Design ET, EAT, and ETR Sliding-Stem Control Valves

Design ET, EAT, and ETR general-purpose control valves (figures 1, 2, 3, and 4) are used for throttling or on-off control of a wide variety of liquids and gases. All three valve designs have single ports, balanced valve plugs, and cage guiding. Metal-to-PTFE seating for stringent shutoff requirements is standard in all valves except those with Cavitrol® III cages. Metal-to-metal seating for higher temperatures is standard for valves with Cavitrol III cages and optional for all other valves.

The temperature limits of Design ET valves can be extended above 232°C (450°F) by using PEEK (PolyEtherEtherKetone) anti-extrusion rings in combination with a spring-loaded PTFE seal. The PEEK anti-extrusion rings expand to close off the clearance gap between the plug and the cage where the PTFE seal may extrude at high temperatures and pressures. The temperature limits are extended to 316°C (600°F) for non-oxidizing service and to 260°C (500°F) for oxidizing service.

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

The easy-e® Valve Family

Design ET, EAT, and ETR control 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
- Interchangeable, restricted-capacity trims and full-sized trims to match variable process flow demands
- Different cage/plug styles that provide particular flow characteristics for highly-specialized applications. The standard cage comes in three different flow characteristics: ■ quick-opening, ■ linear, or ■ equal percentage.

W1916-3 / IL

Figure 1. Design ET Control Valve with Type 667 Actuator

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- Whisper Trim® I, Whisper Trim III (figure 7), and WhisperFlo™ cages (figures 5 and 6) attenuate aerodynamic noise in gaseous service.

- To help eliminate cavitation damage in a properly-sized valve, a standard-travel, Cavitrol III, one-stage cage (figure 9) and a long-travel, Cavitrol III, two-stage cage are available in the 1- through 8-inch Design ET control valve.

- Optional constructions allow material compatibility with NACE Standard MR0175-2002.

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.

Features

- **Compliance with the Clean Air Act**—ENVIRO-SEAL packing systems (figures 10 and 11) that provide an improved stem seal to help prevent the loss of process fluid are available. These packing systems feature PTFE or Graphite ULF packing with live-loading for reduced packing maintenance.

- **PTFE Seating for Long-Lasting Shutoff Capability**—Controlled compression of standard seat construction protects PTFE disk between metal disk seat and disk retainer (figure 2). Only the edge of the PTFE disk is contacted by the flowstream during normal operation. Excellent shutoff is maintained by a backup ring or spring-loading that forces the valve plug seal ring against the cage (figure 2).

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

- **Cost-Effective Operation and Maintenance Economy**—Increased wear resistance of hardened stainless steel trim means longer-lasting service. When inspection or maintenance is necessary, the body can stay in the pipeline during removal of trim parts. Balanced valve plug construction permits use of smaller, lower-cost Fisher actuators. The Design ETR valve also permits easy body interior access without having to remove the bonnet or actuator (figure 4). And, trim inventory costs are cut because dimensional standardization permits use of most standard easy-e trim parts.

- **Compliance with European Standards**—Valves are available with dimensions specified by EN/DIN standards. See figure 16.

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

Table 1. Available Constructions

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

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

Table 2. Shutoff Classifications Per ANSI/FCI 70-2 and IEC 60534-4

Valve Design	Seating	Shutoff Class
All except those with Cavitrol III cages	PTFE	Standard Air Test (maximum leakage is 0.05 mL/min/psid/inch port diameter)(2)
		V (optional)
		VI (optional)(4)
	Metal	IV (standard)
		V (optional)(1)
		VI (optional)(4)
ET with Cavitrol III one-stage cage	Metal	IV (standard)
		V (optional)
ET with Cavitrol III two-stage cages	Metal	V
ET and EAT w/ TSO (Tight Shutoff) trim (Class 125 through 600)	Replaceable, protected soft seat	TSO(3) TSO is not an ANSI/FCI leakage class. Valves with TSO trim are factory tested to a more stringent Fisher test requirement of no leakage at time of shipment. Test medium is water. Specify service ΔP when ordering. Shutoff class V.
ET w/ TSO (Tight Shutoff) trim (Class 125 through 600)	Std or Cavitrol III trim. Replaceable, protected soft seat.	

1. Class V shutoff requires spring-loaded seal ring, radius-seat plug, and wide-bevel seat ring (not available with 8-inch port, quick-opening cage). Not available with trims 4, 29, and 85.
2. This is a special non-ANSI/FCI leakage class.
3. For additional information, contact your Emerson Process Management sales office.
4. Refer to table 3.

ENVIRO-SEAL®, HIGH-SEAL™ Packing Systems

ENVIRO-SEAL and HIGH-SEAL packing systems offer exceptional sealing capabilities. These systems easily install in existing valves or can be purchased with new valves. These systems help seal the process to conserve valuable process fluid. The long-life and reliability of these systems also reduce maintenance cost and downtime.

For applications requiring compliance with environmental protection regulations, the unique Fisher ENVIRO-SEAL packing system (figure 11) and a unique ENVIRO-SEAL bellows seal system (figure 10) 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 11) is offered. The HIGH-SEAL packing system provides improved sealing at pressure/temperature ratings beyond ENVIRO-SEAL limits.

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

ANSI/FCI Class VI Shutoff Capabilities

Design ET valves with soft seat and metal seat constructions can provide ANSI/FCI Class VI shut-off capabilities. See tables 3 and 4.

Table 3. Class VI Shutoff Availability(1)

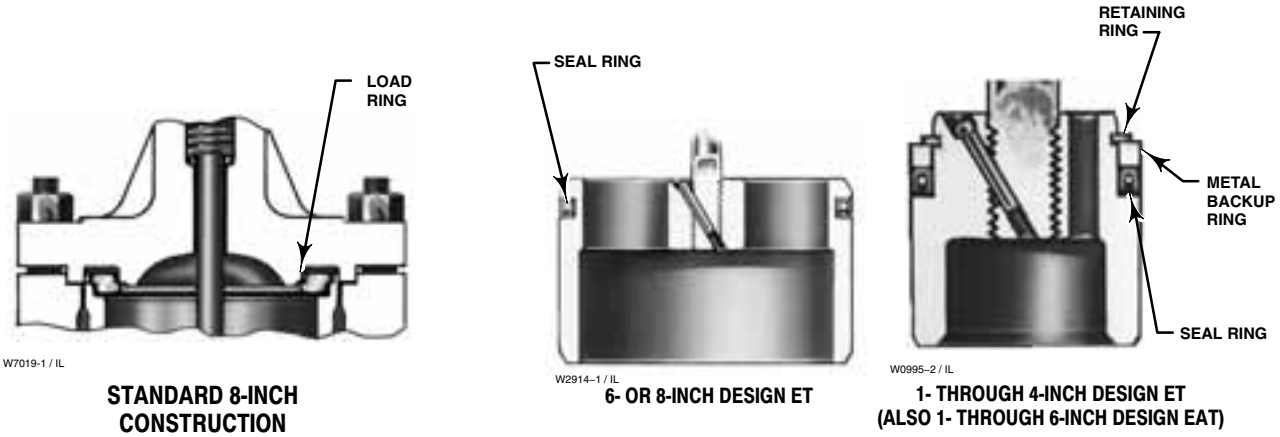
Type	Port Size, Inches	Seat	Minimum Seat Load
ET	$\geq$ 3.4375 $\leq$ 7	Soft	See Catalog 14
ET	$\geq$ 3.4375 $\leq$ 7	Metal	300 lbs/lineal inch

1. Limited retrofit capability. Consult your Emerson Process Management sales office.

Table 4. Class VI Trim Materials

TYPE	CAGE/SEAT RING RETAINER	VALVE PLUG	SEAT RING	SEAL RING	TRIM TEMPERATURE LIMIT	
					°C	°F
ET	S31600 / ENC	S31600 w/ standard beveled seat	S31600/PTFE	UHMWPE(1) R30003	–198 to 66	–325 to 150
	S31600 / ENC	S31600/CoCr-A seat w/ radiused seat (special design)	S31600 w/ wide beveled seat (special design)	UHMWPE R30003	–198 to 66	–325 to 150
	S17400 (17-4PH SST)	S41600 w/ standard beveled seat	S31600/PTFE	UHMWPE R30003	–29 to 66	–20 to 150
	S17400	S41600 w/ radiused seat (special design)	S31600 w/ wide beveled seat (special design)	UHMWPE R30003	–29 to 66	–20 to 150

