

# Fisher<sup>®</sup> ET, EAT, and ETR Sliding-Stem Control Valves

Fisher 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 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.

The ET product line is available for a wide range of applications, including sulfide and chloride stress-cracking environments common to the oil and gas production industries. To discuss available constructions, contact your Emerson Process Management sales office and include the applicable codes and standards required for these environments.

## The easy-e™ Valve Family

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



W19163 / IL

Figure 1. Fisher ET Control Valve with 667 Actuator

different flow characteristics: ■ quick-opening, ■ linear, or ■ equal percentage.

- 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 NPS 1 through NPS 8 ET control valve.



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## 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 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**— Unless otherwise noted, references are to NACE MR0175-2002. Optional materials are available to meet NACE MR0103 and NACE MR0175 / ISO 15156. Material requirements under these standards vary by edition and year of issue; the specific standard must be specified.

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# ET Valve

Table 1. Available Constructions

VALVE	VALVE SIZE, NPS	VALVE BODY MATERIAL AND END CONNECTION STYLE <sup>(1)</sup>							
		Cast Iron Valve Body		Carbon Steel, Alloy Steel, or Stainless Steel Valve Body					
		CL125 FF Flanged	CL250 RF Flanged	Screwed	RF or RTJ Flanged			Butt Weld	Socket Weld
CL150	CL300				CL600				
ET	1, 1-1/2, or 2	X	X	X	X	X	X	X	X
	2-1/2, 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, 1-1/2, or 2	---	---	X	X	X	X	X	X
	2-1/2, 3, or 4	---	---	---	---	---	---	---	---
VALVE	VALVE SIZE, DN	STEEL VALVE BODY MATERIAL AND RAISED-FACE END CONNECTION STYLE <sup>(2)</sup>							
		PN16	PN25	PN40	PN63	PN100			
ET	25, 40, 50, 65, 80, 100, 150, or 200	X	X	X	X	X			
EAT	25, 50, 80, 100, or 150	X	X	X	X	X			
ETR	25, 40, 50, 65, 80, or 100	X	X	X	X	X			

X = Available Construction.  
 1. End connection style abbreviations: FF - Flat Faced, RF - Raised Face, RTJ - Ring Type Joint.  
 2. End connection EN1092-1/B.

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) <sup>(2)</sup>
		V (optional)
		VI (optional) <sup>(4)</sup>
	Metal	IV (standard)
		V (optional) <sup>(1)</sup>
		VI (optional) <sup>(4)</sup>
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 (CL125 through 600)	Replaceable, protected soft seat	TSO <sup>(3)</sup> TSO is not an ANSI/FCI leakage class. Valves with TSO trim are factory tested to a more stringent Emerson Process Management™ 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 (CL125 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 costs and downtime.

For applications requiring compliance with environmental protection regulations, the unique ENVIRO-SEAL packing system (figure 11) and a unique ENVIRO-SEAL bellows seal system (figure 10) are offered. The 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 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

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<sup>(1, 2)</sup>

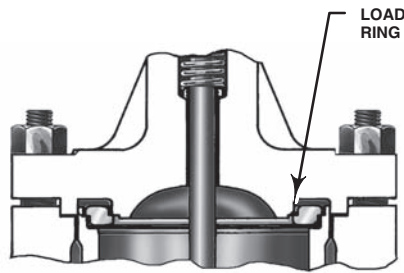
Valve	Port Size, Inches	Seat	Minimum Seat Load
ET	$\geq 3.4375 \leq 7$	Soft	See Catalog 14
ET	$\geq 3.4375 \leq 7$	Metal	300 lbs/lineal inch

1. Limited retrofit capability. Consult your Emerson Process Management sales office.  
2. Not for use with NPS 8.

Table 4. Class VI Trim Materials

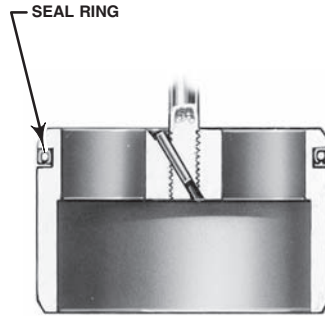
VALVE	CAGE/SEAT RING RETAINER	VALVE PLUG	SEAT RING	SEAL RING	TRIM TEMPERATURE LIMIT	
					°C	°F
ET	S31600 / ENC	S31600 w/ standard beveled seat	S31600/PTFE	UHMWPE <sup>(1)</sup> R30003	-198 to 66	-325 to 150
	S31600 / ENC	S31600/CoCr-A seat w/ radiused seat (special design)	S31600 w/ wide beveled seat (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)



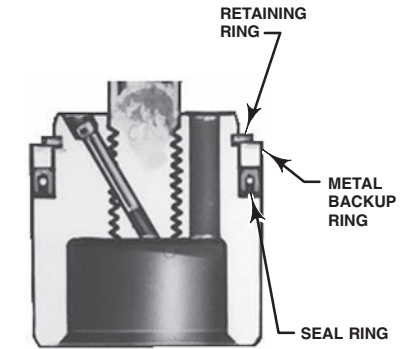
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**STANDARD NPS 8  
CONSTRUCTION**



W2914-1 / IL

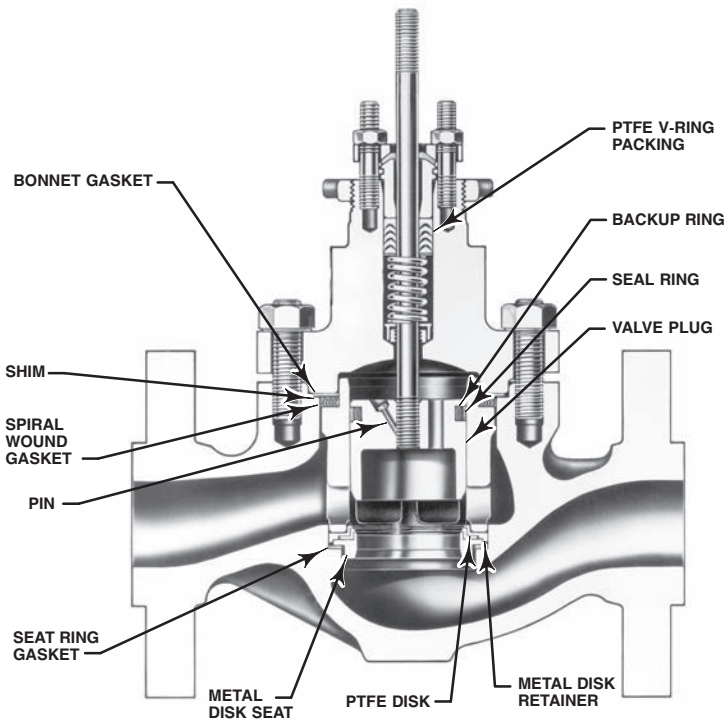
**NPS 6 OR 8 ET**



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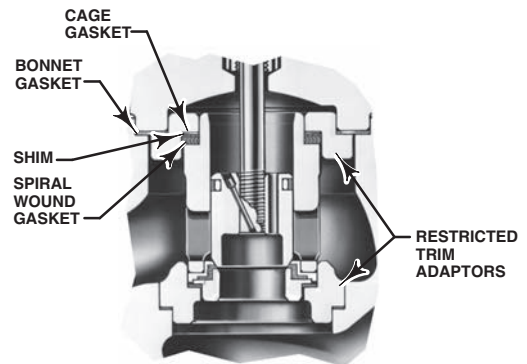
**NPS 1 THROUGH 4 ET  
(ALSO NPS 1 THROUGH 6 EAT)**

**SPRING-LOADED SEAL RING CONSTRUCTION  
FOR USE WITH CAVITROL CAGES AND FOR  
METAL SEAT WITH OPTIONAL  
CLASS V SHUTOFF**



W3162-3 / IL

**STANDARD NPS 1 THROUGH  
6 CONSTRUCTION**



W2001-2 / IL

**OPTIONAL RESTRICTED TRIM**



W0983-2 / IL

**OPTIONAL METAL-TO-METAL  
SEATING**

Figure 2. Fisher ET Sectional with Standard Cages

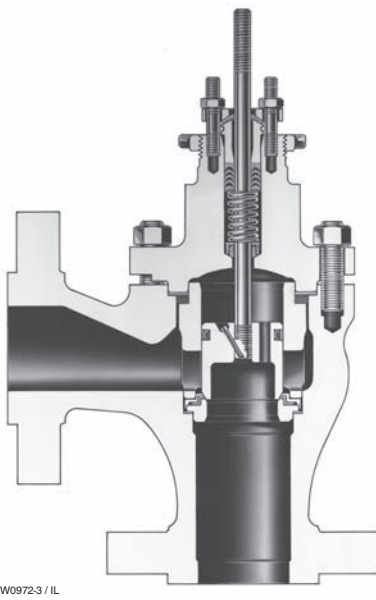


Figure 3. Fisher EAT Sectional

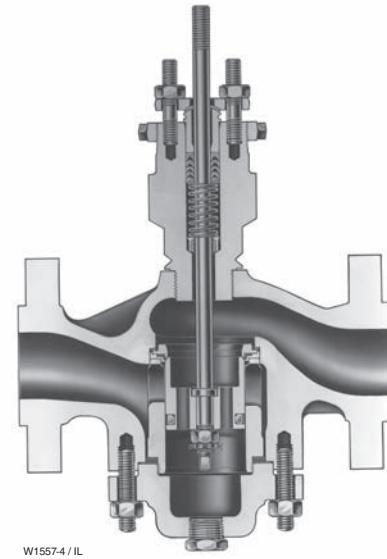


Figure 4. Fisher ETR Sectional



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**WhisperFlo TRIM**

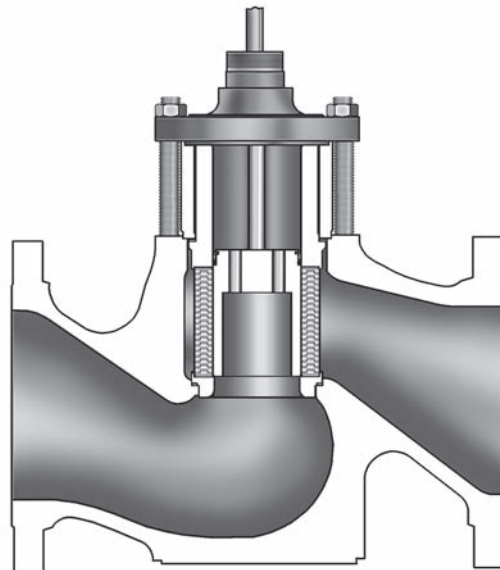
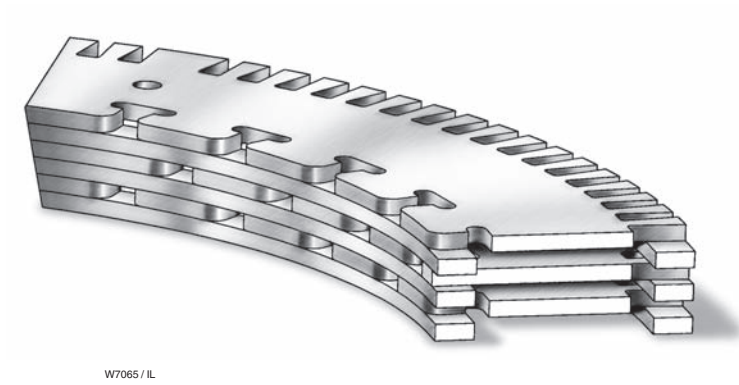
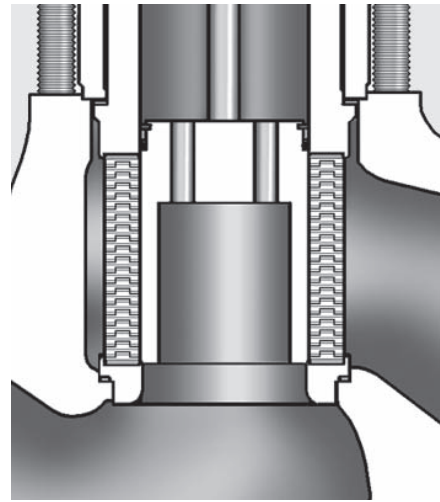


Figure 5. Typical Valve with WhisperFlo Aerodynamic Trim



W7065 / IL



W6851-1

Figure 6. Typical WhisperFlo Cage

Table 5. Typical Combinations of Metal Trim Parts for All Valves Except Those for NACE MR0175 / ISO 15156 and MR0103 Specifications<sup>(1)</sup>, Cavitrol III<sup>(2)</sup>, 6-Inch Whisper Trim III<sup>(3)</sup>, and 4-, 6-, and 8-Inch WhisperFlo Cages<sup>(6)</sup>

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 EAT Valve Only)
1 (typically used with optional metal-seat constructions in all designs and body materials except CF8M)	S41600 HT	CB7Cu-1 HT	---	S41600 HT or CA15 HT <sup>(4)</sup>	S41600 HT
	S17400 HT <sup>(5)</sup>	CB7Cu-1 HT <sup>(5)</sup>			
3	S31600 with seat and guide hard faced with CoCr-A hardfacing alloy	R30006 (alloy 6)	---	R30006 (alloy 6)	---
4 <sup>(7)</sup>	S31600	CB7Cu-1 HT	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 <sup>(8)</sup>	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) <sup>(8)</sup>	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 HT	S31600 disk retainer with CoCr-A disk seat	Seat Ring: R30006 (alloy 6)	---
57 (standard for standard PTFE-seat ET, EAT, ETR in all body materials except CF8M)	S41600 HT	S17400 HT	S31600	---	---

1. For NACE MR0175 / ISO 15156 and MR0103 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 NPS 6 and 8 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.  
 7. Not for use with Whisper Trim I.  
 8. Not for use with Whisper Trim I with 136 mm (5.375 inch) and larger ports.

