Model 360C/363C Cryogenic Control Valves

Technical Sales Bulletin

Figure 1 Model 360C Control Valve

The Model 360C/363C control valve (Figure 1) is a single-port stainless steel globe style valve that can be used for either throttling or on-off control of cryogenic fluids to temperatures as low as -325ºF (-198ºC).

The standard actuator for the Model 360C/363C valve is a Dyna-Flo Model DFC or DFO linear actuators. These heavy-duty actuators are spring return diaphragm style, and can be used for throttling or on-off service, with or without a valve positioner.

Model 360C/363C control valves are manufactured to a high level of quality specifications to ensure superior performance and customer satisfaction.

Features

Stainless Steel Construction
The stainless steel valve body and specialty extension bonnet are designed to meet low temperature requirements.

Versatility
A wide range of trim options including Low Noise and Anti-Cavitation make the 360C/363C a versatile control valve.

Field Service Friendly
No special tools are required to change or inspect trim. Top access makes in-line service easy.

Shut-Off Capabilities
Refer to Table 2 for shut-off classifications.

Cryogenic Spring-Loaded Seals
Specially engineered seals are designed and manufactured for superior performance at extremely low temperatures.

Emissions Reducing Packing
Help prevent the loss of process media and reduce packing maintenance with the use of Dyna-Flo's Live Loaded PTFE and graphite packing systems.

Sour Service Capability
Available in standard configurations that comply with NACE MR0175/ISO 15156, consult Dyna-Flo Control Valves.

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SPECIFICATIONS

Configurations

The Model 360C control valve is a single port cage guided globe style valve with a balanced plug. The standard valve plug action is push down to close. Refer to Table 1.

The Model 363C control valve is a single port post guided globe style valve with an unbalanced plug. The standard valve plug action is push down to close. Refer to Table 1.

PTFE Seat and Metal Seat Available.

Consult your Dyna-Flo sales office for other available configurations.

Sizes and Connection Styles (Refer to Table 1)

Size:	1/2", 3/4", 1", 1-1/2", 2" - 363C Only 3", 4", 6", 8" - 360C Only
Body:	Globe - All Sizes
Rating:	ASME 150 / 300 / 600 - All Sizes
Connection:	RF - All Sizes

Maximum Inlet Pressures and Temperatures

Flanged valves consistent with ASME Class 150, 300, and 600 rating as per ASME B16.34, unless limited.

ASME Class 600 valves with B8M Class 2 bolting are consistent with Class 600 pressure-temperature ratings per ASME B16.34 except as shown below:

Model	Valve Size inch	Maximum Inlet Pressure at 100°F (38°C)	
		Psig	kPag
363C	1	1110	7653
	2	1200	8274
360C	3	1370	9446
	6	1085	7481
	8	1390	9584

Material Temperature Capabilities

360C: -325 to 150°F (-198 to 66°C)

363C: -325 to 300°F (-198 to 149°C)

Characteristic and Flow Direction

Refer to Table 1.

Maximum Pressure Drops

Maximum pressure drop is the same as maximum inlet pressure unless restricted by spiral wound gaskets (refer to Table 15).

Maximum Allowable Actuator Thrust

Refer to Table 8.

Dimensions

Valve Outline Dimension Diagram

Refer to Figure 2.

Approximate Valve Body Weight

Refer to Table 3.

Materials

Refer to Table 11 for standard valve construction materials.
Refer to Tables 13 & 14 for trim materials.

Cross-Section of the Model 360C & 363C Control Valves

Refer to Figures 3 & 4.

Port Diameters and Maximum Valve Plug Travel

Refer to Tables 4 to 7.

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

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Model 360C/363C Cryogenic Control Valves

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Table 1

Available Valve Configurations

Valve Model	Valve Size Inch	End Connection			Characteristic	Flow
		Raised Face (RF) Flanged				
		ASME Class 150	ASME Class 300	ASME Class 600		
363C	1/2 / 3/4 1 / 1-1/2 / 2	✓	✓	✓	Equal Percentage (Standard)	Up
					Dyna-Form (Equal Percentage)	Up
					Quick Opening	Up
					Linear	Up
360C	3 / 4 / 6 / 8	✓	✓	✓	Equal Percentage (Standard)	Down
					Quick Opening	Down
					Linear	Down
					Low-Noise 3 (Linear)	Up
					Anti-Cavitation 1-Stage (Linear)	Down

Table 2

Standard Shut-Off Classifications (in accordance with ANSI/FCI 70.2 and IEC 60534-4)

Valve Trim	Seat Option	Shut-Off Class	
360C (Except Anti-Cavitation)	PCTFE (Soft Seated)	Standard	Class V (Air Test)
		Optional	Class V
			Class VI[(1)]
	Metal	Standard	Class IV
		Optional	Class V[(2)]
			Class VI[(1)]
360C Anti-Cavitation 1 Stage	Metal	Standard	Class IV
		Optional	Class V
363C All	Metal	Standard	Class IV
		Optional	Class V
			Class VI[(1)]
Notes:	**1** - A Class V water test cannot be performed as residual trapped moisture from a hydro test can cause damage to the valve when used with freezing process temperatures.		