1. UHMWPE (Ultra High Molecular Weight Polyethylene)



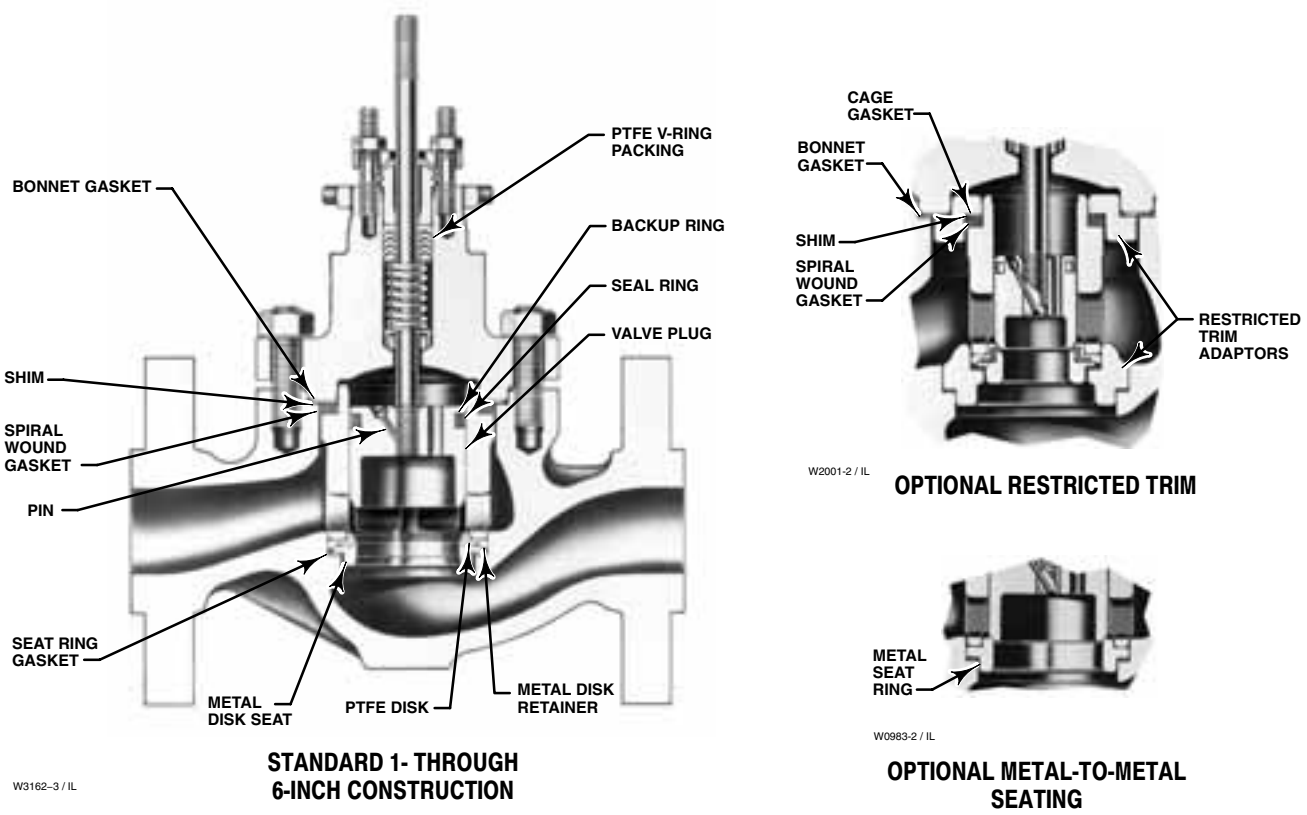


Figure 2. Design ET Sectional with Standard Cages

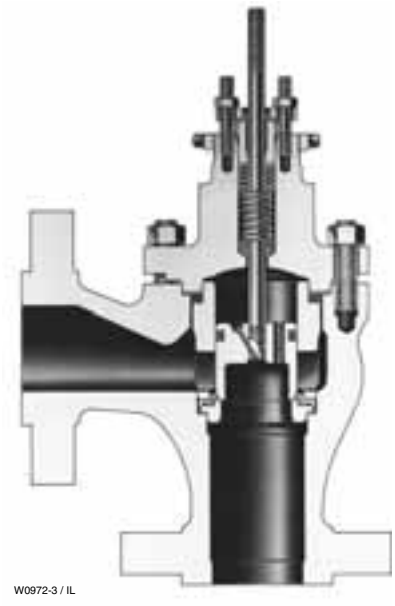


Figure 3. Design EAT Sectional

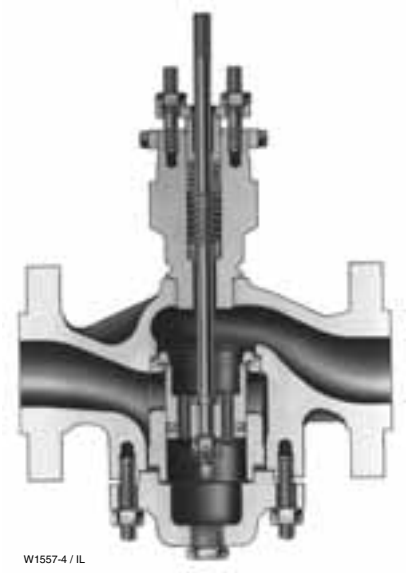


Figure 4. Design ETR Sectional

WhisperFlo® TRIM

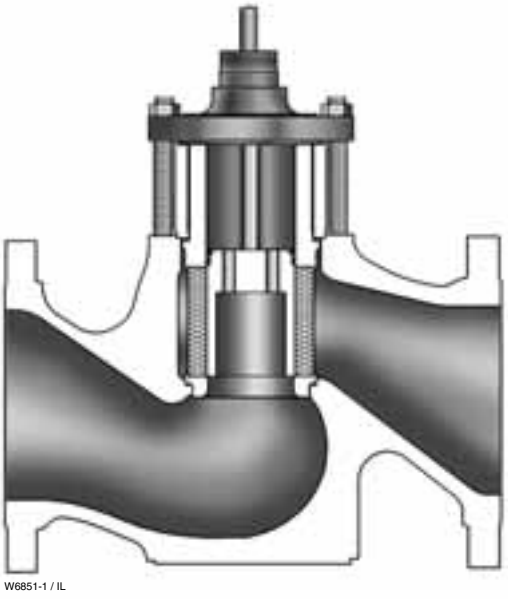


Figure 5. Typical Valve with WhisperFlo® Aerodynamic Trim

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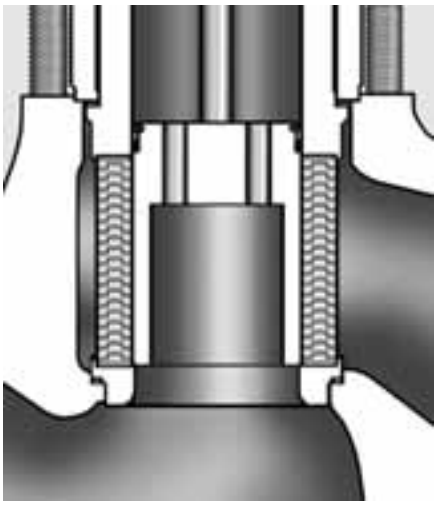


W6851-1

Figure 6. Typical WhisperFlo® Cage

Table 5. Typical Combinations of Metal Trim Parts for All Valves Except Those for NACE Specification(1), Cavitrol® III(2), 6-Inch Whisper Trim® III(3), and 4-, 6-, and 8-Inch WhisperFlo® Cages(6)

Trim Designation	Valve Plug	Cage	Disk Seat and Retainer for Standard PTFE-Seat Construction	Seat Ring or Liner for Optional Metal-Seat Construction	Optional Liner (Metal Seat Design EAT Body Only)
1 (typically used with optional metal-seat constructions in all designs and body materials except CF8M)	S41600 hardened to 38 HRC	CB7Cu-1 hardened to 40 HRC	— — —	S41600 or CA15(4) (410 stainless steel), both hardened to 38 HRC	S41600 hardened to 38 HRC
	S17400 hardened to 40 HRC(5)	CB7Cu-1 hardened to 32 HRC(5)			
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	S31600
27	S31600 with seat and guide hard faced with CoCr-A hardfacing alloy	CF8M with electroless nickel coating (ENC)	S31600 disk retainer with CoCr-A disk seat	R30006 (alloy 6)	— — —
28	S31600 with seat hard faced with CoCr-A hardfacing alloy	CF8M with electroless nickel coating (ENC)	S31600 disk retainer with CoCr-A disk seat	R30006 (alloy 6)	— — —
29 (standard for CF8M bodies in all designs regardless of seat construction)	S31600	CF8M with electroless nickel coating (ENC)	S31600	S31600	S31600
37 and 37H (trim 37H has clearances for high-temperature service above 210°C [410°F])	S31600 with seat and guide hard faced with CoCr-A	CB7Cu-1 hardened to 40 HRC	S31600 disk retainer with CoCr-A disk seat	Seat Ring: R30006 (alloy 6)	— — —
57 (standard for standard PTFE-seat Designs ET, EAT, ETR in all body materials except CF8M)	S41600 hardened to 38 HRC	S17400 hardened to 40 HRC	S31600	— — —	— — —

1. For NACE specification trims, see table 17
2. For Cavitrol III trims, see table 6.
3. For 6-inch Whisper Trim III trims with 5.375 inch port diameter, see table 8
4. CA15 is used for 6- and 8-inch full-sized and restricted-trim valves.
5. For 8-inch Whisper Trim I and 8-inch Whisper Trim III.
6. For 4-, 6-, and 8-Inch WhisperFlo trims, see table 7.

Table 6. Cavitrol® III(1) Metal Trim Part Materials and Body/Trim Temperature Capabilities

TRIM DESIGNATION	VALVE PLUG	CAGE	CAGE RETAINER	SEAT RING	BODY & BONNET		MATERIAL TEMPERATURE CAPABILITY			
							°C		°F	
							Minimum	Maximum	Minimum	Maximum
76	Heat-treated S42000	S17400 SST H900 for Cavitrol III 1-stage or S17400 SST H1075 for Cavitrol III 2-stage	S31600	S17400 with H900 heat-treat condition	WCC carbon steel, WC9 chrome moly steel, or LCC/HT carbon steel		–29	These materials not limiting factors	–20	These materials not limiting factors
					CF8M	1, 1.5, or 2 in. body size	–29	These materials and sizes not limiting factors	–20	These materials and sizes not limiting factors
						2.5 or 3 in. body size	–29	216	–20	420
						4, 6, or 8 in. body size	–29	177	–20	350

1. Available only in 1- through 8-inch Design ET valves.

Table 7. WhisperFlo® Metal Trim Part Materials and Valve Body/Trim Temperature Capabilities (4-, 6-, and 8-inch Design ET only)

TRIM DESIGNATION	VALVE BODY	VALVE PLUG	CAGE	CAGE RETAINER	SEAT	MATERIAL TEMPERATURE CAPABILITY(1)			
						°C		°F	
						Min	Max	Min	Max
901	WCC	S41600	S41000	WCC ENC	S41600	–29	316	–20	600
902	WCC	S31600/CoCrA Seat and Guide	S41000	WCC ENC	S31600/CoCrA	–29	316	–20	600
926	WCC	S31600/CoCrA Seat and Guide	S41000 NACE	WCC/NACE/ENC	S31600/CoCrA	–29	316	–20	600
936	316 CF8M	S31600/CoCrA Seat and Guide	S31603/ R31233	S31600/ENC	S31600/CoCrA	–198	316	–325	600

1. Temperatures above 232°C (450°F) require PEEK anti-extrusion rings and spring-loaded seal ring. This option allows Design ET construction to be used up to 316°C (600°F) for non-oxidizing service and 260°C (500°F) for oxidizing service.