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# ET Valve

Table 6. Cavtrol III<sup>(1)</sup> 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 Cavtrol III 1-stage or S17400 SST H1075 for Cavtrol III 2-stage	S31600	S17400 with H900 heat-treat condition	WCC carbon steel, WC9 chrome moly steel, or LCC carbon steel	-29	These materials not limiting factors	-20	These materials not limiting factors	
					CF8M	NPS 1, 1-1/2, or 2 valve body size	-29	These materials and sizes not limiting factors	-20	These materials and sizes not limiting factors
						NPS 2-1/2 or 3 valve body size	-29	216	-20	420
						NPS 4, 6, or 8 valve body size	-29	177	-20	350

1. Available only in NPS 1 through 8 ET valves.

Table 7. WhisperFlo Metal Trim Part Materials and Valve Body/Trim Temperature Capabilities (NPS 4, 6, and 8 Fisher ET only)

TRIM DESIGNATION	VALVE BODY	VALVE PLUG	CAGE	CAGE RETAINER	SEAT	MATERIAL TEMPERATURE CAPABILITY <sup>(1)</sup>			
						°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
901C	WCC	S41000	S41000	WCC ENC	S31600/PTFE	-29	232	-20	450
904C	WCC	S31600	S41000	WCC ENC	S31600/PTFE	-29	149	-20	300
984C	WCC	S31600	S41000 NACE	WCC/NACE/ENC	S31600/PTFE	-29	149	-20	300
985C	CF8M	S31600	S31603/R31233	S31600/ENC	S31600/PTFE	-73	149	-100	300
990	CD3MN	S31803/CoCrA Seat and Guide	S31803/R31233	S31800/Cr Plate	S31803/CoCrA Seat	-51	316	-60	600
	LCC					-46	316	-51	600
	WCC					-29	316	-20	600
990C	CD3MN	S31803/CoCrA Seat and Guide	S31803/R31233	S31800/Cr Plate	S31803/PTFE	-51	232	-60	450
	LCC					-46	232	-51	450
	WCC					-29	232	-20	450

1. Temperatures above 232°C (450°F) require PEEK anti-extrusion rings and spring-loaded seal ring. This option allows 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 (NPS 6 Fisher 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 HT	S41600 HT	Carbon steel NACE with electroless nickel coating (ENC)	Steel	---	S41000 HT	WCC carbon steel or WC9 chrome moly steel	-29 to 316 <sup>(1)</sup>	-20 to 600 <sup>(1)</sup>
							CF8M (316 SST)	-29 to 163	-20 to 325
301C (for soft seats)	S17400 HT	S41600 HT	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 HT	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 <sup>(1)</sup>	-20 to 600 <sup>(1)</sup>
							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 <sup>(1)</sup>	-20 to 500 <sup>(1)</sup>
							CF8M (316 SST)	-198 to 316 <sup>(1)</sup>	-325 to 600 <sup>(1)</sup>
312C (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	---	WCC carbon steel or WC9 chrome moly steel	-29 to 260 <sup>(1)</sup>	-20 to 500 <sup>(1)</sup>
							CF8M (316 SST)	-198 to 316 <sup>(1)</sup>	-325 to 600 <sup>(1)</sup>
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 <sup>(1)</sup>	-20 to 600 <sup>(1)</sup>
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 ET construction to be used up to 316°C (600°F) for non-oxidizing service and 260°C (500°F) for oxidizing service.

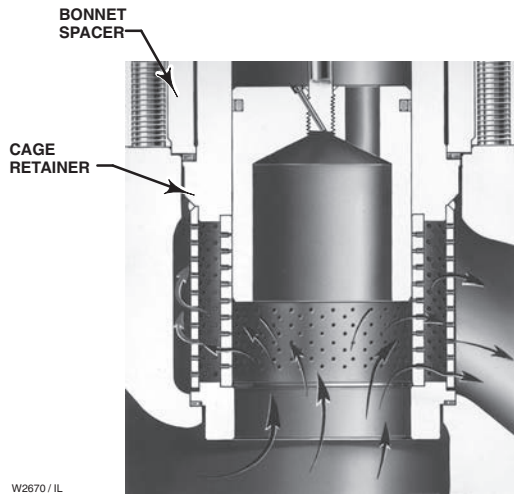


Figure 7. Metal Seat and Whisper Trim III Cage in NPS 6 Fisher ET Valve

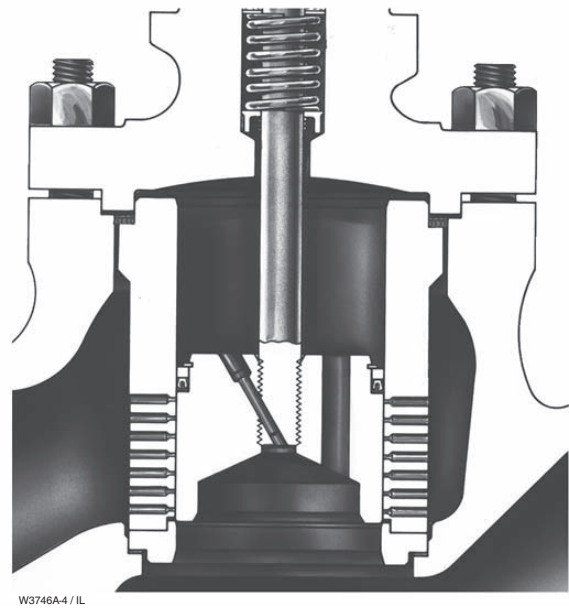


Figure 9. Cavtrol III One-Stage Cage

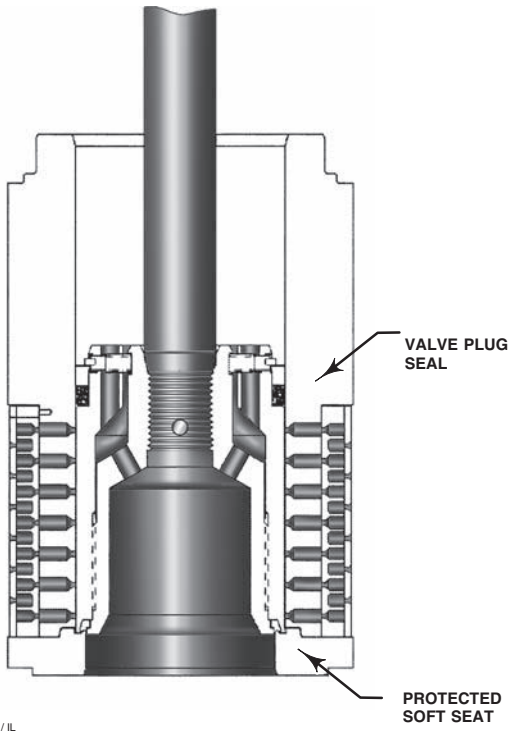


Figure 8. Typical Balanced TSO Trim

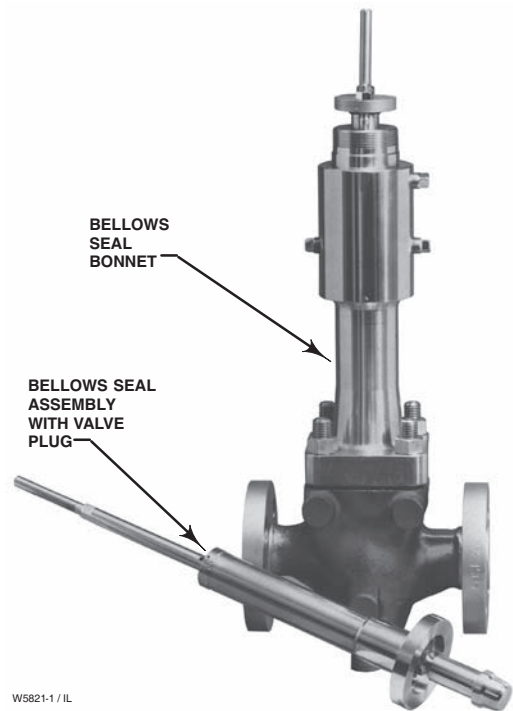
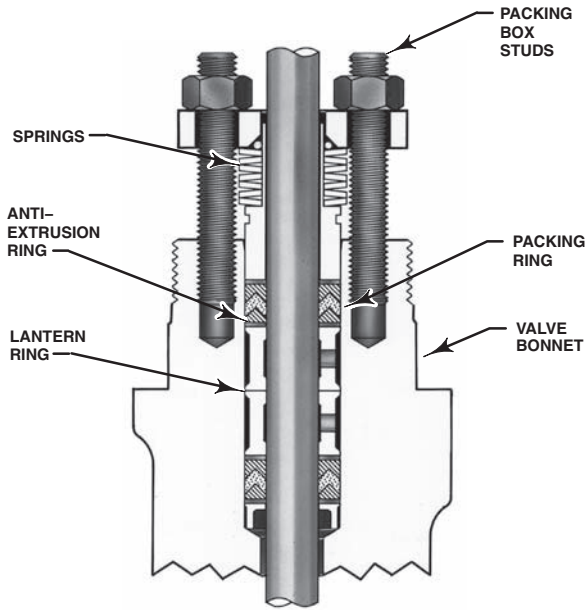
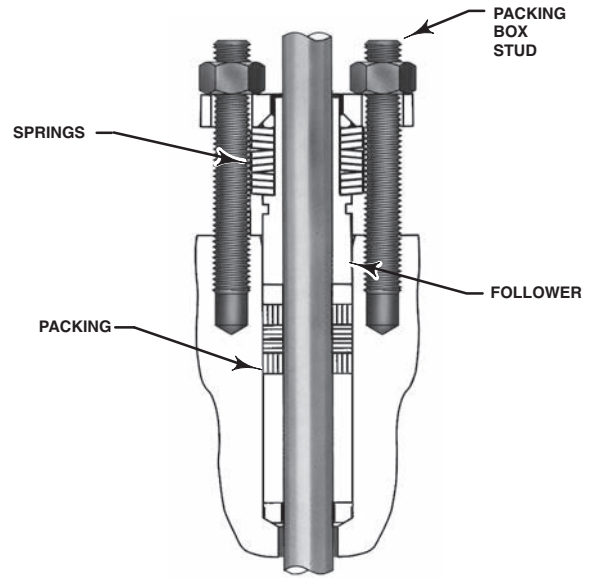


