590 Approximate Valve Weight (without actuator)

Valve Size Inch	lb (Kg)
4	160 (73)
6	290 (132)
8	490 (222)
10	760 (345)
12	950 (431)
16	1700 (771)

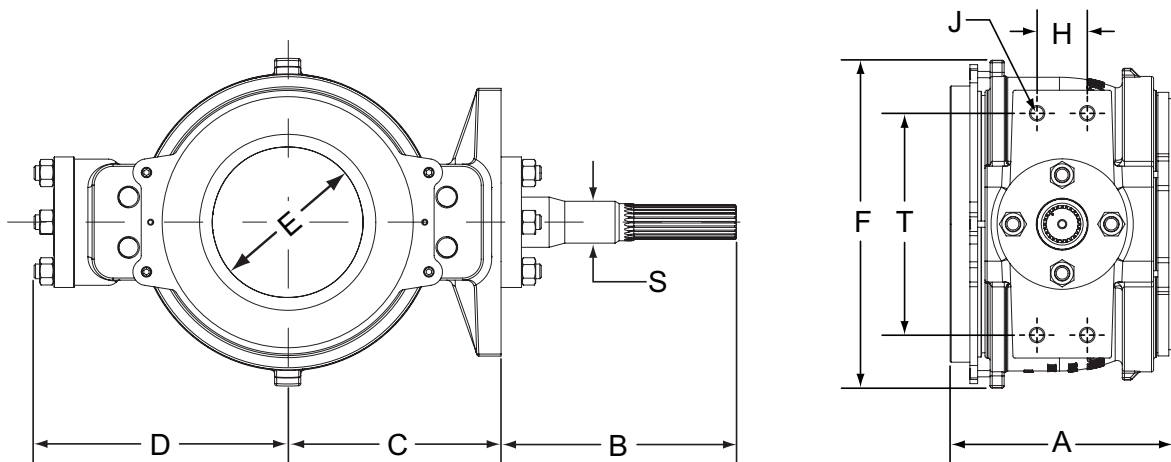


Figure 2 Model 590 Valve Dimensions Diagram



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Table 3

Model 590 Valve Dimensions Inch (mm)

Valve Size	Dimensional Reference					
	B	S		C	D	E (Bore Diameter)
		Spline Diameter	Shaft Diameter			
4"	8.19 (208)	1.25 (31.8)	1.25 (31.8)	6.38 (162)	7.75 (197)	3.00 (76.2)
6"	14.00 (356)	2.00 (50.8)	2.00 (50.8)	7.62 (194)	9.38 (238)	4.00 (101.6)
8"	14.00 (356)	2.50 (63.5)	2.50 (63.5)	10.62 (270)	12.88 (327)	6.00 (152.4)
10"	14.00 (356)	2.50 (63.5)	2.75 (69.9)	11.31 (287)	13.50 (343)	7.38 (187.5)
12"	14.00 (356)	2.50 (63.5)	3.00 (76.2)	12.75 (324)	15.00 (381)	9.00 (228.6)
16"	18.50 (470)	2.50 (63.5)	4.00 (101.6)	15.44 (392)	18.12 (460)	11.50 (292.1)

ASME Class: 600 and 900 (16 Inch ASME 600 Only)

- Envelope Dimensions are + / - 0.25 in. (6.4 mm)
- Face to Face Tolerance Per ASME

Table 4

Model 590 Valve Dimensions Continued Inch (mm)

Valve Size	Dimensional Reference				
	A	F	T	H	J
4"	7.62 (194)	11.00 (279)	9.25 (235)	1.81 (46)	5/8 - UNC
6"	9.00 (229)	12.88 (327)	10.75 (273)	2.00 (51)	3/4 - UNC
8"	9.56 (243)	16.25 (413)	13.25 (337)	3.00 (76)	7/8 - UNC
10"	11.69 (297)	17.50 (445)	13.25 (337)	3.00 (76)	7/8 - UNC
12"	13.31 (338)	19.00 (483)	13.25 (337)	3.00 (76)	7/8 - UNC
16"	15.75 (400)	24.12 (613)	21.00 (533)	5.00 (127)	1-1/4—8UN

ASME Class: 600 and 900 (16 Inch ASME 600 Only)

- Envelope Dimensions are + / - 0.25 in. (6.4 mm)
- Face to Face Tolerance Per ASME

