

# Fisher™ EZ easy-e™ Control Valve

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Figure 1. Fisher EZ Valve with 657 Actuator and DVC6000 Digital Valve Controller



## Introduction

### Scope of Manual

This instruction manual includes installation, maintenance, and parts information for NPS 1/2 through 4 Fisher EZ valves through CL600 ratings. Refer to separate manuals for instructions covering the actuator and accessories.

Do not install, operate, or maintain an EZ valve without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your [Emerson sales office](#) or Local Business Partner before proceeding.

### Description

EZ valves (figure 1) are globe-style with integral end connections, post guiding, and quick-change trim. These valves are used in chemical or hydrocarbon processing applications or in applications that require control of nonlubricating, viscous, or other hard-to-handle fluids.

Table 1. Specifications

<p><b>End Connection Styles</b></p> <p><b>Cast Iron Valves</b>  <i>Flanged:</i> CL125 flat-face or 250 raised-face flanges per ASME B16.1</p> <p><b>Steel and Stainless Steel Valves</b>  <i>Flanged:</i> CL150, 300, and 600 raised-face or ring-type joint flanges per ASME B16.5  <i>Screwed or Socket Welding:</i> Consistent with ASME B16.11  <i>Buttwelding:</i> All available ASME B16.25 schedules that are consistent with ASME B16.34</p> <p><b>Maximum Inlet Pressure<sup>(1)</sup></b></p> <p><b>Cast Iron Valves</b>  <i>Flanged:</i> Consistent with CL125B or 250B per ASME B16.1</p> <p><b>Steel and Stainless Steel Valves</b>  <i>Flanged:</i> Consistent with CL150, 300, or 600 per ASME B16.34  <i>Screwed or Welding:</i> Consistent with CL600 per ASME B16.34</p>	<p><b>Shutoff Classifications per ANSI/FCI 70-2 and IEC 60534-4</b></p> <p><b>Metal Seats:</b> Class IV is standard, Class V is optional  <b>PTFE Composition Seats:</b> Class VI</p> <p><b>Flow Characteristics</b></p> <p>■ Equal percentage, ■ quick opening, and ■ linear</p> <p><b>Flow Direction</b></p> <p>Up through the seat ring</p> <p><b>Approximate Weights</b></p> <p>NPS 1/2 and 3/4 Valves: 9.1 kg (20 pounds)  NPS 1 Valve: 11 kg (25 pounds)  NPS 1-1/2 Valve: 18 kg (40 pounds)  NPS 2 Valve: 36 kg (80 pounds)  NPS 3 Valve: 54 kg (120 pounds)  NPS 4 Valve: 75 kg (165 pounds)</p>
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1. The pressure/temperature limits in this manual and any applicable standard or code limitation for valve should not be exceeded.

## Specifications

Typical specifications for these valves are shown in table 1.

## Educational Services

For information on available courses for the Fisher EZ valve, as well as a variety of other products, contact:

Emerson Automation Solutions  
Educational Services - Registration  
Phone: 1-641-754-3771 or 1-800-338-8158  
E-mail: [education@emerson.com](mailto:education@emerson.com)  
[emerson.com/fishervalvetraining](http://emerson.com/fishervalvetraining)

## Installation

### ▲ WARNING

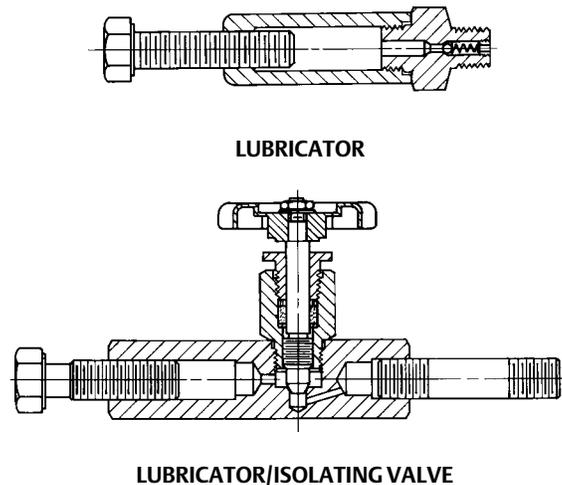
Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

Personal injury or equipment damage caused by sudden release of pressure may result if the valve assembly is installed where service conditions could exceed the limits given in table 1 or on the appropriate nameplates. To avoid such injury or damage, provide a relief valve for overpressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

Figure 2. Optional Packing Lubricator and Lubricator/Isolating Valve



10A9421-A  
AJ5428-D  
A0832-2

## CAUTION

When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and controlled fluid conditions. Responsibility for the safety of process media and compatibility of valve materials with process media rests solely with the purchaser and end-user. Since some body/trim material combinations are limited in their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting your Emerson Automation Solutions sales office.

1. Before installing the valve, inspect it and any associated equipment for damage and any foreign material. Make certain the valve interior is clean, that pipelines are free of foreign material, and that the valve is oriented so that pipeline flow is in the same direction as the arrow on the side of the valve.
2. The control valve assembly may be installed in any orientation unless limited by seismic criteria. However, the normal method is with the actuator vertical above the valve. Other positions may result in uneven valve plug and seat ring retainer wear, and improper operation. With some valves, the actuator may also need to be supported when it is not vertical. For more information, consult your [Emerson sales office](#) or Local Business Partner.
3. Use accepted piping and welding practices when installing the valve in the line. Internal elastomeric parts may stay in place during the welding procedure. For flanged valves, use a suitable gasket between the valve body flange and pipeline flanges.

## CAUTION

Depending on valve body materials used, post weld heat treating may be required. If so, damage to internal elastomeric and plastic parts, as well as internal metal parts is possible. Shrink-fit pieces and threaded connections may also loosen. In general, if post weld heat treating is to be performed, all trim parts should be removed. Contact your Emerson sales office or Local Business Partner for additional information.

4. With a leak-off bonnet construction, remove the pipe plugs (key 14) to hook up the leak-off piping. If continuous operation is required during inspection or maintenance, install a three-valve bypass around the control valve assembly.
5. If the actuator and valve are shipped separately, refer to the actuator mounting procedure in the appropriate actuator instruction manual.

## **⚠ WARNING**

**Personal injury could result from packing leakage. Valve packing was tightened before shipment; however, the packing might require some readjustment to meet specific service conditions. Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

Valves with ENVIRO-SEAL live-loaded packing or HIGH-SEAL Heavy-Duty live-loaded packing will not require this initial re-adjustment. See the Fisher instruction manuals titled ENVIRO-SEAL Packing System for Sliding-Stem Valves or Heavy-Duty Live-Loaded Packing System (as appropriate) for packing instructions. If you wish to convert your present packing arrangement to ENVIRO-SEAL packing, refer to the retrofit kits listed in the Parts Kits sub-section near the end of this manual.

## Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of service conditions. This section includes instructions for packing lubrication, packing maintenance, trim maintenance, and ENVIRO-SEAL bellows seal replacement. All maintenance operations may be performed with the valve in the line.

## **⚠ WARNING**

**Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:**

- Do not remove the actuator from the valve while the valve is still pressurized.
- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.
- Vent the pneumatic actuator loading pressure and relieve any actuator spring precompression.
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
- The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline*. Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

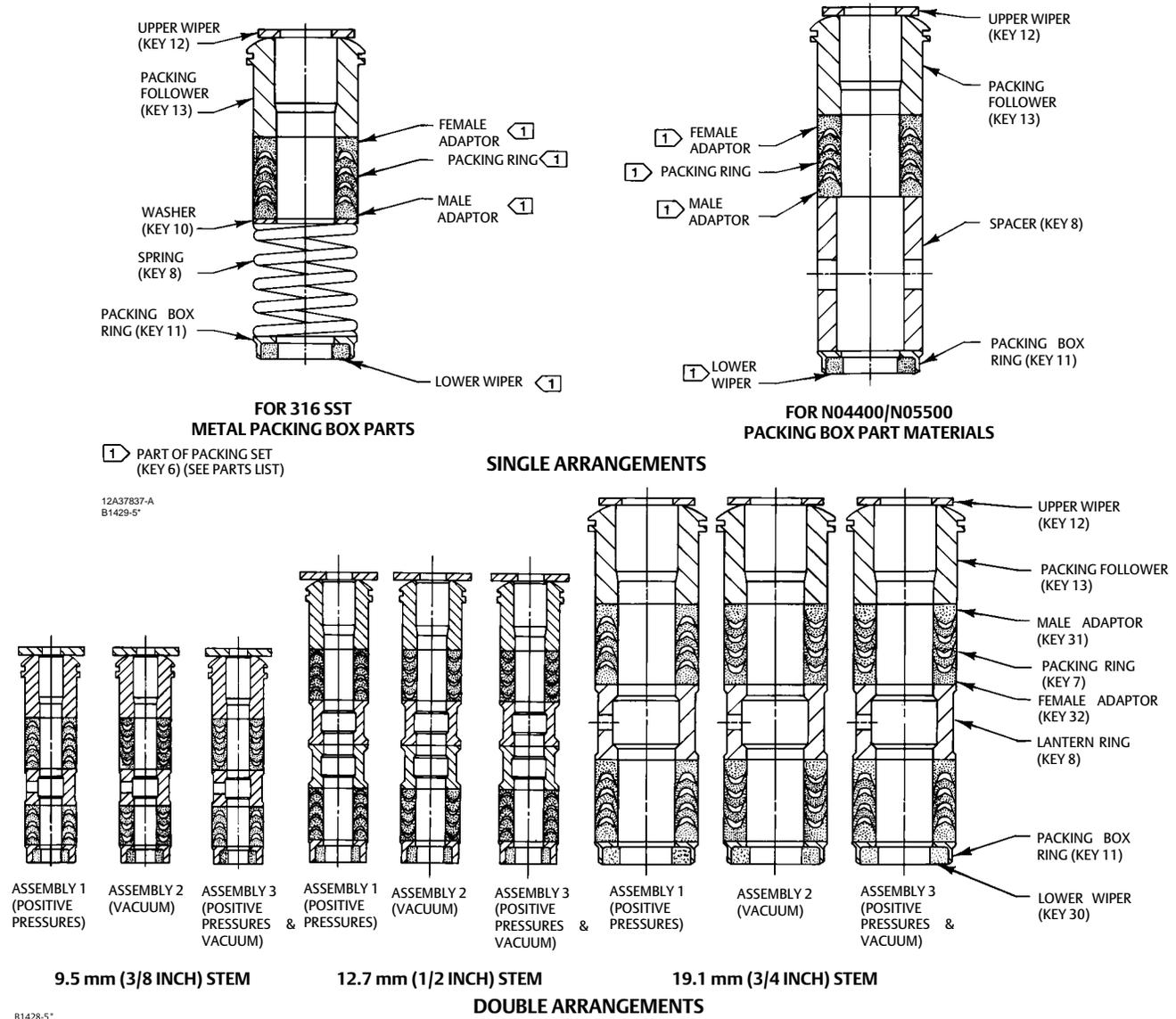
### Note

Whenever a gasket seal is disturbed by removing or shifting gasketed parts, a new gasket should be installed upon reassembly. This is necessary to ensure a good gasket seal since the used gasket may not seal properly.