Table 8. Whisper Trim® III Metal Trim Part Materials and Body/Trim Temperature Capabilities (6-inch Design ET with 5.375 inch port only)

Trim Designation	Valve Plug	Cage	Cage Retainer	Baffle (For Level D3 Cage Only)	Disk Seat and Retainer for PTFE-Seat Construction	Seat Ring for Metal-Seat Construction	Body Bonnet, & Bonnet Spacer	Material Temperature Capability	
								°C	°F
301 (standard for all body materials except CF8M)	S17400 hardened to 40 HRC	S41600 hardened to 38 HRC	Carbon steel NACE with electroless nickel coating (ENC)	Steel	- - -	S41000 hardened to 38 HRC	WCC carbon steel or WC9 chrome moly steel	–29 to 316(1)	–20 to 600(1)
							CF8M (316 SST)	–29 to 163	–20 to 325
301C (for soft seats)	S17400 hardened to 40 HRC	S41600 hardened to 38 HRC	Carbon steel NACE with electroless nickel coating (ENC)	Steel	S31600	- - -	WCC carbon steel or WC9 chrome moly steel	–29 to 204	–20 to 400
							CF8M (316 SST)	–29 to 163	–20 to 325
304	S31600 with seat and guide hard-faced with CoCr-A	S41600 hardened to 38 HRC	Carbon steel NACE with electroless nickel coating (ENC)	Steel	- - -	S31600 with seat hard-faced with CoCr-A	WCC carbon steel or WC9 chrome moly steel	–29 to 316(1)	–20 to 600(1)
							CF8M (316 SST)	–29 to 177	–20 to 350
312 (for level D NACE)	S31600 with seat and guide hard-faced with CoCr-A	S31600 with electroless nickel coating (ENC)	S31600 with electroless nickel coating (ENC)	S31600	- - -	S31600 with seat hard-faced with CoCr-A	WCC carbon steel or WC9 chrome moly steel	–29 to 260(1)	–20 to 500(1)
							CF8M (316 SST)	–198 to 316(1)	–325 to 600(1)
312C	S31600 with seat and guide hard-faced with CoCr-A	S31600 with electroless nickel coating (ENC)	S31600 with electroless nickel coating (ENC)	S31600	S31600	- - -	WCC carbon steel or WC9 chrome moly steel	–29 to 260(1)	–20 to 500(1)
							CF8M (316 SST)	–198 to 316(1)	–325 to 600(1)
313 (NACE compatible)	S31600 with seat and guide hard-faced with CoCr-A	S31600 with electroless nickel coating (ENC)	Carbon steel NACE with electroless nickel coating (ENC)	Steel	- - -	S31600 with seat hard-faced with CoCr-A	WCC carbon steel or WC9 chrome moly steel	–29 to 204	–20 to 400
							CF8M (316 SST)	–29 to 316(1)	–20 to 600(1)
313C (NACE compatible) (for soft seats)	S31600 with seat and guide hard-faced with CoCr-A	S31600 with electroless nickel coating (ENC)	Carbon steel NACE with electroless nickel coating (ENC)	Steel	S31600	- - -	WCC carbon steel or WC9 chrome moly steel	–29 to 204	–20 to 400
							CF8M (316 SST)	–29 to 204	–20 to 400

1. Temperatures above 232°C (450°F) require PEEK anti-extrusion rings and spring-loaded seal ring. This option allows Design ET construction to be used up to 316°C (600°F) for non-oxidizing service and 260°C (500°F) for oxidizing service.

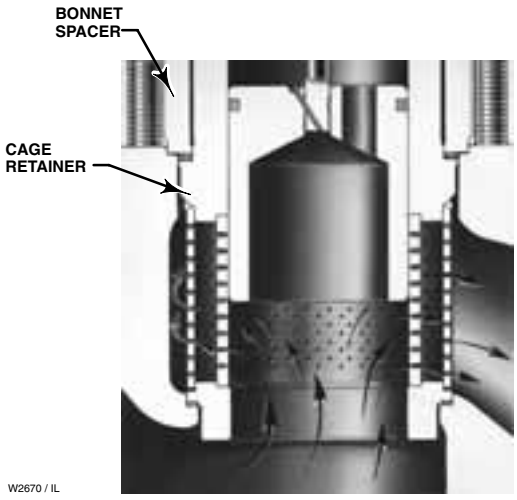


Figure 7. Metal Seat and Whisper Trim® III Cage in 6-Inch Design ET Valve

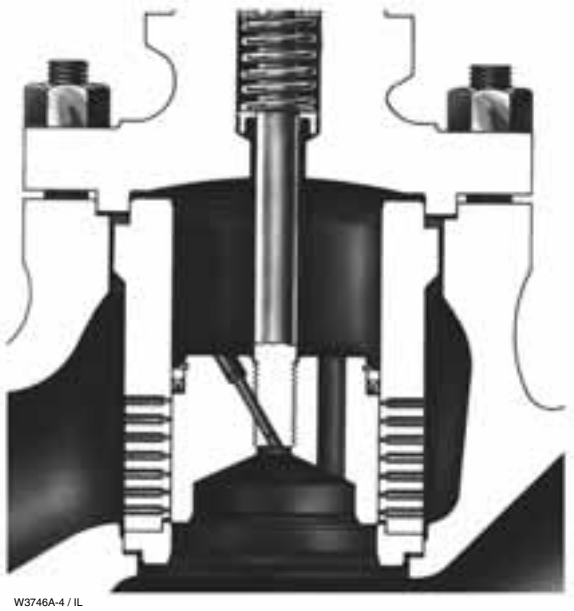


Figure 9. Cavitrol® III One-Stage Cage

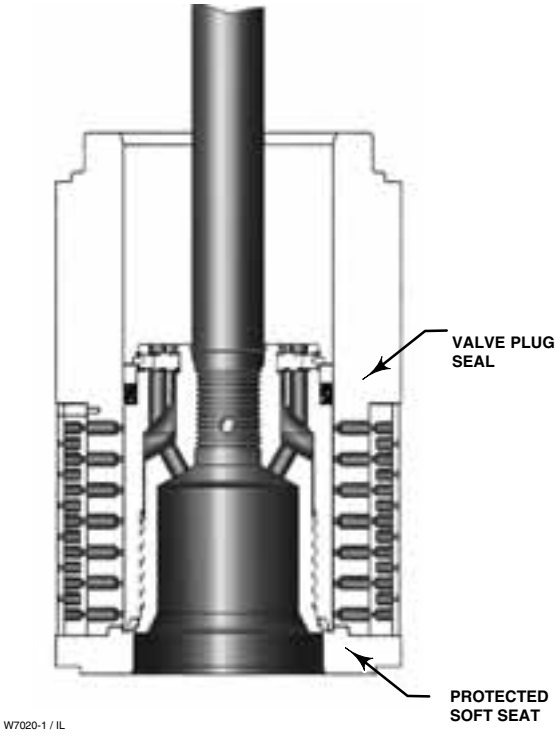


Figure 8. Typical Balanced TSO Trim

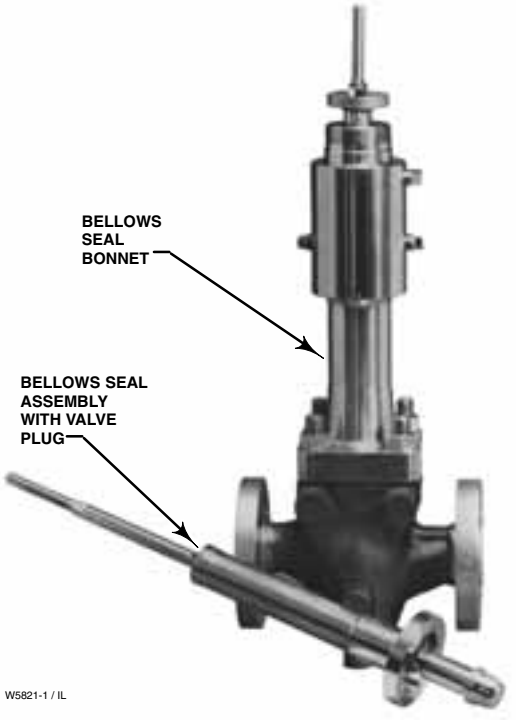
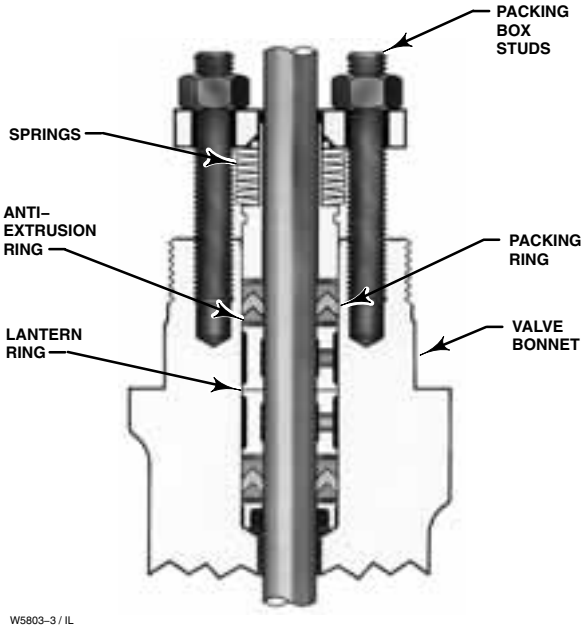
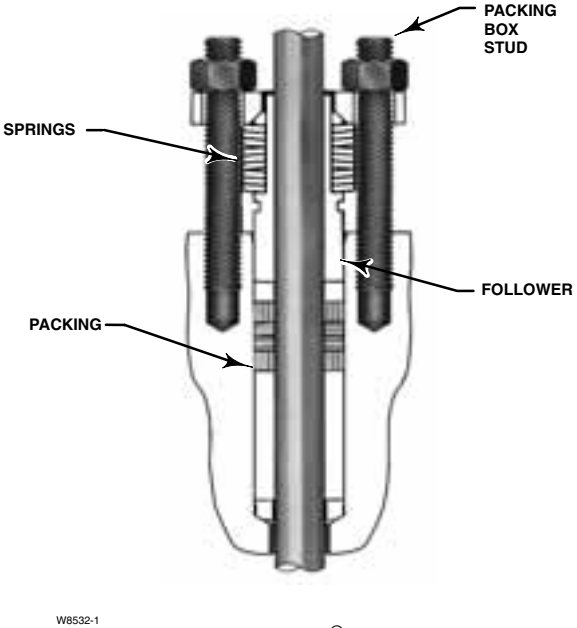


