Design ED, EAD, and EDR Sliding-Stem Control Valves

Design ED, EAD, and EDR single-port control valves shown in figures 1, 2, 3, and 4 have balanced valve plugs, cage guiding, and metal-to-metal seating for all general applications over a wide range of process pressure drops and temperatures. These general purpose, sliding-stem valves are used for either throttling or on-off control of a wide variety of liquids and gases.

Unless otherwise noted, all NACE references are to NACE MR0175-2002.

Figure 1. Design ED Control Valve with Type 667 Actuator

The easy-e® Valve Family

Design ED, EAD, and EDR valves are part of the versatile easy-e family of Fisher® industrial control valves. easy-e valves share the following characteristics:

- Multiple trim material choices
- Trim temperature capability with standard metal seats to 427°C (800°F)
- FGM gaskets
- Interchangeable, restricted-capacity trims and full-size trims match variable process flow demands
- Different cage/plug styles provide particular flow characteristics for highly-specialized applications. The standard cage comes in three different flow characteristics:
  - quick-opening
  - linear
  - equal percentage
- Noise in gaseous service may be attenuated by using Whisper Trim® I, Whisper Trim III (figure 10), and WhisperFlo® cages (figure 12)
- Optional constructions provide material compatibility with NACE MR0175-2002
- 316 stainless steel packing box parts are standard (including packing flange, studs, and nuts)

Contents

Features

- **Compliance with the Clean Air Act—**Optional ENVIRO-SEAL packing systems (figure 7) provide an improved stem seal to help prevent the loss of process fluid. The ENVIRO-SEAL packing systems feature PTFE, Graphite ULF, or Duplex packing with live-loading for reduced packing maintenance.

- **Valve Plug Stability—** Rugged cage guiding provides high valve plug stability, which reduces vibration and mechanical noise.

- **More Flow Capacity for Initial Investment—** Streamlined flow passages in the the Design ED, EAD, and EDR valves provide excellent capacities and flow.

- **Balanced Valve Plug Construction—** Balanced valve plug construction permits use of smaller, lower-cost Fisher actuators. Also, trim inventory costs are cut because dimensional standardization permits use of most standard easy-e trim parts.

- **High-Temperature Capability with Class IV or Class V Shutoff—**Use of multiple graphite piston rings (figure 2) permit Class IV shutoff up to 593°C (1100°F).
Use of C-seal trim (see figure 6) permits Class V shutoff up to 593°C (1100°F).

- **Compliance with European Standards—** Valves are available with dimensions specified by EN/DIN standards. See figure 14.

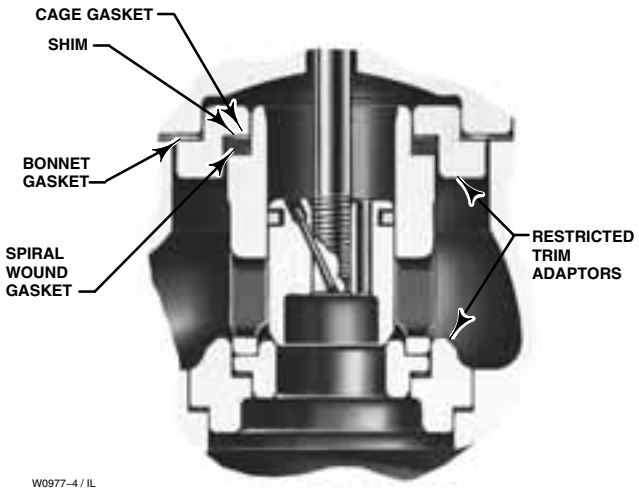
- **Sour Service Capability—**Materials are available for applications handling sour fluids and gases. These materials comply with the requirements of NACE MR0175-2002**.**

- **Operating Economy—**Increased wear resistance provided by standard hardened stainless steel trim means long service life.

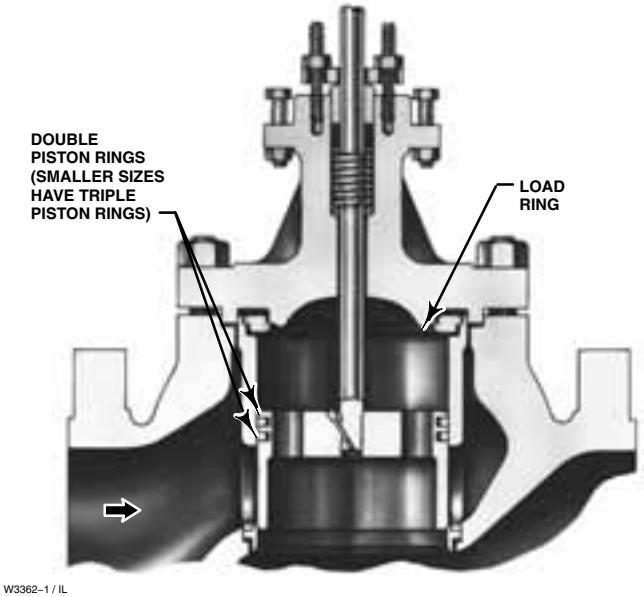
- **Maintenance Economy—**The valve body can stay in the pipeline during removal of trim parts. The Design EDR valve also features easy valve access without removing the actuator.

Note

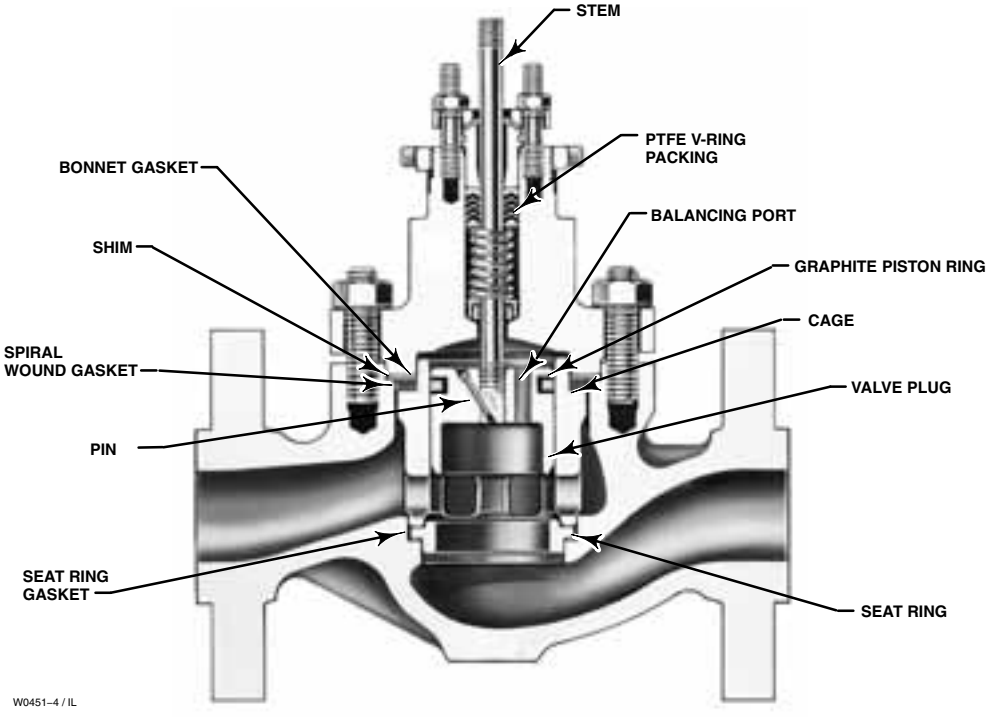
Neither Emerson®, Emerson Process Management™, Fisher, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.



RESTRICTED TRIM



8-INCH VALVE WITH OPTIONAL MULTIPLE PISTON RINGS FOR CLASS IV SHUTOFF (ALSO AVAILABLE IN OTHER SIZES)



STANDARD 1- THROUGH 6-INCH CONSTRUCTION

Figure 2. Design ED Sectional

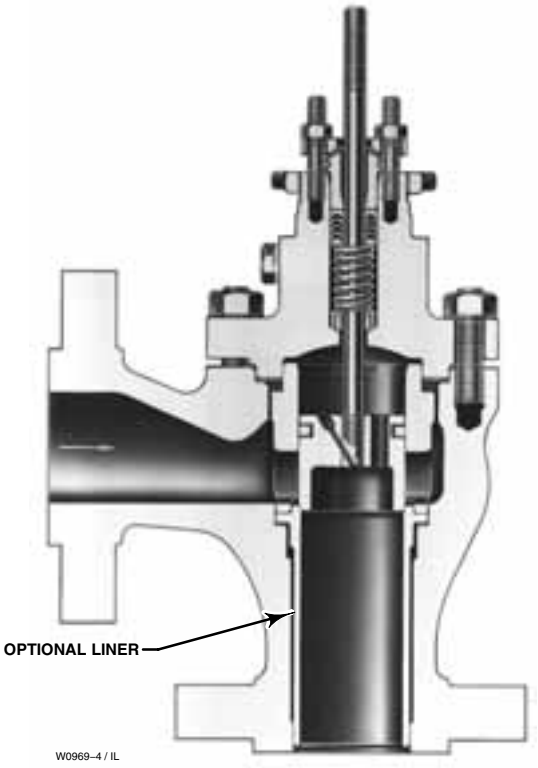


Figure 3. Design EAD Sectional

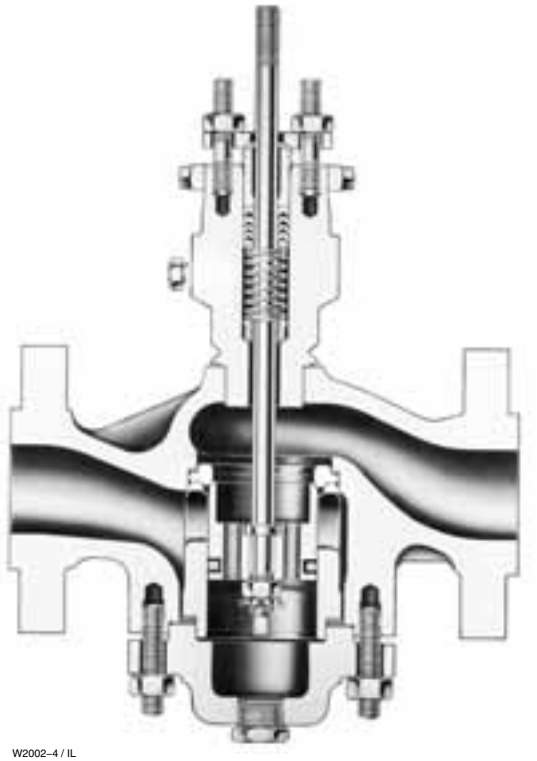


Figure 4. Design EDR Sectional

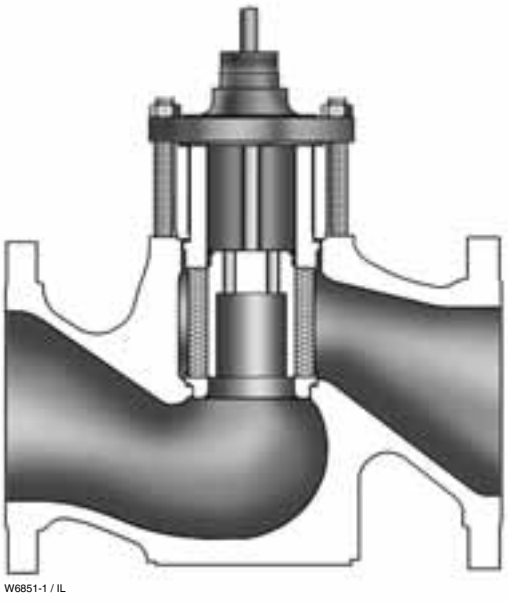


Figure 5. Typical Valve with WhisperFlo® Aerodynamic Trim

Table 1. C-seal™ Shutoff Classification

VALVE DESIGN (CLASS)	VALVE SIZE	PORT DIAMETER		CAGE STYLE	ANSI/FCI LEAKAGE CLASS
	Inches	mm	Inches		
Design ED (Class 150-600)	2.5	73	2.875	Eq. %, Linear, Whisper I, Cav III, 1 stage	V to 593°C (1100°F) [for port diameters from 73 through 203.2 mm (2.875 through 8-inch) with optional C-seal trim]
	3	87.3	3.4375		
	3	73	2.875	Cav III, 2 stage	
	4	73	2.875		
	4	73 111.1	2.875 4.375	Eq. %, Linear, Whisper I, Cav III, 1 stage	
	6	136.5	5.375	Whisper III (A3, B3, C3, D3), Cav III, 2 stage	
		177.8	7	Eq. %, Linear, Whisper I, Cav III, 1 stage	
	8	177.8	7	Cav III, 2 stage	
		203.2	8	Eq. %, Linear, Whisper I, Cav III, 1 stage	

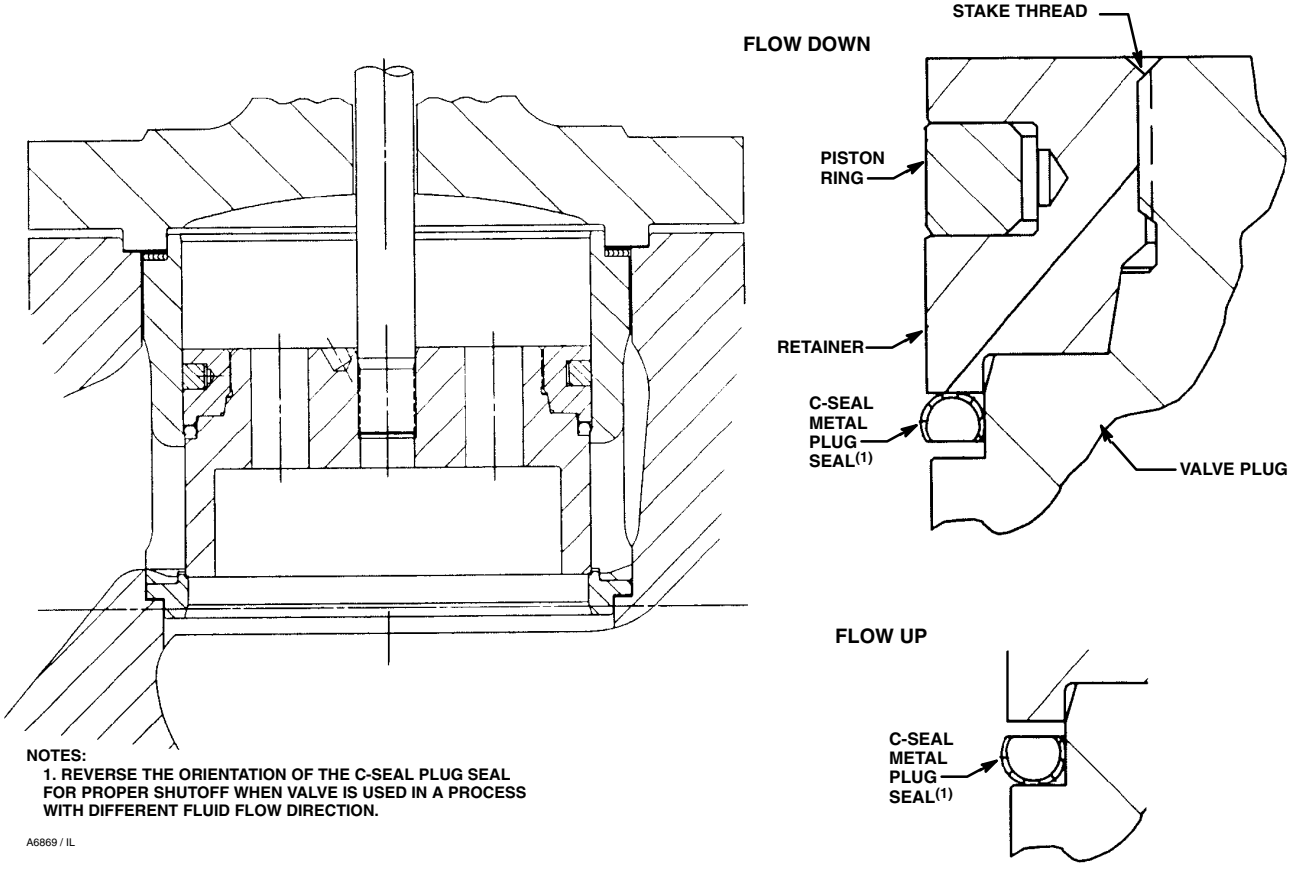


Figure 6. C-seal™ Trim

Table 2. Available Constructions

DESIGN	VALVE SIZE, INCH	VALVE BODY MATERIAL AND END CONNECTION STYLE(1)								
		Carbon Steel, Alloy Steel, or Stainless Steel Valve Body						Cast Iron Valve Body		
		Screwed	RF or RTJ Flanged			Butt-welding	Socket Weld	Screwed	Class 125 FF Flanged	Class 250 RF Flanged
			Class 150	Class 300	Class 600					
ED	1, 1.5, or 2	X	X	X	X	X	X	X	X	X
	1.25	X	- - -	- - -	- - -	- - -	- - -	X	- - -	- - -
	2.5, 3, 4, 6, or 8	- - -	X	X	X	X	- - -	- - -	X	X
EAD	1 or 2	- - -	X	X	X	X	- - -	- - -	- - -	- - -
	3, 4, or 6	- - -	X	X	X	X	- - -	- - -	- - -	- - -
EDR	1, 1.5, or 2	X	X	X	X	X	X	X	X	X
	1.25	X	- - -	- - -	- - -	- - -	- - -	X	- - -	- - -
	2.5, 3, or 4	- - -	X	X	X	X	- - -	- - -	X	X

X = Available Construction.
1. End connection style abbreviations: FF - Flat Faced, RF - Raised Face, RTJ - Ring Type Joint.