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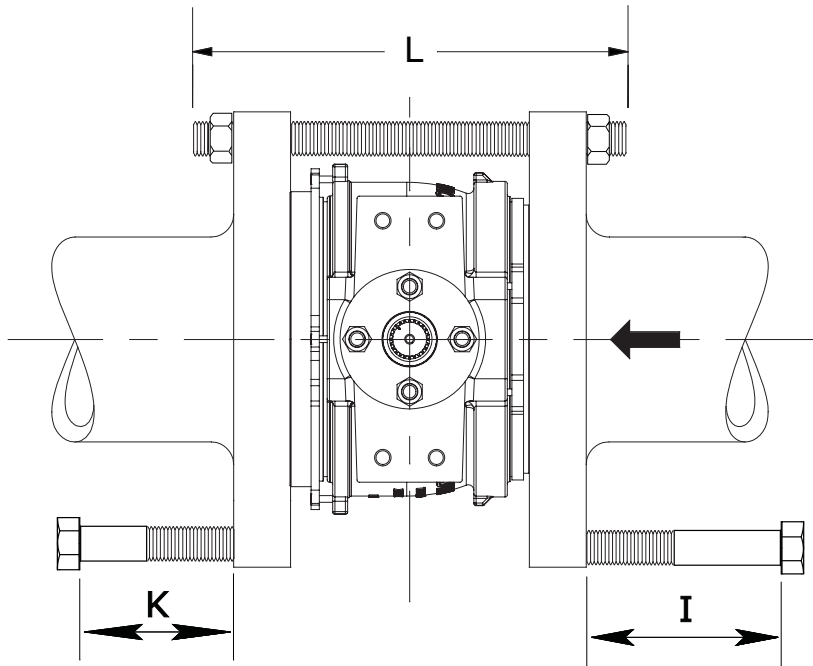


Figure 3
590 Flange Bolting
Dimensions

NOTE: Longer cap screws (Key I) are needed for the side of the valve with less body material (typically the inlet side of the valve for single seal construction).

Table 5

Model 590 Valve Dimensions - Flange Bolting - Class 600 Inch

Valve Size	Dimensional Reference												TPI
	RF						RTJ						
	I	QTY.	K	QTY.	L	QTY.	I	QTY.	K	QTY.	L	QTY.	
4"	-	-	-	-	13.50	8	-	-	-	-	14.50	8	7/8 - 9
6"	4.63	4	4.63	4	16.25	8	4.88	4	4.88	4	16.25	8	1 - 8
8"	5.50	4	5.38	4	17.50	8	5.63	4	5.50	4	17.75	8	1-1/8 - 8
10"	6.25	4	6.38	4	20.75	12	6.50	4	6.50	4	20.75	12	1-1/4 - 8
12"	7.00	4	6.00	4	23.00	16	7.00	4	6.50	4	23.00	16	1-1/4 - 8
16"	7.75	4	7.75	4	26.00	16	8.00	4	8.00	4	26.50	16	1-1/2 - 8

Table 6

Model 590 Valve Dimensions - Flange Bolting - Class 900 Inch

Valve Size	Dimensional Reference												TPI
	RF						RTJ						
	I	QTY.	K	QTY.	L	QTY.	I	QTY.	K	QTY.	L	QTY.	
4"	4.88	4	4.88	4	14.75	4	4.88	4	5.13	4	14.75	4	1-1/8 - 8
6"	5.00	4	5.00	4	17.50	8	5.00	4	5.25	4	17.50	8	1-1/8 - 8
8"	6.00	4	5.88	4	19.00	8	6.00	4	6.13	4	19.00	8	1-3/8 - 8
10"	6.63	4	6.75	4	21.50	12	6.63	4	6.88	4	21.50	12	1-3/8 - 8
12"	7.25	4	6.63	4	24.00	16	7.25	4	7.50	4	24.00	16	1-5/8 - 8

