

# Fisher® easy-e™ Cryogenic Sliding-Stem Control Valves

Fisher easy-e cryogenic valves are globe-style, single-port, valves featuring stainless steel construction materials and fabricated extension bonnets. Fisher ET-C and EWT-C valves are pressure-balanced, whereas the Fisher EZ-C valve is an unbalanced design. These cryogenic valves are designed to provide throttling or on-off control of liquids and gases at cryogenic temperatures as low as  $-198^{\circ}\text{C}$  ( $-325^{\circ}\text{F}$ ).

When required, these rugged valves can reliably provide tight shutoff for special applications within the chemical and hydrocarbon processing industries, such as certain liquefied natural gas services.

The high-capacity ET-C and EWT-C valves with pressure-balanced trim allow the use of smaller, lower-cost actuators, reducing installed costs in high-pressure and high-flow-rate applications.

## The easy-e Valve Family

These valves are part of the versatile easy-e family of industrial control valves. Special features include:

- **ET-C and EWT-C:** Different cage/plug styles provide particular flow characteristics for highly-specialized applications. The standard cage comes in two different flow characteristics: ■ equal percentage and ■ linear.
- **EZ-C:** Interchangeable, restricted-capacity trims and full-sized trims match a variety of process flow demands for highly-specialized applications. The standard plug is designed with three different flow characteristics: ■ equal percentage, ■ linear, and ■ quick-opening.



W6370-1

Typical Fisher easy-e Cryogenic Valve with Extension Bonnet and 585C Actuator



## Features

- **Cryogenic Spring-Loaded Seal Ring**—The seal ring and associated valve parts in the ET-C and EWT-C valves are specifically designed and manufactured for excellent performance at low temperatures.
- **Stable Control**—Rugged cage guiding in the ET-C and EWT-C valves stabilizes the valve plug at all points in its travel to reduce vibration, mechanical noise, and the need for hydraulic snubbers.
- **Cost Effective Operation and Economical Maintenance**—Increased wear resistance of hardened stainless steel trim means long-lasting service. Balanced valve plug construction in the ET-C and EWT-C valves permits use of smaller, lower-cost Fisher actuators.
- **Piping Economy**—Expanded end connections of EW Series valves may reduce the need for line swages while accommodating oversized piping arrangements used to limit fluid flow velocities.
- **Cryogenic Design Features**—The stainless steel valve body and bonnet with fabricated extension are designed to meet low temperature requirements. The unique metal-to-metal seat design provides repeatable tight shutoff, reducing maintenance costs.
- **Rugged Metal Seat**—The metal-to-metal seat is designed and manufactured to provide long-lasting, reliable, tight shutoff at both ambient and cryogenic temperatures without the need for periodic lapping. This reduces the need for soft seats, even in applications with stringent shutoff requirements.
- **Fugitive Emission Protection**—The optional ENVIRO-SEAL™ packing systems provide an improved stem seal to help prevent the loss of valuable or hazardous process fluids, and keep emissions below the EPA limit of 100 ppm. Additionally, these live-loaded packing systems can provide long life and reliability at low temperatures to help reduce maintenance costs and downtime.
- **Thoroughly Tested**—Extensive cryogenic testing during the development of the valve design reduces the need for expensive cold testing for most applications, which results in quicker delivery and greater value.
- **Easy Maintenance**—Quick-change trim, with a clamped-in seat ring, reduces the disassembly/assembly time. The valve body can stay in the pipeline during removal of trim parts for inspection or maintenance.
- **Sour Service Capability**—For NACE applications, consult your Emerson Process Management sales office.

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**Specifications**

**Available Configurations**

**ET-C:** Single-port, globe-style control valve with cage guiding, balanced valve plug, and push-down-to-close valve plug action (figure 1)  
**EWT-C:** Single-port, globe-style control valve with cage guiding, balanced valve plug, push-down-to-close valve plug action, and with expanded end connections (figure 1)  
**EZ-C:** Single-port, globe-style control valve with post-guiding, unbalanced valve plug, and push-down-to-close valve plug action (figure 2)

**Valve Sizes**

**ET-C:** ■ NPS 3, ■ 4, ■ 6, and ■ 8  
**EWT-C:** ■ NPS 6X4<sup>(1)</sup>, ■ 8X4, ■ 8X6, ■ 12X6, and ■ 10X8  
**EZ-C:** ■ NPS 1, ■ 1-1/2, ■ 2, ■ 3, and ■ 4