**Note**

If the valve has ENVIRO-SEAL or HIGH-SEAL live-loaded packing installed, refer to instruction manuals ENVIRO-SEAL Packing System for Sliding Stem Valves, [D101642X012](#), or HIGH-SEAL Live Loaded Packing System, [D101453X012](#), for packing instructions. Figure 6 shows a typical HIGH-SEAL packing system. Figures 7 and 8 show typical ENVIRO-SEAL systems.

**Figure 3. PTFE V-Ring Packing Arrangements for Plain and Extension Bonnets**



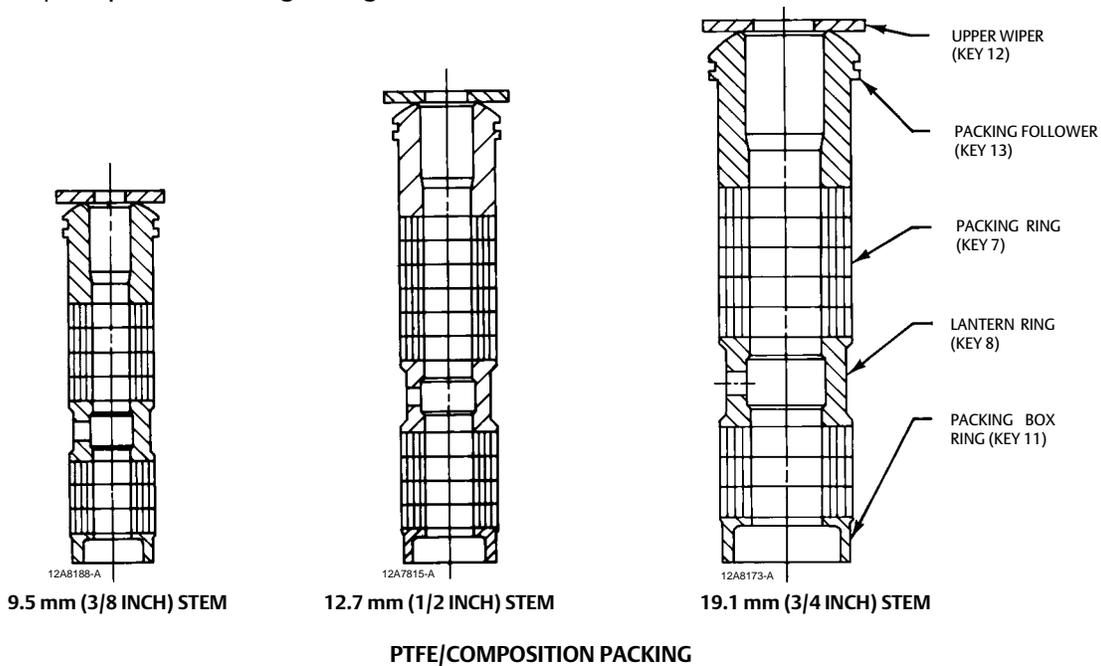
## Packing Lubrication

### Note

ENVIRO-SEAL or HIGH-SEAL packing does not require lubrication.

If an optional lubricator or lubricator/isolating valve (figure 2) is provided for PTFE/composition or other packings that require lubrication, it will be installed in an optional tapped hole in the bonnet. Use a good quality silicon-base lubricant. Packing used in oxygen service or in processes with temperatures over 260°C (500°F) should not be lubricated. To operate the lubricator, simply turn the cap screw clockwise to force the lubricant into the packing box. The lubricator/isolating valve must first be opened and then closed after lubrication is completed.

Figure 4. PTFE/Composition Packing Arrangements for Plain and Extension Bonnets



## Packing Maintenance

This section covers PTFE V-ring, PTFE/composition, and graphite/ribbon packing as used in plain and extension bonnets. Unless otherwise indicated, key numbers refer to figure 3 for PTFE V-ring packing, figure 4 for PTFE/composition packing, and figure 5 for graphite ribbon/filament packing.

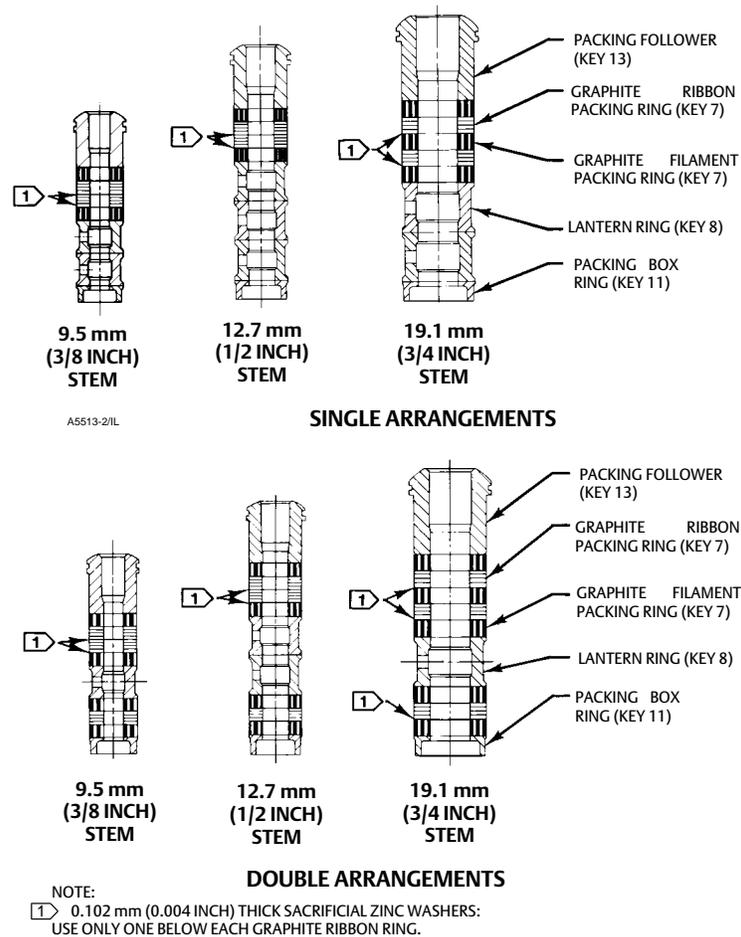
For spring-loaded single PTFE V-ring packing, the spring (key 8, figure 3) maintains a sealing force on the packing. If leakage is noted around the packing follower (key 13, figure 3), check to be sure the shoulder on the packing follower is touching the bonnet. If the shoulder is not touching the bonnet, tighten the packing flange nuts (key 5, figure 11), until the shoulder is against the bonnet. If leakage cannot be stopped in this manner, proceed to the Replacing Packing procedure.

If there is unacceptable packing leakage with other than spring-loaded packing, first try to limit the leakage and establish a stem seal by tightening the packing flange nuts.

If the packing is relatively new and tight on the stem, and if tightening the packing flange nuts does not stop the leakage, the valve stem may be worn or nicked so that a seal cannot be made. The surface finish of a valve stem is critical for making a good packing seal. If the leakage comes from the outside diameter of the packing, the leakage may be caused by nicks or scratches around the packing box wall. If performing any of the following procedures, inspect the valve stem and packing box wall for nicks and scratches.

An illustration of a HIGH-SEAL live-loaded packing system is shown in figure 6. Illustrations of ENVIRO-SEAL live-loaded packing systems are shown in figures 7, 8, and 9.

Figure 5. Graphite Ribbon/Filament Packing Arrangements for Plain and Extension Bonnets



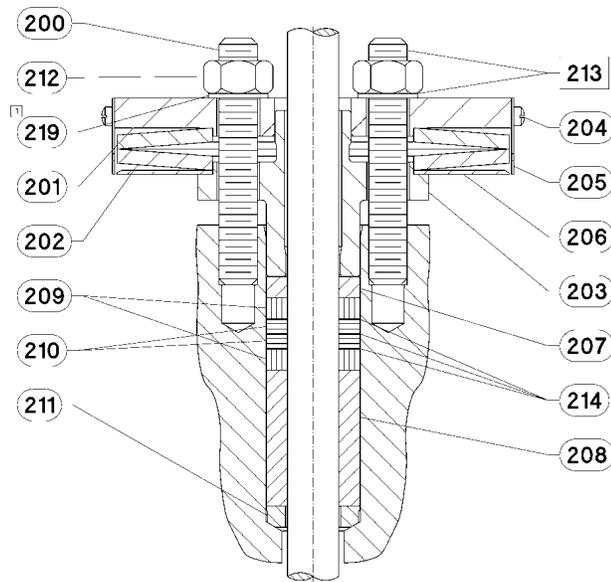
A5514-2

**Table 2. Body-to-Bonnet Torque Guidelines**

VALVE SIZE, NPS	TORQUES <sup>(1, 3)</sup>			
	Bolt Material			
	SA193-B7		SA193-B8M <sup>(2)</sup>	
EZ	N•m	Lbf•ft	N•m	Lbf•ft
1 or smaller	129	95	64	47
1-1/2 or 2	96	71	45	33
3	169	125	88	65
4	271	200	156	115

1. Determined from laboratory tests.  
2. SA193-B8M annealed.  
3. For other materials, contact your [Emerson sales office](#) or Local Business Partner for torques.

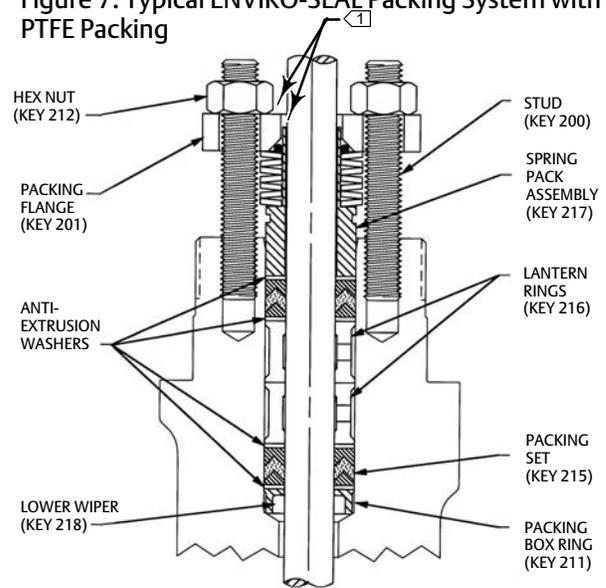
**Figure 6. Typical HIGH-SEAL Graphite ULF Packing System**



3984153-A

1. Find number 219 not required with 3/8-inch stem

**Figure 7. Typical ENVIRO-SEAL Packing System with PTFE Packing**



A6297

Note:

1 For PTFE packing, tighten the packing box hex nuts until the top of the flange is even with the top of the sleeve on the follower (spring pack assembly).