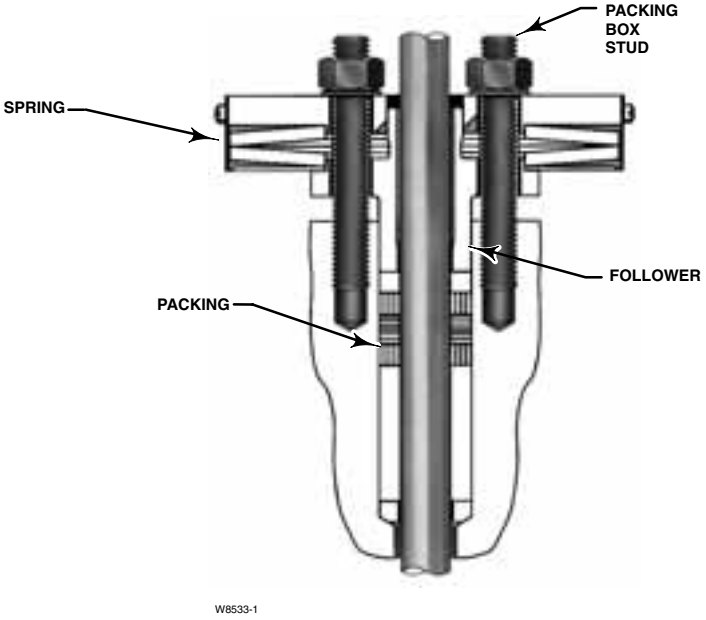
Figure 10. Typical ENVIRO-SEAL® Bellows Seal Bonnet and Bellows Seal Assembly



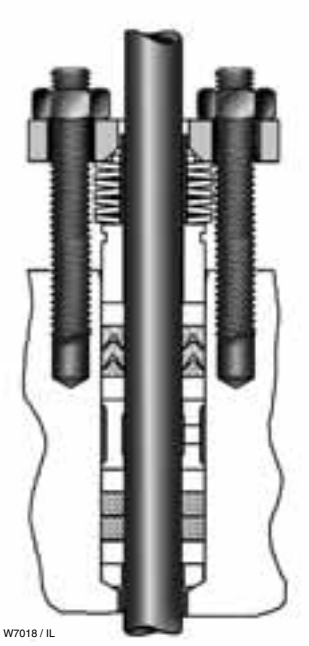
TYPICAL ENVIRO–SEAL® PACKING SYSTEM WITH PTFE PACKING



TYPICAL ENVIRO–SEAL® PACKING SYSTEM WITH GRAPHITE ULF PACKING

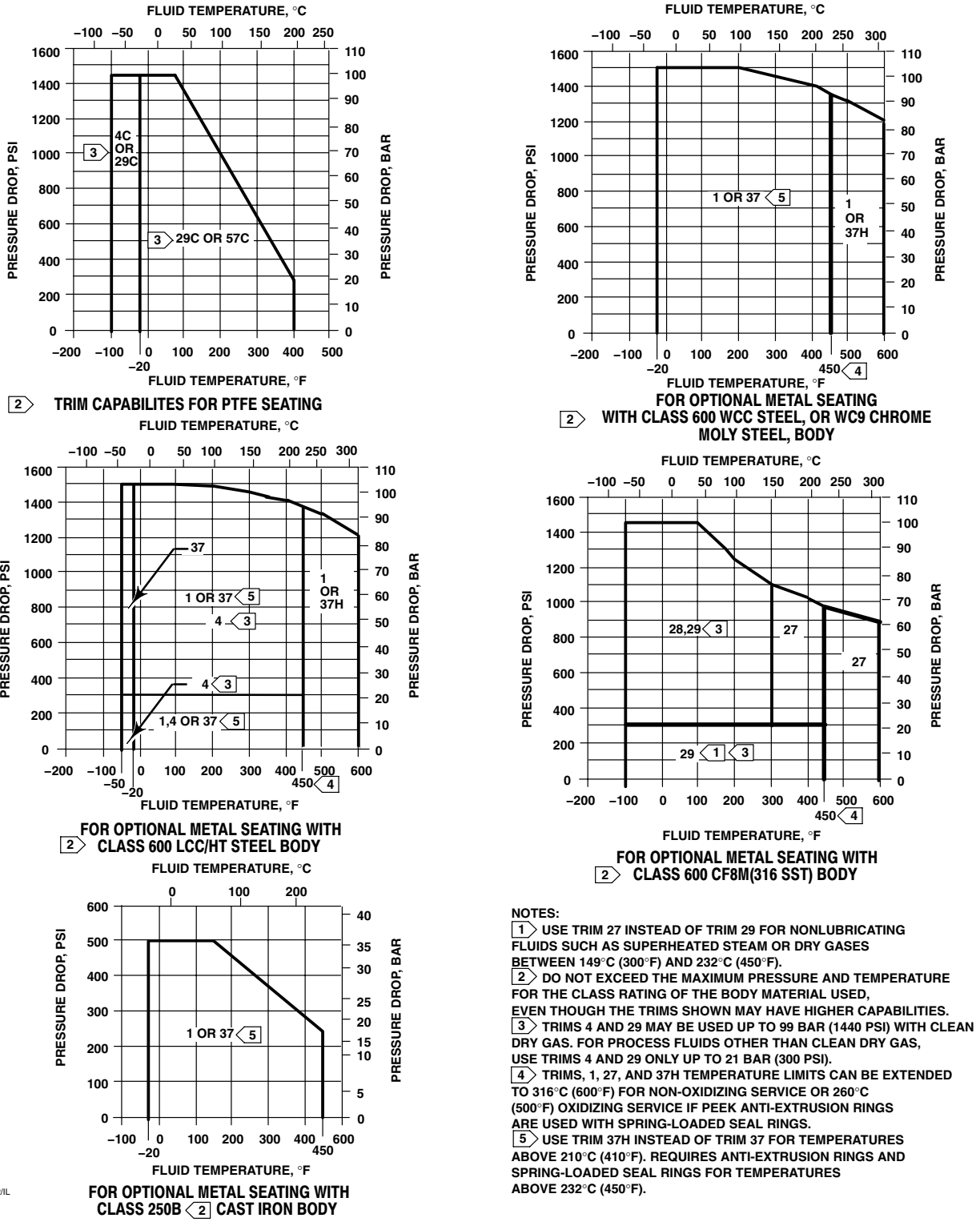


TYPICAL HIGH–SEAL™ PACKING SYSTEM WITH GRAPHITE ULF PACKING



TYPICAL ENVIRO-SEAL® PACKING SYSTEM WITH DUPLEX PACKING

Figure 11. ENVIRO-SEAL® and HIGH-SEAL™ Packing Systems



NOTES:

1 USE TRIM 27 INSTEAD OF TRIM 29 FOR NONLUBRICATING FLUIDS SUCH AS SUPERHEATED STEAM OR DRY GASES BETWEEN 149°C (300°F) AND 232°C (450°F).

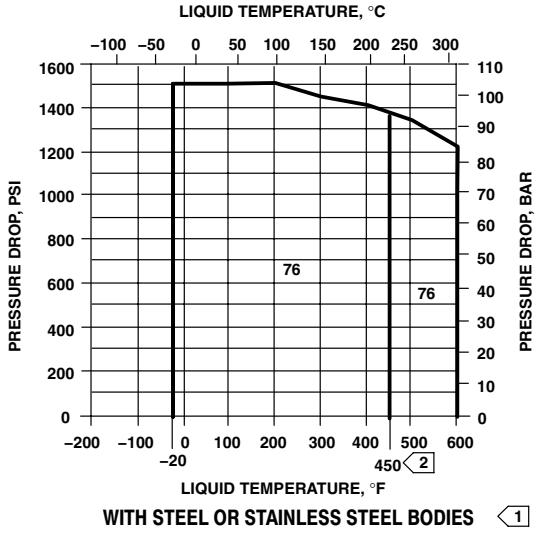
2 DO NOT EXCEED THE MAXIMUM PRESSURE AND TEMPERATURE FOR THE CLASS RATING OF THE BODY MATERIAL USED, EVEN THOUGH THE TRIMS SHOWN MAY HAVE HIGHER CAPABILITIES.

3 TRIMS 4 AND 29 MAY BE USED UP TO 99 BAR (1440 PSI) WITH CLEAN DRY GAS. FOR PROCESS FLUIDS OTHER THAN CLEAN DRY GAS, USE TRIMS 4 AND 29 ONLY UP TO 21 BAR (300 PSI).

4 TRIMS, 1, 27, AND 37H TEMPERATURE LIMITS CAN BE EXTENDED TO 316°C (600°F) FOR NON-OXIDIZING SERVICE OR 260°C (500°F) OXIDIZING SERVICE IF PEEK ANTI-EXTRUSION RINGS ARE USED WITH SPRING-LOADED SEAL RINGS.

5 USE TRIM 37H INSTEAD OF TRIM 37 FOR TEMPERATURES ABOVE 210°C (410°F). REQUIRES ANTI-EXTRUSION RINGS AND SPRING-LOADED SEAL RINGS FOR TEMPERATURES ABOVE 232°C (450°F).

Figure 12. Typical Trim for All Valves Except Those with Cavitrol® III, Whisper Trim® III, or WhisperFlo® Cages



NOTES:
1 DO NOT EXCEED THE MAXIMUM PRESSURE AND TEMPERATURE FOR THE CLASS RATING OF THE BODY MATERIAL USED, EVEN THOUGH THE TRIM SHOWN MAY HAVE HIGHER CAPABILITIES.
2 TRIM 76 TEMPERATURE LIMITS CAN BE EXTENDED TO 316°C (600°F) FOR NON-OXIDIZING SERVICE OR 260°C (500°F) FOR OXIDIZING SERVICE IF PEEK ANTI-EXTRUSION RINGS ARE USED WITH SPRING-LOADED SEAL RINGS.

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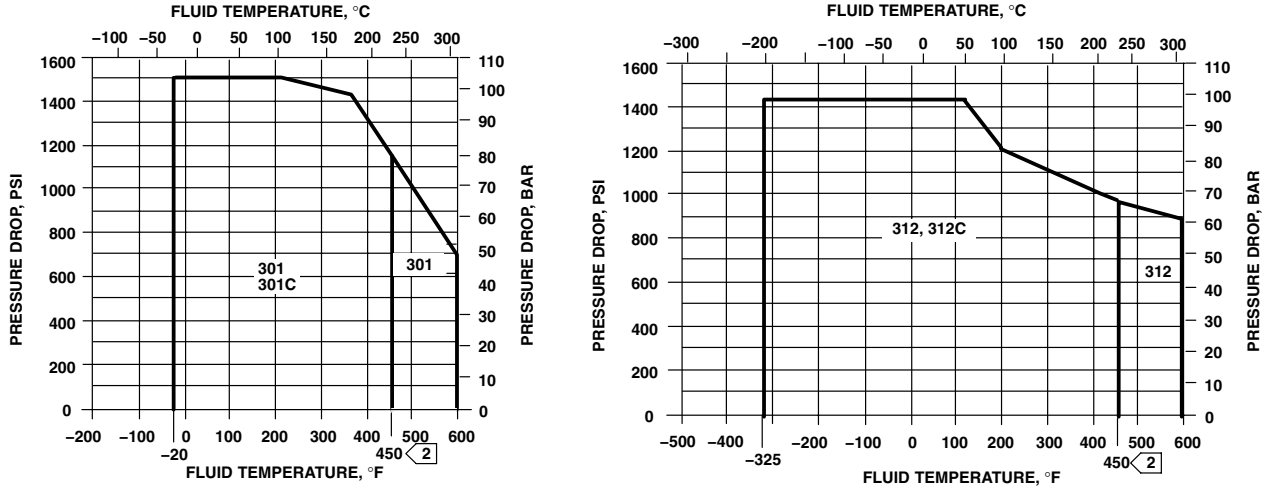
Figure 13. Typical Trim for Cavitrol® III Cage Constructions



NOTES:
1 DO NOT EXCEED THE MAXIMUM PRESSURE AND TEMPERATURE FOR THE CLASS RATING OF THE BODY MATERIAL USED, EVEN THOUGH THE TRIMS SHOWN MAY HAVE HIGHER CAPABILITIES.
2 TRIMS 301 AND 312 TEMPERATURE LIMITS CAN BE EXTENDED TO 316°C (600°F) FOR NON-OXIDIZING SERVICE OR 260°C (500°F) FOR OXIDIZING SERVICE IF PEEK ANTI-EXTRUSION RINGS ARE USED WITH SPRING-LOADED SEAL RINGS.