**End Connection Styles<sup>(2)</sup>**

CL150, 300, or 600 raised-face flanges per ■ ASME B16.5, ■ EN 1092-1/B

**Maximum Inlet Pressure<sup>(2)</sup>**

Consistent with ■ CL150 and ■ CL300 pressure-temperature ratings per ASME B16.34  
 ■ CL600 valves with B8M Class 2 bolting are consistent with CL600 pressure-temperature ratings per ASME B16.34 except as shown below:

VALVE	VALVE SIZE, NPS	MAXIMUM INLET PRESSURE at 38°C (100°F)	
		Bar	Psig
EZ-C	1	77	1110
	2	83	1200
	3	94	1370
ET-C and EWT-C	3	94	1370
	6, 8 x 6, 12 x 6	75	1085
	8, 10 x 8	96	1390

■ CL600 valves with optional S20910 (XM-19) bolting are consistent with CL600 pressure-temperature ratings per ASME B16.34

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

Same as maximum inlet pressure, except where limited by spiral wound gasket for EZ-C (see tables 7 and 8)

**Trim Material**

See tables 1 and 2

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

**ET-C and EWT-C**

*Metal Seat:*  
 ■ Class IV is standard  
 ■ Class V Air Test is optional (Test will be 50 psid air)<sup>(6)</sup>.  
 ■ Class VI (Consult your Emerson Process Management sales office)

*Composition Seat:*  
 ■ Standard air test is standard  
 ■ Class VI is optional

**EZ-C**

*Metal Seat:*  
 ■ Class IV is standard  
 ■ Class VI is optional

**Maximum Actuator Thrust**

See table 3

**Conformance to Customer Specifications**

ET-C with metal seats and EZ-C valves successfully passed type approval testing per SIPM (Shell) specification T-2.253.730

**Flow Characteristics**

**ET-C, EWT-C, and EZ-C**  
 ■ Equal percentage  
 ■ Linear

**EZ-C Only**  
 ■ Quick-opening

**Flow Direction<sup>(5)</sup>**

**ET-C and EWT-C**  
 Normally down for linear and equal percentage trims. Flow up for Whisper Trim™. See figure 1.  
**EZ-C**  
 Up through the seat ring only. See figure 2

(Continued)

**Specifications (Continued)**

**Standard Construction Materials**

**Valve Body and Bonnet:** CF8M (316 SST)  
**Body-Bonnet Bolting:** SA-193-B8M Class 2 studs with SA-194-8M nuts (see table 6)  
**Bonnet Bushing:** S31600/filled PTFE  
**Flat Sheet Gaskets:** S31600/graphite  
**Spiral Wound Gasket:** N06600/graphite  
**Packing Studs and Nuts:** S31600 SST  
**Seal Ring (ET-C and EWT-C):** UHMWPE<sup>(3)</sup> with R30003 spring  
**Back-Up Ring (ET-C and EWT-C):** S31600 (316 SST)  
**Retaining Ring (ET-C and EWT-C):** S30200 (302 SST)  
**Load Ring (for ET-C, NPS 8 and for EWT-C, NPS 10 x 8 only):** N07718  
**Packing Follower, Lantern Ring, Packing Spring<sup>(4)</sup> and Packing Box Ring:** S31600 SST

**Material Temperature Capabilities<sup>(2)</sup>**

**ET-C and EWT-C**  
-198 to 66°C (-325 to 150°F)  
**EZ-C**  
-198 to 149°C (-325 to 300°F)

**Bonnet Extension Length**

See figures 3 and 4 for standard valve dimensions

**Flow Coefficients and Noise Level Prediction**

See Catalog 12

**Port Diameters, Plug Travel, Yoke Boss, and Stem Diameter**

See tables 4 and 5

**Packing Arrangements**

**Standard Material**

■ Single PTFE V-ring. See figures 1 and 2

**Optional Materials**

■ Double PTFE V-ring and  
■ Graphite ribbon/filament

**ENVIRO-SEAL Packing Systems: See figure 5**

**Packing Material:** ■ PTFE V-ring and ■ Graphite ULF

See Bulletin 59.1:061, ENVIRO-SEAL Packing Systems for Sliding-Stem Valves, for more information