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Table 3

360C/363C Approximate Valve Body Weights

Model	Valve Size inch	Valve Body Only	
		lb	Kg
363C	1/2, 3/4, 1	33	15
	1-1/2	48	22
	2	90	41
360C	3	135	61
	4	210	95
	6	465	211
	8	820	372

Table 4

360C Globe Valve Size, Port Diameters, Plug Travel, Stem and Yoke Boss Diameters
(Except Low-Noise and Anti-Cavitation)

Port	Valve Size	Port Diameter		Max Valve Plug Travel		Standard Yoke Boss Diameter (YBD)			
						Stem Diameter		YBD	
	Inch	Inch	mm	Inch	mm	Inch	mm	Inch	mm
Full Port	3	3-7/16	87.3	1-1/2	38.1	1/2	12.7	2-13/16	71.4
						3/4	19.1	3-9/16	90.5
	4	4-3/8	111.1	2	50.8	1/2	12.7	2-13/16	71.4
						3/4	19.1	3-9/16	90.5
	6	7	177.8	2	50.8	3/4	19.1	3-9/16	90.5
						1	25.4	5	127
	8	8	203.2	3	76.2	3/4	19.1	3-9/16	90.5
						1	25.4	5	127
Reduced Port	3	2-5/16	58.7	1-1/8	28.6	1/2	12.7	2-13/16	71.4
						3/4	19.1	3-9/16	90.5
	4	2-7/8	73.0	1-1/2	38.1	1/2	12.7	2-13/16	71.4
						3/4	19.1	3-9/16	90.5
	6	4-3/8	111.1	2	50.8	3/4	19.1	3-9/16	90.5
						1	25.4	5	127

Table 5

360C Low-Noise Valve Size, Port Diameters, Plug Travel, Stem and Yoke Boss Diameters

Valve Size	Option	Port Diameter		Max Valve Plug Travel		Yoke Boss Diameter (YBD)			
						Stem Diameter		YBD	
Inch		Inch	mm	Inch	mm	Inch	mm	Inch	mm
3	A1	3-7/16	87.3	1-1/2	38.1	1/2	12.7	2-13/16	71.4
	B3, C3, D3	2-5/16	58.7			3/4	19.1	3-9/16	90.5
4	A1	4-3/8	111.1	2	50.8	1/2	12.7	2-13/16	71.4
	B3, C3, D3	3-7/16	87.3			3/4	19.1	3-9/16	90.5
6	A1	4-3/8	111.1	2	50.8	3/4	19.1	3-9/16	90.5
		7	177.8						
	B3, C3, D3	5-3/8	136.5	3	76.2	1	25.4	5	127
8	A1	8	203.2	3	76.2	3/4	19.1	3-9/16	90.5
						1	25.4	5	127

Table 6

360C Anti-Cavitation Valve Size, Port Diameters, Plug Travel, Stem and Yoke Boss Diameters

Valve Size	1 Stage				Yoke Boss Diameter (YBD)			
	Port Diameter		Max Valve Plug Travel		Stem Diameter		YBD	
Inch	Inch	mm	Inch	mm	Inch	mm	Inch	mm
3	2-5/16	58.7	1-1/8	28.6	1/2	12.7	2-13/16	71.4
	3-7/16	87.3	1-5/8	41.3	3/4	19.1	3-9/16	90.5
4	2-7/8	73.0	1-1/2	38.1	1/2	12.7	2-13/16	71.4
	4-3/8	111.1	2-1/8	54.0	3/4	19.1	3-9/16	90.5
6	4-3/8	111.1	2-1/8	54.0	3/4	19.1	3-9/16	90.5
	7	177.8	2-1/4	57.2	1	25.4	5	127
8	8	203.2	3-3/8	85.7	3/4	19.1	3-9/16	90.5
					1	25.4	5	127

Table 7

363C Valve Size, Port Diameters, Plug Travel, Stem and Yoke Boss Diameters

Valve Size	Port Diameter						Max Valve Plug Travel		Yoke Boss Diameter (YBD)			
									Stem Diameter		YBD	
Inch	Equal Percentage		Quick Opening		Linear		Inch	mm	Inch	mm	Inch	mm
	Inch	mm	Inch	mm	Inch	mm						
1/2 3/4 1	1/4, 3/8, 1/2, 3/4, 1	6.4, 9.5, 12.7, 19.1, 25.4	1	25.4	1	25.4	3/4	19.1	3/8	9.5	2-1/8	54.0
									1/2	12.7	2-13/16	71.4
1-1/2	1/4, 3/8, 1/2, 3/4, 1, 1-1/2	6.4, 9.5, 12.7, 19.1, 25.4, 38.1	1-1/2	38.1	1-1/2	38.1	3/4	19.1	3/8	9.5	2-1/8	54.0
									1/2	12.7	2-13/16	71.4
2	1/4, 3/8, 1/2, 3/4, 1, 2	6.4, 9.5, 12.7, 19.1, 25.4, 50.8	2	50.8	2	50.8	1-1/8	28.6	1/2	12.7	2-13/16	71.4
									3/4	19.1	3-9/16	90.5