C-seal™ Trim Description

C-seal trim is available for valves with port diameters from 2.875 inches through 8 inches.

With C-seal trim, a balanced valve can achieve high-temperature, Class V shutoff. Because the C-seal plug seal is formed from metal (N07718 nickel alloy) rather than an elastomer, a valve equipped with the C-seal trim can be applied in processes with a fluid temperature of up to 593°C (1100°F).

ENVIRO-SEAL® and HIGH-SEAL™ Packing Systems

ENVIRO-SEAL and HIGH-SEAL packing systems offer exceptional sealing capabilities. They easily install in your existing valves or can be purchased with new valves. These systems may help prevent the loss of process fluid. The long operational life and reliability of these systems also reduces your maintenance costs and downtime.

For applications requiring compliance with environmental protection regulations, the unique Fisher ENVIRO-SEAL packing system (figure 7) and a unique ENVIRO-SEAL bellows seal system (figure 8) are offered. The patented emission control packing system keeps emission concentrations below the EPA 100 ppm requirement.

For an excellent stem seal in applications that are not environmentally-sensitive, the Fisher HIGH-SEAL Graphite ULF packing system (figure 7) is offered. The HIGH-SEAL packing system provides excellent sealing at pressure/temperature ratings beyond ENVIRO-SEAL limits. ENVIRO-SEAL systems may also be applied for excellent stem sealing in higher pressure/temperature applications not requiring EPA compliance.

ENVIRO-SEAL packing systems, available with PTFE, Graphite ULF, or Duplex packing, and the HIGH-SEAL packing systems, Graphite ULF and graphite composite, feature live-loading and unique packing-ring arrangements for long-term, consistent sealing performance.

Table 3. Typical Combinations of Metal Trim Parts[1] for all Valves Except Those for NACE Specification, Whisper Trim® III, and WhisperFlo® Cages

Trim Designation	Valve Plug	Cage	Seat Ring	Liner (Design EAD Valve Only)
1 (standard for Design ED, EAD, and EDR in all valve body materials except CF8M)	S41600 hardened to 38 HRC	CB7Cu-1 hardened to 40 HRC	S41600 or CA15[2] (410 stainless steel), both hardened to 38 HRC	S41600 hardened to 38 HRC
3 and 3H[3]	S31600 with seat and guide hard faced with CoCr-A hardfacing alloy	R30006 (alloy 6)	R30006 (alloy 6)	- - -
4	S31600	CB7Cu-1 hardened to 40 HRC	S31600	S31600
27	S31600 with seat and guide hard faced with CoCr-A hardfacing alloy	CF8M with electroless nickel coating (ENC)	R30006 (alloy 6)	- - -
28	S31600 with seat hard faced with CoCr-A hardfacing alloy			
29 (standard for CF8M bodies in all designs)	S31600	CF8M with electroless nickel coating (ENC)	S31600	S31600
37 and 37H[3]	S31600 with seat and guide hard faced with CoCr-A hardfacing alloy	CB7Cu-1 hardened to 40 HRC	R30006 (alloy 6)	

1. Nonferrous-alloy combinations are also available. Consult your Emerson Process Management sales office for details.
2. CA15 is used for 6- and 8-inch full-size and restricted-trim valves.
3. Trims 3H and 37H have clearances for high-temperature service.

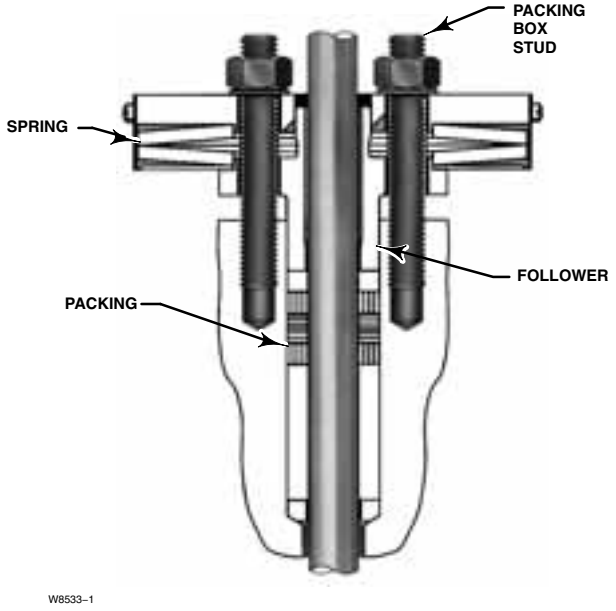
Table 4. Whisper Trim® III Metal Trim Part Materials and Body/Trim Temperature Capabilities (6-inch Design ED only)

TRIM DESIGNATION	VALVE PLUG	CAGE	CAGE RETAINER	BAFFLE (FOR LEVEL D3 CAGE ONLY)	SEAT RING	BODY, BONNET & BONNET SPACER	MATERIAL TEMPERATURE CAPABILITY			
							°C		°F	
							Min	Max	Min	Max
301 (standard for all body materials except S31600)	S17400 hardened to 40 HRC	S41600 hardened to 38 HRC	Carbon steel NACE with electroless nickel coating (ENC)	Steel	410 SST hardened to 38 HRC	WCC carbon steel or WC9 chrome moly steel	–29	343	–20	650
						CF8M (316 SST)	–29	163	–20	325
301A	S17400 hardened to 40 HRC	S41600	WCC Ion Nitrided	Steel	S41600	WCC carbon steel or WC9 chrome moly steel	232	427	450	800
304	S31600 with seat and guide hard faced with CoCr-A hard-facing alloy	S41600 hardened to 38 HRC	Carbon steel NACE with electroless nickel coating (ENC)	Steel	S31600 with seat hard faced with CoCr-A hard-facing alloy	WCC carbon steel, WC9 chrome moly steel	–29	343	–20	650
						CF8M (316 SST)	–29	177	–20	350
313 (NACE compatible)[1]	S31600 with seat and guide hard faced with CoCr-A hard-facing alloy	S31600 with electroless nickel coating (ENC)	Carbon steel NACE with electroless nickel coating (ENC)	Steel	S31600 with seat hard faced with CoCr-A hard-facing alloy	WCC carbon steel, WC9 chrome moly steel, or CF8M (316 SST)	–29	343	–20	650
315	S31600 with seat and guide hard faced with CoCr-A hard-facing alloy	Electrolized 316 SST	Electrolized 316 SST	S31600	S31600 with seat hard faced with CoCr-A hard-facing alloy	WCC carbon steel or WC9 chrome moly steel	–29	260	–20	500
						CF8M (316 SST)	–198	537[2]	–325	1000[2]
318	S31600 with seat and guide hard-faced with CoCr-A	WC9/Nitrided	WC9/Nitrided	WC9	S31600 with seat hard-faced with CoCr-A	WCC carbon steel	–29	427	–20	800
						WC9 chrome moly steel	–29	593	–20	1100

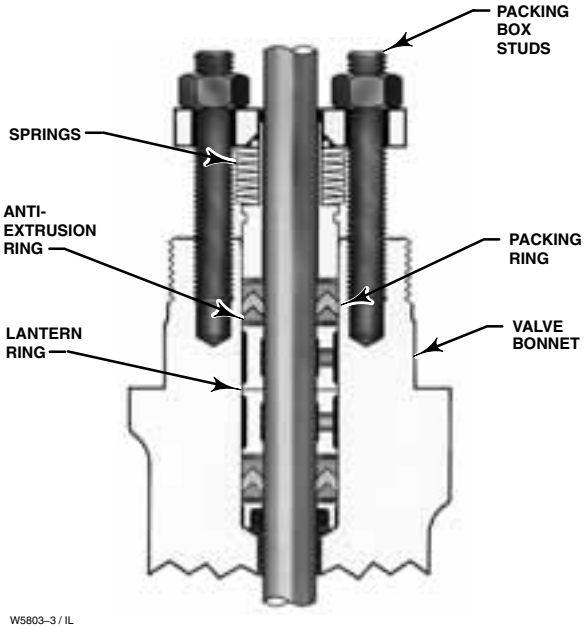
1. Level D3 cage cannot be certified to NACE. Use 316/ENC cage retainer instead.
2. May be used up to 593°C (1100°F) if manufacturing process controls carbon content to 0.04% minimum or 0.08% maximum.

Table 5. WhisperFlo® Metal Trim Part Materials and Valve Body/Trim Temperature Capabilities (4- and 6-inch Design ED only)

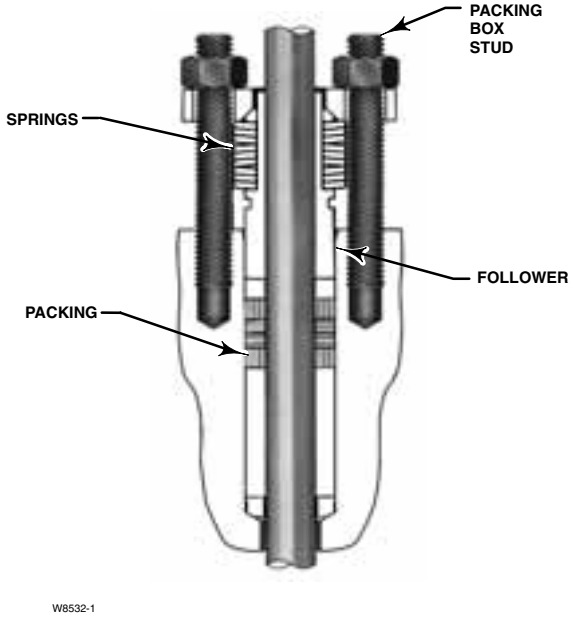
TRIM DESIGNATION	VALVE BODY	VALVE PLUG	CAGE	CAGE RETAINER	SEAT	MATERIAL TEMPERATURE CAPABILITY			
						°C		°F	
						Min	Max	Min	Max
901	WCC	S41600	S41000	WCC ENC	S41600	–29	343	–20	650
902	WCC	S31600/CoCrA Seat and Guide	S41000	WCC ENC	S31600/CoCrA	–29	343	–20	650
915	WCC	S31600/CoCrA Seat and Guide	S41000/Nitride	WCC/Nitride	S31600/CoCrA	343	427	650	800
916	WC9	S31600/CoCrA Seat and Guide	S41000/Nitride	WC9/Nitride	S31600/CoCrA	343	538	650	1000
926	WCC	S31600/CoCrA Seat and Guide	S41000 NACE	WCC/NACE/ENC	S31600/CoCrA	–29	343	–20	650
936	316 CF8M	S31600/CoCrA Seat and Guide	S31603/CRCT	S31600/ENC	S31600/CoCrA	–198	343	–325	650
946	316 CF8M	S31600/CoCrA Seat and Guide	S31603/CRCT	S31600/Nitride	S31600/CoCrA	343	538	650	1000



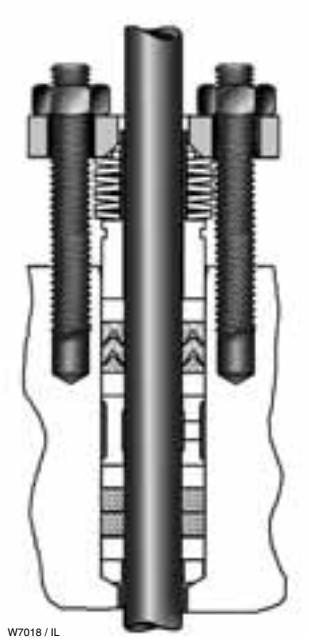
TYPICAL HIGH-SEAL PACKING SYSTEM WITH GRAPHITE ULF PACKING



TYPICAL ENVIRO-SEAL PACKING SYSTEM WITH PTFE PACKING



TYPICAL ENVIRO–SEAL PACKING SYSTEM WITH GRAPHITE ULF PACKING



TYPICAL ENVIRO-SEAL PACKING SYSTEM WITH DUPLEX PACKING

Figure 7. ENVIRO-SEAL® and HIGH-SEAL™ Packing Systems

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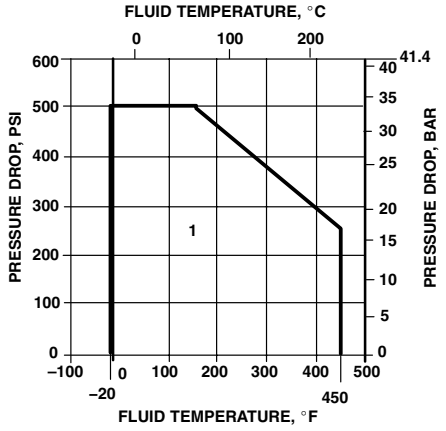
Figure 8. Cutaway of ENVIRO-SEAL® Bellows Seal Bonnet and Internal Shroud, Showing Bellows

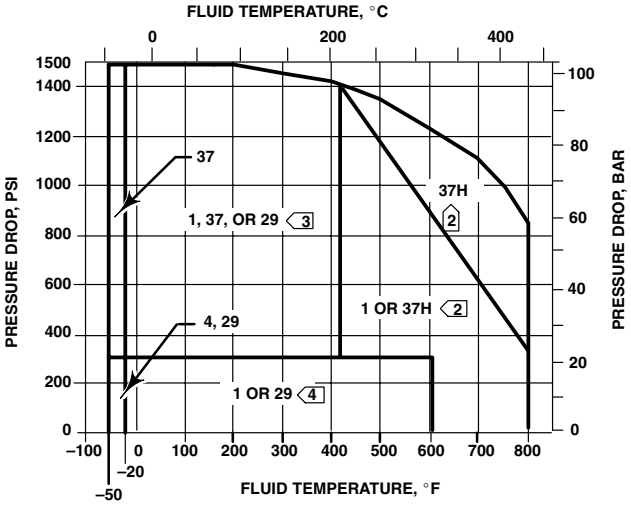
Table 6. Materials and Temperature Limits for All Other Parts

PART			MATERIAL		MATERIAL TEMPERATURE CAPABILITY			
					°C		°F	
					Min	Max	Min	Max
Body-to-bonnet bolting. See table 12 for NACE bolting materials and temperature limits	Cast iron valve body	Cap screws	Steel SAE Grade 5		–29	232	–20	450
	WCC, or WC9 valve body	Studs	Steel SA-193-B7		–29	427(1)	–20	800(1)
		Nuts	Steel SA-194-2H					
	LCC/HT valve body	Studs	Steel SA-193-B7		–46	343(1)	–50	650(1)
		Nuts	Steel SA-194-2H					
	WC9 valve body	Studs	Steel SA-193-B16		–29	566(1)	–20	1050(1)
		Nuts	Steel SA-194-7					
	CF8M (316 SST) valve body	Studs	Steel SA-193-B7 (NACE [non-exposed bolting])		–48	427(1)	–55	800(1)
		Nuts	Steel SA-194-2H (NACE [non-exposed bolting])					
		Studs	304 stainless steel SA-320-B8		–198	These matls not limiting factors	–325	These matls not limiting factors
		Nuts	304 stainless steel SA-194-8					
		Studs	316 stainless steel SA-193-B8M (strain hardened)		–198(2)	427(1)	–325(2)	800(1)
		Nuts	316 stainless steel SA-194-8M					
Piston ring			Graphite (FMS 17F27)	Oxidizing service	–46(3)	427	–50(3)	800
				Non-oxidizing service	–46(3)	482	–50(3)	900
			Graphite (FMS17F39)	Oxidizing service	–46(3)	560	–50(3)	1000
				Non-oxidizing service	–46(3)	593	–50(3)	1100
Valve plug stem			S31600 (S20910, NACE Std.)		–198(2)	593	–325(2)	1100
Pin (Design ED or EAD valve only)			S31600					
Castle nut and cotter pin (Design EDR valve only)			18-8 stainless steel					
Load ring (8 inch Design ED valve only)			S17400		–101	316	–150	600
			N06600		–254	593	–425	1100
			N05500		–204	260	–400	500
Restricted trim adaptors			Cast iron		–73	232	–100	450
			WCC steel		–29	427	–20	800
			S31600		–198(2)	593	–325(2)	1100
Seat ring, bonnet and cage gaskets			FGM (standard)		–198	593(4)	–325	1100(4)
			PTFE-coated N04400		–73	149	–100	300
Spiral wound gaskets			N06600/graphite (FGM-standard)		–198	593(4)	–325	1100(4)
			N04400/composition		–73	232	–100	450
Shim			S31600		These materials not limiting factors			
			N04400					
Packing (temperatures shown are material temperature capabilities). See table 8 for proper bonnet selection.			PTFE V-ring		–40	232	–40	450
			PTFE/composition		–73	232	–100	450
			Graphite ribbon/filament		–198	538(6)	–325	1000(6)
			Graphite ribbon for high-temperature oxidizing service		371	649	700	1200
Packing flange, studs and nuts when used with standard bonnet			S31600		–198(2)	593(1)	–325(2)	1100(1)
Packing follower, and packing spring(5) or lantern ring			S31600		–198(2)	593	–325(2)	1100
Packing box ring			S31600					
Extension bonnet bushing		Trims 1 & 37H	S41600		–29	427	–20	800
		Other trims	S31600		–198(2)	593	–325(2)	1100

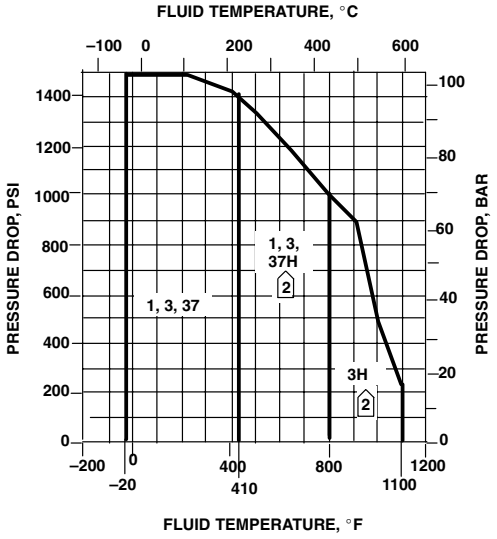
1. Lubricated nuts are standard.
2. May be used down to –254°C (–425°F) if manufacturing process includes Charpy impact test.
3. This minimum is due to thermal expansion differential between piston ring and cage at low temperatures.
4. Except 427°C (800°F) on oxidizing service.
5. Spring is used only with single PTFE V-ring packing; lantern ring replaces spring in other packings.
6. Except 371°C (700°F) on oxidizing service.