**Approximate Weights (CL600 Valves)**

**ET-C:**

NPS 3: 51 kg (135 lb)  
NPS 4: 95 kg (210 lb)  
NPS 6: 211 kg (465 lb)  
NPS 8: 372 kg (820 lb)

**EWT-C:**

NPS 6X4: 200 kg (440 lb)  
NPS 8X4: 277 kg (610 lb)  
NPS 8X6: 318 kg (700 lb)  
NPS 12X6: 730 kg (1610 lb)  
NPS 10X8: 753 kg (1660 lb)

**EZ-C:**

NPS 1: 15 kg (33 lb)  
NPS 1-1/2: 23 kg (48 lb)  
NPS 2: 41 kg (90 lb)  
NPS 3: 60 kg (130 lb)  
NPS 4: 95 kg (210 lb)

**Options**

**ET-C and EWT-C:** ■ Whisper Trim III and WhisperFlo™ trim for aerodynamic noise attenuation, and ■ Cavitrol™ III cages for liquid cavitation protection are available. Contact your Emerson Process Management sales office for information  
**EZ-C:** ■ Micro-Flute and ■ Micro-Flow trim

1. Valve size number is end connection size by normal trim size. For example, an NPS 6X4 EWT-C valve has NPS 6 end connections with NPS 4 trim (see table 4).

2. Do not exceed the pressure or temperature limits in this bulletin, and any applicable code limitations.

3. UHMWPE stands for ultra high molecular weight polyethylene.

4. A spring is used only with PTFE V-ring packing. A lantern rings replace the spring in other packing arrangements.

5. Down is in through the cage and out the seat ring (see figure 1).

6. Class V shutoff cannot be performed with water. The residual trapped moisture from testing with water can cause valve and trim damage from the ice crystals formed at below freezing service temperatures.

**Table 1. Fisher ET-C and EWT-C Typical Trim Material<sup>(1)</sup>**

Trim Designation	Valve Plug	Valve Stem	Cage	Seat Ring
429	S31600 SST with CoCr-A (Alloy 6) hard-faced seat	S20910	Chrome-plated S31600 SST	S31600 SST
430 <sup>(2)</sup>	S31600 SST	S20910	Chrome-plated S31600 SST	S31600 SST/CTFE
431	S31600 SST with CoCr-A (Alloy 6) hard-faced seat and guide	S20910	Chrome-plated S31600 SST	S31600 SST

1. Whisper Trim III requires use of Trim 431.  
2. Soft seat construction.

**Table 2. Fisher EZ-C Typical Combinations of Metal Trim Parts for Equal Percentage (Including Micro-Form), Linear, and Quick-Opening Valve Plugs**

Trim Designation	Valve Plug	Valve Stem	Seat Ring	Seat Ring Retainer	Guide Bushing
327	S31600 SST with CoCr-A (Alloy 6) hard-faced Seat and Guide	S20910 (XM-19)	S31600	CF8M	R30006
328	S31600 SST with CoCr-A (Alloy 6) hard-faced Seat				

**Table 3. Maximum Allowable Actuator Thrust for Standard Bonnet Extension Length**

VALVE	VALVE SIZE, NPS	STEM DIAMETER		MAXIMUM ALLOWABLE STEM LOAD FOR S20910 (XM-19) STEM MATERIAL	
		mm	Inches	N	Lb
ET-C and EWT-C	3	12.7	1/2	15,301	3440
		19.1	3/4	45,459	10,220
	4, 6X4, 8X4	12.7	1/2	16,458	3700
		19.1	3/4	46,971	10,560
	6, 8X6, 12X6	19.1	3/4	36,385	8180
		25.4	1	81,487	18,320
	8, 10X8	19.1	3/4	41,366	9300
		25.4	1	87,003	19,560
EZ-C	1	9.5	3/8	5382	1210
		12.7	1/2	13,166	2960
	1-1/2	9.5	3/8	5338	1200
		12.7	1/2	13,166	2960
	2	12.7	1/2	14,367	3230
		19.1	3/4	44,169	9930
	3	12.7	1/2	15,301	3440
		19.1	3/4	45,459	10,220
	4	12.7	1/2	16,458	3700
		19.1	3/4	46,971	10,560