Table 8

Maximum Allowable Actuator Thrust for Standard Cryogenic Bonnet Lengths

Model	Valve Size Inch	Stem Diameter		Maximum Allowable Stem Load	
		Inch	mm	lb	N
363C	1/2, 3/4, 1	3/8	9.5	1,210	5,382
		1/2	12.7	2,960	13,166
	1-1/2	3/8	9.5	1,200	5,338
		1/2	12.7	2,960	13,166
	2	1/2	12.7	3,230	14,367
		3/4	19.1	9,930	44,169
360C	3	1/2	12.7	3,440	15,301
		3/4	19.1	10,220	45,459
	4	1/2	12.7	3,700	16,458
		3/4	19.1	10,560	46,971
	6	3/4	19.1	8,180	36,385
		1	25.4	18,320	81,487
	8	3/4	19.1	9,300	41,366
		1	25.4	19,560	87,003

Table 9

360C Standard Valve Dimensions (RF End Connection) Inches (mm)
(Refer to Figure 2)

Valve Size Inch	A			B	C		
	ASME Class 150	ASME Class 300	ASME Class 600		Stem Diameter Inch (mm)		
					1/2 (12.7)	3/4 (19.1)	1 (25.4)
3	11.75 (299)	12.50 (318)	13.25 (337)	3.81 (97)	21.00 (533)	21.00 (533)	-
4	13.88 (353)	14.50 (368)	15.50 (394)	5.06 (129)	21.00 (533)	21.00 (533)	-
6	17.75 (451)	18.62 (473)	20.00 (508)	5.50 (140)	-	30.00 (762)	30.00 (762)
8	21.38 (543)	22.38 (543)	24.00 (610)	7.50 (191)	-	30.00 (762)	30.00 (762)

Table 10

363C Standard Valve Dimensions (RF End Connection) Inches (mm)
(Refer to Figure 2)

Valve Size Inch	A			B	C		
	ASME Class 150	ASME Class 300	ASME Class 600		Stem Diameter Inch (mm)		
					3/8 (9.5)	1/2 (12.7)	3/4 (19.1)
1/2, 3/4, 1	7.25 (184)	7.75 (184)	8.25 (210)	2.38 (61)	21.06 (535)	21.62 (549)	-
1-1/2	8.75 (222)	9.25 (235)	9.88 (251)	2.81 (71)	21.06 (535)	21.56 (548)	-
2	10.00 (254)	10.50 (268)	11.25 (286)	3.06 (78)	-	21.00 (533)	21.00 (533)