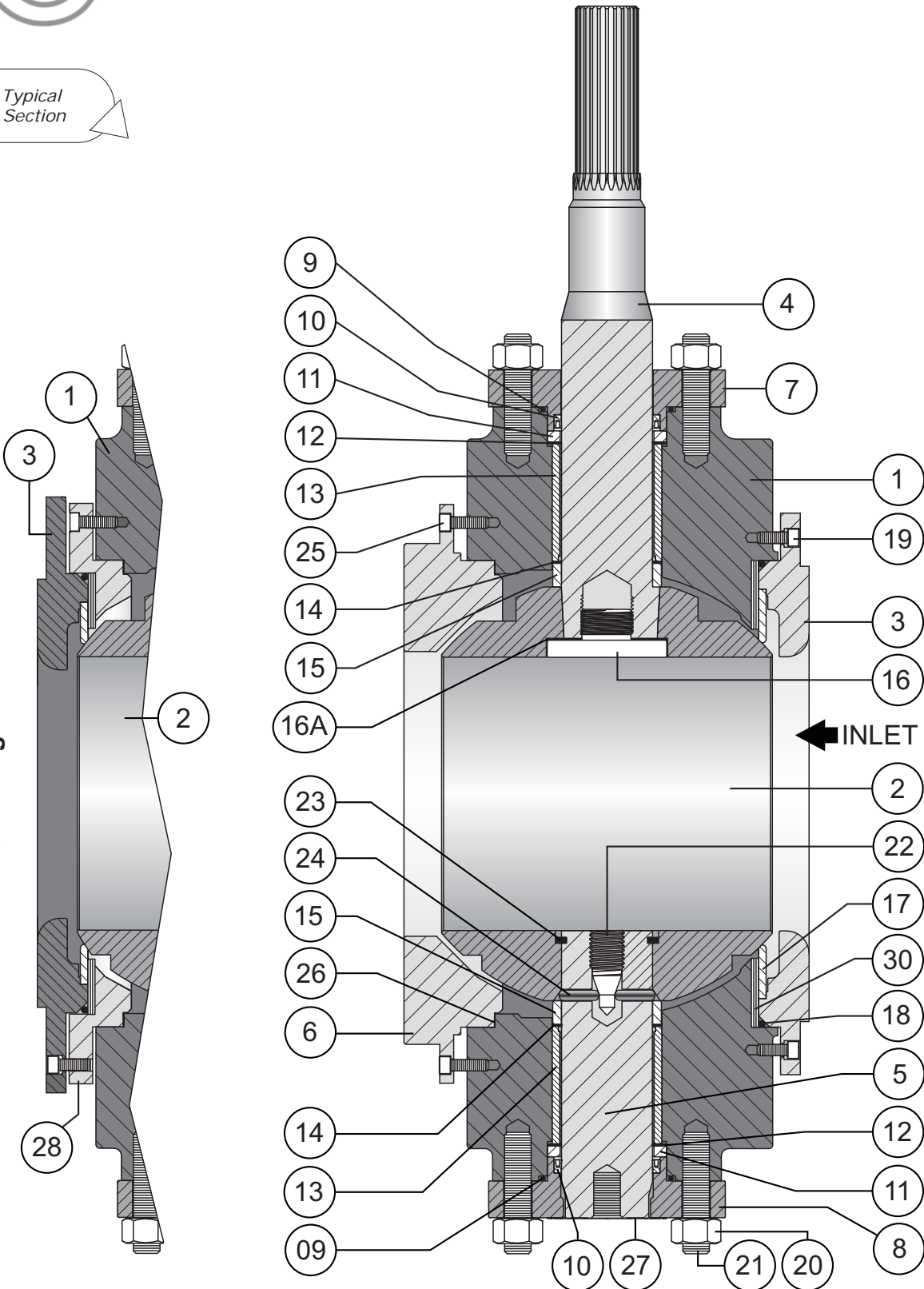


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Figure 4 Typical 590 Cross Section

Dual Seal Diagram



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Table 7

Model 590 Construction Materials

Key	Part Description	Material
01	Body	LCC, WCC ⁽¹⁾ , CF8M
02	Ball	WCC Chrome Plated (Std.), CF8M Chrome Plated
03	Seal Protector Ring	LCC, WCC ⁽¹⁾ , CF8M
04	Drive Shaft	S20910
05	Follower Shaft	S20910
06	Body Outlet	LCC, WCC ⁽¹⁾ , CF8M
07	Inboard Seal Carrier	S31600
08	Outboard Seal Carrier	S31600
09	O-ring, Seal Carrier	Fluorocarbon
10	Seal Ring	Spring Loaded CPTFE / R30003
11	Spacer	S31600*
12	Bushing Spacer Shims	S31600
13	Bushing	S31600* / CPTFE
14	Thrust Washer	CTFE
15	Thrust Spacer	S31600*
16	Shaft Retainer	S20910
16A	Shaft Retainer Washer	S31600
17	Ball Seal	Acetal
18	O-Ring, Seal Protector Ring	Fluorocarbon
19	Cap Screw	Plated Steel
20	Nut, Seal Carrier	2HM
21	Stud, Seal Carrier	B7M
22	Retainer Screw	18-8
23	Split Ring	S31600*
24	Pin	S31600*
25	Cap Screw	Plated Steel
26	Gasket	PTFE
27	Indicator Scale	S30400
28	Adapter Ring	S31600
29	Flow Ring	LCC, WCC ⁽¹⁾ , CF8M
30	Shims	S31600

* All S31600 barstock is dual grade S31600/S31603 (316/316L).