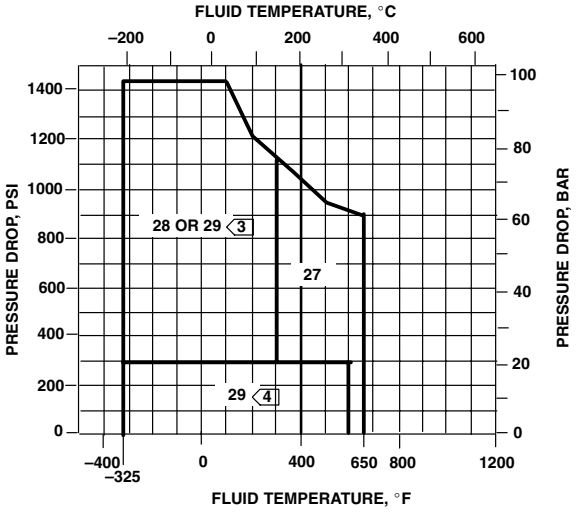
WITH CLASS 250B 1
CAST IRON VALVE BODY



WITH CLASS 600 1
WCC OR LCC/HT STEEL VALVE BODY



WITH CLASS 600 1
WC9 CHROME MOLY STEEL VALVE BODY



WITH CLASS 600 1
316 STAINLESS STEEL (CF8M) VALVE BODY

NOTES:
1 DO NOT EXCEED THE MAXIMUM PRESSURE AND TEMPERATURE FOR THE CLASS RATING OF THE VALVE MATERIAL USED, EVEN THOUGH THE TRIMS SHOWN MAY HAVE HIGHER CAPABILITIES.
2 BE ESPECIALLY CAREFUL TO SPECIFY SERVICE TEMPERATURE IF TRIM 3 OR 37 IS SELECTED AS DIFFERENT THERMAL EXPANSION RATES REQUIRE SPECIAL PLUG CLEARANCES. SPECIFY TRIM 37H FOR TEMPERATURES ABOVE 210°C (410°F). SPECIFY TRIM 3H FOR TEMPERATURES ABOVE 427°C (800°F).
3 TRIM 29 MAY BE USED UP TO 103 BAR (1500 PSI) WITH CLEAN, DRY GAS.
4 USE TRIM 27 INSTEAD OF TRIM 29 FOR NONLUBRICATING FLUIDS SUCH AS SUPERHEATED STEAM OR DRY GASES BETWEEN 149 AND 316°C (300 AND 600°F).

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Figure 9. Typical Trim Used for All Valves Except 4- and 6-Inch Design ED with Whisper Trim® III Cage and WhisperFlo® Cage

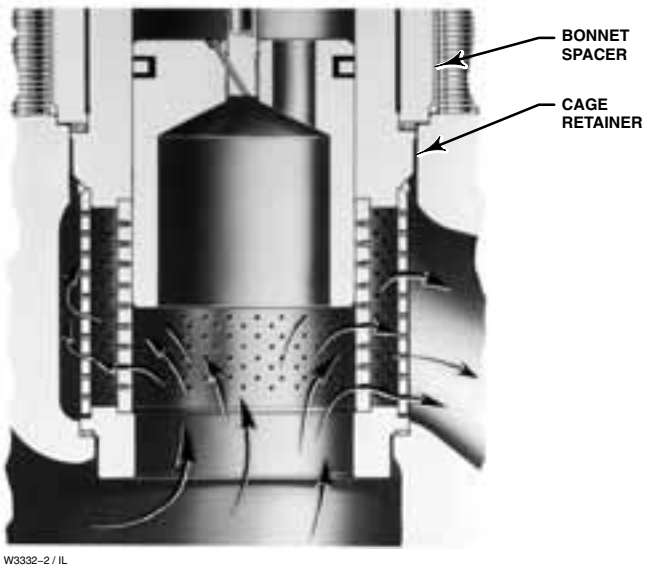

Figure 10. Whisper Trim® III Cage in 6-Inch Design ED Valve

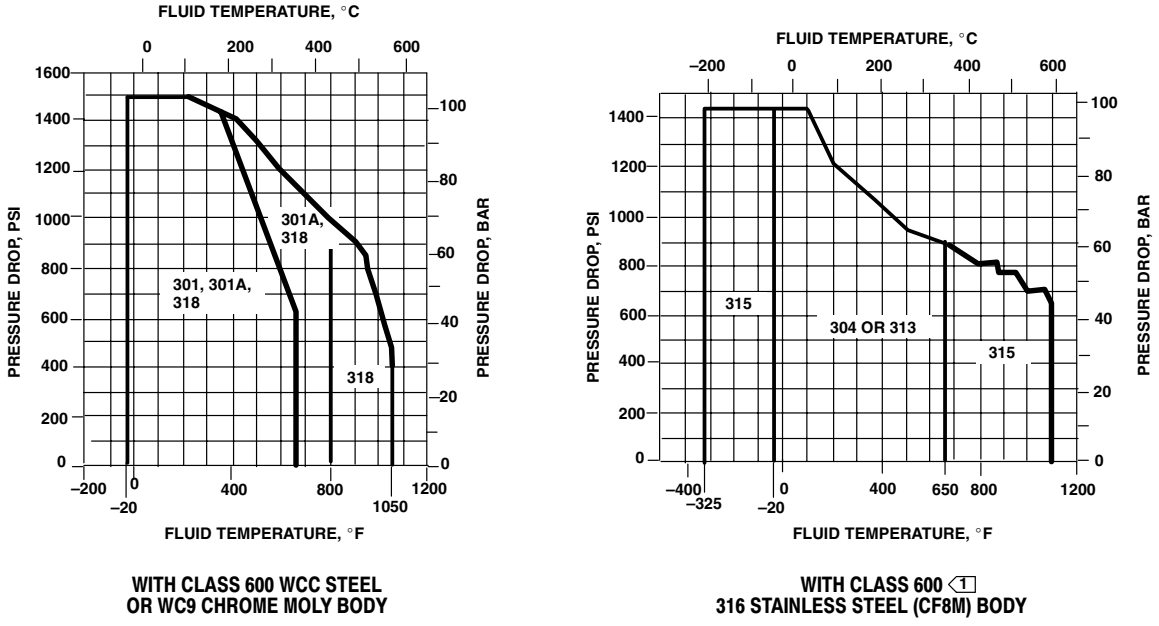

Figure 11. Typical Trim Used for 6-Inch Design ED Valves with Whisper Trim® III Cages

Table 7. Valve Body/Trim Temperature Capabilities(1) For All Valves Except 6-Inch Design ED with Whisper Trim® III Cage and 4- and 6-Inch Design ED with WhisperFlo® Cage

VALVE BODY/BONNET(2) MATERIAL	TRIM DESIGNATION	VALVE SIZE AND DESIGN	MATERIAL TEMPERATURE CAPABILITY			
			°C		°F	
			Min	Max	Min	Max
Cast iron	1, 3, 27, or 29	All	–29	232	–20	450
	37	All	–29	210	–20	410
	37H	All	210	232	410	450
WCC steel	1	All	–29	427	–20	800
	4	All	–29	210	–20	410
	27	All (except limited to 338°C [640°F] for 4- and 6-inch sizes)	–29	343	–20	650
	29	All	–29	149(4)	–20	300(4)
	37	All	–29	210	–20	410
	37H	All	210	427	410	800
WC9 chrome moly steel	1 or 3	All	–29	427	–20	800
	27	All (except limited to 338°C [640°F] for 4- and 6-inch sizes)	–29	343	–20	650
	29	All	–29	149(4)	–20	300(4)
	37	All	–29	210	–20	410
	3H	All	427	593	800	1100
	37H	All	210	427	410	800
LCC/HT steel	1	All	–29	343	–20	650
	4	All	–46	210	–50	410
	27	All (except limited to 338°C [640°F] for 4- and 6-inch sizes)	–46	343	–50	650
	29	All	–46	149(4)	–50	300(4)
	37	All	–46	210	–50	410
	37H	All	210	343	410	650
CF8M (316 stainless steel)	27	All	–198(3)	343	–325(3)	650
	28	All	–198(3)	149(4)	–325(3)	300(4)
	29	All	–198(3)	149(4)	–325(3)	300(4)

1. For metal trim parts only. Restricted trim and full-sized limits are the same.
2. Same material also used for bottom flange, if required.
3. May be used down to –254°C (–425°F) if manufacturing process includes Charpy impact test.
4. Lubricating service allows usage to 316°C (600°F).

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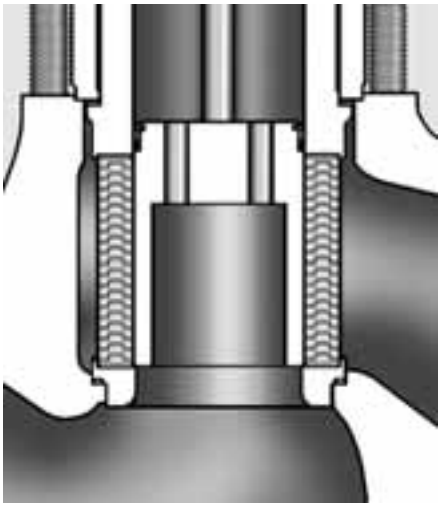

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Figure 12. WhisperFlo® Cage in 4- and 6-Inch Design ED Valve

Table 8. Bonnet Selection Guidelines

BONNET STYLE	PACKING MATERIAL	IN-BODY PROCESS TEMPERATURE LIMITS(1)	
		°C	°F
Plain: ■ Standard for all valves through 6-inch valve body size with 2-13/16 yoke boss diameter ■ Standard for 6-inch and 8-inch valves in cast iron and WCC steel bonnet material with 3-9/16 yoke boss diameter	PTFE V-ring	–18 to 232	0 to 450
	PTFE/Composition	–18 to 232	0 to 450
	Graphite ribbon/filament	–18 to maximum shown in table 6	0 to maximum shown in table 6
Style 1 Cast Extension: ■ Standard for 8-inch valves in S31600 bonnet material with 3-9/16 yoke boss diameter	PTFE V-ring	–46 to 427	–50 to 800
	PTFE/Composition		
	Graphite ribbon/filament	–46 to maximum shown in table 6	–50 to maximum shown in table 6
Style 2 Cast Extension: ■ Optional for 2-inch through 4-inch valve sizes with 2-13/16 inch yoke boss diameter ■ Optional for 6-inch and 8-inch valves with 3-9/16 yoke boss diameter. Not available for 8-inch valve in S31600 bonnet material	PTFE V-ring	–101 to 427	–150 to 800
	PTFE/Composition		
	Graphite ribbon/filament	–101 to maximum shown in table 6	–150 to maximum shown in table 6
ENVIRO-SEAL bellows seal bonnet	PTFE	For exceptional stem sealing capabilities. See Bulletin 59.1:070, ENVIRO-SEAL Bellows Seal Bonnets, for pressure/temperature ratings.	
	Graphite ULF		

1. These in-body process temperatures assume an outside, ambient temperature of 21°C (70°F) and no insulation on the bonnet. When using any packing at low process temperatures, a cast extension bonnet may have to be used to prevent packing damage which could result from the formation of valve stem frost. Material selection for trim and other components will also be limiting factors.

Table 9. Maximum Flow Coefficients for Full-Sized Trim with Equal Percentage Cage and Normal Flow Direction

Valve Design		Valve Size, Inch	C_v at Max. Valve Plug Travel
ED		1, 1.25	17.2
		1.5	35.8
		2	59.7
		2.5	99.4
		3	136
		4	224
		6	394
		8(1)	567
		8(2)	819
EAD	with liner	1	18.5
		2	48.1
		3	149
		4	152
		6	336
	without liner	1	19.0
		2	47.2
		3	148
		4	156
		6	328
EDR		1, 1.25	17.2
		1.5	35.8
		2	59.7
		2.5	99.4
		3	136
		4	224

1. With 51 mm (2 inch) travel.
2. With 76 mm (3 inch) travel.

Table 10. Metal Trim Part Materials for Compatibility with NACE MR0175-2002 (Sour Service) Specifications, Environmental Restrictions Apply, Refer to Standard

Trim Designation	Valve Plug	Cage	Seat Ring for Standard Metal Seat Construction	Optional Liner for Metal Seat (EAD only)	Valve Stem, Packing Follower, Lantern Ring, Packing Box Ring, and Pin	Load Ring(1)
85	S31600	S31600 with electroless nickel coating (ENC)	S31600	S31600	S20910 (Valve Stem) S31600 (All Other Parts)	N05500
86	S31600 with seat hard faced with CoCr-A hardfacing alloy	S31600 with electroless nickel coating (ENC)	R30006 (alloy 6)	- - -		
87	S31600 with seat and guide hard faced with CoCr-A hardfacing alloy	S31600 with electroless nickel coating (ENC)	R30006 (alloy 6)	- - -		

1. 8-inch valve only.