Figure 10. Typical ENVIRO-SEAL Bellows Seal Bonnet and Bellows Seal Assembly



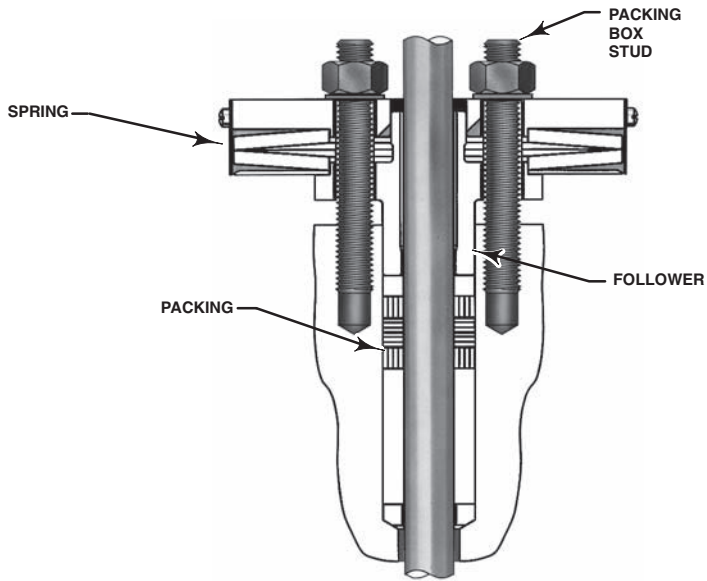
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TYPICAL ENVIRO-SEAL PACKING SYSTEM WITH PTFE PACKING



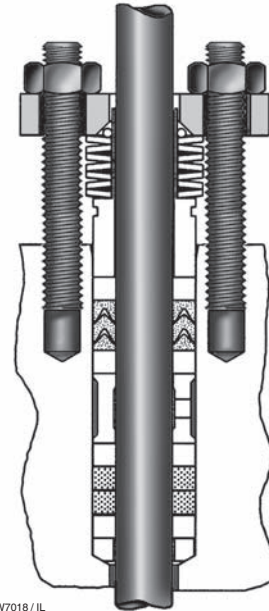
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TYPICAL ENVIRO-SEAL PACKING SYSTEM WITH GRAPHITE ULF PACKING



W8533-1

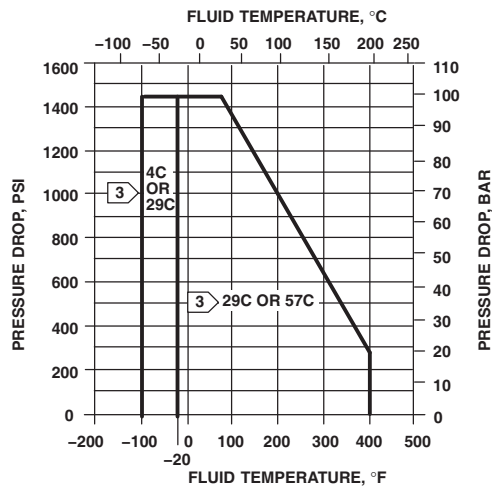
TYPICAL HIGH-SEAL PACKING SYSTEM WITH GRAPHITE ULF PACKING



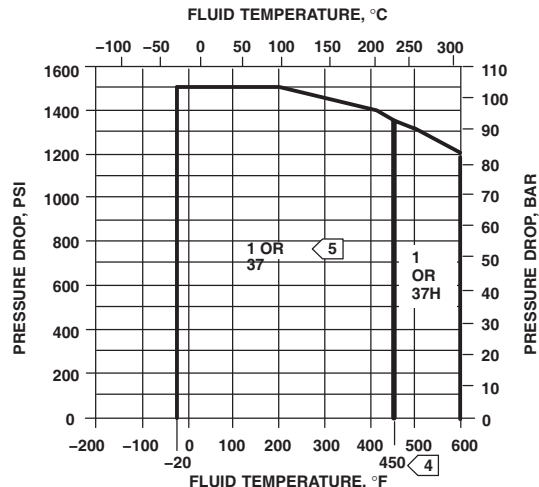
W7018 / IL

TYPICAL ENVIRO-SEAL PACKING SYSTEM WITH DUPLEX PACKING

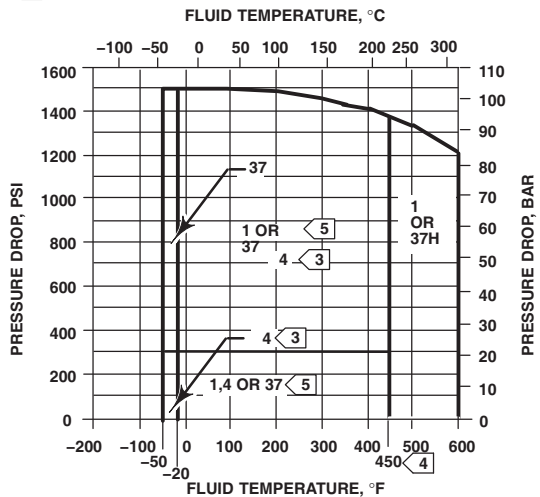
Figure 11. ENVIRO-SEAL and HIGH-SEAL Packing Systems



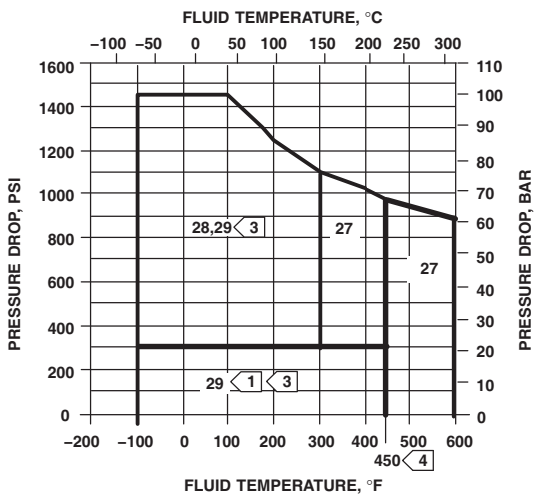
2 TRIM CAPABILITIES FOR PTFE SEATING



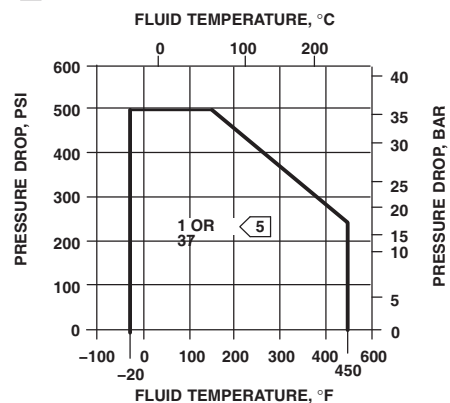
2 FOR OPTIONAL METAL SEATING WITH CL600 WCC STEEL, OR WC9 CHROME MOLY STEEL, BODY



2 FOR OPTIONAL METAL SEATING WITH CL600 LCC STEEL BODY



2 FOR OPTIONAL METAL SEATING WITH CL600 CF8M(316 SST) BODY



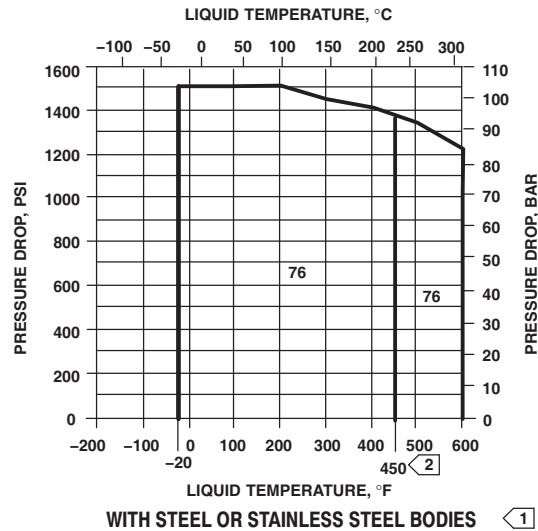
2 FOR OPTIONAL METAL SEATING WITH CL250B CAST IRON BODY

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 PRESSURE 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).

A67362/IL

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

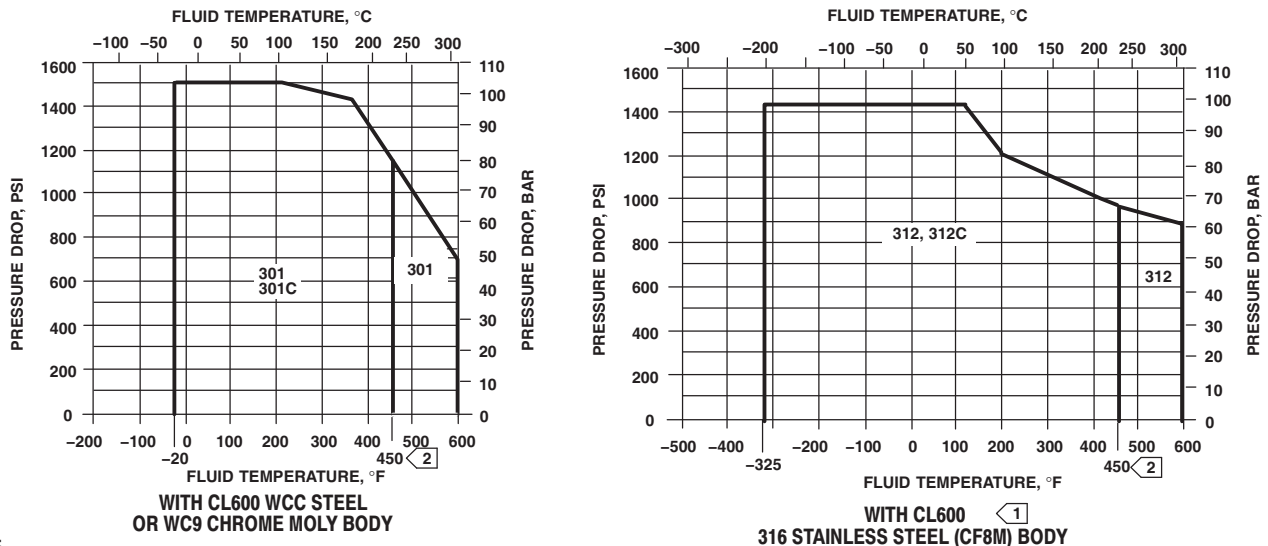


**NOTES:**

- 1 > DO NOT EXCEED THE MAXIMUM PRESSURE AND TEMPERATURE FOR THE PRESSURE 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.

A6737/L

Figure 13. Typical Trim for Cavtrol III Cage Constructions



**NOTES:**

- 1 > DO NOT EXCEED THE MAXIMUM PRESSURE AND TEMPERATURE FOR THE PRESSURE 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/L

Figure 14. Typical Trim for NPS 6 Fisher 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	... <sup>(5)</sup>	-20	... <sup>(5)</sup>	
		Nuts	Steel SA-194-2H					
	LCC body	Studs	Steel SA-193-B7	-46	... <sup>(5)</sup>	-50	... <sup>(5)</sup>	
		Nuts	Steel SA-194-2H					
	CF8M (316 stainless steel) body	Studs	Steel SA-193-B7 (std) (NACE [non-exposed bolting])	-48	... <sup>(5)</sup>	-55	... <sup>(5)</sup>	
		Nuts	Steel SA-194-2H (std) (NACE [non-exposed bolting])	-46	... <sup>(5)</sup>	-50	... <sup>(5)</sup>	
		Studs	304 stainless steel SA-320-B8	... <sup>(5)</sup>	38	... <sup>(5)</sup>	100	
		Nuts	304 stainless steel SA-194-8					
Studs		316 stainless steel SA-193-B8M (strain-hardened) or 316 stainless steel SA-193-B8M	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>		
Nuts	316 stainless steel SA-194-8M							
Disk			PTFE	-73	204	-100	400	
2-piece valve plug seal (standard for NPS 1 thru 6 valves except those with Cavitrol III cage)	Backup ring	Fluoroelastomer <sup>(1)</sup>		-18	204	0	400	
		Ethylene-propylene <sup>(2)</sup>		-40	232	-40	450	
		Nitrile <sup>(3)</sup>	For use with air and hydrocarbons		-40	71	-40	160
			For use with other compatible fluids		-40	82	-40	180
	Seal ring	Carbon-filled PTFE		-73	232	-100	450	
Spring-loaded valve plug seal <sup>(7)</sup>	Backup ring <sup>(4)</sup>	416 stainless steel		-29	... <sup>(5)</sup>	-20	... <sup>(5)</sup>	
		316 stainless steel		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	
	Retaining ring <sup>(4)</sup>	302 stainless steel (N07750, NACE Std)		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	
	Seal ring	PTFE with N10276 spring		-73	232	-100	450	
<b>For applications using PEEK Anti-Extrusion Rings:</b> Spring-loaded valve plug seal	Backup ring <sup>(4)</sup>	416 stainless steel		-29	... <sup>(5)</sup>	-20	... <sup>(5)</sup>	
		316 stainless steel		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	
	Retaining ring <sup>(4)</sup>	302 stainless steel		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	
	Seal ring	PTFE/graphite with N10276 spring		232	316 <sup>(6)</sup>	450	600 <sup>(6)</sup>	
	Anti-extrusion rings	PEEK (PolyEtherEtherKetone)		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	
Valve plug stem			S31600 (S20910, NACE Std.)	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	
Load ring (NPS 8 ET valve only)			S17400 or optional N06600 or N05500	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	
Restricted trim adaptors	Cast iron		-73	232	-100	450		
	WCC steel		-29	... <sup>(5)</sup>	-20	... <sup>(5)</sup>		
	316 stainless steel		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>		
Seat ring, bonnet and cage gaskets	FGM (standard)		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>		
	PTFE-coated N04400		... <sup>(5)</sup>	149	... <sup>(5)</sup>	300		
Spiral wound gasket	N06600/graphite (FGM-standard)		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>		
	N04400/PTFE		-73	149	-100	300		
Shim	316 stainless steel		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>		
	N04400		... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>		
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	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	... <sup>(5)</sup>	