1 - WCC material is special order for all parts except valve ball (Key 2).

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Figure 5 Standard Seal Detail

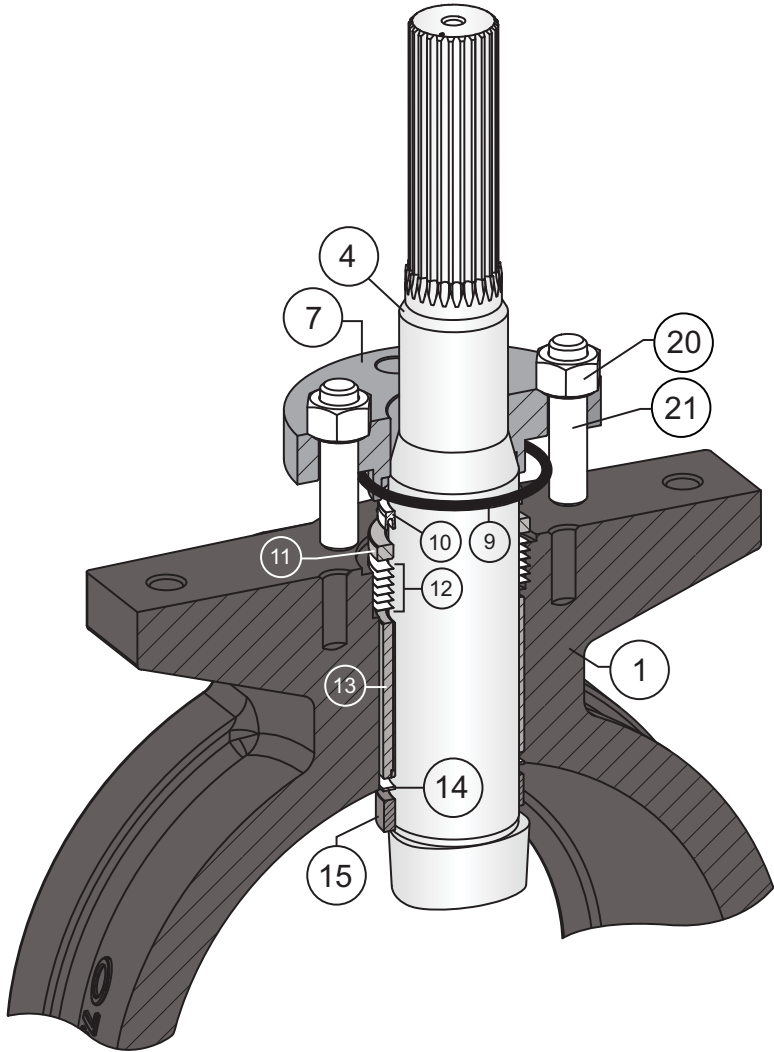


Table 8

Model 590 Live Loaded Packing Construction Materials (See Figures 6 and 7)

Key	Part Description	Material
31	Live Loaded Packing Flange	S31600*
32	Live Loaded Packing Flange O-ring	Nitrile
33	Spring Washers	S17700
34	Live Loaded Packing Stud	B8M
35	Live Loaded Packing Nut	8M
36	Live Loaded Packing Follower (Inboard)	S31600*
37	Live Loaded Packing Follower (Outboard)	S31600*
38	Live Loaded Packing Box	S31600*
39	Anti-extrusion Ring	Graphite
40	PTFE Packing Set	CPTFE
41	Packing Box Ring	S31600*

* All S31600 barstock is dual grade S31600/S31603 (316/316L).