Table 11. Port Diameters, Valve Plug Travel, and Stem and Yoke Boss Diameters

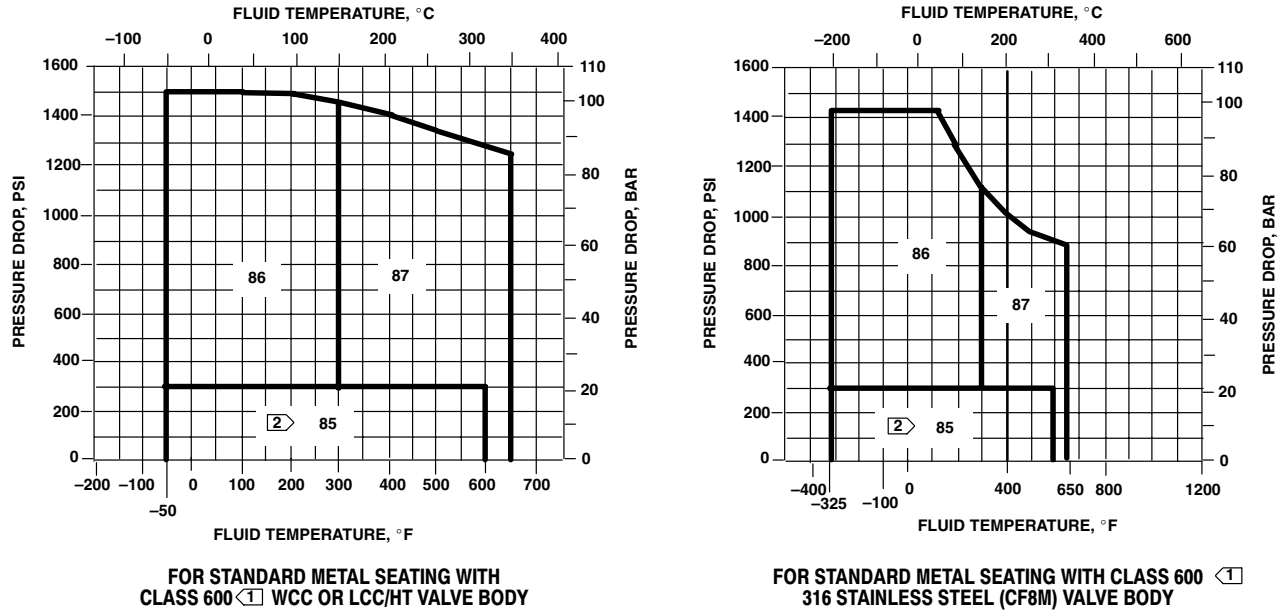
VALVE SIZE, INCH				PORT DIAMETER		MAX VALVE PLUG TRAVEL		STEM AND YOKE BOSS DIAMETERS							
Design ED or EDR		Design EAD						Standard				Optional			
								Stem		Yoke Boss		Stem		Yoke Boss	
Full-Sized Trim	Restricted-Capacity Trim	Full-Sized Trim	Restricted-Capacity Trim	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
1 or 1.25	1.5	1	2	33.3	1.3125	19	0.75	9.5	3/8	54	2-1/8	12.7	1/2	71	2-13/16
- - -	2	- - -	- - -	33.3	1.3125	19	0.75	12.7	1/2	71	2-13/16	- - -	- - -	- - -	- - -
1.5	- - -	2	- - -	47.6	1.875	19	0.75	9.5	3/8	54	2-1/8	12.7	1/2	71	2-13/16
- - -	2.5	- - -	3	47.6	1.875	19	0.75	1.7	1/2	71	2-13/16	- - -	- - -	- - -	- - -
2	3	- - -	4	58.7	2.3125	29	1.125	12.7	1/2	71	2-13/16	19.1	3/4	90	3-9/16
2.5	4	3	6	73.0	2.875	38	1.5	12.7	1/2	71	2-13/16	19.1	3/4	90	3-9/16
3	- - -	4	- - -	87.3	3.4375	38	1.5	12.7	1/2	71	2-13/16	19.1	3/4	90	3-9/16
4	- - -	6	- - -	87(3)	3.4375(3)	76(3)	3(3)	12.7	1/2	71	2-13/16	19.1	3/4	90	3-9/16
				111.1	4.375	51	2					25.4	1	127	5
6(1)	- - -	- - -	- - -	177.8(2)	7(2)	51(2)	2(2)	19.1	3/4	90	3-9/16	25.4 or 31.8	1 or 1-1/4	127	5
				136(3)	5.375(3)	76(3)	3(3)								
8(1)	- - -	- - -	- - -	203.2	8	51	2								
						76	3								

1. Not available in Design EDR valve.
2. Standard-travel cages.
3. Whisper Trim III (6-inch Design ED) and WhisperFlo cages (4- and 6-inch Design ED).

Table 12. Bolting Materials and Temperature Limits for Compatibility with NACE MR0175-2002

VALVE BODY MATERIAL		BOLTING MATERIAL	TEMPERATURE CAPABILITIES			
			°C		°F	
			Min	Max	Min	Max
NACE MR0175-2002 (non-exposed bolting) (Standard)						
WCC and CF8M (316 SST)	Studs	Steel SA-193-B7	–48(2)	427	–55(2)	800
	Nuts	Steel SA-194-2H				
NACE MR0175-2002 (exposed bolting) (Optional) Requires Derating of Valve(1) When These Body-to-Bonnet Bolting Materials are Used						
WCC and CF8M	Studs	Steel SA-193-B7M	–48(2)	427	–55(2)	800
	Nuts	Steel SA-194-2HM				

1. Derating is not required for Class 300 valves. Derating may be required for valves rated at Class 600. Contact your Emerson Process Management sales office for assistance in determining the derating of valves when these body-to-bonnet bolting materials are used.
2. –29°C (–20°F) with WCC valve body material.



NOTES:
1 DO NOT EXCEED THE MAXIMUM PRESSURE AND TEMPERATURE FOR THE CLASS RATING OF THE VALVE MATERIAL USED, EVEN THOUGH THE TRIM SHOWN MAY HAVE HIGHER CAPABILITIES.
2 USE TRIM 87 INSTEAD OF TRIM 85 FOR NONLUBRICATING FLUIDS SUCH AS SUPERHEATED STEAM OR DRY GASES BETWEEN 149 AND 316°C (300 AND 600°F).

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Figure 13. Typical Trim Used for NACE MR0175-2002 (Sour Service)

Table 13. Design ED and EDR Dimensions

VALVE SIZE, INCH	A									G (MAX)	
	Class, End Connection Style(1)										
	Scrd or SW	125 FF or 150 RF	150 RTJ	250 RF or 300 RF	300 RTJ	BW or 600 RF	600 RTJ	PN16-40(2)	PN63-100(2)	Design ED	Design EDR
	mm										
1	210	184	197	197	210	210	210	160	230	60	119
1.25	229	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	60	119
1.5	251	222	235	235	248	251	251	200	260	71	116
2	286	254	267	267	282	286	289	230	300	78	133
2.5	- - -	276	292	292	308	311	314	290	340	90	159
3	- - -	298	311	317	333	337	340	310	380	97	168
4	- - -	353	365	368	384	394	397	350	430	129	192
6	- - -	451	464	473	489	508	511	480	550	162	- - -
8	- - -	543	556	568	584	610	613	600	650	191	- - -
	Inch										
1	8.25	7.25	7.75	7.75	8.25	8.25	8.25			2.38	4.69
1.25	9.00	- - -	- - -	- - -	- - -	- - -	- - -			2.38	4.69
1.5	9.88	8.75	9.25	9.25	9.75	9.88	9.88			2.81	4.56
2	11.25	10.00	10.50	10.50	11.12	11.25	11.38	See	See	3.06	5.25
2.5	- - -	10.88	11.38	11.50	12.12	12.25	12.38	mm	mm	3.56	6.25
3	- - -	11.75	12.25	12.50	13.12	13.25	13.38	below	below	3.81	6.62
4	- - -	13.88	14.38	14.50	15.12	15.50	15.62			5.06	7.56
6	- - -	17.75	18.25	18.62	19.25	20.00	20.12			5.50	- - -
8	- - -	21.38	21.88	22.38	23.00	24.00	24.12			7.50	- - -

1. End connection style abbreviations: BW - Buttwelding, FF - Flat Faced, Scrd - Screwed, SW - Socketweld, RF - Raised Face, RTJ - Ring Type Joint.
2. Valves which meet DIN flange standards and have DIN face-to-face dimensions are available only from Europe. Valves which meet DIN flange standards but not DIN face-to-face standards are available in the US. Consult your Emerson Process Management sales office.

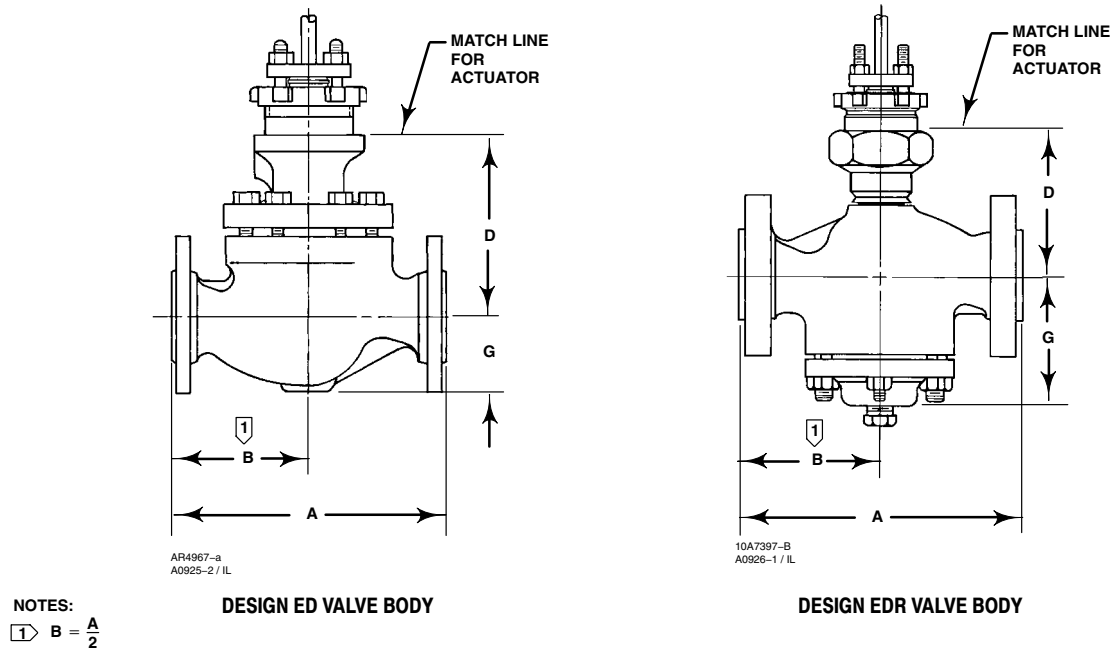


Figure 14. Design ED and EDR Dimensions (also see tables 13, 14, and 15)

Table 14. Design ED and EDR Dimensions

VALVE SIZE, INCH	D FOR PLAIN BONNET						
	Design ED				Design EDR		
	Stem Diameter				Stem Diameter		
	mm						
	9.5	12.7	19.1	25.4 or 31.8	9.5	12.7	19.1
1 or 1.25	127	149	- - -	- - -	113	124	- - -
1.5	124	146	- - -	- - -	122	133	- - -
2	- - -	165	162	- - -	- - -	148	140
2.5	- - -	187	184	- - -	- - -	157	152
3	- - -	191	187	- - -	- - -	167	159
4	- - -	221	217	238	- - -	198	191
6(1)	- - -	- - -	251	270	- - -	- - -	- - -
6(2)	- - -	- - -	312	330	- - -	- - -	- - -
8	- - -	- - -	375(3)	- - -	- - -	- - -	- - -
	Inch						
	3/8	1/2	3/4	1 or 1-1/4	3/8	1/2	3/4
1 or 1.25	5.00	5.88	- - -	- - -	4.44	4.88	- - -
1.5	4.88	5.75	- - -	- - -	4.81	5.25	- - -
2	- - -	6.50	6.38	- - -	- - -	5.81	5.50
2.5	- - -	7.38	7.25	- - -	- - -	6.31	6.00
3	- - -	7.50	7.38	- - -	- - -	6.56	6.25
4	- - -	8.69	8.56	9.38	- - -	7.81	7.50
6(1)	- - -	- - -	9.88	10.62	- - -	- - -	- - -
6(2)	- - -	- - -	12.26	13.00	- - -	- - -	- - -
8	- - -	- - -	14.75(3)	- - -	- - -	- - -	- - -

1. All except Whisper Trim III and WhisperFlo cages.
2. Whisper Trim III and WhisperFlo cages.
3. Available only in cast iron or WCC steel for the stem diameter with plain bonnet.

Table 15. Design ED and EDR Dimensions

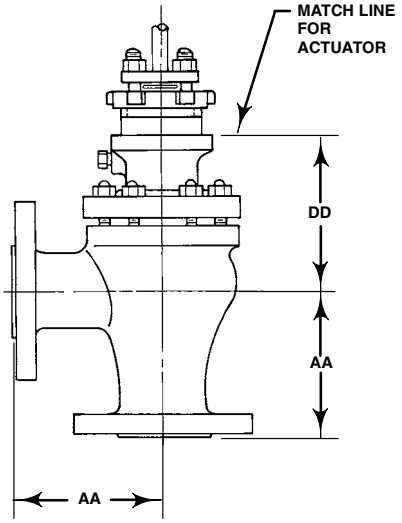
VALVE SIZE, INCH	D FOR EXTENSION AND ENVIRO-SEAL BELLOWS SEAL BONNETS (DESIGN ED ONLY)									
	Style 1 Ext. Bonnet				Style 2 Ext. Bonnet			ENVIRO-SEAL Bellows Seal Bonnet		
	Stem Diameter				Stem Diameter			Stem Diameter		
	mm									
	9.5	12.7	19.1	25.4 or 31.8	9.5	12.7	19.1	9.5	12.7	19.1
1 or 1.25	213	251	- - -	- - -	303	319	- - -	321	- - -	- - -
1.5	210	248	- - -	- - -	300	316	- - -	317	- - -	- - -
2	- - -	267	- - -	- - -	- - -	465	- - -	- - -	384	- - -
2.5	- - -	289	272	- - -	- - -	492	- - -	- - -	- - -	- - -
3	- - -	292	297	- - -	- - -	495	487	- - -	518	518
4	- - -	322	327	370	- - -	526	518	- - -	541	- - -
6(1)	- - -	- - -	357	402	- - -	- - -	543	- - -	- - -	573
6(2)	- - -	- - -	418	462	- - -	- - -	604	- - -	- - -	- - -
8	- - -	- - -	421	450	- - -	- - -	621	- - -	- - -	- - -
	Inch									
	3/8	1/2	3/4	1 or 1-1/4	3/8	1/2	3/4	3/8	1/2	3/4
1 or 1.25	8.38	9.88	- - -	- - -	11.94	12.56	- - -	12.62	- - -	- - -
1.5	8.25	9.75	- - -	- - -	11.81	12.44	- - -	12.50	- - -	- - -
2	- - -	10.50	- - -	- - -	- - -	18.31	- - -	- - -	15.12	- - -
2.5	- - -	11.38	10.69	- - -	- - -	19.38	- - -	- - -	- - -	- - -
3	- - -	11.50	11.69	- - -	- - -	19.50	19.19	- - -	20.38	20.38
4	- - -	12.69	12.88	14.56	- - -	20.69	20.38	- - -	21.31	- - -
6(1)	- - -	- - -	14.06	15.81	- - -	- - -	21.38	- - -	- - -	22.56
6(2)	- - -	- - -	16.44	18.19	- - -	- - -	23.76	- - -	- - -	- - -
8	- - -	- - -	16.56	17.75	- - -	- - -	24.44	- - -	- - -	- - -

1. Standard-travel cages.
2. Whisper Trim III and WhisperFlo cages.

Table 16. Design EAD Dimensions

VALVE SIZE, INCH	AA					
	Class 150		Class 300		Class 600	
	End Connection Style(1)					
	RF	RTJ	RF	RTJ	BW, SW or RF	RTJ
	mm					
1	92	98	98	105	105	105
2	127	133	133	141	143	144
3	149	156	159	167	168	170
4	176	183	184	197	197	198
6	225	232	237	244	254	256
	Inch					
1	3.62	3.88	3.88	4.12	4.12	4.12
2	5.00	5.25	5.25	5.56	5.62	5.69
3	5.88	6.12	6.25	6.56	6.62	6.69
4	6.94	7.19	7.25	7.56	7.75	7.81
6	8.88	9.12	9.31	9.62	10.00	10.06

1. End connection style abbreviations: BW - Buttwelding, FF - Flat Faced, Scrd - Screwed, SW - Socketweld, RF - Raised Face, RTJ - Ring Type Joint.



NOTE:
FOR DIMENSIONS OF VALVES WITH DIN (OR OTHER) END CONNECTIONS. CONSULT YOUR EMERSON SALES OFFICE.