A6738/IL

Figure 14. Typical Trim for 6-Inch Design ET Valve with Whisper Trim® III Cage

Table 9. Materials and Temperature Limits for Other Parts

PART			MATERIAL	TEMPERATURE CAPABILITIES			
				°C		°F	
				Minimum	Maximum	Minimum	Maximum
Body-to-bonnet bolting. See table 18 for NACE bolting materials and temperature limits	Cast iron body	Cap screws	Steel SAE Grade 5	–29	232	–20	450
	WCC body	Studs	Steel SA-193-B7	–29	- - -(5)	–20	- - -(5)
		Nuts	Steel SA-194-2H				
	LCC/HT body	Studs	Steel SA-193-B7	–46		–50	
		Nuts	Steel SA-194-2H				
	CF8M (316 stainless steel) body	Studs	Steel SA-193-B7 (std) (NACE MR0175-2002 [non-exposed bolting])	–48	- - -(5)	–55	- - -(5)
		Nuts	Steel SA-194-2H (std) (NACE MR0175-2002 [non-exposed bolting])	–46	- - -(5)	–50	- - -(5)
		Studs	304 stainless steel SA-320-B8	- - -(5)	38	- - -(5)	100
		Nuts	304 stainless steel SA-194-8				
		Studs	316 stainless steel SA-193-B8M (strain-hardened) or 316 stainless steel SA-193-B8M	- - -(5)	- - -(5)	- - -(5)	- - -(5)
		Nuts	316 stainless steel SA-194-8M				
Disk			PTFE	–73	204	–100	400
2-piece valve plug seal (standard for 1- thru 6-inch valves except those with Cavitrol III cage)		Backup ring	Fluoroelastomer(1)	–18	204	0	400
			Ethylene-propylene(2)	–40	232	–40	450
			Nitrile(3) — For use with air and hydrocarbons	–34	71	–30	160
			Nitrile(3) — For use with other compatible fluids	–34	82	–30	180
		Seal ring	Carbon-filled PTFE	–73	232	–100	450
Spring-loaded valve plug seal(7)		Backup ring(4)	416 stainless steel	–29	- - -(5)	–20	- - -(5)
			316 stainless steel	- - -(5)	- - -(5)	- - -(5)	- - -(5)
		Retaining ring(4)	302 stainless steel (N07750, NACE Std)				
		Seal ring	PTFE with N10276 spring	–73	232	–100	450
For applications using PEEK Anti-Extrusion Rings: Spring-loaded valve plug seal		Backup ring(4)	416 stainless steel	–29	- - -(5)	–20	- - -(5)
			316 stainless steel	- - -(5)	- - -(5)	- - -(5)	- - -(5)
		Retaining ring(4)	302 stainless steel				
		Seal ring	PTFE/graphite with N10276 spring	232	316(6)	450	600(6)
		Anti-extrusion rings	PEEK (PolyEtherEtherKetone)	- - -(5)		- - -(5)	
Valve plug stem			S31600 (S20910, NACE Std.)	- - -(5)	- - -(5)	- - -(5)	- - -(5)
Load ring (8-inch Design ET valve only)			S17400 or optional N06600 or N05500				
Restricted trim adaptors			Cast iron	–73	232	–100	450
			WCC steel	–29	- - -(5)	–20	- - -(5)
			316 stainless steel	- - -(5)		- - -(5)	
Seat ring, bonnet and cage gaskets			FGM (standard)	- - -(5)		- - -(5)	
			PTFE-coated N04400	- - -(5)	149	- - -(5)	300
Spiral wound gasket			N06600/graphite (FGM-standard)	- - -(5)		- - -(5)	
			N04400/PTFE	–73	149	–100	300
Shim			316 stainless steel	- - -(5)	- - -(5)	- - -(5)	- - -(5)
			N04400				
Packing	(temperatures shown are material temperature capabilities)	See table 11 for proper bonnet selection	PTFE V-ring	–40	232	–40	450
			PTFE/composition	–73	232	–100	450
			Graphite ribbon/filament	- - -(5)		- - -(5)	

-continued-

Table 9. Materials and Temperature Limits for Other Parts (continued)

PART		MATERIAL	TEMPERATURE CAPABILITIES			
			°C		°F	
			Minimum	Maximum	Minimum	Maximum
Packing flange, studs, and nuts when used with standard bonnet		316 stainless steel	- - -(5)		- - -(5)	
Metal packing box parts		316 or 17-4PH stainless steel depending on part	- - -(5)		- - -(5)	
Extension bonnet bushing	Trims 1 & 4	416 stainless steel	–29	- - -(5)	–20	- - -(5)
	Other trims	316 stainless steel	- - -(5)		- - -(5)	

1. For high-temperature air, hydrocarbons, and certain other chemicals and solvents. Not for use with steam or ammonia. Not recommended for water above 82°C (180°F).
2. Has excellent moisture resistance to hot water and steam and may be used with most fire-resistant hydraulic oils, but cannot be used with petroleum-based fluids and other hydrocarbons.
3. Cannot be used with fire-resistant hydraulic oils.
4. These parts not used with 137 mm (7 inch) ports or larger.
5. These materials not limiting factors.
6. This material may be used in temperatures up to 260°C (500°F) for oxidizing service.
7. Standard for 8-inch valve regardless of cage and all 1- thru 6-inch valves with Cavitrol III cages, optional in 1- thru 6-inch valves with other than Cavitrol III cages.

Table 10. Design ET Valve Body/Trim Temperature Capabilities For All Valves Except Cavitrol® III, 6-Inch Design ET with Whisper Trim® III Cage, and 4-, 6-, and 8-Inch Design ET with WhisperFlo® Cage

BODY/BONNET(3) MATERIALS	TRIM DESIGNATION	VALVE SIZE AND DESIGN	MATERIAL TEMPERATURE CAPABILITY			
			°C		°F	
			Min	Max	Min	Max
Cast iron	1, 3, 27, 29, or 57	All	–29	232	–20	450
	37	All	–29	210	–20	410
	37H	All	210	232	410	450
WCC steel	1	All	–29	316(1)	–20	600(1)
	27	All	–29	316(1)	–20	600(1)
	29	All	–29	149(2)	–20	300(2)
	37	All	–29	210	–20	410
	37H	All	210	316(1)	410	600(1)
	57	All	–29	232	–20	450
WC9 chrome moly steel	1 or 3	All	–29	316(1)	–20	600(1)
	27	All	–29	316(1)	–20	600(1)
	29	All	–29	149(2)	–20	300(2)
	37	All	–29	210	–20	410
	37H	All	210	316(1)	410	600(1)
	57	All	–29	232	–20	450
LCC/HT steel	1	All	–29	316(1)	–20	600(1)
	4	All	–46	210	–50	410
	27	All	–46	316(1)	–50	600(1)
	29	All	–46	149(2)	–50	300(2)
	37	All	–46	210	–50	410
	37H	All	210	316(1)	410	600(1)
	57	All	–29	232	–20	450
CF8M (316 stainless steel)	27	All	–198(4)	316(1)	–325(4)	600(1)
	28	All	–198(4)	149(2)	–325(4)	300(2)
	29	All	–198(4)	149(2)	–325(4)	300(2)

1. Temperatures above 232°C (450°F) require PEEK anti-extrusion rings and spring-loaded seal ring. This option allows Design ET construction to be used up to 316°C (600°F) for non-oxidizing service and 260°C (500°F) for oxidizing service.
2. Lubricating service allows usage to 232°C (450°F)
3. Same material also used for bottom flange, if required. Restricted trim and full-sized limits are the same.
4. May be used down to –254°C (–425°F) if manufacturing process includes Charpy impact test.

Table 11. Bonnet Selection Guidelines

BONNET STYLE	PACKING MATERIAL	IN-BODY PROCESS TEMPERATURE LIMITS(1)	
		°C	°F
Plain: ■Standard for all valves through 6-inch valve 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	0 to 316(2)	0 to 600(2)
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 316(2)	−50 to 600(2)
	PTFE/Composition		
	Graphite ribbon/filament		
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 316(2)	−150 to 600(2)
	PTFE/Composition		
	Graphite ribbon/filament		
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	For exceptional stem sealing capabilities. See Bulletin 59.1:070, ENVIRO-SEAL Bellows Seal Bonnets, for pressure/temperature ratings.	

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.
2. Temperatures above 232°C (450°F) require PEEK anti-extrusion rings and spring-loaded seal ring.