-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	... <sup>(5)</sup>		... <sup>(5)</sup>		
Metal packing box parts	316 or 17-4PH stainless steel depending on part	... <sup>(5)</sup>		... <sup>(5)</sup>		
Extension bonnet bushing	Trims 1 & 4	416 stainless steel	-29	... <sup>(5)</sup>	-20	... <sup>(5)</sup>
	Other trims	316 stainless steel	... <sup>(5)</sup>		... <sup>(5)</sup>	
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 NPS 8 valve regardless of cage and all NPS 1 thru 6 valves with Cavitrol III cages, optional in NPS 1 thru 6 valves with other than Cavitrol III cages.						

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

BODY/BONNET <sup>(3)</sup> 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 <sup>(1)</sup>	-20	600 <sup>(1)</sup>
	27	All	-29	316 <sup>(1)</sup>	-20	600 <sup>(1)</sup>
	29	All	-29	149 <sup>(2)</sup>	-20	300 <sup>(2)</sup>
	37	All	-29	210	-20	410
	37H	All	210	316 <sup>(1)</sup>	410	600 <sup>(1)</sup>
	57	All	-29	232	-20	450
WC9 chrome moly steel	1 or 3	All	-29	316 <sup>(1)</sup>	-20	600 <sup>(1)</sup>
	27	All	-29	316 <sup>(1)</sup>	-20	600 <sup>(1)</sup>
	29	All	-29	149 <sup>(2)</sup>	-20	300 <sup>(2)</sup>
	37	All	-29	210	-20	410
	37H	All	210	316 <sup>(1)</sup>	410	600 <sup>(1)</sup>
	57	All	-29	232	-20	450
LCC steel	1	All	-29	316 <sup>(1)</sup>	-20	600 <sup>(1)</sup>
	4	All	-46	210	-50	410
	27	All	-46	316 <sup>(1)</sup>	-50	600 <sup>(1)</sup>
	29	All	-46	149 <sup>(2)</sup>	-50	300 <sup>(2)</sup>
	37	All	-46	210	-50	410
	37H	All	210	316 <sup>(1)</sup>	410	600 <sup>(1)</sup>
CF8M (316 stainless steel)	1	All	-29	316 <sup>(1)</sup>	-20	600 <sup>(1)</sup>
	4	All	-46	210	-50	410
	27	All	-46	316 <sup>(1)</sup>	-50	600 <sup>(1)</sup>
	29	All	-46	149 <sup>(2)</sup>	-50	300 <sup>(2)</sup>
	37	All	-46	210	-50	410
	37H	All	210	316 <sup>(1)</sup>	410	600 <sup>(1)</sup>
CF8M (316 stainless steel)	27	All	-198 <sup>(4)</sup>	316 <sup>(1)</sup>	-325 <sup>(4)</sup>	600 <sup>(1)</sup>
	28	All	-198 <sup>(4)</sup>	149 <sup>(2)</sup>	-325 <sup>(4)</sup>	300 <sup>(2)</sup>
	29	All	-198 <sup>(4)</sup>	149 <sup>(2)</sup>	-325 <sup>(4)</sup>	300 <sup>(2)</sup>
1. Temperatures above 232°C (450°F) require PEEK anti-extrusion rings and spring-loaded seal ring. This option allows 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.						

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# ET Valve

Table 11. Bonnet Selection Guidelines

BONNET STYLE	PACKING MATERIAL	IN-BODY PROCESS TEMPERATURE LIMITS <sup>(1)</sup>	
		°C	°F
Plain: ■ Standard for all valve sizes through NPS 6 with 2-13/16 yoke boss diameter ■ Standard for NPS 6 and 8 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 <sup>(2)</sup>	0 to 600 <sup>(2)</sup>
Style 1 Cast Extension: ■ Standard for NPS 8 valves in S31600 bonnet material with 3-9/16 yoke boss diameter	PTFE V-ring	-46 to 316 <sup>(2)</sup>	-50 to 600 <sup>(2)</sup>
	PTFE/Composition		
	Graphite ribbon/filament		
Style 2 Cast Extension: ■ Optional for NPS 2 through 4 valve sizes with 2-13/16 inch yoke boss diameter ■ Optional for NPS 6 and 8 valves with 3-9/16 yoke boss diameter. Not available for NPS 8 valve in S31600 bonnet material	PTFE V-ring	-101 to 316 <sup>(2)</sup>	-150 to 600 <sup>(2)</sup>
	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.	
<p>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.</p> <p>2. Temperatures above 232°C (450°F) require PEEK anti-extrusion rings and spring-loaded seal ring.</p>			

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

Valve	Valve Size, NPS	Cv at Max. Valve Plug Travel	
ET	1	17.2	
	1-1/2	35.8	
	2	59.7	
	2-1/2	99.4	
	3	136	
	4	224	
	6	394	
	8 <sup>(1)</sup> 8 <sup>(2)</sup>	567 819	
EAT	with liner	1	18.5
		2	48.1
		3	149
		4	152
	without liner	6	336
		1	19.0
		2	47.2
		3	148
ETR	4	156	
	6	328	
	1	17.2	
	1-1/2	35.8	
	2	59.7	
	2-1/2	99.4	
	3	136	
	4	224	
	<p>1. With 51 mm (2 inch) travel. 2. With 76 mm (3 inch) travel.</p>		

Table 13. Port Diameters and Valve Plug Travel

VALVE SIZE, NPS				PORT DIAMETER <sup>(1)</sup>		MAXIMUM VALVE PLUG TRAVEL <sup>(1)</sup>	
ET or ETR		EAT		mm	Inch	mm	Inch
Full-Sized Trim	Restricted-Capacity Trim	Full-Sized Trim	Restricted-Capacity Trim				
1	1-1/2	1	2	33.3	1.3125	19.1	0.75
---	2	---	---	33.3	1.3125	19.1	0.75
1-1/2	---	2	---	46.7	1.875	19.1	0.75
---	2-1/2	---	---	46.7	1.875	19.1	0.75
2	3	---	4	58.7	2.3125	29	1.125
2-1/2	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 <sup>(2)</sup>	---	---	---	177.8 <sup>(3)</sup>	7 <sup>(3)</sup>	51 <sup>(3)</sup>	2 <sup>(3)</sup>
				136.5 <sup>(4)</sup>	5.375 <sup>(4)</sup>	76 <sup>(4)</sup>	3 <sup>(4)</sup>
8 <sup>(2)</sup>	---	---	---	203.2	8	51	2
						76	3

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

Table 14. Stem and Yoke Boss Diameters

VALVE SIZE, NPS				STEM AND YOKE BOSS DIAMETERS							
ET or ETR		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	1-1/2	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	---	---	---	---
1-1/2	---	2	---	9.5	3/8	54	2-1/8	12.7	1/2	71	2-13/16
---	2-1/2	---	---	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
2-1/2	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
6 <sup>(1)</sup>	---	---	---	19.1	3/4	90	3-9/16	25.4	1	127	5
								31.8	1-1/4	127	5
8 <sup>(1)</sup>	---	---	---	19.1	3/4	90	3-9/16	25.4 or 31.8	1 or 1-1/4	127	5

1. Not available in ETR valves.

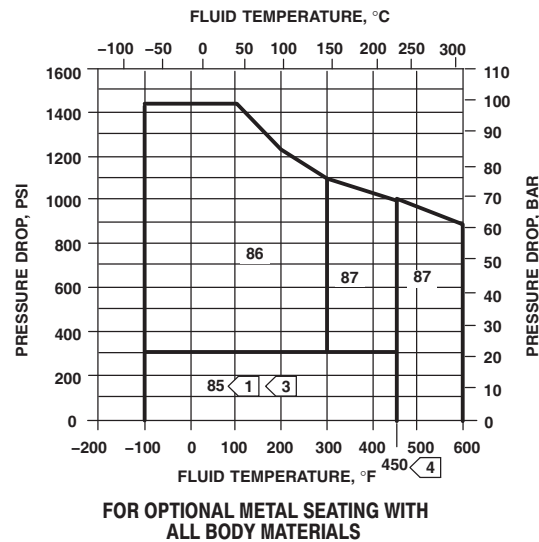
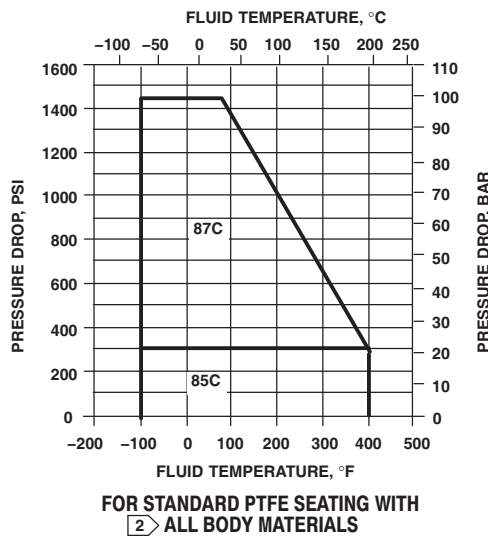
*Table 15. Port Diameters and Valve Plug Travel for Cavitrol III Cage*

ET VALVE SIZE, NPS	ONE-STAGE CAGE		TWO-STAGE CAGE	
	Port Diameters	Valve Plug Travel <sup>(1)</sup>	Port Diameters	Valve Plug Travel
<b>mm</b>				
1	33.3	25	25.4	25
1-1/2	47.6	22	33.3	38
2	58.7	29	47.6	51
2-1/2	73.0	38	58.7	64
3	87.3	41	73.0	76
4	111.1	54	73.0	102
6	177.8	57	136.5	102
8	203.2	86	177.8	152
<b>Inch</b>				
1	1.3125	1	1	1
1-1/2	1.875	0.875	1.3125	1.5
2	2.3125	1.125	1.875	2
2-1/2	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 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	TRIM	MAX TRAVEL		YOKE BOSS SIZE		PORT DIAMETER				C <sub>v</sub> REDUCTION AT 100% TRAVEL <sup>(1)</sup>	UNBALANCE AREA
		mm	Inch	mm	Inch	Nominal		Actual TSO			
						mm	Inch	mm	Inch		mm
ET NPS 3	CAV III 2-Stage	76.2	3	90 127	3-9/16 5	73.0	2.875	68.3	2.6875	0%	0.098
ET NPS 4	CAV III 2-Stage	102	4	90 127	3-9/16 5	73.0	2.875	68.3	2.6875	5%	0.098
EAT NPS 4	Std	38.1	1.5	71.4 90	2-13/16 3-9/16	87.3	3.4375	82.6	3.25	6% 4%	0.118
EAT NPS 6	Std	50.8	2	90	3-9/16	111	4.375	106	4.1875	4% (linear) 3% (equal percent)	0.154

1. This column lists the percent reduction of published maximum C<sub>v</sub> 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 PRESSURE 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 24 BAR (300 PSI).

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 / ISO 15156 and MR0103 (Sour Service)

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# ET Valve

Table 17. Metal Trim Part Materials for Compatibility with NACE MR0175 / ISO 15156 and MR0103 (Sour Service) Specifications. Environmental Restrictions Apply, Refer to Standard.