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Figure 15. Design EAD Dimensions (also see tables 16 and 17)

Table 17. Design EAD Dimensions

VALVE SIZE, INCH	DD										
	Plain Bonnet				Style 1 Extension Bonnet			Style 2 Extension Bonnet			ENVIRO-SEAL Bellows Seal Bonnet
	Stem Diameter										
	mm										
	9.5	12.7	19.1	25.4 or 31.8	9.5	12.7	19.1	9.5	12.7	19.1	
1	111	133	- - -	- - -	197	235	- - -	291	305	- - -	Contact your Emerson sales office.
2	98	121	- - -	- - -	184	223	- - -	278	291	- - -	
3	- - -	149	146	- - -	- - -	251	256	- - -	454	- - -	
4	- - -	140	137	- - -	- - -	241	246	- - -	445	437	
6	- - -	144	141	187	- - -	246	251	- - -	449	441	
	Inch										ENVIRO-SEAL Bellows Seal Bonnet
	3/8	1/2	3/4	1 or 1-1/4	3/8	1/2	3/4	3/8	1/2	3/4	
1	4.38	5.25	- - -	- - -	7.75	9.25	- - -	11.44	12.00	- - -	Contact your Emerson sales office.
2	3.88	4.75	- - -	- - -	7.25	8.75	- - -	10.94	11.44	- - -	
3	- - -	5.88	5.75	- - -	- - -	9.88	10.06	- - -	17.88	- - -	
4	- - -	5.50	5.38	- - -	- - -	9.50	9.69	- - -	17.50	17.19	
6	- - -	5.69	5.56	7.38	- - -	9.69	9.88	- - -	17.69	17.38	

Coefficients

Table 18. Design EAD, Quick Opening Cage, With Liner

With Liner — **Quick Opening Characteristic**

Valve Size, Inches	Port Diameter		Maximum Travel(1)		Flow Coefficient	Coeffs. for 6 mm (0.25 in) Travel(2)	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1	33.3	0.3125	19	0.75	C_v	14.2	5.14	9.24	13.1	16.2	18.8	20.9	22.4	23.4	24.0	24.0	0.90
					K_v	*12.3*	*4.45*	*7.99*	*11.3*	*14.0*	*16.3*	*18.1*	*19.4*	*20.2*	*20.8*	*20.8*	- - -
					X_T	0.800	0.629	0.703	0.761	0.809	0.775	0.713	0.677	0.652	0.630	0.630	- - -
2	47.6	1.875	19	0.75	C_v	29.4	8.77	17.1	26.2	36.1	45.4	53.4	59.3	63.6	67.3	70.7	0.76
					K_v	*25.4*	*7.59*	*14.8*	*22.7*	*31.2*	*39.3*	*46.2*	*51.3*	*55.0*	*58.2*	*61.2*	- - -
					X_T	0.573	0.480	0.513	0.568	0.570	0.577	0.589	0.628	0.618	0.656	0.656	- - -
	33.3 (4)	1.3125 (4)	19	0.75	C_v	17.3	5.91	10.1	15.1	21.7	29.4	37.3	43.7	48.5	52.4	55.2	0.60
					K_v	*15.0*	*5.11*	*8.74*	*13.1*	*18.8*	*25.4*	*32.3*	*37.8*	*42.0*	*45.3*	*47.7*	- - -
					X_T	0.543	0.404	0.584	0.570	0.522	0.478	0.431	0.396	0.370	0.344	0.326	- - -
3	73.0	2.875	38	1.5	C_v	30.6	24.2	47.2	77.8	108	133	148	159	171	181	183	0.76
					K_v	*26.5*	*20.9*	*40.8*	*67.3*	*93.4*	*115*	*128*	*138*	*148*	*157*	*158*	- - -
					X_T	0.540	0.517	0.534	0.504	0.545	0.582	0.636	0.651	0.616	0.575	0.569	- - -
	47.6 (4)	1.875 (4)	19	0.75	C_v	29.8	7.96	15.5	25.7	37.4	49.0	61.2	72.5	83.1	92.8	102	0.60
					K_v	*25.8*	*6.89*	*13.4*	*22.2*	*32.4*	*42.4*	*52.9*	*62.7*	*71.9*	*80.3*	*88.2*	- - -
					X_T	0.576	0.549	0.624	0.603	0.541	0.525	0.482	0.452	0.422	0.391	0.349	- - -
4	87.3	3.4375	38	1.5	C_v	37.1	22.3	46.3	77.1	117	155	180	197	212	230	235	0.72
					K_v	*32.1*	*19.3*	*40.0*	*66.7*	*101*	*134*	*156*	*170*	*183*	*199*	*203*	- - -
					X_T	0.580	0.616	0.547	0.537	0.531	0.529	0.575	0.629	0.635	0.609	0.620	- - -
	58.7 (4)	2.3125 (4)	29	1.125	C_v	31.4	14.4	28.3	46.1	66.7	87.5	107	124	138	149	160	0.61
					K_v	*27.2*	*12.5*	*24.5*	*39.9*	*57.7*	*75.7*	*92.6*	*107*	*119*	*129*	*138*	- - -
					X_T	0.548	0.509	0.533	0.505	0.486	0.482	0.465	0.443	0.416	0.387	0.354	- - -
6	111.1	4.375	51	2	C_v	50.0	39.8	84.0	150	219	279	332	379	420	435	435	0.71
					K_v	*43.3*	*34.4*	*72.7*	*130*	*189*	*241*	*287*	*328*	*363*	*376*	*376*	- - -
					X_T	0.578	0.597	0.599	0.577	0.581	0.581	0.578	0.565	0.527	0.533	0.533	- - -
	73.0 (4)	2.875 (4)	38	1.5	C_v	38.7	23.9	47.1	74.9	109	142	174	201	219	244	248	0.59
					K_v	*33.5*	*20.7*	*40.7*	*64.8*	*94.3*	*123*	*151*	*174*	*189*	*211*	*215*	- - -
					X_T	0.353	0.353	0.353	0.353	0.353	0.356	0.352	0.353	0.352	0.353	0.354	- - -

1. When using Type 655-EAD as a control valve for on-off service, the maximum travel for sizing purposes is 0.75 inch (19 mm).
2. When sizing self-operated regulators, use coefficients listed for 0.25 inch (6 mm) travel.
3. At 100% travel.
4. Restricted trim.

Table 19. Design EAD, Quick Opening Cage, Without Liner

Without Liner

Quick Opening Characteristic

Valve Size, Inches	Port Diameter		Maximum Travel(1)		Flow Coefficient	Coeffs. for 6 mm (0.25 in) Travel(2)	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1	33.3	0.3125	19	0.75	C_v	14.8	5.07	9.36	13.6	16.8	19.2	20.9	22.2	23.1	23.6	23.7	0.87
					K_v	*12.8*	*4.39*	*8.10*	*11.8*	*14.5*	*16.6*	*18.1*	*19.2*	*20.0*	*20.4*	*20.5*	- - -
					X_T	0.757	0.638	0.753	0.753	0.766	0.736	0.703	0.670	0.650	0.640	0.636	- - -
2	47.6	1.875	19	0.75	C_v	28.0	8.06	15.7	24.9	34.3	43.1	51.0	57.1	61.4	64.6	67.2	0.87
					K_v	*24.2*	*6.97*	*13.6*	*21.5*	*29.7*	*37.3*	*44.1*	*49.4*	*53.1*	*55.9*	*58.1*	- - -
					X_T	0.629	0.531	0.621	0.623	0.631	0.641	0.638	0.656	0.676	0.686	0.682	- - -
	33.3 (4)	1.3125 (4)	19	0.75	C_v	17.2	6.02	10.4	15.4	20.9	27.1	33.7	38.5	41.7	44.2	45.6	0.71
					K_v	*14.9*	*5.21*	*9.00*	*13.3*	*18.1*	*23.4*	*29.2*	*33.3*	*36.1*	*38.2*	*39.4*	- - -
					X_T	0.573	0.470	0.541	0.570	0.575	0.563	0.526	0.510	0.492	0.476	0.470	- - -
3	73.0	2.875	38	1.5	C_v	39.2	23.4	47.9	78.7	108	128	142	153	163	171	171	0.81
					K_v	*33.9*	*20.2*	*41.4*	*68.1*	*93.4*	*111*	*123*	*132*	*141*	*148*	*148*	- - -
					X_T	0.576	0.588	0.573	0.534	0.573	0.635	0.662	0.654	0.626	0.600	0.605	- - -
	47.6 (4)	1.875 (4)	19	0.75	C_v	29.1	8.27	15.9	25.6	36.0	46.8	56.4	64.6	72.1	79.3	86.1	0.72
					K_v	*25.2*	*7.15*	*13.8*	*22.1*	*31.1*	*40.5*	*48.8*	*55.9*	*62.4*	*68.6*	*74.5*	- - -
					X_T	0.609	0.488	0.603	0.610	0.594	0.575	0.574	0.569	0.561	0.530	0.490	- - -
4	87.3	3.4375	38	1.5	C_v	39.0	23.9	48.2	80.3	118	151	178	195	209	223	223	0.76
					K_v	*33.7*	*20.7*	*41.7*	*69.5*	*102*	*131*	*154*	*169*	*181*	*193*	*193*	- - -
					X_T	0.562	0.588	0.566	0.554	0.556	0.580	0.610	0.659	0.669	0.644	0.650	- - -
	58.7 (4)	2.3125 (4)	29	1.125	C_v	30.9	13.6	27.0	43.9	62.5	80.6	96.0	109	120	127	133	0.73
					K_v	*26.7*	*11.8*	*23.4*	*38.0*	*54.1*	*69.7*	*83.0*	*94.3*	*104*	*110*	*115*	- - -
					X_T	0.608	0.593	0.614	0.582	0.578	0.587	0.590	0.576	0.547	0.533	0.513	- - -
6	111.1	4.375	51	2	C_v	45.8	37.6	79.6	142	207	265	311	351	383	398	398	0.76
					K_v	*39.6*	*32.5*	*68.9*	*123*	*179*	*229*	*269*	*304*	*331*	*344*	*344*	- - -
					X_T	0.652	0.680	0.652	0.639	0.639	0.655	0.686	0.683	0.666	0.657	0.667	- - -
	73.0 (4)	2.875 (4)	38	1.5	C_v	35.4	21.8	43.1	71.5	103	130	154	173	188	198	206	0.74
					K_v	*30.6*	*18.9*	*37.3*	*61.8*	*89.1*	*112*	*133*	*150*	*163*	*171*	*178*	- - -
					X_T	0.671	0.624	0.650	0.652	0.618	0.659	0.659	0.646	0.620	0.595	0.568	- - -

1. When using Type 655-EAD as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (0.75 inch).
2. When sizing self-operated regulators, use coefficients listed for 6 mm (0.25 inch) travel.
3. At 100% travel.
4. Restricted trim.

Table 20. Design EAD, Linear Cage, With Liner

With Liner - Flow Down

Linear Characteristic

Valve Size, Inches	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L[1]
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C_v	2.71	5.17	8.14	10.7	13.0	15.2	17.2	19.1	20.7	22.0	0.90
					K_v	*2.34*	*4.47*	*7.04*	*9.26*	*11.2*	*13.1*	*14.9*	*16.5*	*17.9*	*19.0*	- - -
					X_T	0.632	0.692	0.719	0.772	0.786	0.777	0.755	0.722	0.682	0.634	- - -
2	47.6	1.875	19	0.75	C_v	3.77	6.94	11.3	16.1	21.0	26.7	33.1	40.1	46.8	53.8	0.82
					K_v	*3.26*	*6.00*	*9.77*	*13.9*	*18.2*	*23.1*	*28.6*	*34.7*	*40.5*	*46.5*	- - -
					X_T	0.665	0.675	0.663	0.642	0.627	0.616	0.617	0.607	0.633	0.661	- - -
	33.3 (2)	1.3125 (2)	19	0.75	C_v	2.95	5.49	8.65	12.1	15.7	19.3	23.4	29.7	35.7	41.0	0.66
					K_v	*2.55*	*4.75*	*7.48*	*10.5*	*13.6*	*16.7*	*20.2*	*25.7*	*30.9*	*35.5*	- - -
					X_T	0.474	0.592	0.587	0.581	0.579	0.584	0.564	0.487	0.451	0.426	- - -
3	73.0	2.875	38	1.5	C_v	10.3	24.0	38.8	54.3	69.8	86.5	102	124	141	155	0.80
					K_v	*8.91*	*20.8*	*33.6*	*47.0*	*60.4*	*74.8*	*88.2*	*107*	*122*	*134*	- - -
					X_T	0.630	0.623	0.618	0.598	0.599	0.591	0.619	0.603	0.614	0.614	- - -
	47.6 (2)	1.875 (2)	19	0.75	C_v	3.37	6.45	10.6	15.3	19.8	25.3	32.2	40.1	48.4	58.1	0.74
					K_v	*2.92*	*5.58*	*9.17*	*13.2*	*17.1*	*21.9*	*27.9*	*34.7*	*41.9*	*50.3*	- - -
					X_T	0.630	0.682	0.693	0.665	0.663	0.637	0.600	0.588	0.569	0.548	- - -
4	87.3	3.4375	38	1.5	C_v	12.7	31.6	54.1	77.8	103	128	149	171	191	208	0.78
					K_v	*11.0*	*27.3*	*46.8*	*67.3*	*89.1*	*111*	*129*	*148*	*165*	*180*	- - -
					X_T	0.677	0.638	0.596	0.590	0.552	0.548	0.573	0.594	0.613	0.627	- - -
	58.7 (2)	2.3125 (2)	29	1.125	C_v	6.70	15.3	25.2	37.0	50.2	64.5	79.4	94.6	110	124	0.66
					K_v	*5.80*	*13.2*	*21.8*	*32.0*	*43.4*	*55.8*	*68.7*	*81.8*	*95.2*	*107*	- - -
					X_T	0.705	0.590	0.596	0.573	0.536	0.509	0.493	0.490	0.471	0.445	- - -
6	111.1	4.375	51	2	C_v	25.4	53.6	83.0	113	146	179	218	263	309	350	0.78
					K_v	*22.0*	*46.4*	*71.8*	*97.7*	*126*	*155*	*189*	*227*	*267*	*303*	- - -
					X_T	0.670	0.666	0.666	0.659	0.631	0.627	0.623	0.624	0.630	0.617	- - -
	73.0 (2)	2.875 (2)	38	1.5	C_v	10.6	25.2	41.1	57.7	76.1	94.8	116	139	168	195	0.67
					K_v	*9.17*	*21.8*	*35.6*	*49.9*	*65.8*	*82.0*	*100*	*120*	*145*	*169*	- - -
					X_T	0.445	0.443	0.448	0.445	0.445	0.445	0.443	0.448	0.442	0.444	- - -

1. At 100% travel.
2. Restricted trim.

Table 21. Design EAD, Linear Cage, Without Liner

Without Liner - Flow Down

Linear Characteristic

Valve Size, Inches	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L (1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C_V	2.90	5.78	8.85	11.6	13.9	16.0	18.0	19.7	21.2	22.3	0.89
					K_V	*2.51*	*5.00*	*7.66*	*10.0*	*12.0*	*13.8*	*15.6*	*17.0*	*18.3*	*19.3*	- - -
					X_T	0.778	0.704	0.699	0.736	0.745	0.747	0.730	0.699	0.664	0.624	- - -
2	47.6	1.875	19	0.75	C_V	3.68	6.98	11.3	15.9	20.8	26.4	32.7	39.2	45.7	52.5	0.84
					K_V	*3.18*	*6.04*	*9.77*	*13.8*	*18.0*	*22.8*	*28.3*	*33.9*	*39.5*	*45.4*	- - -
					X_T	0.676	0.667	0.684	0.666	0.624	0.627	0.632	0.625	0.655	0.679	- - -
	33.3 (2)	1.3125 (2)	19	0.75	C_V	3.01	5.45	8.95	12.5	15.9	19.1	23.3	28.4	33.2	37.6	0.73
					K_V	*2.60*	*4.71*	*7.74*	*10.8*	*13.8*	*16.5*	*20.2*	*24.6*	*28.7*	*32.5*	- - -
					X_T	0.790	0.768	0.661	0.618	0.608	0.611	0.582	0.545	0.535	0.516	- - -
3	73.0	2.875	38	1.5	C_V	10.9	25.1	41.3	58.4	75.7	93.9	112	128	143	153	0.83
					K_V	*9.43*	*21.7*	*35.7*	*50.5*	*65.5*	*81.2*	*96.9*	*111*	*124*	*132*	- - -
					X_T	0.736	0.638	0.591	0.548	0.538	0.532	0.543	0.583	0.619	0.631	- - -
	47.6 (2)	1.875 (2)	19	0.75	C_V	3.61	6.92	11.1	15.5	20.6	26.4	33.2	41.4	50.1	60.2	0.78
					K_V	*3.12*	*5.99*	*9.60*	*13.4*	*17.8*	*22.8*	*28.7*	*35.8*	*43.3*	*52.1*	- - -
					X_T	0.623	0.721	0.694	0.684	0.663	0.630	0.602	0.570	0.568	0.546	- - -
4	87.3	3.4375	38	1.5	C_V	14.0	33.8	56.3	80.2	104	127	148	169	185	201	0.81
					K_V	*12.1*	*29.2*	*48.7*	*69.4*	*90.0*	*110*	*128*	*146*	*160*	*174*	- - -
					X_T	0.640	0.638	0.611	0.588	0.570	0.568	0.593	0.622	0.660	0.664	- - -
	58.7 (2)	2.3125 (2)	29	1.125	C_V	7.02	15.7	25.7	36.9	48.6	60.9	72.9	84.6	97.2	108	0.76
					K_V	*6.07*	*13.6*	*22.2*	*31.9*	*42.0*	*52.7*	*63.1*	*73.2*	*84.1*	*93.4*	- - -
					X_T	0.712	0.626	0.625	0.597	0.587	0.577	0.590	0.604	0.580	0.566	- - -
6	111.1	4.375	51	2	C_V	24.2	51.2	81.8	109	140	171	208	256	300	341	0.78
					K_V	*20.9*	*44.3*	*70.8*	*94.3*	*121*	*148*	*180*	*221*	*260*	*295*	- - -
					X_T	0.643	0.697	0.666	0.693	0.672	0.668	0.684	0.663	0.668	0.662	- - -
	73.0 (2)	2.875 (2)	38	1.5	C_V	10.2	22.8	36.6	52.1	68.0	84.5	102	124	147	168	0.74
					K_V	*8.82*	*19.7*	*31.7*	*45.1*	*58.8*	*73.1*	*88.2*	*107*	*127*	*145*	- - -
					X_T	0.592	0.651	0.661	0.635	0.619	0.619	0.615	0.584	0.568	0.556	- - -