Figure 8. Typical ENVIRO-SEAL Packing System with Graphite ULF Packing

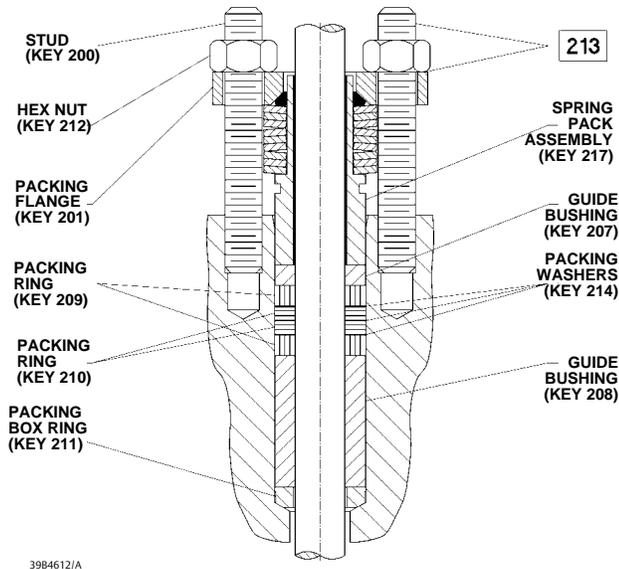
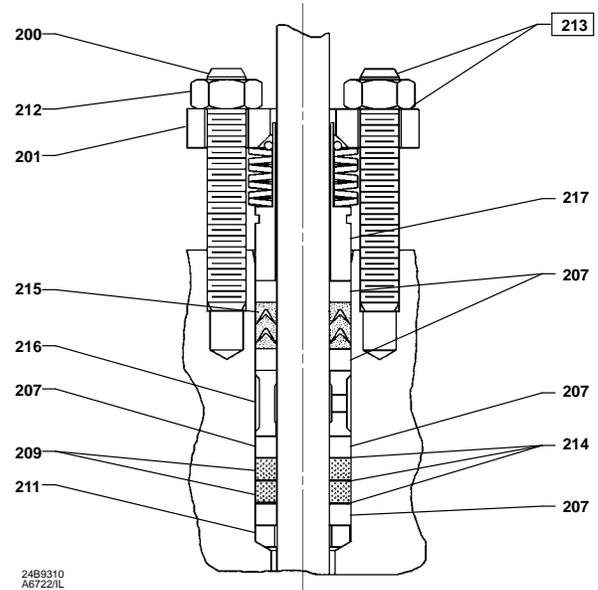


Figure 9. Typical ENVIRO-SEAL Packing System with Duplex Packing



## Replacing Packing

### **⚠ WARNING**

Observe the warning at the start of the Maintenance section.

This section covers replacing packing used in plain and extension bonnets. PTFE V-ring packing is shown in figure 3, PTFE/composition packing is shown in figure 4, and graphite/ribbon packing is shown in figure 5.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve. If using a power actuator, also shut off all pressure lines to the power actuator, and release all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Disconnect the operating lines from the actuator and any leak-off piping from the bonnet. Disconnect the stem connector and then remove the actuator from the valve by unscrewing the yoke locknut (key 15, figure 11).

### **⚠ WARNING**

To avoid personal injury or property damage caused by uncontrolled movement of the bonnet, loosen the bonnet by following the instructions in the next step. Do not remove a stuck bonnet by pulling on it with equipment that can stretch or store energy in any other manner. The sudden release of stored energy can cause uncontrolled movement of the bonnet. If the seat ring retainer sticks to the bonnet, proceed carefully with bonnet removal.

#### Note

The following step also provides additional assurance that the valve body fluid pressure has been relieved.

- Hex nuts (key 16, figure 11) attach the bonnet to the valve. Loosen these nuts or cap screws approximately 3 mm (1/8-inch). Then loosen the body-to-bonnet gasketed joint by either rocking the bonnet or prying between the bonnet and valve body. Work the prying tool around the bonnet until the bonnet loosens.
- Loosen the packing flange nuts (key 5, figure 11) so that the packing is not tight on the valve stem. Remove any travel indicator parts and stem locknuts from the valve stem threads.

## CAUTION

**Avoid damaging the seating surface caused by the valve plug and stem assembly dropping from the bonnet after being lifted part way out. When lifting the bonnet, temporarily install a valve stem locknut on the valve stem. This locknut will prevent the valve plug and stem assembly from dropping out of the bonnet.**

- Completely remove the cap screws (not shown) or hex nuts (key 16, figure 12) that bolt the bonnet and valve body together and carefully lift the bonnet off.
- Remove the locknut and separate the valve plug and stem from the bonnet. Set the parts on a protective surface to prevent damage to gasket or seating surfaces.
- Remove the bonnet gasket (key 10, figure 12) and cover the opening in the valve to protect the gasket surface and to prevent foreign material from getting into the valve body cavity.
- Remove the packing flange nuts, packing flange, upper wiper, and packing follower (keys 5, 3, 12, and 13, figure 11). Carefully push out all the remaining packing parts from the valve side of the bonnet using a rounded rod or other tool that will not scratch the packing box wall. Clean the packing box and the metal packing parts.
- Inspect the valve stem threads and the packing box surfaces for any sharp edges which might cut the packing. Scratches or burrs could cause packing box leakage or damage to the new packing. If the surface condition cannot be improved by light sanding, replace the damaged parts.
- Remove the covering protecting the valve cavity and install a new bonnet gasket (key 10, figure 12), making sure the gasket seating surfaces are clean and smooth. Then slide the bonnet over the stem and onto the stud bolts (key 15, figure 12), or onto the valve cavity if cap screws (not shown) are used instead.

### Note

Proper performance of the tightening procedures in step 11 compresses the spiral wound gasket (key 12, figure 12) enough to both load and seal the seat ring gasket (key 13, figure 12). The tightening procedures also compresses the outer edge of the bonnet gasket (key 10, figure 12) enough to seal the body-to-bonnet joint.

The accepted bolting procedures referred to in step 11 include--but are not limited to--ensuring that bolting threads are clean, and evenly tightening the cap screws, or the nuts onto the studs, in a crisscross pattern. Because of the boltup characteristics of spiral wound gaskets, tightening one cap screw or nut may loosen an adjacent cap screw or nut. Repeat the crisscross tightening pattern several times until each cap screw or nut is tight and the body-to-bonnet seal is made. When the operating temperature has been reached, perform this torquing procedure once again.

### Note

Stud(s) and nut(s) should be installed such that the manufacturer's trademark and material grade marking is visible, allowing easy comparison to the materials selected and documented in the Emerson/Fisher serial card provided with this product.

## ⚠ WARNING

**Personal injury or damage to equipment could occur if improper stud and nut materials or parts are used. Do not operate or assemble this product with stud(s) and nut(s) that are not approved by Emerson/Fisher engineering and/or listed on the**

**serial card provided with this product. Use of unapproved materials and parts could lead to stresses exceeding the design or code limits intended for this particular service. Install studs with the material grade and manufacturer's identification mark visible. Contact your Emerson representative immediately if a discrepancy between actual parts and approved parts is suspected.**

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11. Install bolting, using accepted bolting procedures during tightening so that the body-to-bonnet joint can withstand test pressures and application service conditions. The bolt torques in table 2 may be used as guidelines unless accepted bolting procedures dictate otherwise.
12. Install new packing and the metal packing box parts according to the appropriate arrangement in figure 3, 4, or 5. If split-ring packing is being added, alternate the position of the splits to avoid a leak path. Place a smooth-edged pipe over the valve stem and gently tap each soft packing part into the packing box, being sure that air is not trapped between adjacent soft parts.

Installation of graphite ribbon packing requires special care to avoid trapping air between the rings. Start with only one ring at a time without forcing the top of the packing ring below the bottom of the entrance chamfer of the packing box. Thus, when a ring is added, the stack should not be pushed into the cavity more than the thickness of the added ring.

13. Slide the packing follower, upper wiper, and packing flange (keys 13, 12, and 3, figure 11) into position. Lubricate the packing flange studs (key 4, figure 11) and the faces of the packing flange nuts (key 5, figure 11). Install the packing flange nuts.

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**Note**

The torque values discussed in step 14 and shown in table 3 are recommended guidelines only and are presented as a starting point for this procedure. Tightening the packing flange nuts to a torque value that exceeds the table guidelines, in order to obtain a seal, may indicate other problems.

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14. For **spring-loaded PTFE V-ring packing**, tighten the packing flange nuts until the shoulder on the packing follower (key 13, figure 11) contacts the bonnet.

For **graphite packing**, tighten the packing flange nuts to the maximum recommended torque shown in table 3. Then, loosen the packing flange nuts, and retighten them to the recommended minimum torque shown in table 3.

For **other packing types**, tighten the packing flange nuts alternately in small equal increments until one of the nuts reaches the minimum recommended torque shown in table 3. Then, tighten the remaining flange nuts until the packing flange is level and at a 90-degree angle to the valve stem.

For **ENVIRO-SEAL or HIGH-SEAL live-loaded packing**, refer to the note at the beginning of the Maintenance section on page 5 of this manual.

15. Mount the actuator on the valve body and reconnect the actuator and valve stem according to the procedure in the appropriate actuator instruction manual.

Table 3. Recommended Torque for Packing Flange Nuts (Not for Spring-Loaded Packing)

VALVE STEM DIAMETER		PRESSURE RATING	GRAPHITE TYPE PACKING				PTFE TYPE PACKING			
			Minimum Torque		Maximum Torque		Minimum Torque		Maximum Torque	
mm	Inches		N•m	Lbf•in	N•m	Lbf•in	N•m	Lbf•in	N•m	Lbf•in
9.5	3/8	CL125, CL150	3	27	5	40	1	13	2	19
		CL250 CL300	4	36	6	53	2	17	3	26
		CL600	6	49	8	73	3	23	4	35
12.7	1/2	CL125, CL150	5	44	8	66	2	21	4	31
		CL250 CL300	7	59	10	88	3	28	5	42
		CL600	9	81	14	122	4	39	7	58
19.1	3/4	CL125, CL150	11	99	17	149	5	47	8	70
		CL250 CL300	15	133	23	199	7	64	11	95
		CL600	21	182	31	274	10	87	15	131

## Trim Maintenance

### **⚠ WARNING**

Observe the warning at the start of the Maintenance section.