Trim Designation <sup>(4)</sup>	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 <sup>(1)</sup>
85 <sup>(5)</sup>	S31600	S31600 with electroless nickel coating (ENC)	S31600	S31600	---	S20910 (Valve Stem) S31600 (All Other Parts)	N05500
85C <sup>(2, 5)</sup>	S31600	S31600 with electroless nickel coating (ENC)	---	---	S31600		
86 <sup>(5)</sup>	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) <sup>(3)</sup>	R30006 (alloy 6)	---	---		
87C <sup>(2)</sup> (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) <sup>(3)</sup>	---	---	S31600		

1. NPS 8 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.  
5. Not for use with Whisper Trim I with 136 mm (5.375 inch) and larger ports.

Table 18. Bolting Materials and Temperature Limits for Bolting Compliance with NACE MR0175-2002, NACE MR0175/ISO 15156, and NACE MR0103. Environmental restrictions may apply

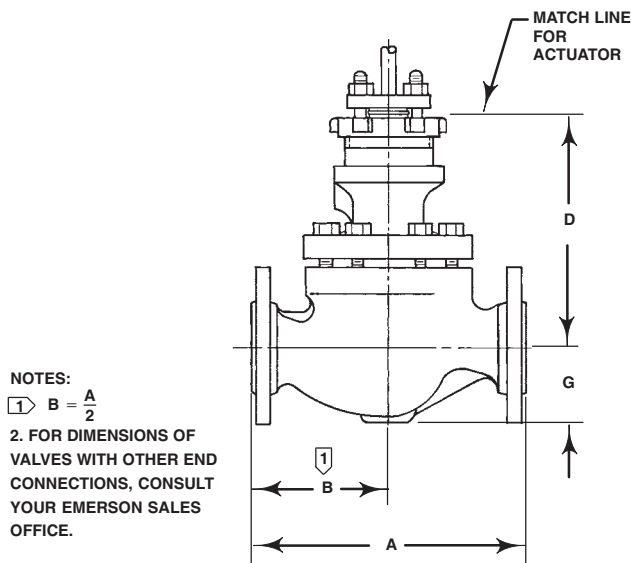
VALVE BODY MATERIAL		BOLTING MATERIAL	TEMPERATURE CAPABILITIES			
			°C		°F	
			Min	Max	Min	Max
<b>Non-exposed bolting (Standard)</b>						
WCC and CF8M (316 SST)	Studs	Steel SA-193-B7	-48 <sup>(2)</sup>	427	-55 <sup>(2)</sup>	800
	Nuts	Steel SA-194-2H				
<b>Exposed bolting (Optional)</b> May require derating of valve <sup>(1)</sup> when these body-to-bonnet bolting materials are used						
WCC and CF8M	Studs	Steel SA-193-B7M	-48 <sup>(2)</sup>	427	-55 <sup>(2)</sup>	800
	Nuts	Steel SA-194-2HM				

1. Derating is not required for CL150 and 300 valves. Derating may be required for valves rated at CL600. 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.

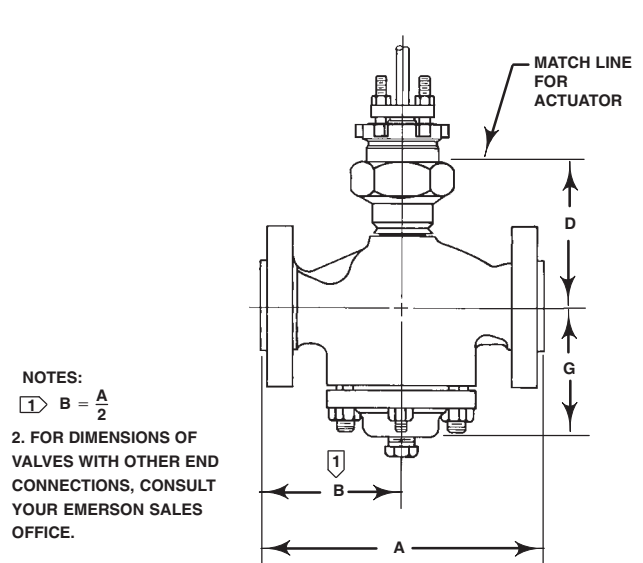
Table 19. Fisher ET and ETR Dimensions

VALVE SIZE, NPS	A									G (MAX)	
	Pressure Rating, End Connection Style <sup>(1)</sup>									ET	ETR
	Scrd or SW	CL125 FF or CL150 RF	CL150 RTJ	CL250 RF or CL300 RF	CL300 RTJ	BW or CL600 RF	CL600 RTJ	PN16-40 <sup>(2)</sup>	PN63-100 <sup>(2)</sup>		
mm											
1	210	184	197	197	210	210	210	160	230	60	119
1-1/2	251	222	235	235	248	251	251	200	260	71	116
2	286	254	267	267	282	286	289	230	300	78	133
2-1/2	---	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	140	---
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	See mm above	See mm above	2.38	4.69
1-1/2	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			3.06	5.25
2-1/2	---	10.88	11.38	11.50	12.12	12.25	12.38	See mm above	See mm above	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			5.51	---
8	---	21.38	21.88	22.38	23.00	24.00	24.12			7.50	---

1. End connection style abbreviations: BW - Butt welding, FF - Flat Faced, Scrd - Screwed, SW - Socketweld, RF - Raised Face, RTJ - Ring Type Joint  
2. Valves which meet EN 1092 flange standards and have EN face-to-face dimensions are available only from Europe (EN 558-1). Valves which meet EN 1092 flange standards but not EN face-to-face standards are available in the US. Consult your Emerson Process Management sales office.



ET CONTROL VALVE



ETR CONTROL VALVE

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

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Table 20. Fisher ET and ETR Dimensions

VALVE SIZE, NPS	D FOR PLAIN BONNET											
	ET Except with Cavitrol III Two-Stage Cage				ET with Cavitrol III Two-Stage Cage				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	127	149	---	---	---	184	---	---	113	124	---	
1-1/2	124	146	---	---	155	177	---	---	122	133	---	
2	---	165	162	---	---	201	198	---	---	148	140	
2-1/2	---	187	184	---	---	229	226	---	---	157	152	
3	---	191	187	---	---	260	256	---	---	167	159	
4	---	221	217	238	---	311	308	354	---	198	191	
6 <sup>(1)</sup>	---	---	251	270	---	---	336	380	---	---	---	
6 <sup>(2)</sup>	---	---	312	330	---	---	---	---	---	---	---	
8	---	---	375 <sup>(3)</sup>	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	5.00	5.88	---	---	---	7.25	---	---	4.44	4.88	---	
1-1/2	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	
2-1/2	---	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 <sup>(1)</sup>	---	---	9.88	10.62	---	---	13.22	14.97	---	---	---	
6 <sup>(2)</sup>	---	---	12.26	13.00	---	---	---	---	---	---	---	
8	---	---	14.75 <sup>(3)</sup>	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. Fisher ET and ETR Dimensions

VALVE SIZE, NPS	D FOR EXTENSION AND ENVIRO-SEAL BELLOWS SEAL BONNETS (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	213	251	---	---	303	319	---	320	---	---	
1-1/2	210	248	---	---	300	316	---	317	---	---	
2	---	267	272	---	---	465	---	---	384	---	
2-1/2	---	289	294	---	---	492	---	---	---	---	
3	---	292	297	---	---	495	487	---	517	517	
4	---	322	327	370	---	526	518	---	541	---	
6 <sup>(1)</sup>	---	---	357	402	---	---	543	---	---	573	
6 <sup>(2)</sup>	---	---	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	8.38	9.88	---	---	11.94	12.56	---	12.62	---	---	
1-1/2	8.25	9.75	---	---	11.81	12.44	---	12.50	---	---	
2	---	10.50	10.69	---	---	18.31	---	---	15.12	---	
2-1/2	---	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 <sup>(1)</sup>	---	---	14.06	15.81	---	---	21.38	---	---	22.56	
6 <sup>(2)</sup>	---	---	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. Fisher EAT Dimensions<sup>(1)</sup>

VALVE SIZE, NPS	AA					
	CL150		CL300		CL600	
	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 - Butt welding, FF - Flat Faced, Scrd - Screwed, SW - Socket weld, RF - Raised Face, RTJ - Ring Type Joint.

Table 23. Fisher EAT Dimensions

VALVE SIZE, NPS	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

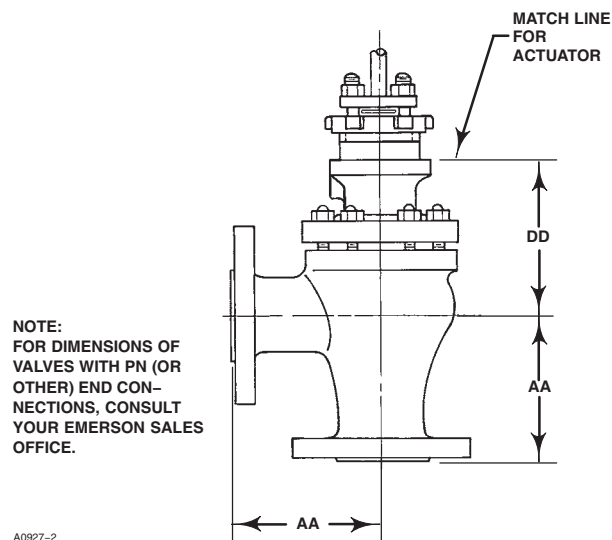


Figure 17. Fisher EAT Dimensions (also see tables 22, 23, and 24)

Table 24. Fisher EAT Dimensions

VALVE SIZE, NPS	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.

# ET Valve

## Coefficients

Table 25. Fisher EAT, Quick Opening Cage, With Liner

With Liner																Quick Opening Characteristic	
Valve Size, NPS	Port Diameter		Maximum Travel <sup>(1)</sup>		Flow Coefficient	Coeffs. for 6 mm (0.25 in) Travel <sup>(2)</sup>	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(3)</sup>
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1	33.3	0.3125	19	0.75	C <sub>V</sub>	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 <sub>V</sub>	12.3	4.45	7.99	11.3	14.0	16.3	18.1	19.4	20.2	20.8	20.8	---
					X <sub>T</sub>	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 <sub>V</sub>	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 <sub>V</sub>	25.4	7.59	14.8	22.7	31.2	39.3	46.2	51.3	55.0	58.2	61.2	---
					X <sub>T</sub>	0.573	0.480	0.513	0.568	0.570	0.577	0.589	0.628	0.618	0.656	0.656	---
	33.3 <sup>(4)</sup>	1.3125 <sup>(4)</sup>	19	0.75	C <sub>V</sub>	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 <sub>V</sub>	15.0	5.11	8.74	13.1	18.8	25.4	32.3	37.8	42.0	45.3	47.7	---
					X <sub>T</sub>	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 <sub>V</sub>	30.6	24.2	47.2	77.8	108	133	148	159	171	181	183	0.76
					K <sub>V</sub>	26.5	20.9	40.8	67.3	93.4	115	128	138	148	157	158	---
					X <sub>T</sub>	0.540	0.517	0.534	0.504	0.545	0.582	0.636	0.651	0.616	0.575	0.569	---
	47.6 <sup>(4)</sup>	1.875 <sup>(4)</sup>	19	0.75	C <sub>V</sub>	29.8	7.96	15.5	25.7	37.4	49.0	61.2	72.5	83.1	92.8	102	0.60
					K <sub>V</sub>	25.8	6.89	13.4	22.2	32.4	42.4	52.9	62.7	71.9	80.3	88.2	---
					X <sub>T</sub>	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 <sub>V</sub>	37.1	22.3	46.3	77.1	117	155	180	197	212	230	235	0.72
					K <sub>V</sub>	32.1	19.3	40.0	66.7	101	134	156	170	183	199	203	---
					X <sub>T</sub>	0.580	0.616	0.547	0.537	0.531	0.529	0.575	0.629	0.635	0.609	0.620	---
	58.7 <sup>(4)</sup>	2.3125 <sup>(4)</sup>	29	1.125	C <sub>V</sub>	31.4	14.4	28.3	46.1	66.7	87.5	107	124	138	149	160	0.61
					K <sub>V</sub>	27.2	12.5	24.5	39.9	57.7	75.7	92.6	107	119	129	138	---
					X <sub>T</sub>	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 <sub>V</sub>	50.0	39.8	84.0	150	219	279	332	379	420	435	435	0.71
					K <sub>V</sub>	43.3	34.4	72.7	130	189	241	287	328	363	376	376	---
					X <sub>T</sub>	0.578	0.597	0.599	0.577	0.581	0.581	0.578	0.565	0.527	0.533	0.533	---
	73.0 <sup>(4)</sup>	2.875 <sup>(4)</sup>	38	1.5	C <sub>V</sub>	38.7	23.9	47.1	74.9	109	142	174	201	219	244	248	0.59
					K <sub>V</sub>	33.5	20.7	40.7	64.8	94.3	123	151	174	189	211	215	---
					X <sub>T</sub>	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 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. Fisher EAT, Quick Opening Cage, Without Liner