Figure 1. Fisher ET-C and EWT-C Valve Detail

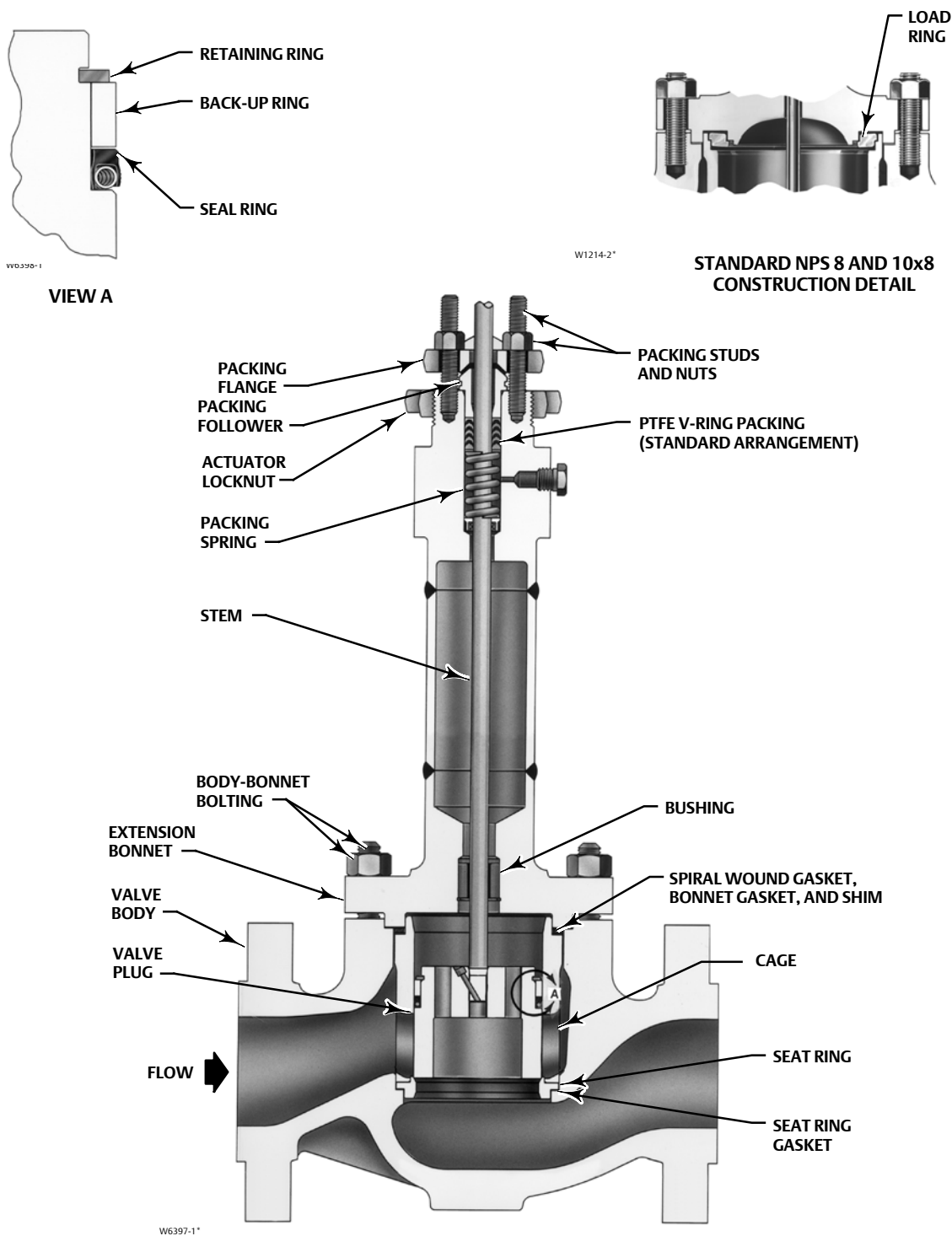
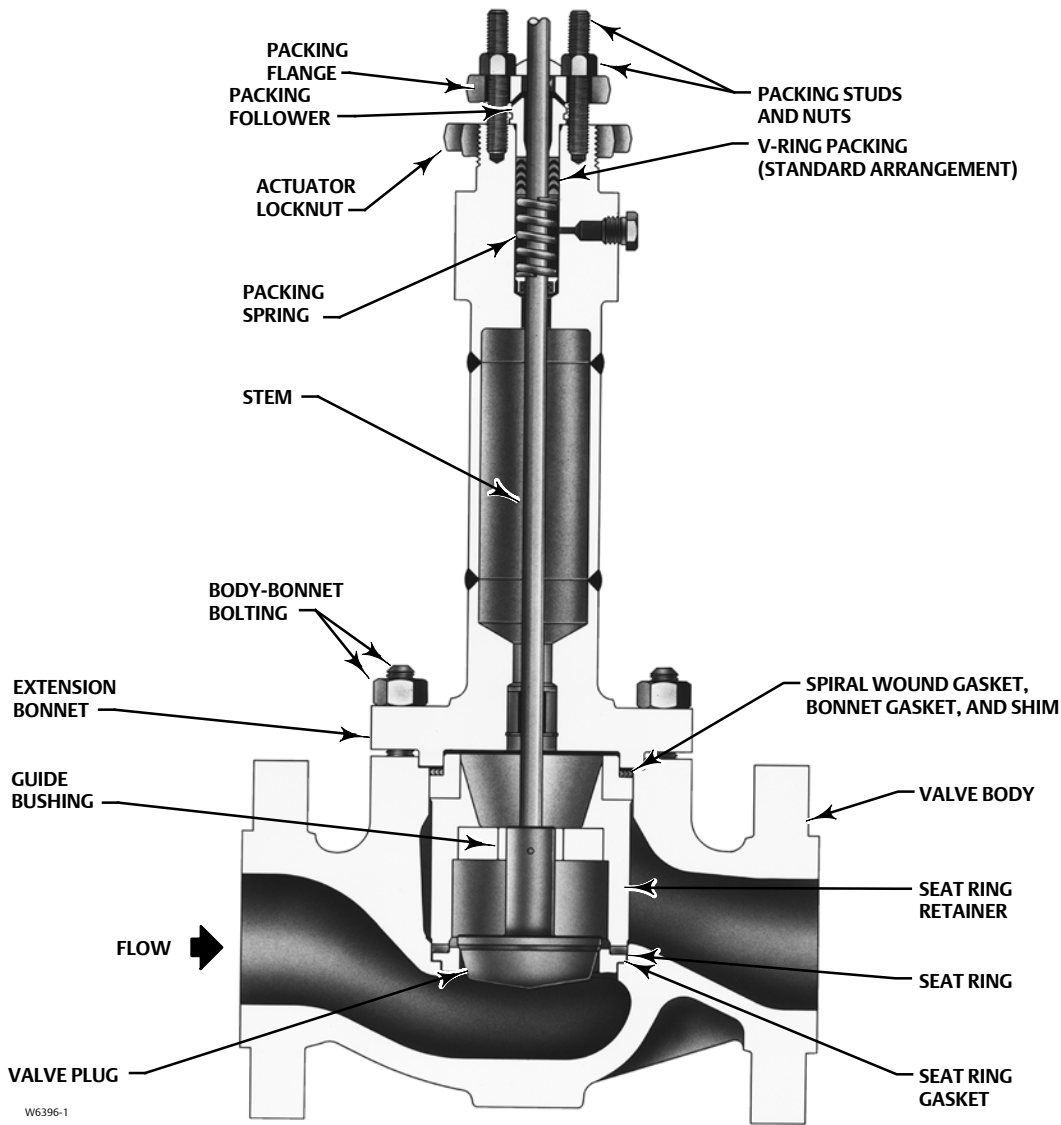