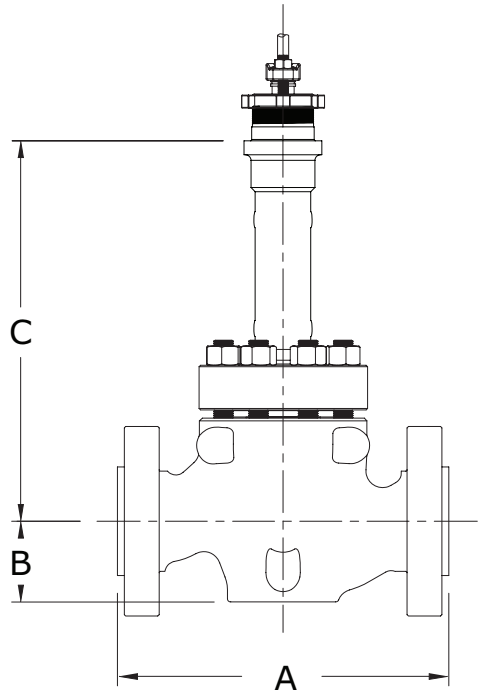
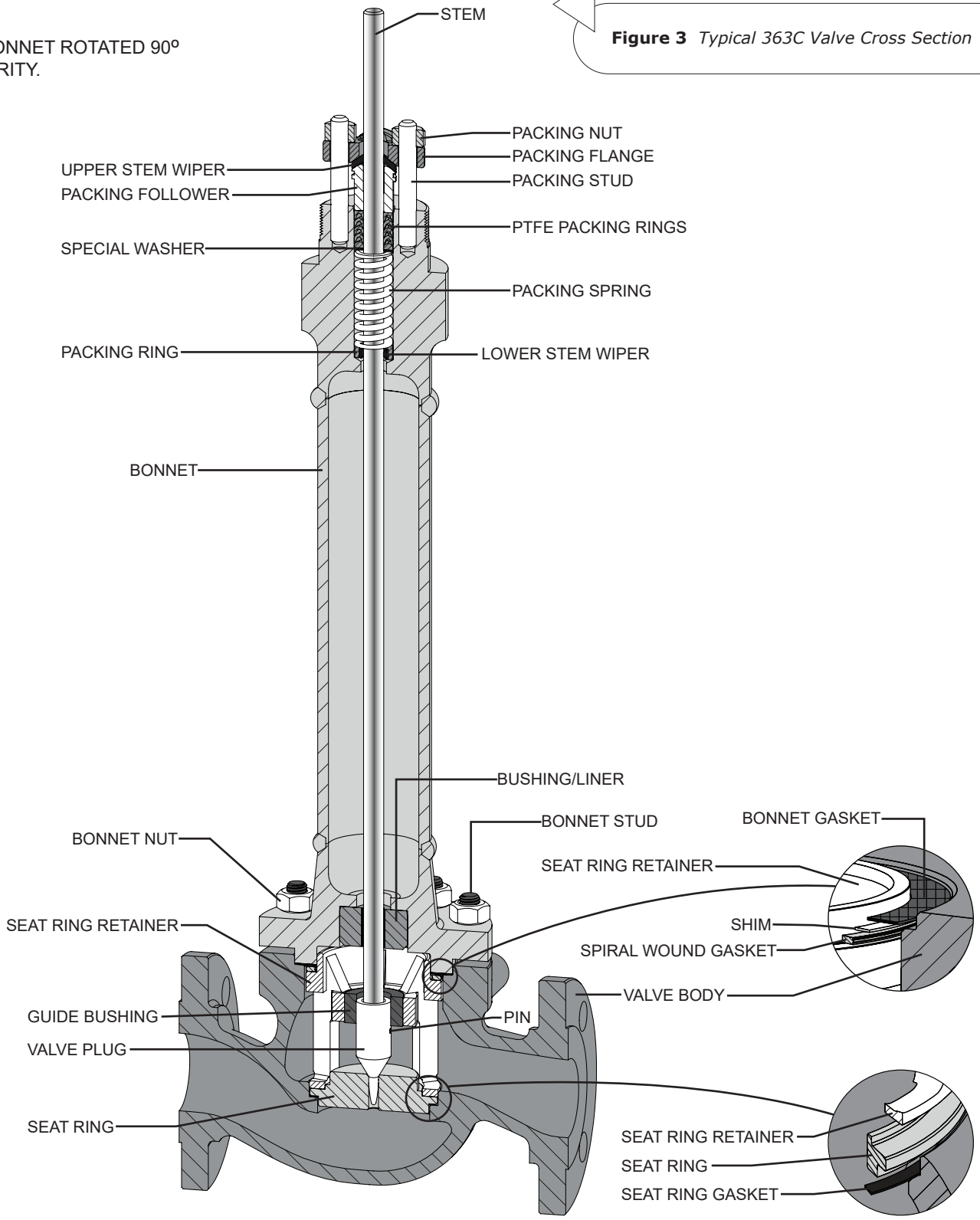