1. At 100% travel.
2. Restricted trim.

Table 22. Design EAD, Equal Percentage Cage, With Liner

With Liner - Flow Down

Equal Percentage Characteristic

Valve Size, Inches	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L (1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C_V	1.02	1.49	2.07	2.70	3.92	5.68	8.18	11.7	15.5	18.5	0.93
					K_V	*0.882*	*1.29*	*1.79*	*2.34*	*3.39*	*4.91*	*7.08*	*10.1*	*13.4*	*16.0*	- - -
					X_T	0.902	0.902	0.820	0.740	0.741	0.737	0.738	0.734	0.742	0.739	- - -
2	47.6	1.875	19	0.75	C_V	1.44	2.38	3.54	5.10	7.60	11.6	18.1	26.9	37.8	48.1	0.83
					K_V	*1.25*	*2.06*	*3.06*	*4.41*	*6.57*	*10.0*	*15.7*	*23.3*	*32.7*	*41.6*	- - -
					X_T	0.619	0.649	0.671	0.678	0.666	0.639	0.574	0.578	0.578	0.576	- - -
	33.3 (2)	1.3125 (2)	19	0.75	C_V	0.792	1.28	1.84	2.56	3.78	5.66	8.64	13.3	19.9	27.6	0.75
					K_V	*0.685*	*1.11*	*1.59*	*2.21*	*3.27*	*4.90*	*7.47*	*11.5*	*17.2*	*23.9*	- - -
					X_T	0.648	0.654	0.682	0.659	0.683	0.661	0.592	0.534	0.479	0.468	- - -
3	73.0	2.875	38	1.5	C_V	4.38	7.99	12.1	16.5	24.2	36.5	56.6	85.9	116	151	0.78
					K_V	*3.79*	*6.91*	*10.5*	*14.3*	*20.9*	*31.6*	*49.0*	*74.3*	*100*	*131*	- - -
					X_T	0.783	0.746	0.680	0.652	0.620	0.588	0.551	0.525	0.553	0.550	- - -
	47.6 (2)	1.875 (2)	19	0.75	C_V	1.31	2.28	3.48	5.05	7.58	11.9	18.2	26.7	38.4	50.5	0.78
					K_V	*1.13*	*1.97*	*3.01*	*4.37*	*6.56*	*10.3*	*15.7*	*23.1*	*33.2*	*43.7*	- - -
					X_T	0.804	0.758	0.719	0.725	0.696	0.634	0.637	0.611	0.561	0.530	- - -
4	87.3	3.4375	38	1.5	C_V	2.31	0.470	7.45	11.3	17.8	28.7	47.9	77.5	112	152	0.81
					K_V	*2.00*	*0.41*	*6.44*	*9.77*	*15.4*	*24.8*	*41.4*	*67.0*	*96.9*	*131*	- - -
					X_T	0.780	0.780	0.791	0.726	0.652	0.630	0.565	0.546	0.549	0.545	- - -
	58.7 (2)	2.3125 (2)	29	1.125	C_V	2.24	3.67	5.44	7.81	11.7	17.9	27.6	41.9	62.6	86.3	0.73
					K_V	*1.94*	*3.17*	*4.71*	*6.76*	*10.1*	*15.5*	*23.9*	*36.2*	*54.1*	*74.6*	- - -
					X_T	0.630	0.668	0.662	0.672	0.659	0.610	0.593	0.574	0.500	0.456	- - -
6	111.1	4.375	51	2	C_V	5.54	11.0	18.1	30.9	51.7	84.3	136	205	276	336	0.74
					K_V	*4.79*	*9.52*	*15.7*	*26.7*	*44.7*	*72.9*	*118*	*177*	*239*	*291*	- - -
					X_T	0.727	0.684	0.657	0.624	0.599	0.585	0.590	0.587	0.573	0.576	- - -
	73.0 (2)	2.875 (2)	38	1.5	C_V	1.32	3.73	7.20	11.1	17.5	27.6	43.4	67.8	102	147	0.74
					K_V	*1.14*	*3.23*	*6.23*	*9.60*	*15.1*	*23.9*	*37.5*	*58.6*	*88.2*	*127*	- - -
					X_T	0.455	0.458	0.454	0.457	0.453	0.454	0.454	0.455	0.454	0.454	- - -

1. At 100% travel.
2. Restricted trim.

Table 23. Design EAD, Equal Percentage Cage, Without Liner

Without Liner - Flow Down

Equal Percentage Characteristic

Valve Size, Inches	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L (1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C_V	1.08	1.62	2.20	2.96	4.18	6.04	8.74	12.5	16.5	19.0	0.91
					K_V	*0.934*	*1.40*	*1.90*	*2.56*	*3.62*	*5.22*	*7.56*	*10.8*	*14.3*	*16.4*	- - -
					X_T	0.912	0.860	0.808	0.771	0.742	0.706	0.693	0.699	0.697	0.694	- - -
2	47.6	1.875	19	0.75	C_V	1.67	2.60	3.82	5.43	7.79	12.2	18.9	27.4	37.8	47.2	0.85
					K_V	*1.44*	*2.25*	*3.30*	*4.70*	*6.74*	*10.6*	*16.3*	*23.7*	*32.7*	*40.8*	- - -
					X_T	0.680	0.690	0.702	0.725	0.707	0.619	0.622	0.621	0.619	0.623	- - -
	33.3 (2)	1.3125 (2)	19	0.75	C_V	1.11	1.55	2.05	2.87	4.07	5.95	8.84	13.4	19.6	26.8	0.79
					K_V	*0.960*	*1.34*	*1.77*	*2.48*	*3.52*	*5.15*	*7.65*	*11.6*	*17.0*	*23.2*	- - -
					X_T	0.938	0.899	0.848	0.789	0.761	0.692	0.636	0.568	0.519	0.507	- - -
3	73.0	2.875	38	1.5	C_V	4.59	8.29	12.0	16.9	25.0	37.7	57.3	85.1	121	148	0.80
					K_V	*3.97*	*7.17*	*10.4*	*14.6*	*21.6*	*32.6*	*49.6*	*73.6*	*105*	*128*	- - -
					X_T	0.779	0.744	0.715	0.684	0.630	0.582	0.583	0.579	0.578	0.580	- - -
	47.6 (2)	1.875 (2)	19	0.75	C_V	1.56	2.51	3.68	5.40	7.65	11.7	18.2	27.0	37.3	47.8	0.84
					K_V	*1.35*	*2.17*	*3.18*	*4.67*	*6.62*	*10.1*	*15.7*	*23.4*	*32.3*	*41.3*	- - -
					X_T	0.834	0.807	0.768	0.718	0.756	0.723	0.679	0.627	0.615	0.615	- - -
4	87.3	3.4375	38	1.5	C_V	2.51	5.10	8.03	12.0	18.7	30.7	47.4	80.3	116	156	0.81
					K_V	*2.17*	*4.41*	*6.95*	*10.4*	*16.2*	*26.6*	*41.0*	*69.5*	*100*	*135*	- - -
					X_T	0.890	0.770	0.744	0.701	0..696	0.637	0.668	0.572	0.566	0.565	- - -
	58.7 (2)	2.3125 (2)	29	1.125	C_V	2.33	3.56	5.64	8.18	11.9	18.0	28.2	42.6	62.2	81.8	0.79
					K_V	*2.02*	*3.08*	*4.88*	*7.08*	*10.3*	*15.6*	*24.4*	*36.8*	*53.8*	*70.8*	- - -
					X_T	0.753	0.846	0.702	0.666	0.682	0.656	0.619	0.609	0.559	0.530	- - -
6	111.1	4.375	51	2	C_V	5.51	10.9	17.9	30.2	50.5	82.0	133	200	269	328	0.78
					K_V	*4.77*	*9.43*	*15.5*	*26.1*	*43.7*	*70.9*	*115*	*173*	*233*	*284*	- - -
					X_T	0.705	0.701	0.663	0.646	0.612	0.604	0.606	0.605	0.596	0.604	- - -
	73.0 (2)	2.875 (2)	38	1.5	C_V	4.00	7.63	11.1	15.0	23.3	35.0	53.3	79.6	112	144	0.78
					K_V	*3.46*	*6.60*	*9.60*	*13.0*	*20.2*	*30.3*	*46.1*	*68.9*	*96.9*	*125*	- - -
					X_T	0.670	0.698	0.725	0.731	0.637	0.629	0.599	0.597	0.573	0.571	- - -

1. At 100% travel.
2. Restricted trim.

Table 24. Design EAD, Whisper Trim® I Cage

Whisper Trim I - Flow Up															**Linear Characteristic**
Valve Size, Inches	**Port Diameter**		**Maximum Travel**		**Flow Coeffi-cient**	**Valve Opening—Percent of Total Travel**									
	mm	**Inches**	**mm**	**Inches**		**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
1	33.3	1.3125	19	0.75	C_v	2.17	5.30	8.44	11.8	14.7	16.6	19.5	21.5	23.1	24.1
					K_v	*1.88*	*4.58*	*7.30*	*10.2*	*12.7*	*14.4*	*16.9*	*18.6*	*20.0*	*20.8*
					X_T	0.390	0.406	0.424	0.454	0.456	0.490	0.490	0.506	0.526	0.536
2	47.6	1.875	19	0.75	C_v	4.98	11.0	19.7	27.9	34.5	40.6	45.7	50.1	53.7	55.9
					K_v	*4.31*	*9.52*	*17.0*	*24.1*	*29.8*	*35.1*	*39.5*	*43.3*	*46.5*	*48.4*
					X_T	0.670	0.633	0.403	0.330	0.322	0.327	0.343	0.359	0.372	0.386
3	73.0	2.875	38	1.5	C_v	12.4	30.4	48.3	67.6	84.2	95.2	112	123	132	138
					K_v	*10.7*	*26.3*	*41.8*	*58.5*	*72.8*	*82.3*	*96.9*	*106*	*114*	*119*
					X_T	0.307	0.303	0.330	0.329	0.332	0.331	0.361	0.360	0.360	0.375
4	87.3	3.4375	38	1.5	C_v	16.7	42.9	67.5	91.2	113	133	152	168	182	194
					K_v	*14.4*	*37.1*	*58.4*	*78.9*	*97.7*	*115*	*131*	*145*	*157*	*168*
					X_T	0.738	0.411	0.378	0.331	0.323	0.342	0.354	0.370	0.391	0.400
6	111.1	4.375	51	2	C_v	28.8	70.4	112	157	195	220	260	285	310	320
					K_v	*24.9*	*60.9*	*96.9*	*136*	*169*	*190*	*225*	*247*	*268*	*277*
					X_T	0.303	0.331	0.361	0.330	0.330	0.360	0.360	0.390	0.391	0.403

Table 25. Design ED, Class 125-600, Quick Opening Cage

Quick Opening

Quick Opening Characteristic

Valve Size, Inches	Port Diameter		Maximum Travel(1)		Flow Coefficient	Coeffs for 6 mm (0.25 Inch) Travel(2)	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1 and 1.25	33.3	1.3125	19	0.75	C_v	14.7	4.86	9.39	13.4	16.9	18.9	20.3	21.1	21.8	21.9	22.1	0.81
					K_v	*12.7*	*4.20*	*8.12*	*11.6*	*14.6*	*16.3*	*17.6*	*18.3*	*18.9*	*18.9*	*19.1*	- - -
					X_T	0.703	0.556	0.744	0.724	0.666	0.626	0.584	0.566	0.549	0.554	0.556	- - -
1.5	47.6	1.875	19	0.75	C_v	22.6	7.79	14.4	20.5	26.8	32.0	36.6	39.4	41.3	42.7	44.0	0.79
					K_v	*19.5*	*6.74*	*12.5*	*17.7*	*23.2*	*27.7*	*31.7*	*34.1*	*35.7*	*36.9*	*38.1*	- - -
					X_T	0.679	0.494	0.641	0.682	0.680	0.686	0.661	0.649	0.638	0.616	0.597	- - -
					F_d	- - -	0.22	0.28	0.32	0.34	0.35	0.36	0.36	0.36	0.36	0.36	- - -
	33.3 (4)	1.3125 (4)	19	0.75	C_v	16.2	5.05	9.99	14.7	20.0	24.0	25.7	26.2	27.4	28.6	29.9	0.88
					K_v	*14.0*	*4.37*	*8.64*	*12.7*	*17.3*	*20.8*	*22.2*	*22.7*	*23.7*	*24.7*	*25.9*	- - -
					X_T	0.942	0.803	0.904	0.946	0.872	0.838	0.849	0.874	0.832	0.795	0.756	- - -
2	58.7	2.3125	29	1.125	C_v	29.7	13.4	26.8	39.9	51.3	62.9	70.6	73.7	75.6	76.8	77.6	0.77
					K_v	*25.7*	*11.6*	*23.2*	*34.5*	*44.4*	*54.4*	*61.1*	*63.8*	*65.4*	*66.4*	*67.1*	- - -
					X_T	0.773	0.605	0.695	0.737	0.761	0.703	0.658	0.641	0.635	0.626	0.623	- - -
					F_d	- - -	0.24	0.30	0.33	0.35	0.36	0.36	0.36	0.36	0.36	0.36	- - -
	33.3 (4)	1.3125 (4)	19	0.75	C_v	16.7	4.80	9.58	14.9	20.2	25.7	29.3	31.2	31.2	31.2	31.2	0.87
					K_v	*14.4*	*4.15*	*8.29*	*12.9*	*17.5*	*22.2*	*25.3*	*27.0*	*27.0*	*27.0*	*27.0*	- - -
					X_T	0.705	0.578	0.733	0.695	0.698	0.666	0.689	0.735	0.791	0.805	0.805	- - -
2.5	73.0	2.875	38	1.5	C_v	33.4	20.9	39.6	58.8	74.2	84.9	97.0	103	106	108	109	0.81
					K_v	*28.9*	*18.1*	*34.3*	*50.9*	*64.2*	*73.4*	*83.9*	*89.1*	*91.7*	*93.4*	*94.3*	- - -
					X_T	0.635	0.601	0.684	0.738	0.767	0.744	0.689	0.669	0.658	0.660	0.652	- - -
					F_d	- - -	0.25	0.31	0.34	0.35	0.36	0.36	0.36	0.36	0.36	0.35	- - -
	47.6 (4)	1.875 (4)	19	0.75	C_v	25.3	7.83	15.2	22.8	31.0	40.0	48.3	54.9	60.3	66.4	71.2	0.86
					K_v	*21.9*	*6.77*	*13.1*	*19.7*	*26.8*	*34.6*	*41.8*	*47.5*	*52.2*	*57.4*	*61.6*	- - -
					X_T	0.642	0.498	0.618	0.627	0.636	0.640	0.669	0.725	0.758	0.737	0.710	- - -
3	87.3	3.4375	38	1.5	C_v	43.6	27.2	52.2	77.9	99.5	124	140	149	154	158	161	0.77
					K_v	*37.7*	*23.5*	*45.2*	*67.4*	*86.1*	*107*	*121*	*129*	*133*	*137*	*139*	- - -
					X_T	0.635	0.626	0.671	0.745	0.796	0.703	0.657	0.619	0.602	0.591	0.577	- - -
					F_d	- - -	0.22	0.29	0.32	0.34	0.35	0.36	0.36	0.36	0.36	0.36	- - -
	58.7 (4)	2.3125 (4)	29	1.125	C_v	35.2	15.9	31.7	47.2	60.7	74.4	83.6	87.3	89.5	91.0	91.9	0.86
					K_v	*30.4*	*13.8*	*27.4*	*40.8*	*52.5*	*64.4*	*72.3*	*75.5*	*77.4*	*78.7*	*79.5*	- - -
					X_T	0.852	0.718	0.837	0.889	0.905	0.842	0.784	0.763	0.760	0.744	0.744	- - -

-continued-

Table 25. Design ED, Class 125-600, Quick Opening Cage (continued)

Valve Size, Inches	Port Diameter		Maximum Travel(1)		Flow Coefficient	Coeffs for 6 mm (0.25 Inch) Travel(2)	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
4	111.1	4.375	51	2	C_v	45.9	37.7	75.0	125	163	193	220	238	247	251	251	0.79
					K_v	*39.7*	*32.6*	*64.9*	*108*	*141*	*167*	*190*	*206*	*214*	*217*	*217*	- - -
					X_T	0.607	0.623	0.689	0.733	0.764	0.762	0.723	0.689	0.669	0.683	0.694	- - -
					F_d	- - -	0.22	0.27	0.29	0.31	0.31	0.31	0.31	0.31	0.31	0.30	- - -
	73.0 (4)	2.875 (4)	38	1.5	C_v	39.8	25.0	47.2	70.1	88.5	101	116	123	127	129	130	0.89
					K_v	*34.4*	*21.6*	*40.8*	*60.6*	*76.6*	*87.4*	*100*	*106*	*110*	*112*	*112*	- - -
					X_T	0.841	0.707	0.879	0.948	0.989	0.956	0.875	0.851	0.834	0.840	0.834	- - -
6	177.8	7	51	2	C_v	92.0	73.6	150	232	306	353	389	416	441	451	460	0.82
					K_v	*79.6*	*63.7*	*130*	*201*	*265*	*305*	*336*	*360*	*381*	*390*	*398*	- - -
					X_T	0.660	0.664	0.651	0.667	0.694	0.722	0.742	0.728	0.723	0.719	0.710	- - -
					F_d	- - -	0.17	0.22	0.25	0.26	0.27	0.28	0.28	0.28	0.28	0.28	- - -
	111.1 (4)	4.375 (4)	51	2	C_v	64.9	*52.3*	*101*	*150*	*199*	*247*	*284*	*310*	*329*	*345*	*358*	*0.87*
					K_v	*56.1*	*45.2*	*87.4*	*130*	*172*	*214*	*246*	*268*	*285*	*298*	*310*	- - -
					X_T	0.758	0.774	0.763	0.771	0.778	0.763	0.761	0.717	0.699	0.707	0.691	- - -
8	203.2	8	51	2	C_v	108	80.3	188	290	389	480	554	615	658	705	744	0.87
					K_v	*93.4*	*69.5*	*163*	*251*	*336*	*415*	*479*	*532*	*569*	*610*	*644*	- - -
					X_T	0.653	0.670	0.628	0.679	0.731	0.766	0.806	0.829	0.859	0.863	0.866	- - -
8	203.2	8	76	3	C_v	108	135	291	434	551	639	706	759	807	841	863	0.85
					K_v	*93.4*	*117*	*252*	*375*	*477*	*553*	*611*	*657*	*698*	*727*	*746*	- - -
					X_T	0.653	0.643	0.699	0.757	0.807	0.838	0.861	0.857	0.841	0.838	0.827	- - -
					F_d	- - -	0.19	0.24	0.26	0.27	0.28	0.28	0.28	0.28	0.28	0.27	- - -

1. When using Type 655-ED or 655-ET as a control valve for on-off service, the maximum travel for sizing purposes is 19 mm (0.75-inch).
2. When using self-operated regulators, use coefficients listed for 6 mm (0.25-inch) travel.
3. At 100% travel.
4. Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Design EDR.