Figure 2. Fisher EZ-C Valve Assembly Detail



**Table 4. Fisher ET-C and EWT-C Port Diameters, Valve Plug Travel, Stem and Yoke Diameters**

VALVE SIZE, NPS		PORT DIAMETER	MAXIMUM VALVE PLUG TRAVEL	VALVE STEM AND YOKE BOSS DIAMETERS			
ET-C	EWT-C			Standard		Optional	
				Stem	Yoke Boss	Stem	Yoke Boss
<b>mm</b>							
3	---	87.3	38.1	12.7	71	19.1	90
4	6X4, 8X4	111.1	50.8				
6	8X6, 12X6	177.8	50.2	19.1	90.5	25.4	127.0
8	10X8	203.2	76.2				
<b>Inches</b>							
3	---	3.4375	1.5	1/2	2-13/16	3/4	3-9/16
4	6X4, 8X4	4.375	2				
6	8X6, 12X6	7	2	3/4	3-9/16	1	5
8	10X8	8	3				

**Table 5. Fisher EZ-C Port Diameters, Valve Plug Travel, and Stem and Yoke Diameters**

VALVE SIZE, NPS	PORT DIAMETER, INCHES			MAXIMUM PLUG TRAVEL	VALVE STEM AND YOKE BOSS DIAMETERS				
	EZ-C	Equal Percentage <sup>(1)</sup>	Quick Opening		Linear	Standard		Optional	
						Stem	Yoke Boss	Stem	Yoke Boss
<b>mm</b>									
1	6.4, 9.5, 12.7, 19.1, and 25.4	25.4	25.4	19	9.5	54	12.7	71	
1-1/2	6.4, 9.5, 12.7, 19.1, 25.4, and 38.1	38.1	38.1						
2	6.4, 9.5, 12.7, 19.1, 25.4, and 50.8	50.8	50.8	29	12.7	71	19.1	90	
3	50.8 and 76.2	76.2	76.2	38					
4	50.8 and 101.6	101.6	101.6	51					
<b>Inches</b>									
1	0.25, 0.375, 0.5, 0.75, and 1	1	1	0.75	3/8	2-1/8	1/2	2-13/16	
1-1/2	0.25, 0.375, 0.5, 0.75, 1, and 1.5	1.5	1.5						
2	0.25, 0.375, 0.5, 0.75, 1, and 2	2	2	1.125	1/2	2-13/16	3/4	3-9/16	
3	2 and 3	3	3	1.5					
4	2 and 4	4	4	2					

1. 6.4 through 19.1 mm (0.25 through 0.75 inch) port diameters use Micro-Form valve plugs.

**Table 6. Bolting Materials**

VALVE	BODY-BONNET BOLTING	
	Studs	Nuts
ET-C, EWT-C, and EZ-C	SA-193-B8M <sup>(1)</sup> Strain Hardened	SA-194-8M <sup>(1)</sup>
	S20910 (XM-19)	SA-194-8M
		SA-194-8MA

1. Standard stud and nut combination.



**Table 7. Fisher EZ-C Maximum Allowable Pressure Drop for N06600/Graphite Spiral Wound Gasket (NPS 1 and 1-1/2 Valve Size) (Flow Up Only)<sup>(1)</sup>**

TEMPERATURE, °C <sup>(3)</sup>	BAR <sup>(2)</sup>										
	EZ-C Valve Size, NPS										
	1					1-1/2					
	Port Diameter, mm										
	6.4	9.5	12.7	19.1	25.4	6.4	9.5	12.7	19.1	25.4	38.1
-198 to 93	94.5	96.2	97.9	104.1*	114*	77.9	79.0	80.0	82.7	87.6	105*
93	89.6*	91.4*	93.1*	98.6*	108*	73.8	74.5	75.2	78.6	82.7	99.3*
149	85.5*	87.2*	88.9*	94.5*	103*	70.3	71.4	72.4	75.2	79.3*	94.5*
TEMPERATURE, °F <sup>(3)</sup>	PSI <sup>(2)</sup>										
	EZ-C Valve Size, NPS										
	1					1-1/2					
	Port Diameter, Inches										
	0.25	0.375	0.5	0.75	1	0.25	0.375	0.5	0.75	1	1.5
-325 to 100	1370	1395	1420	1510*	1660*	1130	1145	1160	1200	1270	1520*
200	1300*	1325*	1350*	1430*	1570*	1070	1080	1090	1140	1200	1440*
300	1240*	1265*	1290*	1370*	1500*	1020	1035	1050	1090	1150*	1370*

1. EZ-C should not be used in flow down service including on-off applications.  
2. Pressure drop cannot exceed maximum inlet pressure as indicated in the specification table on page 2.  
3. Pressure drops at intermediate temperatures may be interpolated.  
\* Pressure drops are in excess of CL600 pressure ratings per ASME B16.34 for CF8M body material.