Figure 2 *Typical Valve Dimension Diagram*

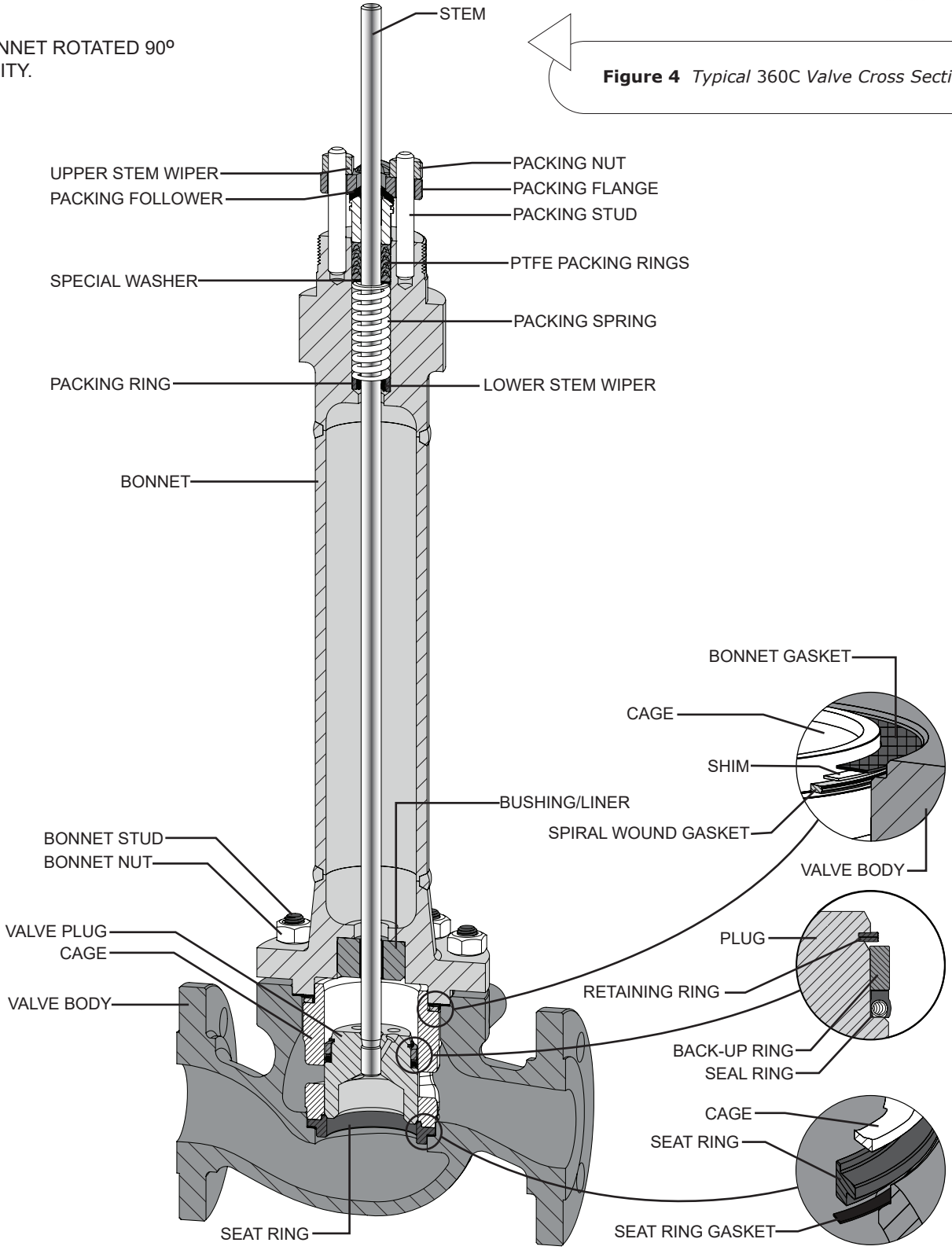
NOTE: BONNET ROTATED 90º FOR CLARITY.

Figure 3 *Typical 363C Valve Cross Section*



NOTE: BONNET ROTATED 90º FOR CLARITY.