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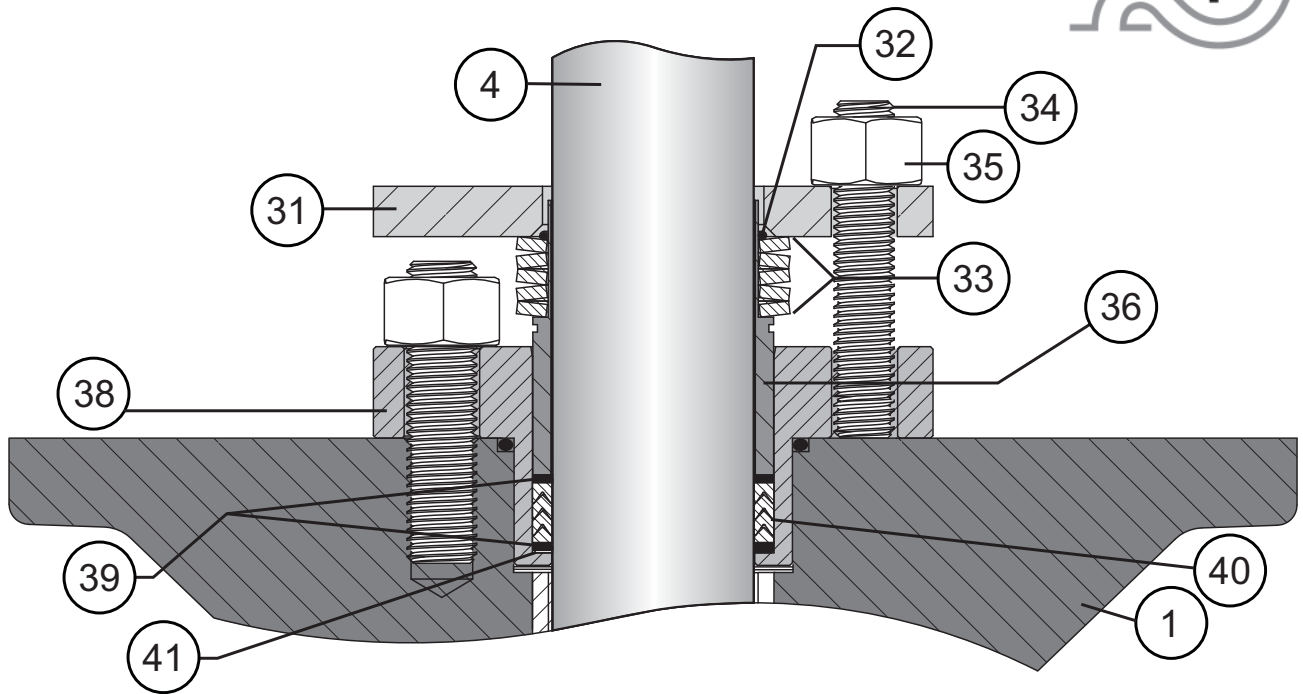