This procedure describes how the valve trim can be completely disassembled. When inspection or repairs are required, perform only those steps necessary to accomplish the task.

### Disassembly

Except where indicated, key numbers referenced in the following steps are found in figure 12.

1. Remove the actuator and the bonnet according to steps 1 through 6 of the Replacing Packing procedure of the Maintenance section.

### **⚠ WARNING**

**Avoid personal injury or property damage from valve or packing leakage.**

**Any damage to the gasket sealing surfaces could cause the valve to leak.**

**The surface finish of the valve stem (key 7) is critical for making a good packing seal. The inside surface of the seat ring retainer is critical for smooth operation of the valve plug.**

**The seating surfaces of the valve plug and seat ring (keys 2 and 9) are critical for proper shutoff.**

**Protect these parts accordingly while disassembling the trim. Gasket selection criteria is provided on page 33 of this instruction manual.**

2. Packing parts can be removed if desired. Replace these parts as described in the Replacing Packing procedure.

### Valves with Plain or Extension Bonnets

Perform the following steps to remove the valve trim.

1. Lift the valve plug and stem assembly [or the plug guide, disk retainer, and disk (keys 27, 28, and 29, figure 13) if used], out of the valve body and set it on a protective surface.

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**Note**

With some valve plug sizes and configurations, the seat ring retainer and bushing assembly (keys 3 and 26, figures 12 and 13) will come out of the valve body with the valve plug and stem assembly, and in other valve plug sizes and configurations, the valve plug or tip will slide through the seat ring retainer and bushing assembly, leaving the retainer and bushing assembly in the valve body.

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2. With the valve plug and stem assembly out of the valve, either slide the seat ring retainer and bushing assembly (keys 3 and 26), and gaskets and shim (keys 10, 12, and 25) up over the valve plug and stem or lift the seat ring retainer and bushing assembly and associated gaskets and shim out of the valve body. If the valve plug is to be reused, protect the valve plug seating surface to prevent scratches.
3. For valves with metal seats, drive out the pin (key 8) and unscrew the valve stem (key 7) from the valve plug (key 2).
4. For valves with 0.25 and 0.375-inch ports and composition seats, refer to figure 13. Drive out the pin (key 8) and unscrew the valve stem (key 7) from the valve plug guide (key 27). Unscrew the disk retainer (key 28) from the valve plug guide. Remove the disk (key 29) from the valve plug tip (key 30).

For valves with 0.5 through 2-inch ports and composition seats, refer to figure 13. Drive out the pin (key 8) and unscrew the valve stem (key 7) from the valve plug guide (key 27). Drive out pin (key 31) and unscrew the tip (key 30) from the valve plug guide. Remove the disk (key 29) from the valve plug guide.

For valves with 3 and 4-inch ports and composition seats, refer to figure 13. Drive out the pin (key 8) and unscrew the valve stem from the valve plug guide (key 27). Remove the cap screw (key 32) to remove the tip (key 30) from the valve plug guide. Remove the disk (key 29).

5. Remove the seat ring and seat ring gasket (keys 9 and 13).
6. Inspect parts for wear or damage that would prevent proper operation of the valve. Replace or repair trim parts according to the following Lapping Metal Seats or Assembly procedure as appropriate.

### Valves with Overtravel (EZ-OVT) Trim

Perform the following steps to remove the valve trim.

1. Lift the bonnet flat sheet gasket, gasket shim, and spiral wound gasket (keys 10, 25, and 12) from the valve body. Discard the old gaskets.
2. Lift the valve plug and stem assembly (key 30, figure 13) out of the valve body and set it on a protective surface.

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**Note**

The seat ring retainer and bushing assembly (keys 3 and 26) will come out of the valve body with the valve plug and stem assembly.

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3. Lift the seat ring (key 9) out of the valve body. There will be a flat sheet gasket located between the seat ring and valve body shelf (key 13). If the gasket does not come out of the valve body with the seat ring, be sure to remove the gasket from the valve body. Discard the gasket and tape or otherwise protect the seating surface of the seat ring to prevent damage.
4. Inspect all parts for wear and damage which would prevent proper operation of the valve. All gasket surfaces on the trim parts and in the valve body must be cleaned of any graphite residue and must be free from nicks and scratches.

The seating surfaces of the valve plug post and seat ring must be free from nicks, scratches, or any other damage which could affect the proper shutoff. Replace or repair trim parts as appropriate.

**Note**

If the soft seat disk is damaged, the entire plug assembly must be replaced.

**Valves with ENVIRO-SEAL Bellows Seal Bonnets**

Perform the following steps to remove the valve trim.

1. Lift the stem/bellows assembly with valve plug attached [or the plug guide, disk retainer, and disk (keys 27, 28, and 29, figure 13) if used], seat ring retainer and gaskets out of the valve body and set them on a protective surface.

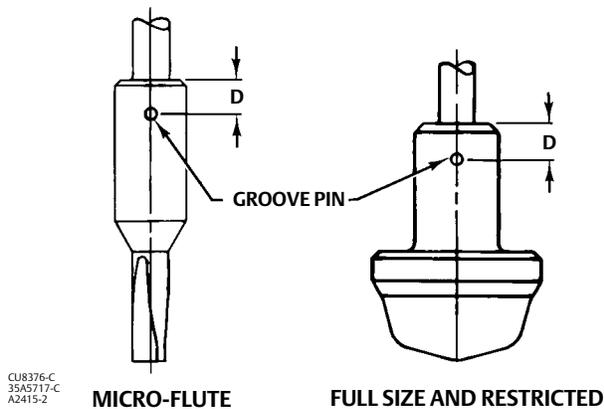
**Note**

With some valve plug sizes and configurations, the seat ring retainer and bushing assembly (keys 3 and 26, figures 12 and 13) will come out of the valve body with the stem/bellows, and in other valve plug sizes and configurations, the valve plug or tip will slide through the seat ring retainer and bushing assembly, leaving the retainer and bushing assembly in the valve body.

2. If the seat ring retainer and bushing assembly (keys 3 and 26) stayed in the valve, lift them out along with gaskets and shim (keys 10, 12, and 25).
3. If the seat ring retainer and bushing assembly (keys 3 and 26) came out of the valve with the stem/bellows assembly, move the seat ring retainer and bushing assembly against the shoulder of the valve plug (key 2) or valve plug guide (key 27, figure 13) to provide access to the pin (key 36, figure 11).

VALVE STEM		BOLT TORQUE		DRILL SIZE, INCH	D DIMENSION	
mm	Inch	N•m	Lbf•ft		mm	Inch
9.5	3/8	40-47	25-35	3/32	16	0.625
12.7	1/2	81-115	60-85	1/8	19	0.75
19.0	3/4	237-339	175-250	3/16	25	1

Figure 10. Bolt Torque for Plug/Stem Connection and Plug/Adaptor Connection and Pin Replacement



4. Place the stem/bellows assembly and valve plug or valve plug guide in a soft-jaw chuck or other type of vise so that the jaws grip a portion of the valve plug or valve plug guide that is not a seating or guiding surface. Drive out the pin (key 36, figure 11).

5. Remove the stem/bellows assembly from the soft-jaw chuck or vise. Place a wrench on the flat areas on the valve stem just below the threads for the actuator/stem connection to keep the stem from turning. Then, unscrew the adaptor (key 24, figure 11), which also includes the valve plug (key 2) or valve plug guide (key 27, figure 13), from the stem/bellows assembly (key 20, figure 11).
6. Remove the seat ring retainer and bushing assembly (keys 3 and 26) by sliding it over the adaptor. If the valve plug is to be reused, protect the valve plug seating surface to prevent scratches.
7. For valves with metal seats, drive out the pin (key 8) and unscrew the adaptor (key 24, figure 11) from the valve plug (key 2).
8. For valves with 0.25 and 0.375-inch ports and composition seats, refer to figure 13. Drive out the pin (key 8) and unscrew the adaptor (key 24, figure 11) from the valve plug guide (key 27). Unscrew the disk retainer (key 28) from the valve plug guide. Remove the disk (key 29) from the valve plug tip (key 30).

For valves with 0.5 through 2-inch ports and composition seats, refer to figure 13. Drive out the pin (key 8) and unscrew the adaptor (key 24, figure 11) from the valve plug guide (key 27). Drive out the pin (key 31) and unscrew the tip (key 30) from the valve plug guide. Remove the disk (key 29) from the valve plug guide.

For valves with 3 and 4-inch ports and composition seats, refer to figure 13. Drive out the pin (key 8) and unscrew the adaptor (key 24, figure 11) from the valve plug guide (key 27). Remove the cap screw (key 32) to remove the tip (key 30) from the valve plug guide. Remove the disk (key 29).

9. Remove the seat ring and seat ring gasket (keys 9 and 13).
10. Inspect parts for wear or damage that would prevent proper operation of the valve. Replace or repair trim parts according to the following Assembly procedure as appropriate.

## Lapping Metal Seats on Valves with Plain and Extension Bonnets

### CAUTION

**To avoid damaging the ENVIRO-SEAL Bellows Seal Bonnet assembly, do not attempt to lap the metal seating surfaces on valves with ENVIRO-SEAL bellows seal bonnets. The design of the bonnet assembly prevents rotation of the stem and any forced lapping rotation will damage internal components of the ENVIRO-SEAL Bellows Seal bonnet.**

With metal-seat constructions, seating surfaces of the valve plug and seat ring (key 2, figure 12) can be lapped for improved shutoff. (Deep nicks should be machined out rather than ground out.) Use a good quality lapping compound of a mixture of 280 to 600-grit. Apply the compound to the bottom of the valve plug.

Assemble the valve to the extent that the seat ring retainer is in place and the bonnet is bolted to the valve body. A simple handle can be made from a piece of strap iron locked to the valve plug stem with nuts. Rotate the handle alternately in each direction to lap the seats. After lapping, remove the bonnet and clean the seat surfaces. Completely assemble as described in the assembly portion of the Trim Maintenance procedure and test the valve for shutoff. Repeat the lapping procedure if leakage is still excessive.

### Note

EZ valves with Overtravel (EZ-OVT) trim should not be lapped.

## Assembly

This procedure assumes that all the trim and associated gaskets were removed from the valve body. If these parts were not all removed, start the assembly procedure at the appropriate step. Except where indicated, key numbers referenced in the following steps are found in figure 12.

## Valves with Plain or Extension Bonnets

Perform the following steps to assemble and install the trim.