Figure 4 *Typical* 360C *Valve Cross Section*



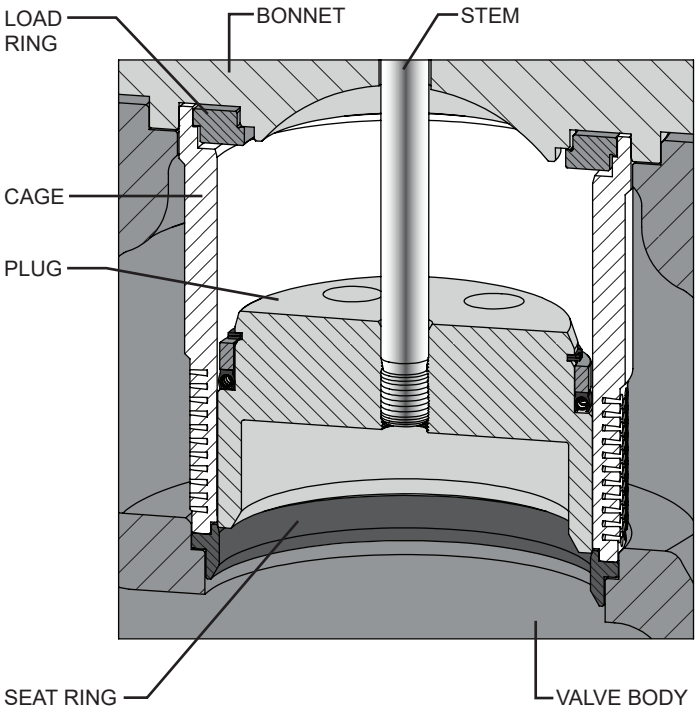


Figure 5 *8 Inch Anti-Cavitation Valve Assembly With Load Ring Detail*

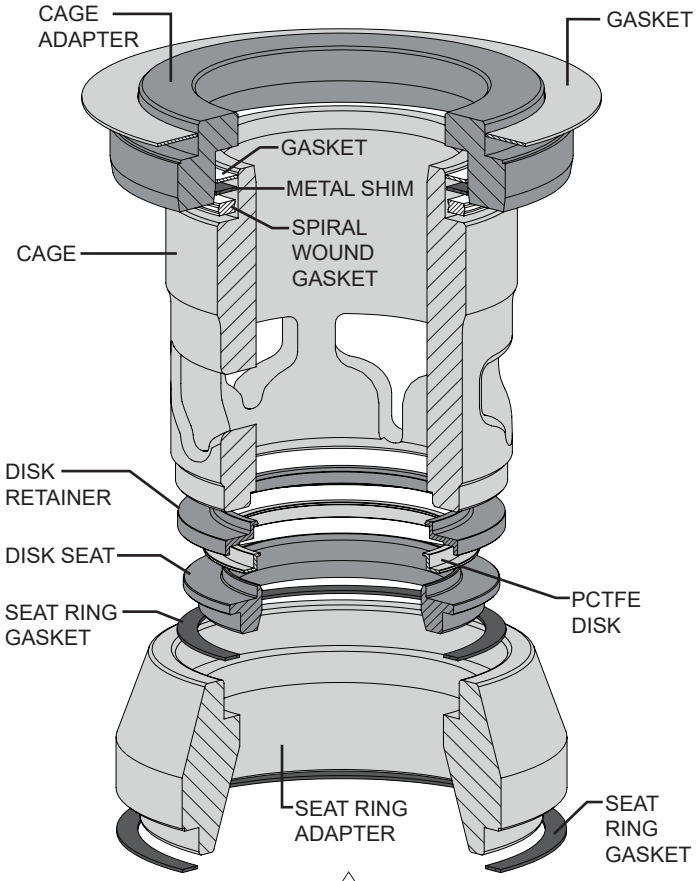


Figure 6 *Reduced Trim and Soft Seat Assembly Diagram*

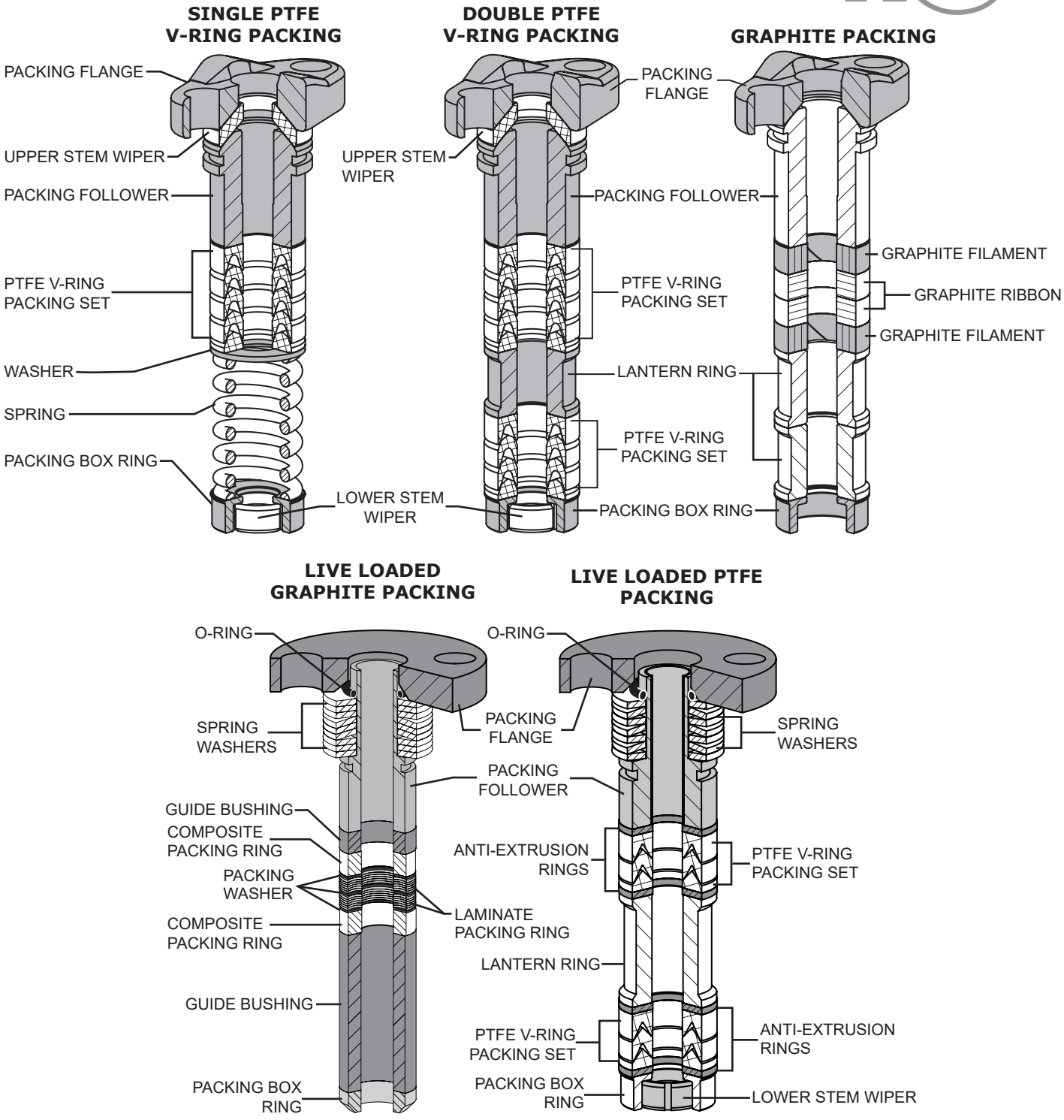


Figure 7 *Typical Packing Arrangements*

Table 11

Common Valve Parts Typical Construction Materials and Temperature Limitations

Part		Material	Temperature Limitations			
			Min. ºF	Max. ºF	Min. ºC	Max. ºC
Valve Stem		S20910	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Load Ring (8 Inch Valves Only)		Inconel 718	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Cage Adapter (Reduced Trim)		S31600/S31603 Dual Grade	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Seat Ring Adapter (Reduced Trim)		S31600/S31603 Dual Grade	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Spring-Loaded (Three-Piece) Valve Plug Seal	Backup Ring	S31600/S31603 Dual Grade	NLF(1)	NLF(1)	NLF(1)	NLF(1)
	Seal Ring	PCTFE / Elgiloy	NLF(1)	NLF(1)	NLF(1)	NLF(1)
	Retaining Ring	S31600/S31603 Dual Grade	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Seat Ring / Bonnet / Cage Gaskets		Graphite	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Spiral Wound Gaskets		N06600 / Graphite	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Shim		S30400	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Disk		PCTFE	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Disk Seat		S31600/S31603 Dual Grade	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Disk Retainer		S31600/S31603 Dual Grade	NLF(1)	NLF(1)	NLF(1)	NLF(1)
Packing		PTFE V-Ring	NLF(1)	NLF(1)	NLF(1)	NLF(1)
		Graphite (Ribbon/Filament)	NLF(1)	NLF(1)	NLF(1)	NLF(1)

NOTES:

1 - NLF - This Material is Not A Limiting Factor. For the temperature limitation refer to the Material Temperature Capabilities on Page 2.

Table 12