**Table 8. Fisher EZ-C Maximum Allowable Pressure Drop for N06600/Graphite Spiral Wound Gasket (NPS 2 through 4 Valve Size) (Flow Up Only)<sup>(1)</sup>**

TEMPERATURE, °C <sup>(3)</sup>	BAR <sup>(2)</sup>									
	EZ-C Valve Size, NPS									
	2					3			4	
	Port Diameter, mm									
	6.4	9.5	12.7	19.1	25.4	50.8	50.8	75.2	50.8	101.6
-198 to 93	67.6	68.2	68.7	70.3	73.1	101*	69.6	97.2	65.5	114*
93	63.4	64.1	64.8	66.9	69.6	95.8*	66.2	92.4*	62.1	108*
149	60.7	61.4	62.1	63.4	66.2	91.7*	62.7	88.3*	58.6	103*
TEMPERATURE, °F <sup>(3)</sup>	PSI <sup>(2)</sup>									
	EZ-C Valve Size, NPS									
	2					3			4	
	Port Diameter, Inches									
	0.25	0.375	0.5	0.75	1	2	2	3	2	4
-325 to 100	980	985	990	1020	1060	1470*	1010	1410	950	1650*
200	920	930	940	970	1010	1390*	960	1340*	900	1560*
300	880	890	900	920	960	1330*	910	1280*	850	1490*

1. EZ-C should not be used in flow down service including on-off applications.  
2. Pressure drop cannot exceed maximum inlet pressure as indicated in the specification table on page 2.  
3. Pressure drops at intermediate temperatures may be interpolated.  
\* Pressure drops are in excess of CL600 pressure ratings per ASME B16.34 for CF8M body material.

**Table 9. Fisher ET-C and EWT-C Valve Dimensions**

VALVE SIZE, NPS	RAISED-FACE FLANGE			G	D		
	A				Stem Diameter, mm (Inches)		
	CL150	CL300	CL600		12.7 (1/2)	19.1 (3/4)	25.4 (1)
mm							
3	298	318	337	97	533	533	---
4	353	368	394	129	533	533	---
6X4	451	473	508	135	568	568	---
8X4	543	568	610	176	570	570	---
6	451	473	508	140	---	762	762
8X6	543	568	610	183	---	797	797
12X6	737	775	819	254	---	865	865
8	543	568	610	191	---	762	762
10X8	673	708	752	273	---	762	762
Inches							
3	11.75	12.50	13.25	3.81	21.00	21.00	---
4	13.88	14.50	15.50	5.06	21.00	21.00	---
6X4	17.75	18.62	20.00	5.31	22.38	22.38	---
8X4	21.38	22.38	24.00	6.94	22.44	22.44	---
6	17.75	18.62	20.00	5.50	---	30.00	30.00
8X6	21.38	22.38	24.00	7.19	---	31.38	31.38
12X6	29.00	30.50	32.25	10.00	---	34.06	34.06
8	21.38	22.38	24.00	7.50	---	30.00	30.00
10X8	26.50	27.88	29.62	10.75	---	30.00	30.00

**Figure 3. Fisher ET-C and EWT-C Valve Dimensions (also see table 9)**

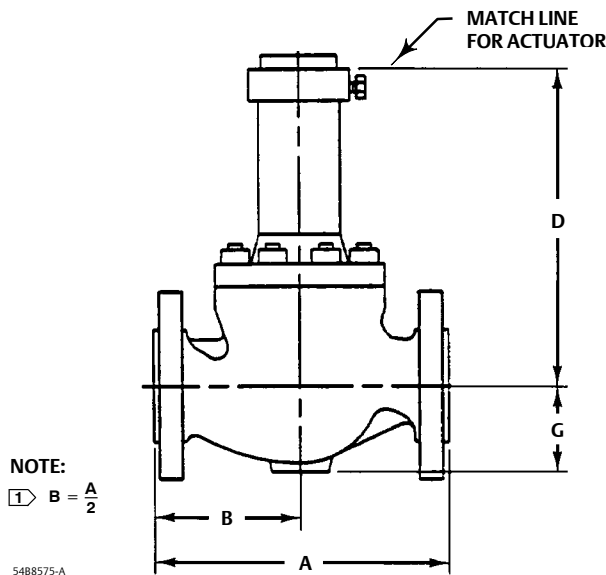


Table 10. Fisher EZ-C Valve Dimensions

VALVE SIZE, NPS	RAISED-FACE FLANGE			G	D		
	A				Stem Diameter, mm (Inches)		
	CL150	CL300	CL600		9.5 (3/8)	12.7 (1/2)	19.1 (3/4)
mm							
1	184	197	210	61	535	549	---
1-1/2	222	235	251	71	535	548	---
2	254	267	286	78	---	533	533
3	299	318	337	97	---	535	535
4	353	368	394	129	---	535	535
Inches							
1	7.25	7.75	8.25	2.38	21.06	21.62	---
1-1/2	8.75	9.25	9.88	2.81	21.06	21.56	---
2	10.00	10.50	11.25	3.06	---	21.00	21.00
3	11.75	12.50	13.25	3.81	---	21.06	21.06
4	13.88	14.50	15.50	5.06	---	21.06	21.06