### CAUTION

**To avoid weakening the stem that may cause failure in service, never reuse an old stem with a new valve plug. Using an old stem with a new plug requires drilling a new pin hole in the stem, which will weaken the stem. However, a used valve plug may be reused with a new stem.**

1. For valves with metal seats, screw the valve stem (key 7) into the valve plug (key 2). Tighten to the torque value given in figure 10. Refer to figure 10 to select the proper drill size. Drill through the stem using the hole in the valve plug as a guide. Remove any chips or burrs and drive in a new pin (key 8) to lock the assembly.
2. For valves with 0.25 and 0.375-inch ports and composition seats, refer to figure 13. Place the disk (key 29) on the valve plug tip (key 30). Place the disk retainer (key 28) over the disk, and then thread the disk retainer onto the valve plug guide (key 27).

### CAUTION

**To avoid failure in service for valves with 0.5 through 1-inch ports and composition seats, never reuse an old valve plug guide with a new valve plug tip. Using an old valve plug guide with a new plug tip requires drilling a new pin hole in the valve plug guide, which will weaken the guide. However, a used valve plug tip may be reused with a new valve plug guide.**

For valves with 0.5 through 1-inch ports and composition seats, refer to figure 13. Insert the disk (key 29) in the valve plug guide (key 27). Screw the tip (key 30) onto the valve plug guide to clamp the disk in place. Using a 3/32-inch bit, drill through the valve plug guide using the hole in the tip as a drilling guide. Remove any chips or burrs and drive in a new pin (key 31).

### CAUTION

**To avoid failure in service for valves with 1.5 and 2-inch ports and composition seats, never reuse an old valve plug tip with a new valve plug guide. Using an old valve plug tip with a new valve plug guide requires drilling a new pin hole in the valve plug tip which will weaken the tip. However, a used valve plug guide may be reused with a new valve plug tip.**

For valves with 1.5 and 2-inch ports and composition seats, refer to figure 13. Insert the disk (key 29) in the valve plug guide (key 27). Screw the tip (key 30) into the valve plug guide to clamp the disk in place. Using a 3/32-inch bit, drill through the valve plug tip using the hole in the valve plug guide as a drilling guide. Remove any chips or burrs and drive in a new pin (key 31).

For valves with 3 and 4-inch ports and composition seats, refer to figure 13. Insert the disk (key 29) in the valve plug guide (key 27). Place the tip (key 30) against the valve plug guide to clamp the disk in place. Insert the cap screw (key 32) through the tip and thread it into valve plug guide to secure the tip to the valve plug guide.

### CAUTION

**To avoid failure in service, never reuse an old stem with a new valve plug guide. Using an old stem with a new valve plug guide requires drilling a new pin hole in the stem, which will weaken the stem. However, a used valve plug guide may be**

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**reused with a new stem except for valves with 0.5 through 1-inch ports and composition seats (see to figure 13). For these constructions, a used valve plug guide should only be used if the tip is reused.**

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3. For all valves with composition seats, screw the valve stem (key 7) into the valve plug guide (key 27, figure 13). Tighten to the torque value given in figure 10. Refer to figure 10 to select the proper drill size. Drill through the stem, using the hole in the valve plug guide as a drilling guide. Remove any chips or burrs and drive in a new pin (key 8) to lock the assembly.
4. Install the seat ring gasket (key 13), and replace the seat ring (key 9).

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#### Note

With some valve plug sizes and configurations, the valve plug or tip will slide through the seat ring retainer and bushing assembly (keys 3 and 26), and in other configurations it won't.

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5. If the valve plug (key 2) or valve plug tip (key 30, figure 13) will not slide through the seat ring retainer and bushing assembly (keys 3 and 26), proceed as follows:
  - a. Place the seat ring retainer and bushing assembly (keys 3 and 26) over the stem of valve plug and stem assembly or over the stem of the valve plug guide and stem assembly.
  - b. Install the seat ring retainer and bushing assembly, which also includes the valve plug and stem assembly or valve plug guide and stem assembly, on the top of the seat ring, ensuring that the seat ring retainer slips onto the seat ring properly. Any rotation orientation of the seat ring retainer with respect to the valve body is acceptable.
  - c. Place the spiral wound gasket, shim, and bonnet gasket (keys 12, 25, and 10) on the shoulder of the seat ring retainer.
6. If the valve plug (key 2) or the valve plug tip (key 30, figure 13) will slide through the seat ring retainer and bushing assembly (keys 3 and 26), proceed as follows:
  - a. Install the seat ring retainer and bushing assembly on the top of the seat ring, ensuring that the seat ring retainer slips onto the seat ring properly. Any rotation orientation of the seat ring retainer with respect to the valve body is acceptable.
  - b. Place the spiral wound gasket, shim, and bonnet gasket (keys 12, 25, and 10) on the shoulder of the seat ring retainer.
  - c. Slide the valve plug and stem assembly or the valve plug guide and stem assembly into the seat ring retainer and bushing assembly (keys 3 and 26).
7. Mount the bonnet on the valve body and complete the assembly according to steps 10 through 15 of the Replacing Packing procedure, omitting steps 12 and 13 if new packing is not being installed, and being sure to observe the note prior to step 11.

#### Valves with Overtravel (EZ-OVT) Trim

Perform the following steps to assemble and install the trim

1. Install the seat ring gasket (key 13) and replace the seat ring (key 9).
2. Place the seat ring retainer and bushing assembly (key 3) over the stem of the valve plug and stem assembly (key 30, figure 13).
3. Install the seat ring retainer and bushing assembly, which also includes the valve plug and stem assembly, on top of the seat ring. Ensure that the seat ring retainer slips onto the seat ring properly. Any rotation orientation of the seat ring retainer with respect to the valve body is acceptable.

4. Place the spiral wound gasket, shim, and bonnet gasket (keys 12, 25, 10) on the shoulder of the seat ring retainer.
5. Mount the bonnet on the valve body and complete the assembly according to steps 10 through 15 of the Replacing Packing procedure, omitting steps 12 and 13 if new packing is not being installed. Be sure to observe the note prior to step 11.

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**Note**

When connecting the valve stem to the stem connecting block on the actuator, extra stem force is required on the valve plug to ensure proper seating of the plug to the seat ring. This is required to deform the soft seat disk ensuring a backup metal-to-metal mating surface between the valve plug guide post and the seat ring.

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### Valves with ENVIRO-SEAL Bellows Seal Bonnets

Perform the following steps to assemble and install the trim.

1. For valves with 0.25 and 0.375-inch ports and composition seats, refer to figure 13. Place the disk (key 29) on the valve plug tip (key 30). Place the disk retainer (key 28) over the disk, and then thread the disk retainer onto the valve plug guide (key 27).

**CAUTION**

**To avoid failure in service of valves with 0.5 through 1-inch ports and composition seats, never reuse an old valve plug guide with a new valve plug tip. Using an old valve plug guide with a new plug tip requires drilling a new pin hole in the valve plug guide, which will weaken the guide. However, a used valve plug tip may be reused with a new valve plug guide.**

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For valves with 0.5 through 1-inch ports and composition seats, refer to figure 13. Insert the disk (key 29) in the valve plug guide (key 27). Screw the tip (key 30) onto the valve plug guide to clamp the disk in place. Using a 3/32-inch bit, drill through the valve plug guide using the hole in the tip as a drilling guide. Remove any chips or burrs and drive in a new pin (key 31).

**CAUTION**

**To avoid failure in service of valves with 1.5 and 2-inch ports and composition seats, never reuse an old valve plug tip with a new valve plug guide. Using an old valve plug tip with a new valve plug guide requires drilling a new pin hole in the valve plug tip, which will weaken the tip. However, a used valve plug guide may be reused with a new valve plug tip.**

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For valves with 1.5 and 2-inch ports and composition seats, refer to figure 13. Insert the disk (key 29) in the valve plug guide (key 27). Screw the tip (key 30) into the valve plug guide to clamp the disk in place. Using a 3/32-inch bit, drill through the valve plug tip using the hole in the valve plug guide as a drilling guide. Remove any chips or burrs and drive in a new pin (key 31).

For valves with 3 and 4-inch ports and composition seats, refer to figure 13. Insert the disk (key 29) in the valve plug guide (key 27). Place the tip (key 30) against the valve plug guide to clamp the disk in place. Insert the cap screw (key 32) through the tip and thread it into valve plug guide to secure the tip to the valve plug guide.

**CAUTION**

**To avoid weakening the adaptor that may cause failure in service, never reuse an old adaptor with a new valve plug or valve plug guide. Using an old adaptor with a new valve plug or valve plug guide requires drilling a new pin hole in the adaptor, which will weaken the adaptor. However, a used valve plug or valve plug guide may be reused with a new adaptor.**

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2. Thread the valve plug (key 2) or, the valve plug guide (key 27, figure 13) if the valve has composition seats, onto the adaptor (key 24, figure 11). Tighten to the torque valve given in figure 10.

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**Note**

Valve plugs may not be pre-drilled. Follow the procedure in the following step.

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3. If the valve plug is not pre-drilled, drill a hole according to figure 10. Otherwise, select the proper drill size (figure 10) and drill through the adaptor using the hole in the valve plug as a guide. Remove any chips or burrs and drive in a new pin (key 8) to lock the assembly.

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**Note**

With some valve plug sizes and configurations, the valve plug or tip will slide through the seat ring retainer and bushing assembly, and in other configurations it will not.

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4. If the valve plug (key 2) or valve plug tip (key 30, figure 13) will not slide through the seat ring retainer and bushing assembly (keys 3 and 26), proceed as follows:
  - a. Slide the seat ring retainer and bushing assembly (keys 3 and 26) over the adaptor (key 24, figure 11) so that the bushing rests on the shoulder of the valve plug or valve plug guide.
  - b. Place the spiral wound gasket, shim, and bonnet gasket (keys 12, 25, and 10) on the shoulder of the seat ring retainer.
  - c. Place a wrench on the flat areas of the stem just below the threads for the actuator/stem connection to keep the stem from turning.
  - d. Screw the adaptor (key 24, figure 11), which also includes the valve plug or valve plug guide and seat ring retainer and bushing assembly and gaskets, onto the stem/bellows assembly (key 20, figure 11). Tighten the adaptor until it is snug. Then, turn the adaptor until the valve stem hole lines up with the next adaptor pin hole. Drive in a new pin (key 36) to lock the assembly.
  - e. Install the seat ring gasket (key 13), and replace the seat ring (key 9).
  - f. Install the seat ring retainer and bushing assembly, which also contains the valve plug/adaptor assembly or valve plug guide/adaptor assembly, on the top of the seat ring, ensuring that the seat ring retainer slips onto the seat ring properly. Any rotation orientation of the seat ring retainer with respect to the valve body is acceptable.
  - g. Place a new gasket (key 22, figure 11) over the stem and bellows assembly.
5. If the valve plug (key 2) or the valve plug tip (key 30, figure 13) will slide through the seat ring retainer and bushing assembly (keys 3 and 26), proceed as follows:
  - a. Place a wrench on the flat areas of the stem just below the threads for the actuator/stem connection to keep the stem from turning.
  - b. Screw the adaptor (key 24, figure 11), which also includes the valve plug or valve plug guide onto the stem/bellows assembly (key 20, figure 11). Tighten the adaptor until it is snug. Then, turn the adaptor until the valve stem hole lines up with the next adaptor pin hole. Drive in a new pin (key 36) to lock the assembly.
  - c. Install the seat ring gasket (key 13), and replace the seat ring (key 9).