Body to Bonnet Bolting Temperature Limitations

Body Material	ASME Class	Bolt/Nut Material	Temperature Limitations			
			Min. ºF	Max. ºF	Min. ºC	Max. ºC
CF8M	150/300/600	B8M/8M(1) (Standard)	-325	NLF(2)	-198	NLF(2)

NOTES:

1 - NACE MR0175/ISO15156 Non-Exposed Bolting option (Bolting that is not directly exposed to sour environments and is not to be buried, insulated, equipped with flange protectors, or otherwise denied direct atmospheric exposure).

2 - NLF - This material is Not A Limiting Factor. For the temperature limitation refer to the Material Temperature Capabilities on Page 2.

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Table 13

360C Standard Trim Options

Trim Spec	Valve Plug	Stem	Cage	Seat Ring	Seat Type	Temperature Limit
C1	S31600(1) / Alloy 6 Hard Faced Seat	S20910	S31600(1) / CRPL(2)	S31600(1)	Metal	NLF(3)
C2	S31600(1)	S20910	S31600(1) / CRPL(2)	S31600(1) / PCTFE	Soft	NLF(3)
C3(4)	S31600(1) / Alloy 6 Hard Faced Seat & Guide	S20910	S31600(1) / CRPL(2)	S31600(1)	Metal	NLF(3)

NOTE:

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

2 - CRPL = Chrome Plated.

3 - NLF - This material is Not A Limiting Factor. For the temperature limitation refer to the Material Temperature Capabilities on Page 2.

4 - Use Trim C3 for all Low-Noise and Anti-Cavitation valve applications.

Table 14

363C Standard Trim Options

Trim Spec	Valve Plug	Stem	Retainer / Bushing	Seat Ring	Seat Type	Temperature Limit
C1	S31600(1) / Alloy 6 Hard Faced Seat	S20910	CF8M / Alloy 6	S31600(1)	Metal	NLF(2)
C2	S31600(1) / Alloy 6 Hard Faced Seat & Guide	S20910	CF8M / Alloy 6	S31600(1)	Metal	NLF(2)

NOTE:

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

2 - NLF - This material is Not A Limiting Factor. For the temperature limitation refer to the Material Temperature Capabilities on Page 2.

Table 15

363C Maximum Allowable Pressure Drops[2] for N06600/Graphite Gaskets Psig (kPag) (Flow Up Only)[1]