Figure 4. Fisher EZ-C Valve Dimensions (also see table 10)

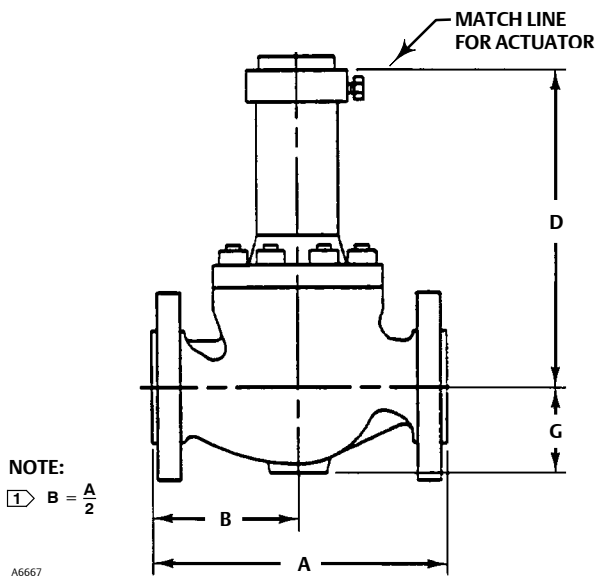
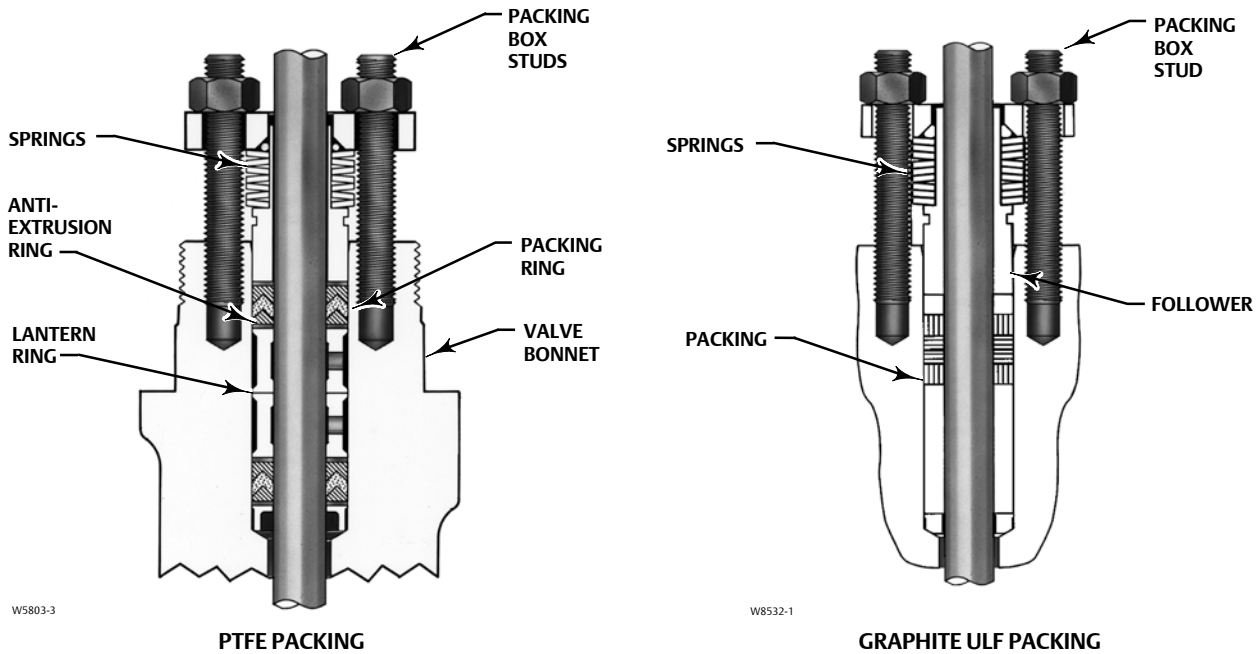


Figure 5. ENVIRO-SEAL Packing Systems



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