Without Liner																Quick Opening Characteristic	
Valve Size, NPS	Port Diameter		Maximum Travel <sup>(1)</sup>		Flow Coefficient	Coeffs. for 6 mm (0.25 in) Travel <sup>(2)</sup>	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(3)</sup>
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1	33.3	0.3125	19	0.75	C <sub>V</sub>	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 <sub>V</sub>	12.8	4.39	8.10	11.8	14.5	16.6	18.1	19.2	20.0	20.4	20.5	---
					X <sub>T</sub>	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 <sub>V</sub>	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 <sub>V</sub>	24.2	6.97	13.6	21.5	29.7	37.3	44.1	49.4	53.1	55.9	58.1	---
					X <sub>T</sub>	0.629	0.531	0.621	0.623	0.631	0.641	0.638	0.656	0.676	0.686	0.682	---
	33.3 <sup>(4)</sup>	1.3125 <sup>(4)</sup>	19	0.75	C <sub>V</sub>	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 <sub>V</sub>	14.9	5.21	9.00	13.3	18.1	23.4	29.2	33.3	36.1	38.2	39.4	---
					X <sub>T</sub>	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 <sub>V</sub>	39.2	23.4	47.9	78.7	108	128	142	153	163	171	171	0.81
					K <sub>V</sub>	33.9	20.2	41.4	68.1	93.4	111	123	132	141	148	148	---
					X <sub>T</sub>	0.576	0.588	0.573	0.534	0.573	0.635	0.662	0.654	0.626	0.600	0.605	---
	47.6 <sup>(4)</sup>	1.875 <sup>(4)</sup>	19	0.75	C <sub>V</sub>	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 <sub>V</sub>	25.2	7.15	13.8	22.1	31.1	40.5	48.8	55.9	62.4	68.6	74.5	---
					X <sub>T</sub>	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 <sub>V</sub>	39.0	23.9	48.2	80.3	118	151	178	195	209	223	223	0.76
					K <sub>V</sub>	33.7	20.7	41.7	69.5	102	131	154	169	181	193	193	---
					X <sub>T</sub>	0.562	0.588	0.566	0.554	0.556	0.580	0.610	0.659	0.669	0.644	0.650	---
	58.7 <sup>(4)</sup>	2.3125 <sup>(4)</sup>	29	1.125	C <sub>V</sub>	30.9	13.6	27.0	43.9	62.5	80.6	96.0	109	120	127	133	0.73
					K <sub>V</sub>	26.7	11.8	23.4	38.0	54.1	69.7	83.0	94.3	104	110	115	---
					X <sub>T</sub>	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 <sub>V</sub>	45.8	37.6	79.6	142	207	265	311	351	383	398	398	0.76
					K <sub>V</sub>	39.6	32.5	68.9	123	179	229	269	304	331	344	344	---
					X <sub>T</sub>	0.652	0.680	0.652	0.639	0.639	0.655	0.686	0.683	0.666	0.657	0.667	---
	73.0 <sup>(4)</sup>	2.875 <sup>(4)</sup>	38	1.5	C <sub>V</sub>	35.4	21.8	43.1	71.5	103	130	154	173	188	198	206	0.74
					K <sub>V</sub>	30.6	18.9	37.3	61.8	89.1	112	133	150	163	171	178	---
					X <sub>T</sub>	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 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. Fisher EAT, Linear Cage, With Liner

With Liner - Flow Down															Linear Characteristic	
Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(1)</sup>
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C <sub>V</sub>	2.71	5.17	8.14	10.7	13.0	15.2	17.2	19.1	20.7	22.0	0.90
					K <sub>V</sub>	2.34	4.47	7.04	9.26	11.2	13.1	14.9	16.5	17.9	19.0	---
					X <sub>T</sub>	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 <sub>V</sub>	3.77	6.94	11.3	16.1	21.0	26.7	33.1	40.1	46.8	53.8	0.82
					K <sub>V</sub>	3.26	6.00	9.77	13.9	18.2	23.1	28.6	34.7	40.5	46.5	---
					X <sub>T</sub>	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 <sub>V</sub>	2.95	5.49	8.65	12.1	15.7	19.3	23.4	29.7	35.7	41.0	0.66
					K <sub>V</sub>	2.55	4.75	7.48	10.5	13.6	16.7	20.2	25.7	30.9	35.5	---
					X <sub>T</sub>	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 <sub>V</sub>	10.3	24.0	38.8	54.3	69.8	86.5	102	124	141	155	0.80
					K <sub>V</sub>	8.91	20.8	33.6	47.0	60.4	74.8	88.2	107	122	134	---
					X <sub>T</sub>	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 <sub>V</sub>	3.37	6.45	10.6	15.3	19.8	25.3	32.2	40.1	48.4	58.1	0.74
					K <sub>V</sub>	2.92	5.58	9.17	13.2	17.1	21.9	27.9	34.7	41.9	50.3	---
					X <sub>T</sub>	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 <sub>V</sub>	12.7	31.6	54.1	77.8	103	128	149	171	191	208	0.78
					K <sub>V</sub>	11.0	27.3	46.8	67.3	89.1	111	129	148	165	180	---
					X <sub>T</sub>	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 <sub>V</sub>	6.70	15.3	25.2	37.0	50.2	64.5	79.4	94.6	110	124	0.66
					K <sub>V</sub>	5.80	13.2	21.8	32.0	43.4	55.8	68.7	81.8	95.2	107	---
					X <sub>T</sub>	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 <sub>V</sub>	25.4	53.6	83.0	113	146	179	218	263	309	350	0.78
					K <sub>V</sub>	22.0	46.4	71.8	97.7	126	155	189	227	267	303	---
					X <sub>T</sub>	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 <sub>V</sub>	10.6	25.2	41.1	57.7	76.1	94.8	116	139	168	195	0.67
					K <sub>V</sub>	9.17	21.8	35.6	49.9	65.8	82.0	100	120	145	169	---
					X <sub>T</sub>	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. Fisher EAT, Linear Cage, Without Liner

Without Liner - Flow Down															Linear Characteristic	
Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(1)</sup>
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C <sub>V</sub>	2.90	5.78	8.85	11.6	13.9	16.0	18.0	19.7	21.2	22.3	0.89
					K <sub>V</sub>	2.51	5.00	7.66	10.0	12.0	13.8	15.6	17.0	18.3	19.3	---
					X <sub>T</sub>	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 <sub>V</sub>	3.68	6.98	11.3	15.9	20.8	26.4	32.7	39.2	45.7	52.5	0.84
					K <sub>V</sub>	3.18	6.04	9.77	13.8	18.0	22.8	28.3	33.9	39.5	45.4	---
					X <sub>T</sub>	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 <sub>V</sub>	3.01	5.45	8.95	12.5	15.9	19.1	23.3	28.4	33.2	37.6	0.73
					K <sub>V</sub>	2.60	4.71	7.74	10.8	13.8	16.5	20.2	24.6	28.7	32.5	---
					X <sub>T</sub>	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 <sub>V</sub>	10.9	25.1	41.3	58.4	75.7	93.9	112	128	143	153	0.83
					K <sub>V</sub>	9.43	21.7	35.7	50.5	65.5	81.2	96.9	111	124	132	---
					X <sub>T</sub>	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 <sub>V</sub>	3.61	6.92	11.1	15.5	20.6	26.4	33.2	41.4	50.1	60.2	0.78
					K <sub>V</sub>	3.12	5.99	9.60	13.4	17.8	22.8	28.7	35.8	43.3	52.1	---
					X <sub>T</sub>	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 <sub>V</sub>	14.0	33.8	56.3	80.2	104	127	148	169	185	201	0.81
					K <sub>V</sub>	12.1	29.2	48.7	69.4	90.0	110	128	146	160	174	---
					X <sub>T</sub>	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 <sub>V</sub>	7.02	15.7	25.7	36.9	48.6	60.9	72.9	84.6	97.2	108	0.76
					K <sub>V</sub>	6.07	13.6	22.2	31.9	42.0	52.7	63.1	73.2	84.1	93.4	---
					X <sub>T</sub>	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 <sub>V</sub>	24.2	51.2	81.8	109	140	171	208	256	300	341	0.78
					K <sub>V</sub>	20.9	44.3	70.8	94.3	121	148	180	221	260	295	---
					X <sub>T</sub>	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 <sub>V</sub>	10.2	22.8	36.6	52.1	68.0	84.5	102	124	147	168	0.74
					K <sub>V</sub>	8.82	19.7	31.7	45.1	58.8	73.1	88.2	107	127	145	---
					X <sub>T</sub>	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. Fisher EAT, Equal Percentage Cage, With Liner

With Liner - Flow Down																Equal Percentage Characteristic
Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(1)</sup>
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C <sub>V</sub>	1.02	1.49	2.07	2.70	3.92	5.68	8.18	11.7	15.5	18.5	0.93
					K <sub>V</sub>	0.882	1.29	1.79	2.34	3.39	4.91	7.08	10.1	13.4	16.0	---
					X <sub>T</sub>	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 <sub>V</sub>	1.44	2.38	3.54	5.10	7.60	11.6	18.1	26.9	37.8	48.1	0.83
					K <sub>V</sub>	1.25	2.06	3.06	4.41	6.57	10.0	15.7	23.3	32.7	41.6	---
					X <sub>T</sub>	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 <sub>V</sub>	0.792	1.28	1.84	2.56	3.78	5.66	8.64	13.3	19.9	27.6	0.75
					K <sub>V</sub>	0.685	1.11	1.59	2.21	3.27	4.90	7.47	11.5	17.2	23.9	---
					X <sub>T</sub>	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 <sub>V</sub>	4.38	7.99	12.1	16.5	24.2	36.5	56.6	85.9	116	151	0.78
					K <sub>V</sub>	3.79	6.91	10.5	14.3	20.9	31.6	49.0	74.3	100	131	---
					X <sub>T</sub>	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 <sub>V</sub>	1.31	2.28	3.48	5.05	7.58	11.9	18.2	26.7	38.4	50.5	0.78
					K <sub>V</sub>	1.13	1.97	3.01	4.37	6.56	10.3	15.7	23.1	33.2	43.7	---
					X <sub>T</sub>	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 <sub>V</sub>	2.31	0.470	7.45	11.3	17.8	28.7	47.9	77.5	112	152	0.81
					K <sub>V</sub>	2.00	0.41	6.44	9.77	15.4	24.8	41.4	67.0	96.9	131	---
					X <sub>T</sub>	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 <sub>V</sub>	2.24	3.67	5.44	7.81	11.7	17.9	27.6	41.9	62.6	86.3	0.73
					K <sub>V</sub>	1.94	3.17	4.71	6.76	10.1	15.5	23.9	36.2	54.1	74.6	---
					X <sub>T</sub>	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 <sub>V</sub>	5.54	11.0	18.1	30.9	51.7	84.3	136	205	276	336	0.74
					K <sub>V</sub>	4.79	9.52	15.7	26.7	44.7	72.9	118	177	239	291	---
					X <sub>T</sub>	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 <sub>V</sub>	1.32	3.73	7.20	11.1	17.5	27.6	43.4	67.8	102	147	0.74
					K <sub>V</sub>	1.14	3.23	6.23	9.60	15.1	23.9	37.5	58.6	88.2	127	---
					X <sub>T</sub>	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. Fisher EAT, Equal Percentage Cage, Without Liner