Table 26. Design ED, Class 125-600, Linear Cage

Linear

Linear Characteristic

Valve Size, Inches	Port Diameter		Maximum Travel(2)		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1 & 1.25	33.3	1.3125	19	0.75	C_v	3.21	5.50	8.18	10.9	13.2	15.0	16.9	18.6	19.9	20.6	0.84
					K_v	*2.78*	*4.76*	*7.08*	*9.43*	*11.4*	*13.0*	*14.6*	*16.1*	*17.2*	*17.8*	- - -
					X_T	0.340	0.644	0.494	0.509	0.532	0.580	0.610	0.629	0.628	0.636	- - -
1.5	47.6	1.875	19	0.75	C_v	4.23	7.84	11.8	15.8	20.4	25.3	30.3	34.7	37.2	39.2	0.82
					K_v	*3.66*	*6.78*	*10.2*	*13.7*	*17.6*	*21.9*	*26.2*	*30.0*	*32.2*	*33.9*	- - -
					X_T	0.656	0.709	0.758	0.799	0.738	0.729	0.708	0.686	0.683	0.656	- - -
					F_d	0.30	0.37	0.41	0.44	0.44	0.41	0.38	0.35	0.34	0.34	- - -
	33.3 (3)	1.3125 (3)	19	0.75	C_v	2.92	5.70	9.05	12.5	15.6	18.5	21.1	23.9	26.8	29.2	0.91
					K_v	*2.53*	*4.93*	*7.83*	*10.8*	*13.5*	*16.0*	*18.3*	*20.7*	*23.2*	*25.3*	- - -
					X_T	0.690	0.651	0.633	0.634	0.650	0.666	0.708	0.718	0.737	0.733	- - -
2	58.7	2.3125	29	1.125	C_v	7.87	16.0	24.9	33.4	42.1	51.8	62.0	68.1	70.6	72.9	0.77
					K_v	*6.81*	*13.8*	*21.5*	*28.9*	*36.4*	*44.8*	*53.6*	*58.9*	*61.1*	*63.1*	- - -
					X_T	0.641	0.720	0.728	0.767	0.793	0.754	0.683	0.658	0.652	0.638	- - -
					F_d	0.30	0.35	0.36	0.37	0.37	0.36	0.35	0.35	0.34	0.33	- - -
	33.3 (3)	1.3125 (3)	19	0.75	C_v	3.53	6.36	9.92	13.3	16.5	19.7	22.7	25.6	29.3	33.3	0.87
					K_v	*3.05*	*5.50*	*8.58*	*11.5*	*14.3*	*17.0*	*19.6*	*22.1*	*25.3*	*28.8*	- - -
					X_T	0.456	0.529	0.549	0.582	0.611	0.633	0.671	0.723	0.727	0.694	- - -
2.5	73.0	2.875	38	1.5	C_v	9.34	21.6	35.5	49.5	62.7	74.1	83.6	93.5	102	108	0.81
					K_v	*8.08*	*18.7*	*30.7*	*42.8*	*54.2*	*64.1*	*72.3*	*80.9*	*88.2*	*93.4*	- - -
					X_T	0.680	0.660	0.644	0.669	0.674	0.706	0.716	0.687	0.658	0.641	- - -
					F_d	0.27	0.33	0.35	0.36	0.35	0.34	0.32	0.29	0.27	0.27	- - -
	47.6 (3)	1.875 (3)	19	0.75	C_v	4.10	8.09	12.3	16.7	21.1	26.8	33.7	41.3	49.2	57.0	0.84
					K_v	*3.55*	*7.00*	*10.6*	*14.4*	*18.3*	*23.2*	*29.2*	*35.7*	*42.6*	*49.3*	- - -
					X_T	0.668	0.646	0.684	0.688	0.698	0.694	0.678	0.668	0.669	0.666	- - -
3	87.3	3.4375	38	1.5	C_v	14.5	32.9	52.1	70.4	88.5	105	118	133	142	148	0.82
					K_v	*12.5*	*28.5*	*45.1*	*60.9*	*76.6*	*90.8*	*102*	*115*	*123*	*128*	- - -
					X_T	0.671	0.699	0.697	0.720	0.733	0.718	0.707	0.650	0.630	0.620	- - -
					F_d	0.26	0.32	0.35	0.36	0.36	0.36	0.36	0.28	0.29	0.30	- - -
	58.7 (3)	2.3125 (3)	29	1.125	C_v	8.06	16.9	26.7	37.5	49.0	61.4	73.8	85.3	94.7	102	0.85
					K_v	*6.97*	*14.6*	*23.1*	*32.4*	*42.4*	*53.1*	*63.8*	*73.8*	*81.9*	*88.2*	- - -
					X_T	0.592	0.614	0.662	0.672	0.674	0.676	0.694	0.722	0.736	0.732	- - -
4	111.1	4.375	51	2	C_v	23.3	50.3	78.1	105	127	152	181	203	223	236	0.82
					K_v	*20.2*	*43.5*	*67.6*	*90.8*	*110*	*131*	*157*	*176*	*193*	*204*	- - -
					X_T	0.691	0.714	0.720	0.731	0.764	0.757	0.748	0.762	0.732	0.688	- - -
					F_d	0.31	0.36	0.38	0.38	0.37	0.35	0.32	0.30	0.27	0.28	- - -
	73.0 (3)	2.875 (3)	38	1.5	C_v	9.77	22.6	37.2	51.8	65.7	77.5	87.5	97.9	107	113	0.84
					K_v	*8.45*	*19.5*	*32.2*	*44.8*	*56.8*	*67.0*	*75.7*	*84.7*	*92.6*	*97.7*	- - -
					X_T	0.926	0.899	0.873	0.904	0.919	0.962	0.972	0.937	0.891	0.872	- - -

-continued-

Table 26. Design ED, Class 125-600, Linear Cage (continued)

Valve Size, Inches	Port Diameter		Maximum Travel(2)		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
6	177.8	7	51	2	C_v	46.3	107	171	228	279	327	367	402	420	433	0.84
					K_v	*40.0*	*92.6*	*148*	*197*	*241*	*283*	*317*	*348*	*363*	*375*	- - -
					X_T	0.656	0.727	0.744	0.781	0.803	0.800	0.784	0.758	0.755	0.740	- - -
					F_d	0.21	0.26	0.29	0.30	0.31	0.31	0.31	0.28	0.28	0.28	- - -
	111.1 (3)	4.375 (3)	51	2	C_v	16.7	38.6	65.4	93.7	123	156	194	244	290	322	0.88
					K_v	*14.4*	*33.4*	*56.6*	*81.1*	*106*	*135*	*168*	*211*	*251*	*279*	- - -
					X_T	0.762	0.698	0.675	0.684	0.681	0.660	0.676	0.657	0.685	0.703	- - -
8(2)	203.2	8	51	2	C_v	60.2	129	206	285	363	444	526	581	640	688	0.87
					K_v	*52.1*	*112*	*178*	*247*	*314*	*384*	*455*	*503*	*554*	*595*	- - -
					X_T	0.704	0.721	0.657	0.651	0.683	0.713	0.740	0.801	0.821	0.839	- - -
8	203.2	8	76	3	C_v	91.4	207	325	440	550	639	711	760	795	846	0.87
					K_v	*79.1*	*179*	*281*	*381*	*476*	*553*	*615*	*657*	*688*	*732*	- - -
					X_T	0.651	0.624	0.677	0.746	0.786	0.803	0.823	0.836	0.843	0.807	- - -
					F_d	0.23	0.28	0.30	0.31	0.31	0.31	0.31	0.31	0.31	0.31	- - -

1. At 100% travel.
2. If coefficients listed above for the 8-inch linear cage with 51 mm (2-inch) travel are not sufficient for your application, consider using the quick opening cage. The 8-inch quick opening cage with 51 mm (2-inch) travel has approximately a linear characteristic.
3. Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Design EDR.

Table 27. Design ED, Class 125-600, Equal Percentage Cage, Flow Down

Equal Percentage

Equal Percentage Characteristic

Valve Size, Inches	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F_L (1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1 & 1.25	33.3	1.3125	19	0.75	C_v	0.783	1.54	2.20	2.89	4.21	5.76	7.83	10.9	14.1	17.2	0.88
					K_v	*0.677*	*1.33*	*1.90*	*2.50*	*3.64*	*4.98*	*6.77*	*9.43*	*12.2*	*14.9*	- - -
					X_T	0.766	0.614	0.587	0.667	0.672	0.687	0.743	0.760	0.733	0.667	- - -
1.5	47.6	1.875	19	0.75	C_v	1.52	2.63	3.87	5.41	7.45	11.2	17.4	24.5	30.8	35.8	0.84
					K_v	*1.31*	*2.27*	*3.35*	*4.68*	*6.44*	*9.69*	*15.1*	*21.2*	*26.6*	*31.0*	- - -
					X_T	0.780	0.735	0.716	0.715	0.738	0.727	0.690	0.685	0.685	0.679	- - -
					F_d	0.64	0.63	0.63	0.64	0.46	0.45	0.30	0.31	0.35	0.38	- - -
	33.3 (2)	1.3125 (2)	19	0.75	C_v	1.12	1.56	2.22	3.10	4.27	6.17	9.01	13.1	18.2	23.1	0.91
					K_v	*0.969*	*1.35*	*1.92*	*2.68*	*3.69*	*5.34*	*7.79*	*11.3*	*15.7*	*20.0*	- - -
					X_T	0.821	0.864	0.820	0.703	0.721	0.679	0.665	0.639	0.650	0.700	- - -
2	58.7	2.3125	29	1.125	C_v	1.66	2.93	4.66	6.98	10.8	16.5	25.4	37.3	50.7	59.7	0.85
					K_v	*1.44*	*2.53*	*4.03*	*6.04*	*9.34*	*14.3*	*22.0*	*32.3*	*43.9*	*51.6*	- - -
					X_T	0.827	0.834	0.774	0.727	0.687	0.684	0.702	0.736	0.686	0.687	- - -
					F_d	0.41	0.50	0.53	0.58	0.37	0.32	0.27	0.26	0.29	0.31	- - -
	33.3 (2)	1.3125 (2)	19	0.75	C_v	0.923	1.42	2.09	2.84	4.11	5.83	8.58	12.8	18.5	24.3	0.88
					K_v	*0.798*	*1.23*	*1.81*	*2.46*	*3.56*	*5.04*	*7.42*	*11.1*	*16.0*	*21.0*	- - -
					X_T	0.775	0.744	0.742	0.707	0.715	0.714	0.714	0.641	0.621	0.649	- - -
2.5	73.0	2.875	38	1.5	C_v	3.43	7.13	10.8	15.1	22.4	33.7	49.2	71.1	89.5	99.4	0.84
					K_v	*2.97*	*6.17*	*9.34*	*13.1*	*19.4*	*29.2*	*42.6*	*61.5*	*77.4*	*86.0*	- - -
					X_T	0.778	0.702	0.678	0.677	0.658	0.654	0.661	0.665	0.661	0.660	- - -
					F_d	0.45	0.49	0.49	0.47	0.35	0.32	0.30	0.24	0.25	0.27	- - -
	47.6 (2)	1.875 (2)	19	0.75	C_v	1.57	2.57	3.82	5.44	7.64	11.5	18.2	26.7	35.1	43.9	0.89
					K_v	*1.36*	*2.22*	*3.30*	*4.71*	*6.61*	*9.95*	*15.7*	*23.1*	*30.4*	*38.0*	- - -
					X_T	0.801	0.756	0.713	0.677	0.648	0.672	0.628	0.635	0.706	0.710	- - -
3	87.3	3.4375	38	1.5	C_v	4.32	7.53	10.9	17.1	27.2	43.5	66.0	97.0	120	136	0.82
					K_v	*3.74*	*6.51*	*9.43*	*14.8*	*23.5*	*37.6*	*57.1*	*83.9*	*104*	*118*	- - -
					X_T	0.774	0.706	0.682	0.635	0.616	0.602	0.663	0.693	0.670	0.675	- - -
					F_d	0.52	0.63	0.68	0.39	0.36	0.29	0.26	0.28	0.30	0.32	- - -
	58.7 (2)	2.3125 (2)	29	1.125	C_v	1.75	3.11	4.77	7.07	10.7	17.0	27.9	41.5	58.0	70.7	0.87
					K_v	*1.51*	*2.69*	*4.13*	*6.12*	*9.26*	*14.7*	*24.1*	*35.9*	*50.2*	*61.2*	- - -
					X_T	0.944	0.840	0.803	0.757	0.735	0.642	0.531	0.613	0.629	0.702	- - -
4	111.1	4.375	51	2	C_v	5.85	11.6	18.3	30.2	49.7	79.7	125	171	205	224	0.82
					K_v	*5.06*	*10.0*	*15.8*	*26.1*	*43.0*	*68.9*	*108*	*148*	*177*	*194*	- - -
					X_T	0.731	0.650	0.643	0.645	0.632	0.625	0.672	0.742	0.737	0.716	- - -
					F_d	0.45	0.42	0.40	0.33	0.30	0.28	0.23	0.24	0.26	0.28	- - -
	73.0 (2)	2.875 (2)	38	1.5	C_v	3.82	7.65	11.4	16.9	25.5	38.2	60.5	85.7	105	112	0.89
					K_v	*3.30*	*6.62*	*9.86*	*14.6*	*22.1*	*33.0*	*52.3*	*74.1*	*90.8*	*96.9*	- - -
					X_T	0.746	0.700	0.694	0.669	0.640	0.627	0.591	0.644	0.735	0.813	- - -

-continued-

Table 27. Design ED, Class 125-600, Equal Percentage Cage, Flow Down (continued)

Valve Size, Inches	Port Diameter		Maximum Travel		Flow Coeffi-cient	Valve Opening—Percent of Total Travel										F_L (1)
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
6	177.8	7	51	2	C_v	12.9	25.8	43.3	67.4	104	162	239	316	368	394	0.85
					K_v	*11.2*	*22.3*	*37.5*	*58.3*	*90.0*	*140*	*207*	*273*	*318*	*341*	- - -
					X_T	0.688	0.680	0.682	0.709	0.700	0.720	0.736	0.744	0.780	0.778	- - -
					F_d	0.39	0.44	0.47	0.33	0.29	0.22	0.22	0.24	0.25	0.26	- - -
	111.1 (2)	4.375 (2)	51	2	C_v	5.40	10.1	15.8	26.7	45.2	71.2	111	169	232	274	0.88
					K_v	*4.67*	*8.74*	*13.7*	*23.1*	*39.1*	*61.6*	*96.0*	*146*	*201*	*237*	- - -
					X_T	0.834	0.834	0.735	0.654	0.626	0.613	0.614	0.610	0.629	0.695	- - -
8	203.2	8	51	2	C_v	18.5	38.0	58.4	86.7	130	189	268	371	476	567	0.85
					K_v	*16.0*	*32.9*	*50.5*	*75.0*	*112*	*163*	*232*	*321*	*412*	*490*	- - -
					X_T	0.727	0.623	0.600	0.588	0.580	0.587	0.599	0.611	0.671	0.724	- - -
8	203.2	8	76	3	C_v	27.0	58.1	105	188	307	478	605	695	761	818	0.86
					K_v	*23.4*	*50.3*	*90.8*	*163*	*266*	*413*	*523*	*601*	*658*	*708*	- - -
					X_T	0.644	0.654	0.636	0.611	0.643	0.615	0.725	0.809	0.804	0.807	- - -
					F_d	0.28	0.26	0.23	0.20	0.17	0.22	0.24	0.25	0.25	0.26	- - -

1. At 100% travel.
2. Restricted trim.

Notes: The coefficients shown on this page are also appropriate for Design EDR.