Table 12. Maximum Flow Coefficients for Full-Sized Trim with Equal Percentage Cage and Normal Flow Direction

Valve Design		Valve Size, Inch	Cv at Max. Valve Plug Travel
ET		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
EAT	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
ETR		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 13. Port Diameters and Valve Plug Travel

VALVE SIZE, INCH				PORT DIAMETER(1)		MAXIMUM VALVE PLUG TRAVEL(1)	
Design ET or ETR		Design EAT					
Full-Sized Trim	Restricted-Capacity Trim	Full-Sized Trim	Restricted-Capacity Trim	mm	Inch	mm	Inch
1 or 1.25	1.5	1	2	33.3	1.3125	19.1	0.75
- - -	2	- - -	- - -	33.3	1.3125	19.1	0.75
1.5	- - -	2	- - -	46.7	1.875	19.1	0.75
- - -	2.5	- - -	- - -	46.7	1.875	19.1	0.75
2	3	- - -	4	58.7	2.3125	29	1.125
2.5	4	3	6	73.0	2.875	38	1.5
3	- - -	4	- - -	87.3	3.4375	38	1.5
4	- - -	6	- - -	111.1	4.375	51	2
6(2)	- - -	- - -	- - -	177.8(3)	7(3)	51(3)	2(3)
				136.5(4)	5.375(4)	76(4)	3(4)
8(2)	- - -	- - -	- - -	203.2	8	51	2
						76	3

1. For Cavitrol III trim, see table 15.
2. Not available in Design ETR valves.
3. Standard-travel cages.
4. Whisper Trim III cages

Table 14. Stem and Yoke Boss Diameters

VALVE SIZE, INCH				STEM AND YOKE BOSS DIAMETERS							
Design ET or ETR		Design EAT		Standard				Optional			
Full-Sized Trim	Restricted-Capacity Trim	Full-Sized Trim	Restricted-Capacity Trim	Stem		Yoke Boss		Stem		Yoke Boss	
				mm	Inch	mm	Inch	mm	Inch	mm	Inch
1 or 1.25	1.5	1	2	9.5	3/8	54	2-1/8	12.7	1/2	71	2-13/16
- - -	2	- - -	- - -	12.7	1/2	71	2-13/16	- - -	- - -	- - -	- - -
1.5	- - -	2	- - -	9.5	3/8	54	2-1/8	12.7	1/2	71	2-13/16
- - -	2.5	- - -	- - -	12.7	1/2	71	2-13/16	- - -	- - -	- - -	- - -
2	3	- - -	4	12.7	1/2	71	2-13/16	19.1	3/4	90	3-9/16
2.5	4	3	6	12.7	1/2	71	2-13/16	19.1	3/4	90	3-9/16
3	- - -	4	- - -	12.7	1/2	71	2-13/16	19.1	3/4	90	3-9/16
4	- - -	6	- - -	12.7	1/2	71	2-13/16	19.1	3/4	90	3-9/16
								25.4	1	127	5
6(1)	- - -	- - -	- - -	19.1	3/4	90	3-9/16	25.4 or 31.8	1 or 1-1/4	127	5
8(1)	- - -	- - -	- - -								

1. Not available in Design ETR valves.

Table 15. Port Diameters and Valve Plug Travel for Cavitrol® III Cage

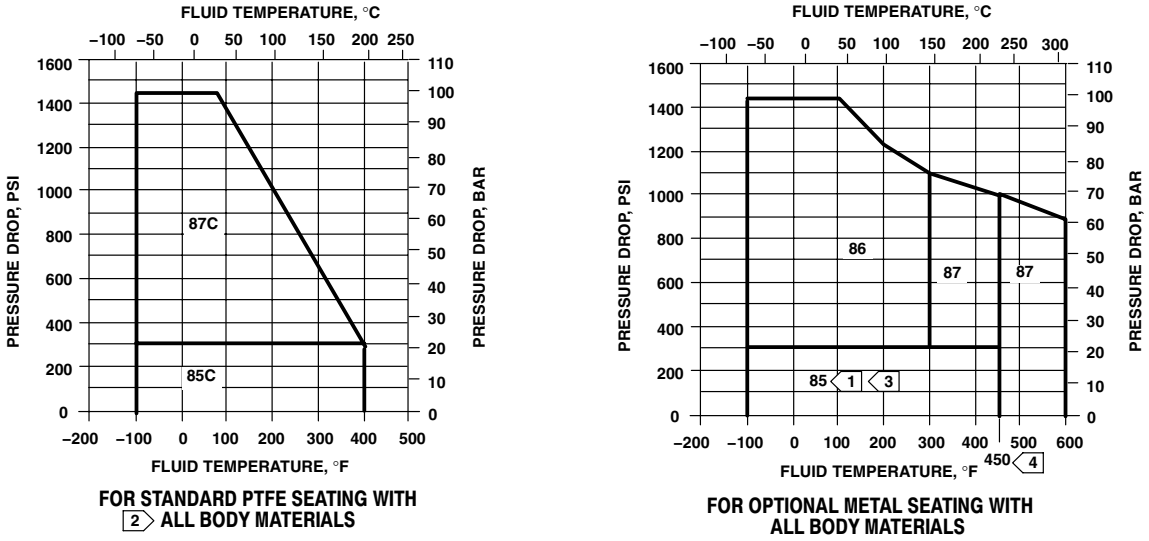
DESIGN ET VALVE SIZE, INCH	ONE-STAGE CAGE		TWO-STAGE CAGE	
	Port Diameters	Valve Plug Travel(1)	Port Diameters	Valve Plug Travel
		mm		
1 or 1.25	33.3	25	25.4	25
1.5	47.6	22	33.3	38
2	58.7	29	47.6	51
2.5	73.0	38	58.7	64
3	87.3	41	7.30	76
4	111.1	54	73.0	102
6	177.8	57	136.5	102
8	203.2	86	177.8	152
		Inch		
1 or 1.25	1.3125	1	1	1
1.5	1.875	0.875	1.3125	1.5
2	2.3125	1.125	1.875	2
2.5	2.875	1.5	2.3125	2.5
3	3.4375	1.625	2.875	3
4	4.375	2.125	2.875	4
6	7	2.25	5.375	4
8	8	3.375	7	6

1. The travel listed is the maximum travel that can be obtained for the given size. In situations where increased valve capacity is not needed, standard Design ET valve travels should be utilized in selecting the actuator.

Table 16. Port Diameters, Valve Plug Travel, Yoke Boss Diameters for TSO (Tight Shutoff) Trim

VALVE TYPE	TRIM	MAX TRAVEL		YOKE BOSS SIZE		PORT DIAMETER				C_V REDUCTION AT 100% TRAVEL(1)
						Nominal		Actual TSO		
		mm	Inch	mm	Inch	mm	Inch	mm	Inch	
ET 3-Inch	CAV III 2−Stage	76.2	3	90 127	3-9/16 5	73.0	2.875	68.3	2.6875	0%
ET 4-Inch	CAV III 2−Stage	102	4	90 127	3-9/16 5	73.0	2.875	68.3	2.6875	5%
EAT 4-Inch	Std	38.1	1.5	71.4 90	2-13/16 3-9/16	87.3	3.4375	82.6	3.25	6% 4%
EAT 6-Inch	Std	50.8	2	90	3-9/16	111	4.375	106	4.1875	4% (linear) 3% (equal percent)

1. This column lists the percent reduction of published maximum C_V of the trim listed in the TRIM column.



NOTES:

1 USE TRIM 87 INSTEAD OF TRIM 85 FOR NONLUBRICATING FLUIDS SUCH AS SUPER-HEATED STEAM OR DRY GASES BETWEEN 149°C (300°F) AND 232°C (450°F).

2 DO NOT EXCEED THE MAXIMUM PRESSURE AND TEMPERATURE FOR THE CLASS RATING OF THE BODY MATERIAL USED, EVEN THOUGH THE TRIMS SHOWN MAY HAVE HIGHER CAPABILITIES.

3 TRIM 85 MAY BE USED UP TO 99 BAR (1440 PSI) WITH CLEAN DRY GAS. FOR PROCESS FLUIDS OTHER THAN CLEAN DRY GAS, USE TRIM 85 ONLY UP TO 21 BAR (300 PSI).

4 TRIM 87 TEMPERATURE LIMITS CAN BE EXTENDED TO 316°C (600°F) FOR NON-OXIDIZING SERVICE OR 260°C (500°F) FOR OXIDIZING SERVICE IF PEEK ANTI-EXTRUSION RINGS ARE USED WITH SPRING-LOADED SEAL RINGS.

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Figure 15. Typical Trim for NACE MR0175-2002 (Sour Service)

Table 17. Metal Trim Part Materials for Compatibility with NACE MR0175-2002 (Sour Service) Specifications. Environmental Restrictions Apply, Refer to Standard.

Trim Designation[4]	Valve Plug	Cage	Seat Ring for Standard Metal Seat Construction	Optional Liner for Metal Seat (EAT only)	Disk Seat and Retainer for Optional PTFE-Seat Construction	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
85C[2]	S31600	S31600 with electroless nickel coating (ENC)	- - -	- - -	S31600		
86	S31600 with seat hard faced with CoCr-A hardfacing alloy	S31600 with electroless nickel coating (ENC)	R30006 (alloy 6)	- - -	- - -		
87 (Also used for 8-inch Whisper Trim I)	S31600 with seat and guide hard faced with CoCr-A hardfacing alloy	S31600 with electroless nickel coating (ENC)[3]	R30006 (alloy 6)	- - -	- - -		
87C[2] (Also used for 8-inch Whisper Trim I)	S31600 with seat and guide hard faced with CoCr-A hardfacing alloy	S31600 with electroless nickel coating (ENC)[3]	- - -	- - -	S31600		

1. 8-inch valve body only.
2. 85C and 87C are trims for PTFE-seat construction.
3. 8-inch Whisper Trim I cage is CB7CU-1, double H1150 (NACE) / ENC.
4. N07750 retaining ring is standard for spring-loaded seal ring construction.

Table 18. Bolting Materials and Temperature Limits for Bolting Compliance 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) May require 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 150 and 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 body material.

Table 19. Design ET and ETR 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	DIN PN16-40(2)	DIN PN63-100(2)	Design ET	Design ETR
	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 mm above	See mm above	3.06	5.25
2.5	- - -	10.88	11.38	11.50	12.12	12.25	12.38			3.56	6.25
3	- - -	11.75	12.25	12.50	13.12	13.25	13.38			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.