Figure 6 Live Loaded Packing Configuration - Inboard

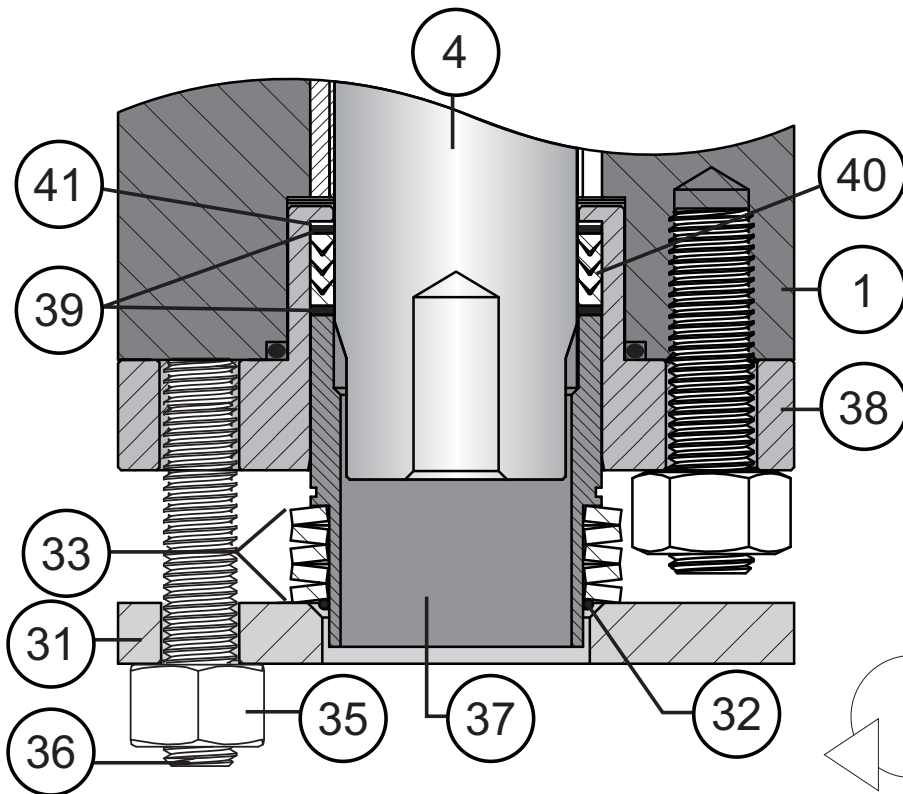


Figure 7 Live Loaded Packing Configuration - Outboard

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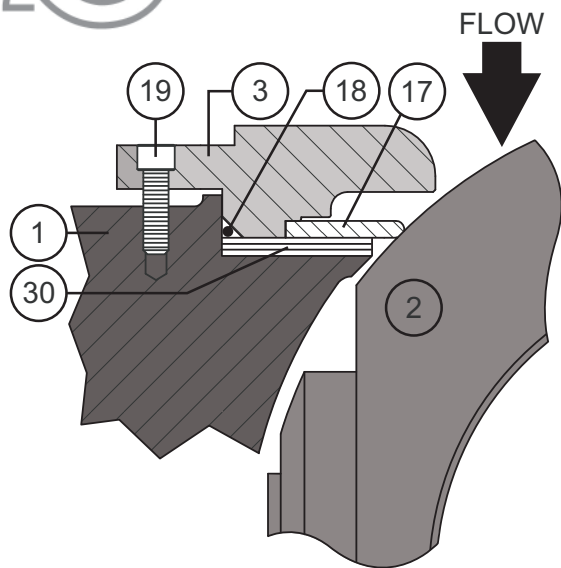


Figure 8 Ball Seal Detail

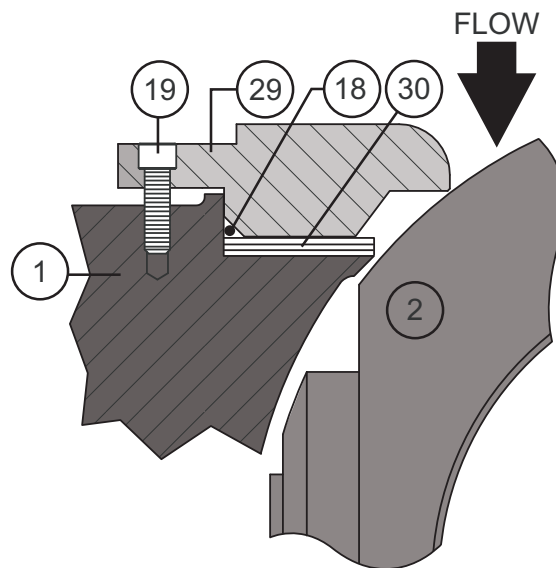
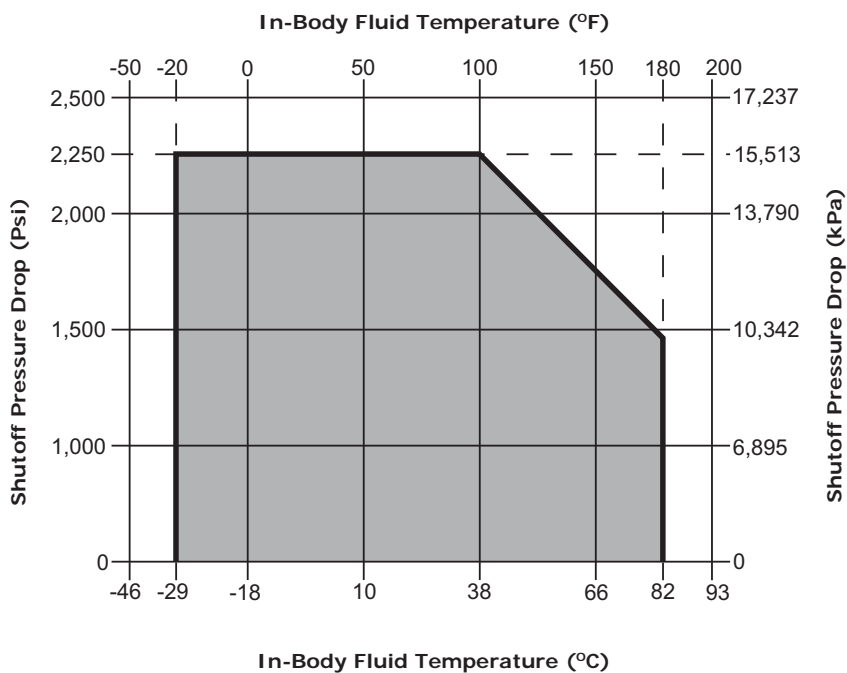