Table 28. Design ED, Class 125-600, Whisper Trim® I Cage, Flow Up

Whisper Trim I

Linear Characteristic

Valve Size, Inches(1)	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel									
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100
1 & 1.25	33.3	1.3125	19	0.75	C_v	3.28	7.39	12.0	14.2	14.9	15.3	15.7	16.0	16.4	16.8
					K_v	*2.84*	*6.39*	*10.4*	*12.3*	*12.9*	*13.2*	*13.6*	*13.8*	*14.2*	*14.5*
					X_T	0.581	0.605	0.617	0.644	0.764	0.790	0.809	0.813	0.795	0.768
1.5	47.6	1.875	19	0.75	C_v	2.62	7.42	13.9	20.8	23.2	24.2	24.9	25.4	26.1	26.7
					K_v	*2.27*	*6.42*	*12.0*	*18.0*	*20.1*	*20.9*	*21.5*	*22.0*	*22.6*	*23.1*
					X_T	0.892	0.766	0.632	0.498	0.614	0.771	0.876	0.919	0.901	0.894
	33.3 (2)	1.3125 (2)	19	0.75	C_v	3.12	7.36	13.0	18.5	20.7	21.4	21.8	23.1	23.9	25.2
					K_v	*2.70*	*6.37*	*11.2*	*16.0*	*17.9*	*18.5*	*18.9*	*20.0*	*20.7*	*21.8*
					X_T	0.559	0.605	0.460	0.383	0.472	0.622	0.768	0.823	0.874	0.857
2	58.7	2.3125	29	1.125	C_v	7.30	19.2	34.6	42.2	45.5	47.0	47.1	47.2	47.2	48.0
					K_v	*6.31*	*16.6*	*29.9*	*36.5*	*39.4*	*40.7*	*40.7*	*40.8*	*40.8*	*41.5*
					X_T	0.604	0.467	0.318	0.387	0.526	0.689	0.843	0.899	0.940	0.938
	33.3 (2)	1.3125 (2)	19	0.75	C_v	2.86	6.79	11.7	18.4	23.6	27.9	30.9	33.5	35.3	36.7
					K_v	*2.47*	*5.87*	*10.1*	*15.9*	*20.4*	*24.1*	*26.7*	*29.0*	*30.5*	*31.7*
					X_T	0.672	0.755	0.547	0.386	0.358	0.377	0.398	0.431	0.470	0.483
2.5	73.0	2.875	38	1.5	C_v	12.2	32.6	49.7	54.4	55.9	59.8	64.0	67.7	71.4	74.0
					K_v	*10.6*	*28.2*	*43.0*	*47.1*	*48.4*	*51.7*	*55.4*	*58.6*	*61.8*	*64.0*
					X_T	0.748	0.428	0.414	0.589	0.792	0.877	0.857	0.792	0.712	0.719
	47.6 (2)	1.875 (2)	19	0.75	C_v	3.11	8.31	14.9	22.4	29.9	36.0	41.6	46.4	50.5	53.6
					K_v	*2.69*	*7.19*	*12.9*	*19.4*	*25.9*	*31.1*	*36.0*	*40.1*	*43.7*	*46.4*
					X_T	0.603	0.761	0.596	0.467	0.397	0.395	0.398	0.411	0.427	0.439
3	87.3	3.4375	38	1.5	C_v	16.5	40.3	70.8	88.0	92.1	90.7	90.3	92.6	95.6	99.1
					K_v	*14.3*	*34.9*	*61.2*	*76.1*	*79.7*	*78.5*	*78.1*	*80.1*	*82.7*	*85.7*
					X_T	0.685	0.471	0.331	0.378	0.532	0.753	0.929	0.983	0.968	0.923
	58.7 (2)	2.3125 (2)	29	1.125	C_v	8.15	19.1	33.2	47.6	60.8	72.1	81.8	90.1	97.4	103
					K_v	*7.05*	*16.5*	*28.7*	*41.2*	*52.6*	*62.4*	*70.8*	*77.9*	*84.3*	*89.1*
					X_T	0.720	0.660	0.500	0.439	0.406	0.412	0.437	0.472	0.504	0.510
4	111.1	4.375	51	2	C_v	33.9	76.6	117	135	137	137	141	149	157	169
					K_v	*29.3*	*66.3*	*101*	*117*	*119*	*119*	*122*	*129*	*136*	*146*
					X_T	0.607	0.385	0.352	0.467	0.682	0.887	0.977	0.958	0.921	0.811
	73.0 (2)	2.875 (2)	38	1.5	C_v	13.6	32.5	54.3	75.5	94.6	112	127	141	153	160
					K_v	*11.8*	*28.1*	*47.0*	*65.3*	*81.8*	*96.9*	*110*	*122*	*132*	*138*
					X_T	0.674	0.481	0.374	0.344	0.345	0.354	0.370	0.385	0.407	0.428
6	177.8	7	51	2	C_v	55.8	125	196	245	270	286	297	308	323	338
					K_v	*48.3*	*108*	*170*	*212*	*234*	*247*	*257*	*266*	*279*	*292*
					X_T	0.294	0.323	0.286	0.322	0.406	0.494	0.579	0.644	0.673	0.662
8	203.2	8	76 (3,4)	3 (3,4)	C_v	100	226	337	436	502	581	641	655	659	681
					K_v	*86.5*	*195*	*292*	*377*	*434*	*503*	*554*	*567*	*570*	*589*
					X_T	0.456	0.490	0.470	0.427	0.452	0.468	0.521	0.624	0.703	0.701
			29 (5)	4 (5)	C_v	142	303	428	542	611	652	669	689	700	726
					K_v	*123*	*262*	*370*	*469*	*529*	*564*	*579*	*596*	*606*	*628*
					X_T	0.549	0.450	0.436	0.441	0.513	0.624	0.707	0.709	0.729	0.718

1. 6-inch E-body with restricted Whisper Trim not available. Use EW body where this trim is desired.
2. Restricted trim.
3. Travel limited to 70 mm (2.75 inches) with Class IV ED valve plug.
4. Travel limited to 64 mm (2.5 inches) with anti-extrusion ring or ET-C valve plug.
5. Travel limited to 95 mm (3.75 inches) with anti-extrusion ring or ET-C valve plug.

Notes: The coefficients shown on this page are also appropriate for Design EDR.

Table 29. Design ED, Class 125-600, Whisper Trim® III Cage, Flow Up

Whisper Trim III

Linear Characteristic(2)

Valve Size, Inches	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										X_T(1)
	mm	Inches	mm	Inches		Minimum(3)	20	30	40	50	60	70	80	90	100	
A3 $\Delta P/P_1 \leq 0.6$																
6	136.5	5.375	76	3	C_v	4.67	68.2	92.0	129	163	196	228	257	279	295	0.714
					K_v	4.04	*59.0*	*79.6*	*112*	*141*	*170*	*197*	*222*	*241*	*255*	- - -
B3 $\Delta P/P_1 \leq 0.75$																
6	136.5	5.375	76	3	C_v	4.67	38.2	66.9	94.5	120	144	167	190	211	228	0.473
					K_v	4.04	*33.0*	*57.9*	*81.7*	*104*	*125*	*144*	*164*	*183*	*197*	- - -
C3 $\Delta P/P_1 \leq 0.85$																
6	136.5	5.375	76	3	C_v	4.67	28.0	41.3	55.3	69.3	83.0	97.0	110	124	138	0.563
					K_v	4.04	*24.2*	*35.7*	*47.8*	*59.9*	*71.8*	*83.9*	*95.2*	*107*	*119*	- - -
D3 $\Delta P/P_1 \leq 0.99$																
6	136.5	5.375	76	3	C_v	4.67	6.67	9.50	19.9	31.4	46.0	61.0	75.7	89.7	104	0.563
					K_v	4.04	*5.77*	*8.22*	*17.2*	*27.2*	*39.8*	*52.8*	*65.5*	*77.6*	*90.0*	- - -

1. This column lists X_T factors for Whisper Trim III cages at 100% travel.
2. Level D exhibits an equal percentage characteristic for the first 1.5 inches (38 mm) of travel, then linear characteristic.
3. This coefficient is minimum rather than 10% open. Valves should not be required to throttle at less than the specified minimum coefficient for an extended period of time. Erosion damage to the valve may result.

Notes: The coefficients shown on this page are also appropriate for Design EDR.

Specifications

Available Configurations

Design ED: Single-port, globe-style control valve with cage guiding, balanced valve plug, and push-down-to-close valve plug action (figures 1 and 2)
Design EAD: Angle version of Design ED control valve, used to facilitate piping or in applications where a self-draining valve is desired (figure 3)
Design EDR: Same as Design ED control valve except with push-down-to-open valve plug action (figure 4)

Valve Sizes

See table 2

End Connection Styles(1)(2)

Cast Iron Valves.
Flanged: Design ED, 1- through 8-inch, Class ■ 125 flat-face or ■ 250 raised-face flanges per ASME B16.1
Screwed: Design ED, 1- through 2-inch, consistent with ASME B16.4
Steel and Stainless Steel Valves.
Flanged: Class ■ 150, 300, or 600 raised-face (RF) or ring-type joint (RTJ) flanges per ASME B16.5
Screwed or Socket Welding: 1- through 2-inch, consistent with ASME B16.11
Buttwelding: 1- through 8-inch . Schedules 40 or 80 consistent with ASME B16.25

Socket weld end connection style is not available for Design EAD.
Also, see table 2 and figures 14 and 15

Maximum Inlet Pressures and Temperatures(1)(2)

As listed below, unless limited by maximum pressure drop or material temperature capabilities
Cast Iron Valves.
Flanged: Consistent with Class 125B or 250B per ASME B16.1
Screwed: Consistent with Class 250 per ASME B16.4
Steel and Stainless Steel Valves.
Flanged: Consistent with Class 150, 300, and 600(3) per ASME B16.34
Screwed or Welding: Consistent with Class 600(3) per ASME B16.34

Maximum Pressure Drop(2)

Same as maximum inlet pressure for specific construction defined above, except where further limited as follows:

All Valves Except Those with Whisper Trim III and WhisperFlo Cages: See figure 9.
Valves with Whisper Trim III Cages (6-inch Design ED): See figure 11 except where further limited by the following max Δ-P/P_1 ratio(4)—0.60 for level A3 cage, 0.75 for level B3 cage, 0.85 for level C3 cage, or 0.99 for level D3 cage
Valves for NACE MR0175-2002: See figure 13

Shutoff Classifications per ANSI/FCI 70-2 and IEC 60534-4

Class II: Standard with single graphite ring and 33 through 203 mm (1.3125 through 8-inch) port size
Class III: Optional for valves with single graphite piston ring and 87 mm (3.4375 inch) or larger port diameter
Class IV: For valves with multiple graphite piston rings and 111 mm (4.375 inch) or larger port diameter
Class V High-Temperature: For valves with port diameters from 73 through 203.2 mm (2.875 through 8-inch) with optional C-seal trim. See table 1

Construction Materials

Valve Body, Bonnet, and Bonnet Spacer or Bottom Flange, if used: ■ Cast iron, ■ WCC carbon steel, ■ 316 stainless steel, ■ LCC/HT carbon steel, ■ WC9 chrome moly steel, or ■ other materials upon request
Valve Plug, Cage, and Metal Seating Parts.
All Valves Except Those with Whisper Trim III and WhisperFlo Cages: See table 3.
Valves with Whisper Trim III and WhisperFlo Cages (4- and 6-inch Design ED): See tables 4 and 5.
Valves for NACE Specification: See table 10.
Bellows Seal Assembly: ■ 316L stainless steel or ■ N04400
All Other Parts: See table 6

- continued -

Specifications (continued)

Material Temperature Capabilities(2)

Valve Body/Trim Combinations.
All Valves Except Those with Whisper Trim III and WhisperFlo Cages: See table 7.
Valves with Whisper Trim III Cages (6-inch Design ED): See table 4.
Valves with WhisperFlo Cages (4- and 6-inch Design ED): See table 5.
All Other Parts: See table 6

Flow Characteristics

Standard Cages: ■ Quick-opening, ■ linear, or ■ equal percentage
Whisper Trim and WhisperFlo Cages: Linear

Flow Directions

Design ED or EAD: ■ Standard Cage—Normally down, ■ Whisper Trim and WhisperFlo Cages—Always up
Design EDR: ■ Standard Cage—Normally up, ■ Whisper Trim Cage—Always down

Flow Coefficients and Noise Level Prediction

See table 9, the section titled Coefficients in this bulletin, and Catalog 12

Port Diameters and Valve Plug Travels

See table 11

Yoke Boss and Stem Diameters

See table 11

Typical Bonnet Styles

■ Plain or ■ extension. See figures 14 and 15 for standard dimensions. See table 8 for selection guidelines.
■ ENVIRO-SEAL bellows seal bonnet. See figure 14 for standard dimensions.
See figure 8 for view of ENVIRO-SEAL bellows seal bonnet. Also, see Bulletin 59.1:070, ENVIRO-SEAL Bellows Seal Bonnets, for further information

Packing Arrangements

■ Single PTFE V-ring (standard), ■ double arrangements, ■ leak-off arrangements, ■ ENVIRO-SEAL packing system. See figure 7 for ENVIRO-SEAL configuration.
ENVIRO-SEAL Packing Systems in vacuum service: Standard ENVIRO-SEAL packing systems can be used in vacuum service with packing rings in standard orientation. Do not reverse the ENVIRO-SEAL PTFE packing rings. See Bulletin 59.1:061, ENVIRO-SEAL Packing Systems for Sliding-Stem Valves, for further information.

Approximate Weights

1 and 1.25 Inch Sizes: 14 kg (30 lb)
1.5 Inch Size: 20 kg (45 lb)
2 Inch Size: 39 kg (85 lb)
2.5 Inch Size: 45 kg (100 lb)
3 Inch Size: 57 kg (125 lb)
4 Inch Size: 77 kg (170 lb)
6 Inch Size: 159 kg (350 lb)
8 Inch Size: 408 kg (900 lb)

Additional Options

■ Seal welding of Design EDR valve body/bonnet joint for temperatures above 232°C (450°F), ■ lubricator, ■ lubricator/isolating valve, ■ drilled and tapped connection in extension bonnet for leak-off service, ■ valve body drain plug, ■ style 3 fabricated extension bonnet made on order to a specific length for cryogenic service, ■ style NS bonnet for seismic service requirements, ■ packings suitable for nuclear service, ■ C-seal trim for Class V high-temperature shutoff

1. DIN (or other) ratings and end connections can usually be supplied; consult your Emerson Process Management sales office.
2. The pressure/temperature limits in this bulletin and in any applicable standard limitations should not be exceeded.
3. Certain bonnet bolting material selections may require a Class 600 easy-e valve assembly to be derated. Contact your Emerson Process Management sales office for more information.
4. Limitation based on excessive noise increases if max ΔP/P1 ratio for a given cage level is exceeded.

ENVIRO-SEAL Packing System Specifications

Applicable Stem Diameters

■ 9.5 mm (3/8 inches), ■ 12.7 (1/2), ■ 19.1 (3/4), ■ 25.4 (1), and ■ 31.8 (1-1/4) diameter valve stems

Maximum Pressure/Temperature Limits(1)

To Meet the EPA Fugitive Emission Standard of 100 PPM(2)
For ENVIRO-SEAL PTFE and ENVIRO-SEAL Duplex packing systems: full Class 300 up to 232°C (450°F)
For ENVIRO-SEAL Graphite ULF packing system: 104 bar (1500 psig) at 316°C (600°F)

Construction Materials

PTFE Packing Systems.
Packing Ring and Lower Wiper: PTFE V-ring(3)
Male and Female Adaptor Rings: Carbon-filled PTFE V-ring
Anti-Extrusion Washer: Filled PTFE
Lantern Ring: S31600 (316 stainless steel)
Spring: ■ 17-7PH stainless steel or ■ N06600
Packing Box Flange: S31600
Packing Follower: S31600 lined with carbon-filled PTFE
Packing Box Studs: Strain-hardened 316 stainless steel
Packing Box Nuts: 316 stainless steel SA194 Grade 8M

Graphite ULF Packing Systems.
Packing Ring: Graphite rings
Spring: ■ 17-7PH stainless steel or ■ N06600
Packing Box Flange: S31600
Packing Follower: S31600 lined with carbon-filled PTFE
Packing Box Studs: Strain-hardened 316 stainless steel
Packing Box Nuts: 316 stainless steel SA194 Grade 8M

1. Refer to the valve specifications in this bulletin for pressure/temperature limits of valve parts. Do not exceed the pressure/temperature rating of the valve. Do not exceed any applicable code or standard limitation.
2. The Environmental Protection Agency (EPA) has set a limit of 100 parts per million (ppm) for fugitive emissions from a valve in selected VOC (Volatile Organic Compound) services.
3. In vacuum service, reversing the ENVIRO-SEAL PTFE packing rings is not necessary.

Note

Neither Emerson, Emerson Process Management, Fisher, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

ED Valve

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