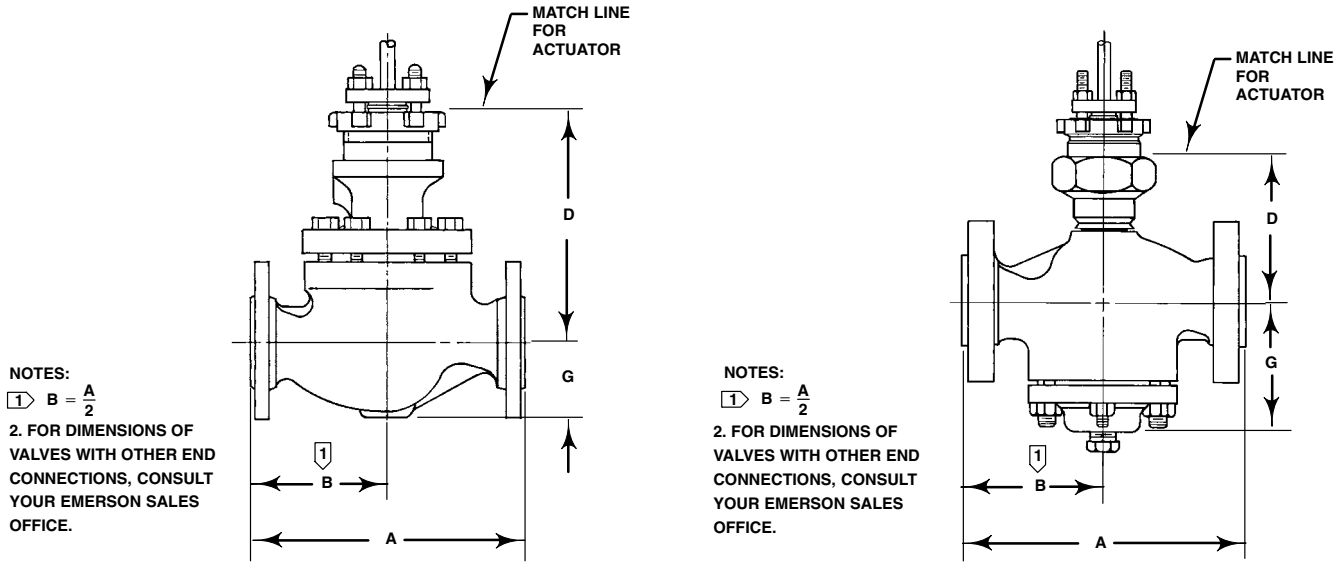


Figure 16. Design ET and ETR Dimensions (also see tables 19, 20, and 21)

Table 20. Design ET and ETR Dimensions

VALVE SIZE, INCH	D FOR PLAIN BONNET										
	Design ET Except with Cavitrol III Two-Stage Cage				Design ET with Cavitrol III Two-Stage Cage				Design ETR		
	Stem Diameter, mm				Stem Diameter, mm				Stem Diameter, mm		
	9.5	12.7	19.1	25.4 or 31.8	9.5	12.7	19.1	25.4 or 31.8	9.5	12.7	19.1
1 or 1.25	127	149	- - -	- - -	- - -	184	- - -	- - -	113	124	- - -
1.5	124	146	- - -	- - -	155	177	- - -	- - -	122	133	- - -
2	- - -	165	162	- - -	- - -	201	198	- - -	- - -	148	140
2.5	- - -	187	184	- - -	- - -	229	226	- - -	- - -	157	152
3	- - -	191	187	- - -	- - -	260	256	- - -	- - -	167	159
4	- - -	221	217	238	- - -	311	308	354	- - -	198	191
6(1)	- - -	- - -	251	270	- - -	- - -	336	380	- - -	- - -	- - -
6(2)	- - -	- - -	312	330	- - -	- - -	- - -	- - -	- - -	- - -	- - -
8	- - -	- - -	375(3)	426	- - -	- - -	511	560	- - -	- - -	- - -
	Stem Diameter, Inch				Stem Diameter, Inch				Stem Diameter, Inch		
	3/8	1/2	3/4	1 or 1-1/4	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	- - -	- - -	- - -	7.25	- - -	- - -	4.44	4.88	- - -
1.5	4.88	5.75	- - -	- - -	6.09	6.97	- - -	- - -	4.81	5.25	- - -
2	- - -	6.50	6.38	- - -	- - -	7.91	7.78	- - -	- - -	5.81	5.50
2.5	- - -	7.38	7.25	- - -	- - -	9.03	8.91	- - -	- - -	6.31	6.00
3	- - -	7.50	7.38	- - -	- - -	10.22	10.09	- - -	- - -	6.56	6.25
4	- - -	8.69	8.56	9.38	- - -	12.25	12.12	13.94	- - -	7.81	7.50
6(1)	- - -	- - -	9.88	10.62	- - -	- - -	13.22	14.97	- - -	- - -	- - -
6(2)	- - -	- - -	12.26	13.00	- - -	- - -	- - -	- - -	- - -	- - -	- - -
8	- - -	- - -	14.75(3)	16.75	- - -	- - -	20.12	22.06	- - -	- - -	- - -

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 21. Design ET and ETR Dimensions

VALVE SIZE, INCH	D FOR EXTENSION AND ENVIRO-SEAL BELLOWS SEAL BONNETS (DESIGN ET ONLY, EXCEPT WITH CAVITROL® III CAGE)									
	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	- - -	320	- - -	- - -
1.5	210	248	- - -	- - -	300	316	- - -	317	- - -	- - -
2	- - -	267	272	- - -	- - -	465	- - -	- - -	384	- - -
2.5	- - -	289	294	- - -	- - -	492	- - -	- - -	- - -	- - -
3	- - -	292	297	- - -	- - -	495	487	- - -	517	517
4	- - -	322	327	370	- - -	526	518	- - -	541	- - -
6(1)	- - -	- - -	357	402	- - -	- - -	543	- - -	- - -	573
6(2)	- - -	- - -	418	462	- - -	- - -	604	- - -	- - -	- - -
8	- - -	- - -	421	450	- - -	- - -	621	- - -	- - -	703
	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	10.69	- - -	- - -	18.31	- - -	- - -	15.12	- - -
2.5	- - -	11.38	11.56	- - -	- - -	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	- - -	- - -	27.69

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

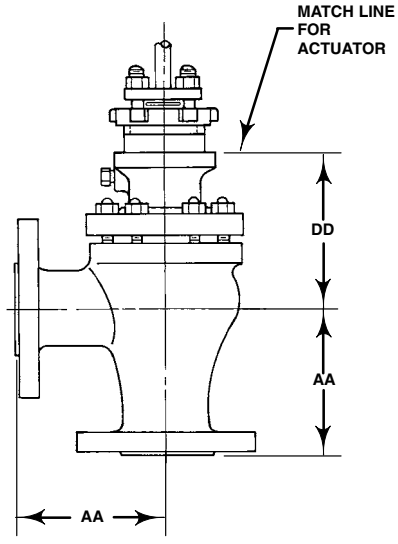
Table 22. Design EAT Dimensions[1]

VALVE SIZE, IN.	AA					
	Class 150		Class 300		Class 600	
	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.

Table 23. Design EAT Dimensions

VALVE SIZE, IN.	DD						
	Plain Bonnet				Style 1 Extension Bonnet		
	Stem Diameter, mm				Stem Diameter, mm		
	9.5	12.7	19.1	25.4 or 38.1	9.5	12.7	19.1
1	111	133	- - -	- - -	197	253	- - -
2	98	121	- - -	- - -	184	223	- - -
3	- - -	149	146	- - -	- - -	251	256
4	- - -	140	137	- - -	- - -	241	246
6	- - -	144	141	187	- - -	246	251
	Stem Diameter, In.				Stem Diameter, In.		
	3/8	1/2	3/4	1 or 1-1/4	3/8	1/2	3/4
1	4.38	5.25	- - -	- - -	7.75	9.95	- - -
2	3.88	4.75	- - -	- - -	7.25	8.75	- - -
3	- - -	5.88	5.75	- - -	- - -	9.88	10.06
4	- - -	5.50	5.38	- - -	- - -	9.50	9.69
6	- - -	5.69	5.56	7.38	- - -	9.69	9.88



NOTE:
FOR DIMENSIONS OF VALVES WITH DIN (OR OTHER) END CON–NECTIONS, CONSULT YOUR EMERSON SALES OFFICE.

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Figure 17. Design EAT Dimensions (also see tables 22, 23, and 24)

Table 24. Design EAT Dimensions

VALVE SIZE, IN.	DD					
	Style 2 Extension Bonnet			ENVIRO-SEAL Bellows Seal Bonnet		
	Stem Diameter, mm			Stem Diameter, mm		
	9.5	12.7	19.1	9.5	12.7	19.1
1	291	305	- - -	305	- - -	- - -
2	278	291	- - -	292	- - -	- - -
3	- - -	454	- - -	- - -	- - -	- - -
4	- - -	445	437	- - -	467	- - -
6	- - -	449	441	- - -	465	- - -
	Stem Diameter, In.			Stem Diameter, In.		
	3/8	1/2	3/4	3/8	1/2	3/4
1	11.44	12.00	- - -	12.00	- - -	- - -
2	10.94	11.44	- - -	11.50	- - -	- - -
3	- - -	17.88	- - -	- - -	- - -	- - -
4	- - -	17.50	17.19	- - -	18.38	- - -
6	- - -	17.69	17.38	- - -	18.31	- - -

Ordering Information

Inlet pressure and temperature must always be limited by the applicable ASME pressure/temperature rating. Pressure drop information for various trim material combinations is provided in figures 12, 13, and 15. The maximum allowable pressure drop for the application must not exceed the lowest value indicated for the combination of materials selected.

When ordering, specify:

Application Information

1. Type of application:

   a. Throttling or on-off

   b. Reducing or relief

2. Controlled fluid (include chemical analysis of fluid if possible)

3. Specific gravity of controlled fluid

4. Fluid temperature

5. Inlet pressures:

   a. Minimum

   b. Normal

   c. Maximum

6. Pressure drops:

   a. Minimum flowing drop

   b. Normal flowing drop

   c. Maximum flowing drop

   d. Maximum at shutoff

7. Flow rates:

   a. Minimum controlled flow

   b. Normal flow

   c. Maximum flow

8. Maximum permissible noise level, if critical

9. Shutoff classification required

10. Valve stem diameter and bonnet type (plain, extension, or ENVIRO-SEAL bellows seal bonnet)

11. Line size and schedule

Valve Information

To determine what valve ordering information is needed, refer to the specifications. Review the description for each specification and in the referenced tables; write down your choice whenever there is a selection to be made. Always specify the valve design letter designation.

Actuator and Accessory Information

Refer to the specific actuator and accessory bulletins for required ordering information.

Coefficients

Table 25. Design EAT, 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-EAT 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 26. Design EAT, 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-EAT 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 27. Design EAT, 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 28. Design EAT, 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 29. Design EAT, 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 30. Design EAT, 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 31. Design EAT, Whisper Trim® I Cage

Whisper Trim® I - Flow Up

Linear Characteristic

Valve Size, Inches	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	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 32. Design ET, 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 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 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 32. Design ET, Class 125-600, Quick Opening Cage (continued)

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	
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-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 ETR.

Table 33. Design ET, 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 33. Design ET, 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 ETR.