Figure 9 Flow Ring Detail

Figure 10 Model 590 Maximum Allowable Shutoff Pressure Drops - Single Seal and Dual Seal



NOTE: Do not exceed the pressure/temperature limitations in the above chart or the body rating, whichever is lower.

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Table 9

Model 590 Equal Percentage Sizing Coefficients Forward or Reverse Flow

Valve Size		Degrees Opening								
		10	20	30	40	50	60	70	80	90
4 inch	C_V	0	6.74	19.0	39.9	68.9	114	182	335	498
	X_T	0.66	0.66	0.77	0.76	0.71	0.59	0.47	0.26	0.17
	F_L	0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
	F_d	0.45	0.49	0.69	0.84	0.92	0.96	0.98	1.00	1.00
6 inch	C_V	0	15.7	42.8	76.1	130	203	308	567	855
	X_T	0.99	0.99	0.83	0.90	0.76	0.64	0.54	0.28	0.17
	F_L	0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
	F_d	0.54	0.54	0.69	0.83	0.90	0.94	0.97	1.00	1.00
8 inch	C_V	1.48	27.9	91.8	177	308	478	720	1220	2188
	X_T	0.35	0.92	0.81	0.85	0.63	0.58	0.48	0.29	0.14
	F_L	0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
	F_d	0.45	0.59	0.75	0.85	0.92	0.96	0.98	0.99	1.00
10 inch	C_V	42.8	85.5	174	306	484	764	1150	1800	3045
	X_T	0.33	0.59	0.75	0.72	0.68	0.57	0.43	0.29	0.15
	F_L	0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
	F_d	0.60	0.62	0.77	0.86	0.92	0.96	0.98	0.99	1.00
12 inch	C_V	40.6	122	267	499	812	1230	1870	3060	5801
	X_T	0.24	0.88	0.88	0.78	0.60	0.49	0.38	0.23	0.10
	F_L	0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
	F_d	0.40	0.64	0.78	0.87	0.93	0.97	0.98	0.99	1.00
16 inch	C_V	68.3	203	447	813	1340	2030	3010	4630	8130
	X_T	0.46	0.71	0.87	0.83	0.66	0.51	0.42	0.27	0.13
	F_L	0.90	0.90	0.90	0.90	0.85	0.78	0.68	0.57	0.45
	F_d	0.42	0.66	0.79	0.87	0.93	0.97	0.98	1.00	1.00

Relationships Of Note:

$$C_1 = 39.76\sqrt{X_T}$$

$$C_g = C_V C_1$$

$$K_m = F_L^2$$



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MODEL NUMBERING SYSTEM

SAMPLE PART NUMBER: 590-8-CLS-PN

VALVE SIZE						8		
4	4 INCH	6	6 INCH	8	8 INCH		10	10 INCH
12	12 INCH	16	16 INCH					
BALL MATERIAL						-		
-	WCC / CRPL	S	CF8M / CRPL					
ASME RATING / END CONNECTION						C		
C	600 RF	D	900 RF	E	600 RTJ		F	900 RTJ
BODY MATERIAL						L		
L	LCC	W	WCC*	M	CF8M			
BALL SEAL CONFIGURATION						S		
S	SINGLE SEAL	D	DUAL SEAL	F	FLOW RING			
PAINT						-		
-	DFPS-01 (STANDARD)			2	DFPS-02 (SEVERE SERVICE)			
3	DFPS-03 (HIGH TEMPERATURE)							
SHAFT SEALS						P		
P	R30003 / CPTFE SHAFT SEALS (STANDARD)			L	LIVE LOADED PTFE PACKING			
SHAFT MATERIAL / STYLE						N		
N	S20910 SPLINED	K	S20910 KEYED					
*NOTE: WCC material is special order for all parts except valve ball (Key 2).								

590

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