- d. Install the seat ring retainer and bushing assembly on the top of the seat ring, ensuring that the seat ring retainer slips onto the seat ring properly. Any rotation orientation of the seat ring retainer with respect to the valve body is acceptable.
  - e. Place the spiral wound gasket, shim, and bonnet gasket (keys 12, 25, and 10) on the shoulder of the seat ring retainer.
  - f. Slide the valve plug/adaptor assembly or the valve plug guide/adaptor assembly and the connected stem and bellows assembly into the seat ring retainer and bushing assembly (keys 3 and 26).
  - g. Place a new gasket (key 22, figure 11) over the stem and bellows assembly.
6. Mount the bonnet on the valve body and complete the assembly according to steps 10 through 15 of the Replacing Packing procedure, omitting steps 12 and 13 if new packing is not being installed, and being sure to observe the note prior to step 11.

## ENVIRO-SEAL Bellows Seal and Bonnet

### Replacing a Plain or Extension Bonnet with an ENVIRO-SEAL Bellows Seal (Stem/Bellows Assembly) and Bonnet

Instructions are provided for replacing a plain or extension bonnet with an ENVIRO-SEAL bellows seal bonnet when the existing valve has a metal seat. If the valve has a composition seat, refer to figure 13 and to composition seat information in the Valves with ENVIRO-SEAL Bellows Seal Bonnet procedure of the Trim Maintenance section.

1. Remove the actuator and bonnet according to steps 1 through 6 of the Replacing Packing procedure of the Maintenance section.

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#### Note

With some valve plug sizes and configurations, the valve plug will slide through the seat ring retainer and bushing assembly, and in other configurations it won't. If the valve plug will not slide through the seat ring retainer and bushing assembly, then the valve plug and stem assembly and the seat ring retainer and bushing assembly must be removed together.

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2. Using care, remove the valve plug and stem assembly, and, if necessary, the seat ring retainer and bushing assembly from the valve body.
3. Remove and discard the existing bonnet gasket (key 10, figure 12). Cover the valve body opening to protect sealing surfaces and to prevent foreign material from entering the valve body cavity.

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#### Note

The ENVIRO-SEAL stem/bellows assembly for easy-e valves is available only with a threaded and drilled plug/adaptor connection. The existing valve plug can be reused with the new stem/bellows assembly or a new plug can be installed.

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4. Inspect the existing valve plug. If the plug is in good condition, it can be reused with the new ENVIRO-SEAL stem/bellows assembly. To remove the existing valve plug from the stem, first, place the existing plug stem assembly in a soft-jaw chuck or other type of vise so that the jaws grip a portion of the valve plug that is not a seating surface. Drive out or drill out the pin (key 8, figure 12).
5. Place a wrench on the flat areas on the existing valve stem just below the threads for the actuator/stem connection. Then, unscrew the stem from the valve plug (key 2, figure 12).

**CAUTION**

When installing a valve plug on the ENVIRO-SEAL stem/bellows assembly, the valve stem must not be rotated. Damage to the bellows may result.

Do not grip the bellows shroud or other parts of the stem/bellows assembly. Grip only the flat areas on the stem where it extends out of the top of the bellows shroud.

**Note**

The ENVIRO-SEAL stem/bellows assembly has a one-piece stem.

Table 4. Recommended Torque for ENVIRO-SEAL Bellows Seal Packing Flange Nuts

VALVE SIZE, NPS	VALVE STEM DIAMETER THROUGH PACKING	MINIMUM TORQUE		MAXIMUM TORQUE	
		N•m	Lbf•in	N•m	Lbf•in
1/2 - 2	1/2	2	22	4	33
3 - 4	1	5	44	8	67

- To attach the valve plug to the stem of the new ENVIRO-SEAL stem/bellows assembly, it is necessary to first attach the valve plug to the adaptor (key 24, figure 11). Locate the adaptor. Notice that a hole has not been drilled in the adaptor threads where the valve plug screws onto the adaptor.

Secure the valve plug in a soft-jaw chuck or other type of vise. Do not grip the plug on any seating surface. Position the plug in the chuck or vise for easy threading of the adaptor. Thread the adaptor into the valve plug and tighten to the torque value given in figure 10.

**Note**

Valve plugs may not be pre-drilled. Follow the procedure in the following step.

- If the valve plug is not pre-drilled, drill a hole according to figure 10. Otherwise, select the proper size of drill bit (figure 10) and drill through the adaptor using the hole in the valve plug as a guide. Remove any metal chips or burrs and drive in a new pin (key 8, figure 12) to lock the valve plug/adaptor assembly together.

**Note**

For some valve plug configurations, you must place the valve plug/adaptor assembly inside the seat ring retainer and bushing assembly before attaching the adaptor to the stem extending from the bottom of the ENVIRO-SEAL stem/bellows assembly. If this task is necessary, then place the spiral wound gasket, shim, and bonnet gasket (keys 12, 25, and 10, figure 12) on the shoulder of the seat ring retainer. Check the existing seat ring retainer and bushing assembly for clearances. If necessary, use appropriate procedures to support the seat ring retainer while screwing the valve plug/adaptor assembly onto the valve stem extending from the ENVIRO-SEAL stem/bellows assembly.

- Place a wrench on the flat areas of the valve stem just below the threads for the actuator/stem connection to keep the stem from turning.
- Screw the adaptor (key 24, figure 11), which also includes the valve plug or valve plug guide and may include the seat ring retainer and bushing assembly and gaskets, onto the valve stem. Tighten the adaptor until it is

finger-tight. Then, tighten the adaptor with a wrench until the valve stem hole lines up with the next adaptor pin hole. Drive in a new pin (key 36, figure 11) to lock the assembly. Make certain the spiral wound gasket, shim, and bonnet gasket (keys 12, 25, and 10, figure 12) are located on the shoulder of the seat ring retainer.

10. Inspect the seat ring. Replace, if necessary.
11. Install the new stem/bellows assembly with valve plug/adaptor by placing it into the valve body.
12. Place a new gasket (key 22, figure 11) over the stem/bellows assembly. Place the new ENVIRO-SEAL bonnet over the stem/bellows assembly.

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**Note**

Stud(s) and nut(s) should be installed such that the manufacturer's trademark and material grade marking is visible, allowing easy comparison to the materials selected and documented in the Emerson/Fisher serial card provided with this product.

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**⚠ WARNING**

**Personal injury or damage to equipment could occur if improper stud and nut materials or parts are used. Do not operate or assemble this product with stud(s) and nut(s) that are not approved by Emerson/Fisher engineering and/or listed on the serial card provided with this product. Use of unapproved materials and parts could lead to stresses exceeding the design or code limits intended for this particular service. Install studs with the material grade and manufacturer's identification mark visible. Contact your Emerson representative immediately if a discrepancy between actual parts and approved parts is suspected.**

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13. Properly lubricate the bonnet stud bolts. Install and tighten the bonnet hex nuts to the proper torque.
14. Install new packing and the metal packing box parts according to the appropriate arrangement in figure 14 or 15.
15. Install the packing flange. Properly lubricate the packing flange stud bolts and the faces of the packing flange nuts.  
For **graphite packing**, tighten the packing flange nuts to the maximum recommended torque shown in table 4. Then, loosen the packing flange nuts, and retighten them to the recommended minimum torque shown in table 4.  
For **other packing types**, tighten the packing flange nuts alternately in small equal increments until one of the nuts reaches the minimum recommended torque shown in table 4. Then, tighten the remaining flange nuts until the packing flange is level and at a 90-degree angle to the valve stem.
16. Install travel indicator parts, stem locknuts, and mount the actuator on the valve body according to the procedure in the appropriate actuator instruction manual.

### Replacing an Installed ENVIRO-SEAL Bellows Seal (Stem/Bellows Assembly)

Instructions are provided for replacing an ENVIRO-SEAL bellows seal (stem/bellows assembly) when the existing valve has a metal seat. If the valve has a composition seat, refer to figure 13 and to composition seat information in the Valves with ENVIRO-SEAL Bellows Seal Bonnet procedure of the Trim Maintenance section.

1. Remove the actuator and bonnet according to steps 1 through 5 of the Replacing Packing procedure of the Maintenance section.

---

**Note**

With some valve plug sizes and configurations, the valve plug will slide through the seat ring retainer and bushing assembly, and in other configurations it won't. If the valve plug will not slide through the seat ring retainer and bushing assembly, then the valve plug and stem assembly and the seat ring retainer and bushing assembly must be removed together.

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- Using care, remove the valve plug and stem assembly, and, if necessary, the seat ring retainer and bushing assembly from the valve body. Remove and discard the existing bonnet gasket (key 10, figure 12) and gasket (key 22, figure 11). Cover the valve body opening to protect sealing surfaces and to prevent foreign material from entering the valve body cavity.

## CAUTION

The ENVIRO-SEAL stem/bellows assembly for easy-e valves is available only with a threaded and pinned adaptor/stem connection. The existing valve plug can be reused with the new stem/bellows assembly or a new plug can be installed. If the existing valve plug is reused, and the adaptor is in good condition, it may be reused also. However, to avoid weakening the adaptor that may cause failure in service, never reuse an old adaptor with a new valve plug. Using an old adaptor with a new plug requires drilling a new pin hole in the adaptor, which will weaken the adaptor. However, a used valve plug may be reused with a new adaptor.

- Inspect the existing valve plug and adaptor. If they are in good condition, they can be reused with the new stem/bellows assembly, and they do not need to be separated.

## CAUTION

When removing/installing a valve plug on the ENVIRO-SEAL stem/bellows assembly, the valve stem must not be rotated. Damage to the bellows may result.

Do not grip the bellows shroud or other parts of the stem/bellows assembly. Grip only the flat areas on the stem where it extends out of the top of the bellows shroud.

## Note

The ENVIRO-SEAL stem/bellows assembly has a one-piece stem.