Table 34. Design ET, 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 34. Design ET, Class 125-600, Equal Percentage Cage, Flow Down (continued)

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	
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 ETR.

Table 35. Design ET, 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 ET 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 ETR.

Table 36. Design ET, 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 38 mm (1.5 inches) 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 periodof time. Erosion damage to the valve may result.

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

Table 37. Design ET, Cavitrol® III Cage

Class 600 - Flow Down

Linear Characteristic

Valve Size, Inches	Port Diameter		Total Travel		Minimum Throttling C_v(1)	Flow Coefficient	Valve Opening—Percent of Total Travel										F_L(3)
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
One Stage																	
1	33.3	1.3125	25.4	1	1.9	C_v	0.25	0.48	2.36	5.04	7.36	9.47	11.2	13.1	14.6	15.5	0.90
						K_v	*0.216*	*0.415*	*2.04*	*4.36*	*6.37*	*8.19*	*9.69*	*11.3*	*12.6*	*13.4*	- - -
1.5	47.6	1.875	22.2	0.875	2.5	C_v	0.59	0.72	2.54	6.03	9.32	12.8	15.6	18.2	20.8	22.5	0.93
						K_v	*0.510*	*0.623*	*2.20*	*5.22*	*8.06*	*11.1*	*13.5*	*15.7*	*18.0*	*19.5*	- - -
2	58.7	2.3125	28.6	1.125	3.9	C_v	0.84	1.49	6.68	12.3	17.3	22.1	26.7	30.9	34.4	36.1	0.93
						K_v	*0.727*	*1.29*	*5.78*	*10.6*	*15.0*	*19.1*	*23.1*	*26.7*	*29.8*	*31.2*	- - -
2.5	73.0	2.875	38.1(2)	1.5	4.2	C_v	0.84	6.83	16.2	25.0	33.0	41.2	48.8	55.5	61.7	64.4	0.91
						K_v	*0.727*	*5.91*	*14.0*	*21.6*	*28.5*	*35.6*	*42.2*	*48.0*	*53.4*	*55.7*	- - -
3	87.3	3.4375	41.3(2)	1.625	4.6	C_v	1.65	10.8	22.3	34.3	45.3	55.5	64.7	72.7	80.0	86.7	0.89
						K_v	*1.43*	*9.34*	*19.3*	*29.7*	*39.2*	*48.0*	*56.0*	*62.9*	*69.2*	*75.0*	- - -
4	111.1	4.375	54.0(2)	2.125	5.2	C_v	3.47	22.7	43.3	63.4	81.8	100	116	131	144	151	0.90
						K_v	*3.00*	*19.6*	*37.5*	*54.8*	*70.8*	*86.5*	*100*	*113*	*125*	*131*	- - -
6	177.8	7	57.2	2.25	10	C_v	4.6	30.0	65.3	99.7	134	165	195	219	241	259	0.91
						K_v	*4.0*	*25.9*	*56.5*	*86.2*	*116*	*143*	*169*	*189*	*208*	*224*	- - -
8	203.2	8	85.7	3.375	15	C_v	16.2	70.2	124	176	227	276	324	370	412	439	0.94
						K_v	*14.0*	*60.7*	*107*	*152*	*196*	*239*	*280*	*320*	*356*	*380*	- - -
Two Stage																	
1	25.4	1	25	1	0.28	C_v	0.11	0.41	1.08	1.75	2.43	3.10	3.78	4.45	5.12	5.80	0.98
						K_v	*0.095*	*0.355*	*0.934*	*1.51*	*2.10*	*2.68*	*3.27*	*3.85*	*4.43*	*5.02*	- - -
1.5	33.3	1.3125	38	1.5	0.44	C_v	0.22	1.20	2.23	3.26	4.29	5.31	6.355	7.37	8.40	9.40	0.98
						K_v	*0.19*	*1.04*	*1.93*	*2.82*	*3.71*	*4.59*	*5.50*	*6.38*	*7.27*	*8.13*	- - -
2	47.6	1.875	51	2	0.92	C_v	0.80	3.05	5.29	7.56	9.83	12.1	14.3	16.5	18.8	21.0	0.98
						K_v	*0.692*	*2.64*	*4.58*	*6.54*	*8.50*	*10.5*	*12.4*	*14.3*	*16.3*	*18.2*	- - -
2.5	58.7	2.3125	64	2.5	1.10	C_v	1.75	5.25	8.71	12.2	15.6	19.1	22.6	26.1	29.6	33.0	0.98
						K_v	*1.51*	*4.54*	*7.53*	*10.6*	*13.5*	*16.5*	*19.5*	*22.6*	*25.6*	*28.5*	- - -
3	73.0	2.875	76	3	1.20	C_v	3.14	8.23	13.3	18.5	23.5	28.7	33.8	38.9	44.0	49.0	0.98
						K_v	*2.72*	*7.12*	*11.5*	*16.0*	*20.3*	*24.8*	*29.2*	*33.6*	*38.1*	*42.4*	- - -
4	73.0	2.875	102	4	1.90	C_v	2.83	11.2	19.4	27.4	35.5	43.2	50.5	57.1	63.2	69.0	0.98
						K_v	*2.45*	*9.69*	*16.8*	*23.7*	*30.7*	*37.4*	*43.7*	*49.4*	*54.7*	*59.7*	- - -
6	136.5	5.375	102	4	3.00	C_v	6.05	22.5	38.0	53.7	69.4	85.2	100	115	130	144	0.98
						K_v	*5.23*	*19.5*	*32.9*	*46.5*	*60.0*	*73.7*	*86.5*	*99.5*	*112*	*125*	- - -
8	177.8	7	152	6	7.00	C_v	19.8	47.5	74.5	101	129	156	184	211	238	265	0.98
						K_v	*17.1*	*41.1*	*64.4*	*87.4*	*112*	*135*	*159*	*183*	*206*	*229*	- - -

1. Valves should not be required to throttle at a C_v less than the specified minimum C_v for an extended period of time. Erosion damage to the valve seats may result.
2. Less than fully available travel.
3. At 100% travel.

Specifications

Available Configurations

Design ET: 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 EAT: Angle version of Design ET control valve, used to facilitate piping or in applications where a self-draining valve is desired (figure 3)
Design ETR: Same as Design ET control valve except with push-down-to-open valve plug action (figure 4)

Valve Sizes and End Connection Styles

See table 1

Maximum Inlet Pressures and Temperatures(1,2)

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

Maximum Pressure Drops(2)

Same as maximum inlet pressure for specific construction defined above, except where further limited as follows:
All Valves Except Those with Cavitrol III, Whisper Trim III, and WhisperFlo Cages: See figure 12.
Valves with Cavitrol III Cages: See figure 13.
Valves with Whisper Trim III Cages: See figure 14 except where further limited by the following max $\Delta P/P1$ ratios(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 15.

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

Class IV, V, or VI. See tables 2, 3, or 4

Construction Materials

Body, Bonnet, and Bonnet Spacer or Bottom Flange, if used: ■ Cast iron, ■ WCC carbon steel, or ■ LCC/HT carbon steel, ■ WC9 chrome moly steel, ■ CF8M (316 stainless steel), or ■ other materials upon request
Valve Plug, Cage, and Metal Seating Parts:
All Valves Except Those with Cavitrol III or Whisper Trim III Cages: See table 5.
Valves with Cavitrol III Cages: See table 6.
Valves with Whisper Trim III Cages: See table 8.
Valves with WhisperFlo Cages: See table 7.
Bellows Seal Assembly: ■ 316L stainless steel or ■ N04400
All Other Parts: See table 9

Material Temperature Capabilities(2)

Body/Trim Combinations:.
All Valves Except Those with Cavitrol III or Whisper Trim III Cages: See figure 12.
Valves with Cavitrol III Cages: See table 6.
Valves with Whisper Trim III Cages: See table 8.
Valves with WhisperFlo Cages: See table 7.
Bolting For NACE MR0175-2002: See table 17.
Bonnets: See table 11.
All Other Parts: See table 9

Flow Characteristics

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

Flow Directions

Design ET.
Standard Cage: Normally down
Whisper Trim and WhisperFlo Cages: Always up
Cavitrol Cage: Always down
Design EAT.
Standard Cage with Liner for Metal Seat: Normally down
Standard Cage without Liner: Flow up or down
Whisper Trim and WhisperFlo Cages: Always up
Design ETR.
Standard Cage: Normally up
Whisper Trim Cage: Always down

Flow Coefficients and Noise Level Prediction

See table 12 and Catalog 12
For Whisper Trim III cage flow coefficients (other than 6-inch valves), contact your Emerson Process Management sales office

- continued -

Specifications (continued)

Port Diameters and Maximum Valve Plug Travels

See tables 13 and 15

Yoke Boss and Stem Diameters

See table 14

Typical Bonnet Styles

See table 11

Packing Arrangements

Standard Material: Single PTFE V-ring
Optional Materials: See table 9.
ENVIRO-SEAL Packing Systems: See figures 10 and 11.
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. Also, see Bulletin 59.1:061, ENVIRO-SEAL Packing Systems for Sliding-Stem Valves

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

■ Lubricator, ■ lubricator/isolating valve, ■ drilled and tapped connection in extension bonnet for leak-off service, ■ 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, ■ Class V shutoff for ET above 232°C (450°F) using PEEK anti-extrusion rings

1. DIN (or other) ratings and end connections can usually be supplied; consult your Emerson Process Management sales office.
2. The pressure or temperature limits in this bulletin, and any applicable code 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 increase if max $\Delta P/P_1$ ratio for a given cage level is exceeded.

ET Valve

ENVIRO-SEAL® Packing System Specifications

Applicable Stem Diameters

■ 9.5 mm (3/8 inches), ■ 12.7 mm (1/2 inches), ■ 19.1 mm (3/4 inches), ■ 25.4 mm (1 inch), and ■ 31.8 mm (1-1/4 inches) 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: 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

Graphite ULF Packing Systems: Graphite rings
Duplex Packing Systems:.
Male and Female Adaptor Rings: Carbon-filled PTFE V-ring
Guide Bushings: Carbon graphite
Packing Rings: Graphite composite
Packing Washer: PTFE
Anti-Extrusion Washer: Filled PTFE (not required for Graphite ULF or duplex packing)
Lantern Ring: S31600 (316 stainless steel) (not required for Graphite ULF packing)
Packing Box Flange: S31600
Spring: ■ 17-7PH stainless steel or ■ N06600
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, it is not necessary to reverse the ENVIRO-SEAL PTFE packing rings.

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.

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