Valve Size Inch	Port Size Inch (mm)	Temperature[3] -325 to 100ºF (-253 to 38ºC)	200ºF (93ºC)	300ºF (149ºC)
1/2, 3/4, 1	1/4 (6.4)	1,370 (9,446)	1,300 (8,963)[4]	1,240 (8,550)[4]
	3/8 (9.5)	1,395 (9,618)	1,325 (9,136)[4]	1,265 (8,722)[4]
	1/2 (12.7)	1,420 (9,791)	1,350 (9,308)[4]	1,290 (8,894)[4]
	3/4 (19.1)	1510 (10,411)[4]	1,430 (9,860)[4]	1,370 (9,446)[4]
	1 (25.4)	1,660 (11,445)[4]	1,570 (10,825)[4]	1,500 (10,342)[4]
1-1/2	1/4 (6.4)	1,130 (7791)	1,070 (7,377)	1,020 (7,033)
	3/8 (9.5)	1,145 (7895)	1,080 (7,446)	1,035 (7,136)
	1/2 (12.7)	1,160 (7998)	1,090 (7,515)	1,050 (7,240)
	3/4 (19.1)	1,200 (8274)	1,140 (7,860)	1,090 (7,515)
	1 (25.4)	1,270 (8756)	1,200 (8,274)	1,150 (7,929)[4]
	1 1/2 (38.1)	1,520 (10,480)[4]	1,440 (9,929)[4]	1,370 (9,446)[4]
2	1/4 (6.4)	980 (6,757)	920 (6,343)	880 (6,067)
	3/8 (9.5)	985 (6,791)	930 (6,412)	890 (6,136)
	1/2 (12.7)	990 (6,826)	940 (6,481)	900 (6,205)
	3/4 (19.1)	1,020 (7,033)	970 (6,688)	920 (6,343)
	1 (24.4)	1,060 (7,308)	1,010 (6,964)	960 (6,619)
	2 (50.8)	1,470 (10,135)[4]	1,390 (9,584)[4]	1,330 (9,170)[4]

NOTES:

1 - Model 363 valves should not be used in Flow Down applications.

2 - Pressure drops can not exceed the maximum inlet pressure as indicated on Page 2.

3 - Pressure drops at intermediate temperatures may be interpolated.

4 - Pressure drops are in excess of Class 600 pressure ratings as per ASME B16.34 for CF8M body material.

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Model 360C/363C Cryogenic Control Valves

MODEL NUMBERING SYSTEM

SAMPLE PART NUMBER: 360C-3AFMB1FP2-KE4

							MODEL	**360C**
363C	MODEL 363 CRYOGENIC			**360C**	MODEL 360 CRYOGENIC			
							BODY STYLE	**-**
-	GLOBE							
							VALVE SIZE	**3**
9	1/2 INCH	**7**	3/4 INCH	**1**	1 INCH	**5**	1-1/2 INCH	
2	2 INCH	**3**	3 INCH	**4**	4 INCH	**6**	6 INCH	
8	8 INCH							
							ASME RATING	**A**
A	150	**B**	300	**C**	600			
							END CONNECTION	**F**
F	RF							
							BODY MATERIAL	**M**
M	CF8M							
							BOLTING	**B**
B	B8M / 8M							
							TRIM	**1**
1	TRIM C1			**3**	TRIM C2			
2	TRIM C3 (360C ONLY)							
							PORT SIZE	**F**
F	FULL PORT	**R**	REDUCED PORT	**01**	3/16 INCH PORT	**02**	1/4 INCH PORT	
03	3/8 INCH PORT	**04**	1/2 INCH PORT	**06**	3/4 INCH PORT			
							PACKING STYLE	**P**
P	SINGLE PTFE V-RING (PRESSURE)			**J**	DOUBLE PTFE V-RING (PRESSURE)			
G	SINGLE GRAPHITE (PRESSURE)			**V**	DOUBLE PTFE V-RING (VACUUM)			
R	DOUBLE PTFE V-RING (VACUUM / PRESSURE)			**L**	LIVE LOADED PTFE V-RING (PRESSURE)			
T	LIVE LOADED GRAPHITE (PRESSURE)							
							YOKE BOSS SIZE	**2**
1	2-1/8" (3/8" STEM)	**2**	2-13/16" (1/2" STEM)	**3**	3-9/16" (3/4" STEM)	**5**	5" (1" STEM)	
							PAINT	**-**
-	NONE							
							BACKUP RING / SEAL RING	**K**
K	S31600 / PCTFE-ELGILOY							
							CHARACTERISTIC	**E**
E	EQUAL PERCENT	**L**	LINEAR	**Q**	QUICK OPENING			
A	ANTI-CAVITATION 1 STAGE (LINEAR)			**Z**	LOW-NOISE III A1 (LINEAR)			
Y	LOW-NOISE III B3 (LINEAR)			**C**	LOW-NOISE III C3 (LINEAR)			
1	LOW-NOISE III D1 (LINEAR)			**D**	LOW-NOISE III D3 (LINEAR)			
M	DYNA-FORM							
							CHARACTERISTIC (EXTENDED TRAVEL)	
R	EQUAL PERCENT - EXTENDED TRAVEL			**S**	LINEAR - EXTENDED TRAVEL			
T	QUICK OPENING - EXTENDED TRAVEL			**W**	LOW-NOISE III A1 (LINEAR) - EXTENDED TRAVEL			
V	ANTI-CAVITATION 1 STAGE (LINEAR) - EXTENDED TRAVEL							
4	LOW-NOISE III A1 (LINEAR) EXTENDED 4" TRAVEL (8" VALVE ONLY)							
							SHUT-OFF CLASS	**4**
4	CLASS IV	**5**	CLASS V	**6**	CLASS VI			

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