- If the existing valve plug and adaptor are not in good condition and must be replaced, first, place the existing stem/bellows assembly and valve plug and adaptor assembly in a soft-jaw chuck or other type of vise so that the jaws grip a portion of the valve plug that is not a seating surface. Drive out or drill out pin (key 8, figure 12). Drive out pin (key 36, figure 11).
  - Use a wrench on the flat areas on the valve stem just below the threads for the actuator/stem connection in a soft-jaw chuck or vice to keep the stem from turning. Then, unscrew the valve plug from the adaptor and the adaptor from the stem/bellows assembly.
  - To attach either the existing valve plug or a new one to the stem of the new ENVIRO-SEAL stem/bellows assembly, it is necessary to first attach the valve plug to the adaptor (key 24, figure 11), if the valve plug was removed from the adaptor. Locate the adaptor. Notice that a hole has not been drilled in the new adaptor threads where the valve plug screws onto the adaptor.
- If installing either a new valve plug and/or a new adaptor, secure the valve plug in a soft-jaw chuck or other type of vise. Do not grip the plug on any seating surface. Position the plug in the chuck or vise for easy threading of the adaptor. Thread the adaptor into the valve plug and tighten to the torque values given in figure 10.
- Complete the installation by following steps 7 through 16 of the Replacing a Plain or Extension Bonnet with an ENVIRO-SEAL Bellows Seal and Bonnet procedure provided in the previous section.

## Purging the ENVIRO-SEAL Bellows Seal Bonnet

The ENVIRO-SEAL bellows seal bonnet has been designed so that it can be purged or leak tested. Refer to figure 11 for an illustration of an ENVIRO-SEAL bellows seal bonnet, and perform the following steps for purging or leak testing.

1. Remove the two diametrically opposed pipe plugs (key 16).
2. Connect a purging fluid to one of the pipe plug connections.
3. Install appropriate piping or tubing in the other pipe plug connection to pipe away the purging fluid or to make a connection to an analyzer for leak testing.
4. When purging or leak testing has been completed, remove the piping or tubing and reinstall the pipe plugs (key 16).

## Parts Ordering

Each valve is assigned a serial number which can be found on the valve body. This same number also appears on the actuator nameplate when the valve is shipped from the factory as part of a control valve assembly. Refer to the serial number when contacting your [Emerson sales office](#) or Local Business Partner for technical assistance. When ordering replacement parts, refer to the serial number and to the 11-character part number for each part required from the following parts list.

## Parts Kits

Gasket parts kits are in key 10 table.

### Packing Kits (non-live-loaded)

REPAIR KIT MATERIAL	STEM DIAMETER, mm (INCH) YOKE BOSS DIAMETER, mm (INCH)		
	9.5 (3/8) 54 (2-1/8)	12.7 (1/2) 71 (2-13/16)	19.1 (3/4) 90 (3-9/16)
	Part Number		
PTFE (Contains keys 6, 8, 10, 11, and 12)	RPACKX00012	RPACKX00022	RPACKX00032
Double PTFE (Contains keys 6, 8, 11, and 12)	RPACKX00042 <sup>(1)(2)</sup>	RPACKX00052 <sup>(1)</sup>	RPACKX00062 <sup>(1)</sup>
PTFE/Composition (Contains keys 7, 8, 11, and 12)	RPACKX00072	RPACKX00082	RPACKX00092
Single Graphite Ribbon/Filament (Contains keys 7 [ribbon ring], 7 [filament ring], 8, and 11)	RPACKX00102	RPACKX00112	RPACKX00122
Double Graphite Ribbon/Filament (Contains keys 7 [ribbon ring], 7 [filament ring], 8, and 11)	RPACKX00162	RPACKX00172	RPACKX00182
1. These parts kits contain one extra lower wiper (key 30). Discard this extra part upon assembly. 2. This parts kit contains one extra packing ring (key 7). Discard this extra part upon assembly.			

### Packing Kits (ENVIRO-SEAL) Repair

REPAIR KIT MATERIAL	STEM DIAMETER, mm (INCH) YOKE BOSS DIAMETER, mm (INCH)		
	9.5 (3/8) 54 (2-1/8)	12.7 (1/2) 71 (2-13/16)	19.1 (3/4) 90 (3-9/16)
	Part Number		
Double PTFE (Contains keys 214, 215, and 218)	RPACKX00192	RPACKX00202	RPACKX00212
Graphite ULF (Contains keys 207, 208, 209, 210, and 214)	RPACKX00592	RPACKX00602	RPACKX00612
Duplex (Contains keys 207, 209, 214, and 215)	RPACKX00292	RPACKX00302	RPACKX00312

Packing Kits (ENVIRO-SEAL) Retrofit

REPAIR KIT MATERIAL	STEM DIAMETER, mm (INCH) YOKE BOSS DIAMETER, mm (INCH)		
	9.5 (3/8) 54 (2-1/8)	12.7 (1/2) 71 (2-13/16)	19.1 (3/4) 90 (3-9/16)
	Part Number		
Double PTFE (Contains keys 200, 201, 211, 212, 214, 215, 216, 217, and 218)	RPACKXRT012	RPACKXRT022	RPACKXRT032
Graphite ULF (Contains keys 200, 201, 207, 208, 209, 210, 211, 212, 214, and 217)	RPACKXRT262	RPACKXRT272	RPACKXRT282
Duplex (Contains keys 200, 201, 207, 209, 211, 212, 214, 215, 216, and 217)	RPACKXRT212	RPACKXRT222	RPACKXRT232

**⚠ WARNING**

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Automation Solutions should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

**easy-e Low-e Bonnet Repair Kits**

Kit consists of plain bonnet, Graphite / Inconel gasket set, ENVIRO-SEAL packing retro-fit kit, packing flange, packing flange studs and nuts. New stem is not included.

Bonnet Material	Packing Type	Valve Size, NPS	Stem Size	Part Number		
WCC <sup>(1)</sup>	ENVIRO-SEAL PTFE	0.5-1.25	3/8"	RLEPBNTX012		
		1.5	3/8"	RLEPBNTX022		
		2	1/2"	RLEPBNTX032		
		2.5	1/2"	RLEPBNTX042		
		3	1/2"	RLEPBNTX052		
		4	1/2"	RLEPBNTX062		
		6	3/4"	RLEPBNTX072		
	ENVIRO-SEAL Graphite ULF	0.5-1.25	3/8"	RLEPBNTX152		
		1.5	3/8"	RLEPBNTX162		
		2	1/2"	RLEPBNTX172		
		2.5	1/2"	RLEPBNTX182		
		3	1/2"	RLEPBNTX192		
		4	1/2"	RLEPBNTX202		
		6	3/4"	RLEPBNTX212		
SST <sup>(1)</sup>	ENVIRO-SEAL PTFE	0.5-1.25	3/8"	RLEPBNTX082		
		1.5	3/8"	RLEPBNTX092		
		2	1/2"	RLEPBNTX102		
		2.5	1/2"	RLEPBNTX112		
		3	1/2"	RLEPBNTX122		
		4	1/2"	RLEPBNTX132		
	ENVIRO-SEAL Graphite ULF	0.5-1.25	3/8"	RLEPBNTX222		
		1.5	3/8"	RLEPBNTX232		
		2	1/2"	RLEPBNTX242		
		2.5	1/2"	RLEPBNTX252		
		3	1/2"	RLEPBNTX262		
		4	1/2"	RLEPBNTX272		
		WCC	ENVIRO-SEAL Duplex	0.5-1.25	3/8"	RLEPBNTX292
				1.5	3/8"	RLEPBNTX302
2	1/2"			RLEPBNTX322		
2.5	1/2"			RLEPBNTX332		
3	1/2"			RLEPBNTX342		
4	1/2"			RLEPBNTX352		
6	3/4"			RLEPBNTX362		
SST	ENVIRO-SEAL Duplex	0.5-1.25	3/8"	RLEPBNTX372		
		1.5	3/8"	RLEPBNTX392		
		2	1/2"	RLEPBNTX412		
		2.5	1/2"	RLEPBNTX422		
		3	1/2"	RLEPBNTX432		
		4	3/4"	RLEPBNTX442		

1. Compliant with NACE MR0175-2003 and prior, NACE MR0175 / ISO 15156 (all revisions), and NACE MR0103 (all revisions).

# Parts List

## Bonnet

**Note**

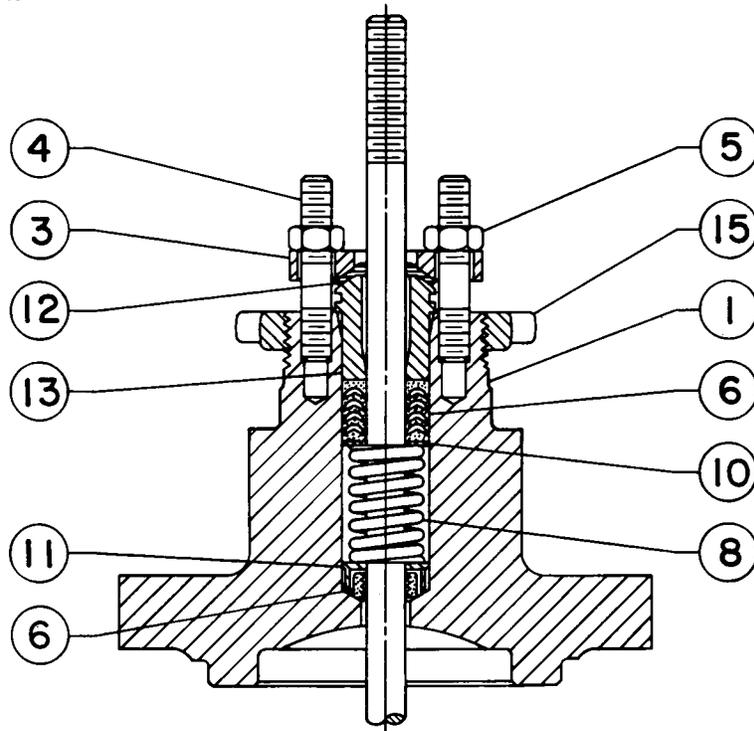
Part numbers are shown for recommended spares only. For part numbers not shown, contact your [Emerson sales office](#) or Local Business Partner.