Without Liner - Flow Down															Equal Percentage Characteristic	
Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(1)</sup>
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C <sub>V</sub>	1.08	1.62	2.20	2.96	4.18	6.04	8.74	12.5	16.5	19.0	0.91
					K <sub>V</sub>	0.934	1.40	1.90	2.56	3.62	5.22	7.56	10.8	14.3	16.4	---
					X <sub>T</sub>	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 <sub>V</sub>	1.67	2.60	3.82	5.43	7.79	12.2	18.9	27.4	37.8	47.2	0.85
					K <sub>V</sub>	1.44	2.25	3.30	4.70	6.74	10.6	16.3	23.7	32.7	40.8	---
					X <sub>T</sub>	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 <sub>V</sub>	1.11	1.55	2.05	2.87	4.07	5.95	8.84	13.4	19.6	26.8	0.79
					K <sub>V</sub>	0.960	1.34	1.77	2.48	3.52	5.15	7.65	11.6	17.0	23.2	---
					X <sub>T</sub>	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 <sub>V</sub>	4.59	8.29	12.0	16.9	25.0	37.7	57.3	85.1	121	148	0.80
					K <sub>V</sub>	3.97	7.17	10.4	14.6	21.6	32.6	49.6	73.6	105	128	---
					X <sub>T</sub>	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 <sub>V</sub>	1.56	2.51	3.68	5.40	7.65	11.7	18.2	27.0	37.3	47.8	0.84
					K <sub>V</sub>	1.35	2.17	3.18	4.67	6.62	10.1	15.7	23.4	32.3	41.3	---
					X <sub>T</sub>	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 <sub>V</sub>	2.51	5.10	8.03	12.0	18.7	30.7	47.4	80.3	116	156	0.81
					K <sub>V</sub>	2.17	4.41	6.95	10.4	16.2	26.6	41.0	69.5	100	135	---
					X <sub>T</sub>	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 <sub>V</sub>	2.33	3.56	5.64	8.18	11.9	18.0	28.2	42.6	62.2	81.8	0.79
					K <sub>V</sub>	2.02	3.08	4.88	7.08	10.3	15.6	24.4	36.8	53.8	70.8	---
					X <sub>T</sub>	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 <sub>V</sub>	5.51	10.9	17.9	30.2	50.5	82.0	133	200	269	328	0.78
					K <sub>V</sub>	4.77	9.43	15.5	26.1	43.7	70.9	115	173	233	284	---
					X <sub>T</sub>	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 <sub>V</sub>	4.00	7.63	11.1	15.0	23.3	35.0	53.3	79.6	112	144	0.78
					K <sub>V</sub>	3.46	6.60	9.60	13.0	20.2	30.3	46.1	68.9	96.9	125	---
					X <sub>T</sub>	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. Fisher EAT, Whisper Trim I Cage

<b>Whisper Trim I - Flow Up</b>														<b>Linear Characteristic</b>	
Valve Size, NPS	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 <sub>v</sub>	2.17	5.30	8.44	11.8	14.7	16.6	19.5	21.5	23.1	24.1
					K <sub>v</sub>	1.88	4.58	7.30	10.2	12.7	14.4	16.9	18.6	20.0	20.8
					X <sub>T</sub>	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 <sub>v</sub>	4.98	11.0	19.7	27.9	34.5	40.6	45.7	50.1	53.7	55.9
					K <sub>v</sub>	4.31	9.52	17.0	24.1	29.8	35.1	39.5	43.3	46.5	48.4
					X <sub>T</sub>	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 <sub>v</sub>	12.4	30.4	48.3	67.6	84.2	95.2	112	123	132	138
					K <sub>v</sub>	10.7	26.3	41.8	58.5	72.8	82.3	96.9	106	114	119
					X <sub>T</sub>	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 <sub>v</sub>	16.7	42.9	67.5	91.2	113	133	152	168	182	194
					K <sub>v</sub>	14.4	37.1	58.4	78.9	97.7	115	131	145	157	168
					X <sub>T</sub>	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 <sub>v</sub>	28.8	70.4	112	157	195	220	260	285	310	320
					K <sub>v</sub>	24.9	60.9	96.9	136	169	190	225	247	268	277
					X <sub>T</sub>	0.303	0.331	0.361	0.330	0.330	0.360	0.360	0.390	0.391	0.403

Table 32. Fisher ET, CL125-600, Quick Opening Cage

Quick Opening																Quick Opening Characteristic	
Valve Size, NPS	Port Diameter		Maximum Travel <sup>(1)</sup>		Flow Coefficient	Coeffs for 6 mm (0.25 In) Travel <sup>(2)</sup>	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(3)</sup>
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C <sub>v</sub>	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 <sub>v</sub>	12.7	4.20	8.12	11.6	14.6	16.3	17.6	18.3	18.9	18.9	19.1	---
					X <sub>T</sub>	0.703	0.556	0.744	0.724	0.666	0.626	0.584	0.566	0.549	0.554	0.556	---
1-1/2	47.6	1.875	19	0.75	C <sub>v</sub>	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 <sub>v</sub>	19.5	6.74	12.5	17.7	23.2	27.7	31.7	34.1	35.7	36.9	38.1	---
					X <sub>T</sub>	0.679	0.494	0.641	0.682	0.680	0.686	0.661	0.649	0.638	0.616	0.597	---
	F <sub>d</sub>	---	0.22	0.28	0.32	0.34	0.35	0.36	0.36	0.36	0.36	0.36	0.36	---			
	33.3 <sup>(4)</sup>	1.3125 <sup>(4)</sup>	19	0.75	C <sub>v</sub>	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 <sub>v</sub>	14.0	4.37	8.64	12.7	17.3	20.8	22.2	22.7	23.7	24.7	25.9	---
X <sub>T</sub>					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 <sub>v</sub>	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 <sub>v</sub>	25.7	11.6	23.2	34.5	44.4	54.4	61.1	63.8	65.4	66.4	67.1	---
					X <sub>T</sub>	0.773	0.605	0.695	0.737	0.761	0.703	0.658	0.641	0.635	0.626	0.623	---
	F <sub>d</sub>	---	0.24	0.30	0.33	0.35	0.36	0.36	0.36	0.36	0.36	0.36	0.36	---			
	33.3 <sup>(4)</sup>	1.3125 <sup>(4)</sup>	19	0.75	C <sub>v</sub>	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 <sub>v</sub>	14.4	4.15	8.29	12.9	17.5	22.2	25.3	27.0	27.0	27.0	27.0	---
X <sub>T</sub>					0.705	0.578	0.733	0.695	0.698	0.666	0.689	0.735	0.791	0.805	0.805	---	
2-1/2	73.0	2.875	38	1.5	C <sub>v</sub>	33.4	20.9	39.6	58.8	74.2	84.9	97.0	103	106	108	109	0.81
					K <sub>v</sub>	28.9	18.1	34.3	50.9	64.2	73.4	83.9	89.1	91.7	93.4	94.3	---
					X <sub>T</sub>	0.635	0.601	0.684	0.738	0.767	0.744	0.689	0.669	0.658	0.660	0.652	---
	F <sub>d</sub>	---	0.25	0.31	0.34	0.35	0.36	0.36	0.36	0.36	0.36	0.36	0.35	---			
	47.6 <sup>(4)</sup>	1.875 <sup>(4)</sup>	19	0.75	C <sub>v</sub>	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 <sub>v</sub>	21.9	6.77	13.1	19.7	26.8	34.6	41.8	47.5	52.2	57.4	61.6	---
X <sub>T</sub>					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 <sub>v</sub>	43.6	27.2	52.2	77.9	99.5	124	140	149	154	158	161	0.77
					K <sub>v</sub>	37.7	23.5	45.2	67.4	86.1	107	121	129	133	137	139	---
					X <sub>T</sub>	0.635	0.626	0.671	0.745	0.796	0.703	0.657	0.619	0.602	0.591	0.577	---
	F <sub>d</sub>	---	0.22	0.29	0.32	0.34	0.35	0.36	0.36	0.36	0.36	0.36	0.36	---			
	58.7 <sup>(4)</sup>	2.3125 <sup>(4)</sup>	29	1.125	C <sub>v</sub>	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 <sub>v</sub>	30.4	13.8	27.4	40.8	52.5	64.4	72.3	75.5	77.4	78.7	79.5	---
X <sub>T</sub>					0.852	0.718	0.837	0.889	0.905	0.842	0.784	0.763	0.760	0.744	0.744	---	

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Table 32. Fisher ET, CL125-600, Quick Opening Cage (continued)

Valve Size, NPS	Port Diameter		Maximum Travel <sup>(1)</sup>		Flow Coefficient	Coeffs for 6 mm (0.25 in) Travel <sup>(2)</sup>	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(3)</sup>
	mm	Inches	mm	Inches			10	20	30	40	50	60	70	80	90	100	
4	111.1	4.375	51	2	C <sub>v</sub>	45.9	37.7	75.0	125	163	193	220	238	247	251	251	0.79
					K <sub>v</sub>	39.7	32.6	64.9	108	141	167	190	206	214	217	217	---
					X <sub>T</sub>	0.607	0.623	0.689	0.733	0.764	0.762	0.723	0.689	0.669	0.683	0.694	---
					F <sub>d</sub>	---	0.22	0.27	0.29	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.30
	73.0 (4)	2.875 (4)	38	1.5	C <sub>v</sub>	39.8	25.0	47.2	70.1	88.5	101	116	123	127	129	130	0.89
					K <sub>v</sub>	34.4	21.6	40.8	60.6	76.6	87.4	100	106	110	112	112	---
X <sub>T</sub>					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 <sub>v</sub>	92.0	73.6	150	232	306	353	389	416	441	451	460	0.82
					K <sub>v</sub>	79.6	63.7	130	201	265	305	336	360	381	390	398	---
					X <sub>T</sub>	0.660	0.664	0.651	0.667	0.694	0.722	0.742	0.728	0.723	0.719	0.710	---
					F <sub>d</sub>	---	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 <sub>v</sub>	64.9	52.3	101	150	199	247	284	310	329	345	358	0.87
					K <sub>v</sub>	56.1	45.2	87.4	130	172	214	246	268	285	298	310	---
X <sub>T</sub>	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 <sub>v</sub>	108	80.3	188	290	389	480	554	615	658	705	744	0.87
					K <sub>v</sub>	93.4	69.5	163	251	336	415	479	532	569	610	644	---
					X <sub>T</sub>	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 <sub>v</sub>	108	135	291	434	551	639	706	759	807	841	863	0.85
					K <sub>v</sub>	93.4	117	252	375	477	553	611	657	698	727	746	---
					X <sub>T</sub>	0.653	0.643	0.699	0.757	0.807	0.838	0.861	0.857	0.841	0.838	0.827	---
					F <sub>d</sub>	---	0.19	0.24	0.26	0.27	0.28	0.28	0.28	0.28	0.28	0.27	---

1. When using 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 ETR.

**Product Bulletin**

51.1:ET  
April 2011

**ET Valve**

Table 33. Fisher ET, CL125-600, Linear Cage

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

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Table 33. Fisher ET, CL125-600, Linear Cage (continued)

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

Table 34. Fisher ET, CL125-600, Equal Percentage Cage, Flow Down

Equal Percentage															Equal Percentage Characteristic	
Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(1)</sup>
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
1	33.3	1.3125	19	0.75	C <sub>v</sub>	0.783	1.54	2.20	2.89	4.21	5.76	7.83	10.9	14.1	17.2	0.88
					K <sub>v</sub>	0.677	1.33	1.90	2.50	3.64	4.98	6.77	9.43	12.2	14.9	---
					X <sub>T</sub>	0.766	0.614	0.587	0.667	0.672	0.687	0.743	0.760	0.733	0.667	---
1-1/2	47.6	1.875	19	0.75	C <sub>v</sub>	1.52	2.63	3.87	5.41	7.45	11.2	17.4	24.5	30.8	35.8	0.84
					K <sub>v</sub>	1.31	2.27	3.35	4.68	6.44	9.69	15.1	21.2	26.6	31.0	---
					X <sub>T</sub>	0.780	0.735	0.716	0.715	0.738	0.727	0.690	0.685	0.685	0.679	---
	F <sub>d</sub>	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 <sub>v</sub>	1.12	1.56	2.22	3.10	4.27	6.17	9.01	13.1	18.2	23.1	0.91
					K <sub>v</sub>	0.969	1.35	1.92	2.68	3.69	5.34	7.79	11.3	15.7	20.0	---
X <sub>T</sub>					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 <sub>v</sub>	1.66	2.93	4.66	6.98	10.8	16.5	25.4	37.3	50.7	59.7	0.85
					K <sub>v</sub>	1.44	2.53	4.03	6.04	9.34	14.3	22.0	32.3	43.9	51.6	---
					X <sub>T</sub>	0.827	0.834	0.774	0.727	0.687	0.684	0.702	0.736	0.686	0.687	---
	F <sub>d</sub>	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 <sub>v</sub>	0.923	1.42	2.09	2.84	4.11	5.83	8.58	12.8	18.5	24.3	0.88
					K <sub>v</sub>	0.798	1.23	1.81	2.46	3.56	5.04	7.42	11.1	16.0	21.0	---
X <sub>T</sub>					0.775	0.744	0.742	0.707	0.715	0.714	0.714	0.641	0.621	0.649	---	
2-1/2	73.0	2.875	38	1.5	C <sub>v</sub>	3.43	7.13	10.8	15.1	22.4	33.7	49.2	71.1	89.5	99.4	0.84
					K <sub>v</sub>	2.97	6.17	9.34	13.1	19.4	29.2	42.6	61.5	77.4	86.0	---
					X <sub>T</sub>	0.778	0.702	0.678	0.677	0.658	0.654	0.661	0.665	0.661	0.660	---
	F <sub>d</sub>	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 <sub>v</sub>	1.57	2.57	3.82	5.44	7.64	11.5	18.2	26.7	35.1	43.9	0.89
					K <sub>v</sub>	1.36	2.22	3.30	4.71	6.61	9.95	15.7	23.1	30.4	38.0	---
X <sub>T</sub>					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 <sub>v</sub>	4.32	7.53	10.9	17.1	27.2	43.5	66.0	97.0	120	136	0.82
					K <sub>v</sub>	3.74	6.51	9.43	14.8	23.5	37.6	57.1	83.9	104	118	---
					X <sub>T</sub>	0.774	0.706	0.682	0.635	0.616	0.602	0.663	0.693	0.670	0.675	---
	F <sub>d</sub>	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 <sub>v</sub>	1.75	3.11	4.77	7.07	10.7	17.0	27.9	41.5	58.0	70.7	0.87
					K <sub>v</sub>	1.51	2.69	4.13	6.12	9.26	14.7	24.1	35.9	50.2	61.2	---
X <sub>T</sub>					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 <sub>v</sub>	5.85	11.6	18.3	30.2	49.7	79.7	125	171	205	224	0.82
					K <sub>v</sub>	5.06	10.0	15.8	26.1	43.0	68.9	108	148	177	194	---
					X <sub>T</sub>	0.731	0.650	0.643	0.645	0.632	0.625	0.672	0.742	0.737	0.716	---
	F <sub>d</sub>	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 <sub>v</sub>	3.82	7.65	11.4	16.9	25.5	38.2	60.5	85.7	105	112	0.89
					K <sub>v</sub>	3.30	6.62	9.86	14.6	22.1	33.0	52.3	74.1	90.8	96.9	---
X <sub>T</sub>					0.746	0.700	0.694	0.669	0.640	0.627	0.591	0.644	0.735	0.813	---	

-continued-

Table 34. Fisher ET, CL125-600, Equal Percentage Cage, Flow Down (continued)

Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										F <sub>L</sub> <sup>(1)</sup>
	mm	Inches	mm	Inches		10	20	30	40	50	60	70	80	90	100	
6	177.8	7	51	2	C <sub>v</sub>	12.9	25.8	43.3	67.4	104	162	239	316	368	394	0.85
					K <sub>v</sub>	11.2	22.3	37.5	58.3	90.0	140	207	273	318	341	---
					X <sub>T</sub>	0.688	0.680	0.682	0.709	0.700	0.720	0.736	0.744	0.780	0.778	---
					F <sub>d</sub>	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 <sub>v</sub>	5.40	10.1	15.8	26.7	45.2	71.2	111	169	232	274	0.88
					K <sub>v</sub>	4.67	8.74	13.7	23.1	39.1	61.6	96.0	146	201	237	---
					X <sub>T</sub>	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 <sub>v</sub>	18.5	38.0	58.4	86.7	130	189	268	371	476	567	0.85
					K <sub>v</sub>	16.0	32.9	50.5	75.0	112	163	232	321	412	490	---
					X <sub>T</sub>	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 <sub>v</sub>	27.0	58.1	105	188	307	478	605	695	761	818	0.86
					K <sub>v</sub>	23.4	50.3	90.8	163	266	413	523	601	658	708	---
					X <sub>T</sub>	0.644	0.654	0.636	0.611	0.643	0.615	0.725	0.809	0.804	0.807	---
					F <sub>d</sub>	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 ETR.

Table 35. Fisher ET, CL125-600, Whisper Trim I Cage, Flow Up

Whisper Trim I											Linear Characteristic				
Valve Size, NPS <sup>(1)</sup>	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 <sub>v</sub>	3.28	7.39	12.0	14.2	14.9	15.3	15.7	16.0	16.4	16.8
					K <sub>v</sub>	2.84	6.39	10.4	12.3	12.9	13.2	13.6	13.8	14.2	14.5
					X <sub>T</sub>	0.581	0.605	0.617	0.644	0.764	0.790	0.809	0.813	0.795	0.768
1-1/2	47.6	1.875	19	0.75	C <sub>v</sub>	2.62	7.42	13.9	20.8	23.2	24.2	24.9	25.4	26.1	26.7
					K <sub>v</sub>	2.27	6.42	12.0	18.0	20.1	20.9	21.5	22.0	22.6	23.1
					X <sub>T</sub>	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 <sub>v</sub>	3.12	7.36	13.0	18.5	20.7	21.4	21.8	23.1	23.9	25.2
					K <sub>v</sub>	2.70	6.37	11.2	16.0	17.9	18.5	18.9	20.0	20.7	21.8
					X <sub>T</sub>	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 <sub>v</sub>	7.30	19.2	34.6	42.2	45.5	47.0	47.1	47.2	47.2	48.0
					K <sub>v</sub>	6.31	16.6	29.9	36.5	39.4	40.7	40.7	40.8	40.8	41.5
					X <sub>T</sub>	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 <sub>v</sub>	2.86	6.79	11.7	18.4	23.6	27.9	30.9	33.5	35.3	36.7
					K <sub>v</sub>	2.47	5.87	10.1	15.9	20.4	24.1	26.7	29.0	30.5	31.7
					X <sub>T</sub>	0.672	0.755	0.547	0.386	0.358	0.377	0.398	0.431	0.470	0.483
2-1/2	73.0	2.875	38	1.5	C <sub>v</sub>	12.2	32.6	49.7	54.4	55.9	59.8	64.0	67.7	71.4	74.0
					K <sub>v</sub>	10.6	28.2	43.0	47.1	48.4	51.7	55.4	58.6	61.8	64.0
					X <sub>T</sub>	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 <sub>v</sub>	3.11	8.31	14.9	22.4	29.9	36.0	41.6	46.4	50.5	53.6
					K <sub>v</sub>	2.69	7.19	12.9	19.4	25.9	31.1	36.0	40.1	43.7	46.4
					X <sub>T</sub>	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 <sub>v</sub>	16.5	40.3	70.8	88.0	92.1	90.7	90.3	92.6	95.6	99.1
					K <sub>v</sub>	14.3	34.9	61.2	76.1	79.7	78.5	78.1	80.1	82.7	85.7
					X <sub>T</sub>	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 <sub>v</sub>	8.15	19.1	33.2	47.6	60.8	72.1	81.8	90.1	97.4	103
					K <sub>v</sub>	7.05	16.5	28.7	41.2	52.6	62.4	70.8	77.9	84.3	89.1
					X <sub>T</sub>	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 <sub>v</sub>	33.9	76.6	117	135	137	137	141	149	157	169
					K <sub>v</sub>	29.3	66.3	101	117	119	119	122	129	136	146
					X <sub>T</sub>	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 <sub>v</sub>	13.6	32.5	54.3	75.5	94.6	112	127	141	153	160
					K <sub>v</sub>	11.8	28.1	47.0	65.3	81.8	96.9	110	122	132	138
					X <sub>T</sub>	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 <sub>v</sub>	55.8	125	196	245	270	286	297	308	323	338
					K <sub>v</sub>	48.3	108	170	212	234	247	257	266	279	292
					X <sub>T</sub>	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 <sub>v</sub>	100	226	337	436	502	581	641	655	659	681
					K <sub>v</sub>	86.5	195	292	377	434	503	554	567	570	589
					X <sub>T</sub>	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 <sub>v</sub>	142	303	428	542	611	652	669	689	700	726
					K <sub>v</sub>	123	262	370	469	529	564	579	596	606	628
					X <sub>T</sub>	0.549	0.450	0.436	0.441	0.513	0.624	0.707	0.709	0.729	0.718

1. NPS 6 valve with restricted Whisper Trim not available. Use EW valve 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 ETR.

Table 36. Fisher ET, CL125-600, Whisper Trim III Cage, Flow Up

<b>Whisper Trim III</b>															Linear Characteristic <sup>(2)</sup>	
Valve Size, NPS	Port Diameter		Maximum Travel		Flow Coefficient	Valve Opening—Percent of Total Travel										$X_T^{(1)}$
	mm	Inches	mm	Inches		Minimum <sup>(3)</sup>	20	30	40	50	60	70	80	90	100	
<b>A3 <math>\Delta P/P_1 \leq 0.6</math></b>																
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	---
<b>B3 <math>\Delta P/P_1 \leq 0.75</math></b>																
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	---
<b>C3 <math>\Delta P/P_1 \leq 0.85</math></b>																
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	---
<b>D3 <math>\Delta P/P_1 \leq 0.99</math></b>																
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 period of time. Erosion damage to the valve may result.

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

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**ET Valve**

Table 37. Fisher ET, Cavitrol III Cage

<b>CL600 - Flow Down</b>																Linear Characteristic	
Valve Size, NPS	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	
<b>One Stage</b>																	
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	---
1-1/2	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	---
2-1/2	73.0	2.875	38.1 <sup>(2)</sup>	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 <sup>(2)</sup>	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 <sup>(2)</sup>	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	---
<b>Two Stage</b>																	
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	---
1-1/2	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	---
2-1/2	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

**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)

**EAT:** Angle version of ET control valve, used to facilitate piping or in applications where a self-draining valve is desired (figure 3)

**ETR:** Same as ET control valve except with push-down-to-open valve plug action (figure 4)

### Valve Sizes and End Connection Styles

Flanged raised-face per EN 1092-1/B and see table 1

### Maximum Inlet Pressures and Temperatures<sup>(1,2)</sup>

As listed below, unless limited by maximum pressure drop or material temperature capabilities **Valves with Cast Iron Bodies.**

*Flanged:* Consistent with CL125B or 250B per ASME B16.1

**Valves with Steel and Stainless Steel Bodies.**

*Flanged:* Consistent with CL150, 300, and 600<sup>(3)</sup> per ASME B16.34

*Screwed or Welding:* Consistent with flanged CL600 per ASME B16.34

### Maximum Pressure Drops<sup>(2)</sup>

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  $\Delta P/P_1$  ratios<sup>(4)</sup> — 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 / ISO 15156 and MR0103:**

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 carbon steel, ■ WC9 chrome moly steel, ■ CF8M (cast 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<sup>(2)</sup>

**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 / ISO 15156 and MR0103:** See table 18.

**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

**ET.**

*Standard Cage:* Normally down

*Whisper Trim and WhisperFlo Cages:* Always up

*Cavitrol Cage:* Always down

**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

**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 NPS 6 valves), contact your Emerson Process Management™ sales office

- continued -

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**Specifications (continued)**

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**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**

- NPS 1:** 14 kg (30 lb)
- NPS 1-1/2:** 20 kg (45 lb)
- NPS 2:** 39 kg (85 lb)
- NPS 2-1/2:** 45 kg (100 lb)
- NPS 3:** 57 kg (125 lb)
- NPS 4:** 77 kg (170 lb)
- NPS 6:** 159 kg (350 lb)
- NPS 8:** 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

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1. EN (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 CL600 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.

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## 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<sup>(1)</sup>

**To Meet the EPA Fugitive Emission Standard of 100 PPM<sup>(2)</sup>.**

*For ENVIRO-SEAL PTFE and ENVIRO-SEAL Duplex packing systems: full CL300 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<sup>(3)</sup>.*

*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

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