Key	Description
1	Bonnet/ENVIRO-SEAL bellows seal bonnet If you need a bonnet or an ENVIRO-SEAL bellows seal bonnet as a replacement part, order by valve size and stem diameter, serial number, and desired material.
2	Baffle,(for extension bonnets only)
3	Packing Flange
3	ENVIRO-SEAL Bellows Seal Packing Flange
4	Packing Flange Stud (2 req'd)
4	ENVIRO-SEAL Bellows Seal Stud Bolt
5	Packing Flange Nut (2 req'd)
5	ENVIRO-SEAL Bellows Seal Hex Nut
6*	Packing Set, PTFE (2 req'd for double packing)
6*	ENVIRO-SEAL Bellows Seal Packing Set
7*	Packing Ring, PTFE/comp (for double packing)
7*	Packing Ring (2 req'd for single packing, 3 req'd for double packing)
7*	Packing Ring
7*	ENVIRO-SEAL Bellows Seal Packing Ring
8	Spring (for single PTFE packing only)
8	Spacer (for single PTFE packing only)
8	Lantern Ring (for double PTFE packing)
8	ENVIRO-SEAL Bellows Seal Spring
8	ENVIRO-SEAL Bellows Seal Spacer
10	Special Washer (for single PTFE packing)
11*	Packing Box Ring
12*	Upper Wiper, felt
12*	ENVIRO-SEAL Bellows Seal Upper Wiper
13	Packing Follower
13*	ENVIRO-SEAL Bellows Seal Bushing
13*	ENVIRO-SEAL Bellows Seal Bushing/Liner

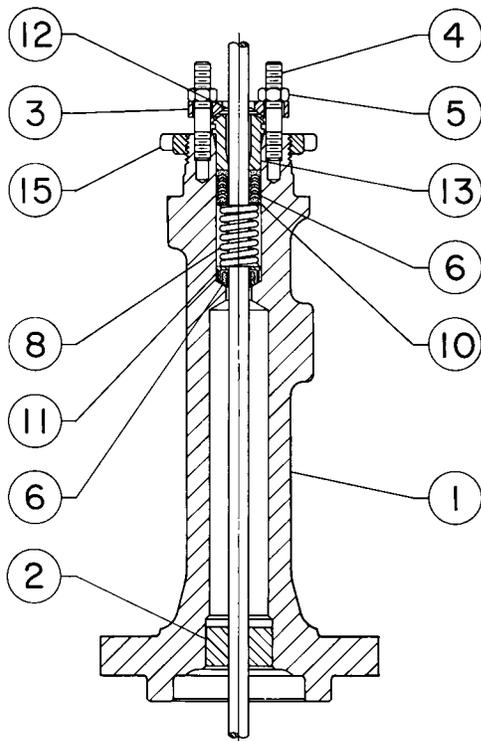
Key	Description
14	Pipe Plug (not shown)
14	Lubricator
14	Lubricator/Isolating Valve
15	Yoke Locknut
15	ENVIRO-SEAL Bellows Seal Yoke Locknut
16	Pipe Plug (not shown)
16	ENVIRO-SEAL Bellows Seal Pipe Plug (2 req'd)
20*	ENVIRO-SEAL Bellows Seal Stem/Bellows
22*	ENVIRO-SEAL Bellows Seal Bonnet Gasket
24	ENVIRO-SEAL Bellows Seal Adaptor
27	Pipe Nipple, for lub/isolating valve,steel
28	ENVIRO-SEAL Bellows Seal Nameplate, Warning
29	ENVIRO-SEAL Bellows Seal Drive Screw (2 req'd)
34	Lubricant, anti-seize (not furnished with valve)
36*	ENVIRO-SEAL Bellows Seal Pin
37	ENVIRO-SEAL Bellows Seal Warning Tag
38	ENVIRO-SEAL Bellows Seal Tie
39	ENVIRO-SEAL Bellows Seal Thrust Ring
200	Stud (2 req'd)
201	Packing Flange
202	Spring, (2 req'd)
203	Spring guide packing follower
204	Screw, (4 req'd)
205	Load Scale, (2 req'd)
206	Indicator Disk
207*	Guide Bushing, white (2 req'd)
208*	Guide Bushing, no color
209*	Packing Ring <sup>(1)</sup> (3 req'd)
210*	Packing Ring (2 req'd)
211*	Packing Box Ring
212	Hex Nut (2 req'd)
213	Lubricant, anti-seize
214*	Anti-Extrusion washer (4 req'd)
214*	Packing Washer (5 req'd)
215*	Packing Set (2 req'd)
216	Lantern Ring
217	Spring Pack Assembly
218*	Lower wiper

\*Recommended spare parts  
1. Part number is stamped on part

Figure 11. Typical Bonnets



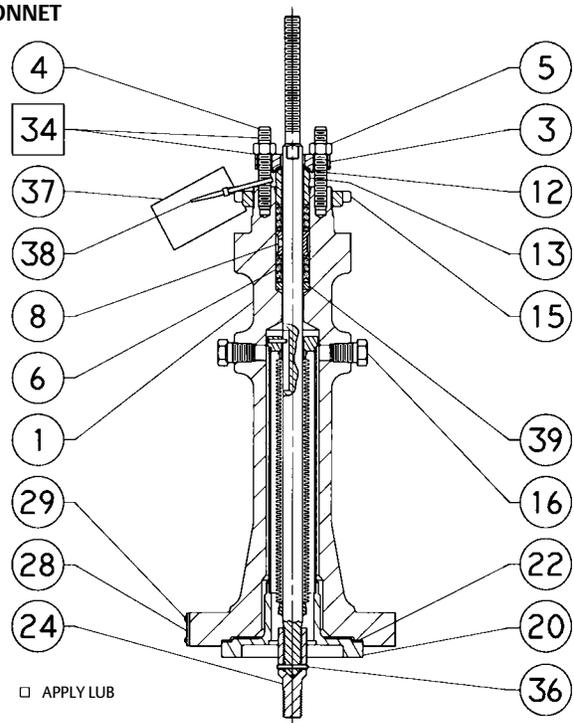
AU3910-A



CU3911-D

EXTENSION BONNET

PLAIN BONNET



4283947-A

□ APPLY LUB

ENVIRO-SEAL BELLOWS SEAL BONNET

**Key**    **Description**

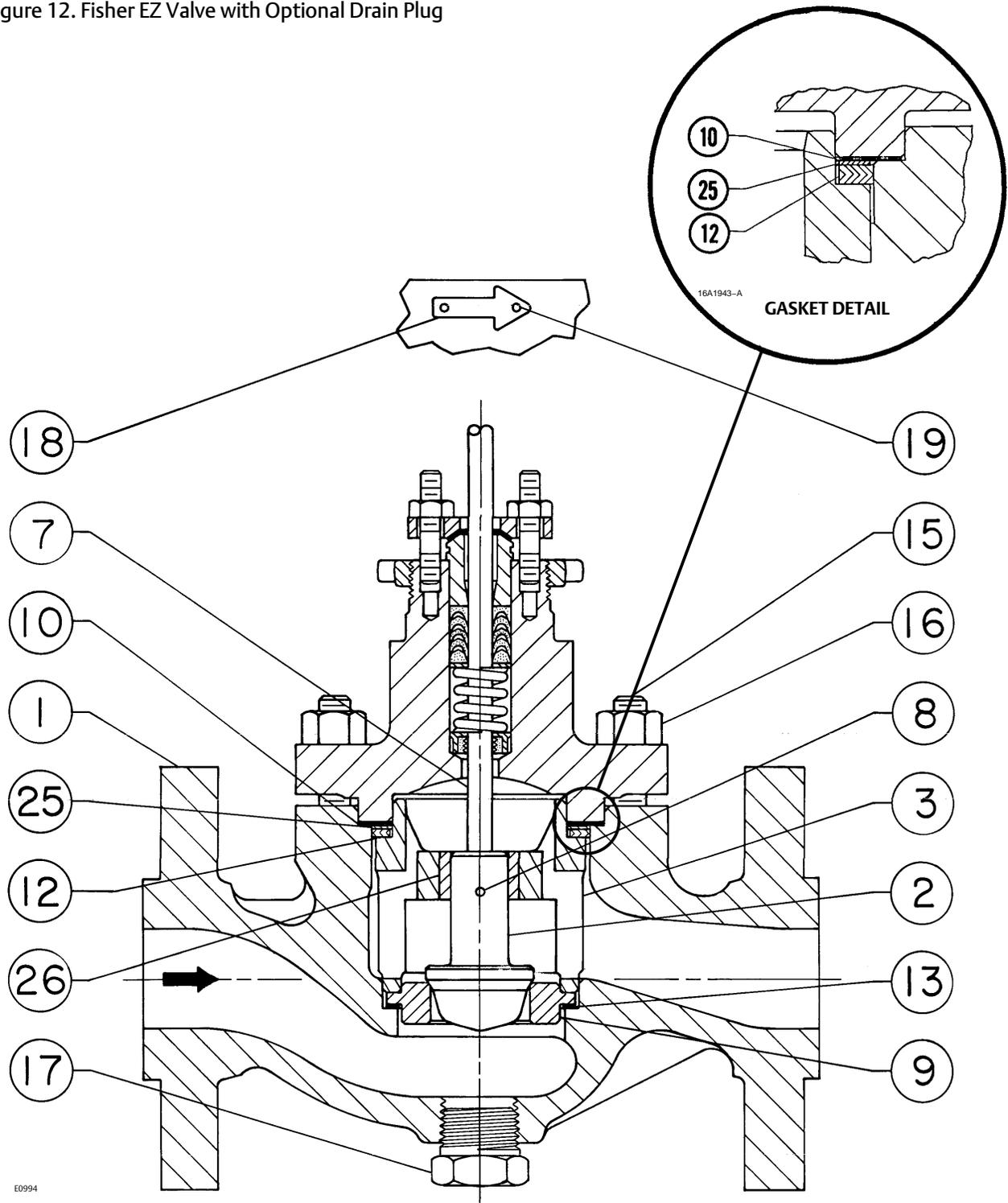
## Valve Body

- 1    Valve Body  
    If you need a valve body as a replacement part, order by valve size, serial number, and desired material.
- 2\*   Valve Plug
- 3\*   Seat Ring Retainer
- 7\*   Stem
- 8\*   Pin
- 9\*   Seat Ring
- 10\*   Bonnet Gasket
- 12\*   Spiral Wound Gasket
- 13\*   Seat Ring Gasket

**Key**    **Description**

- 15   Cap Screw or Stud Bolt
- 16   Nut
- 17   Pipe Plug, for use in valve bodies with drain tapping only
- 18   Flow Arrow, SST
- 19   Drive Screw, SST (4 req'd)
- 25\*   Shim
- 26\*   Bushing
- 27\*   Valve Plug Guide (for composition seats only)
- 28\*   Disk Retainer, (composition seats only)
- 29\*   Disk, PTFE (composition seats only)
- 30\*   Tip (composition seats only)
- 31\*   Pin (composition seats only)
- 32   Cap Screw (composition seat only)
- 33   Nameplate, stainless steel
- 34   Wire, lead

Figure 12. Fisher EZ Valve with Optional Drain Plug



E0994

Figure 13. Composition Seats for Fisher EZ Valve

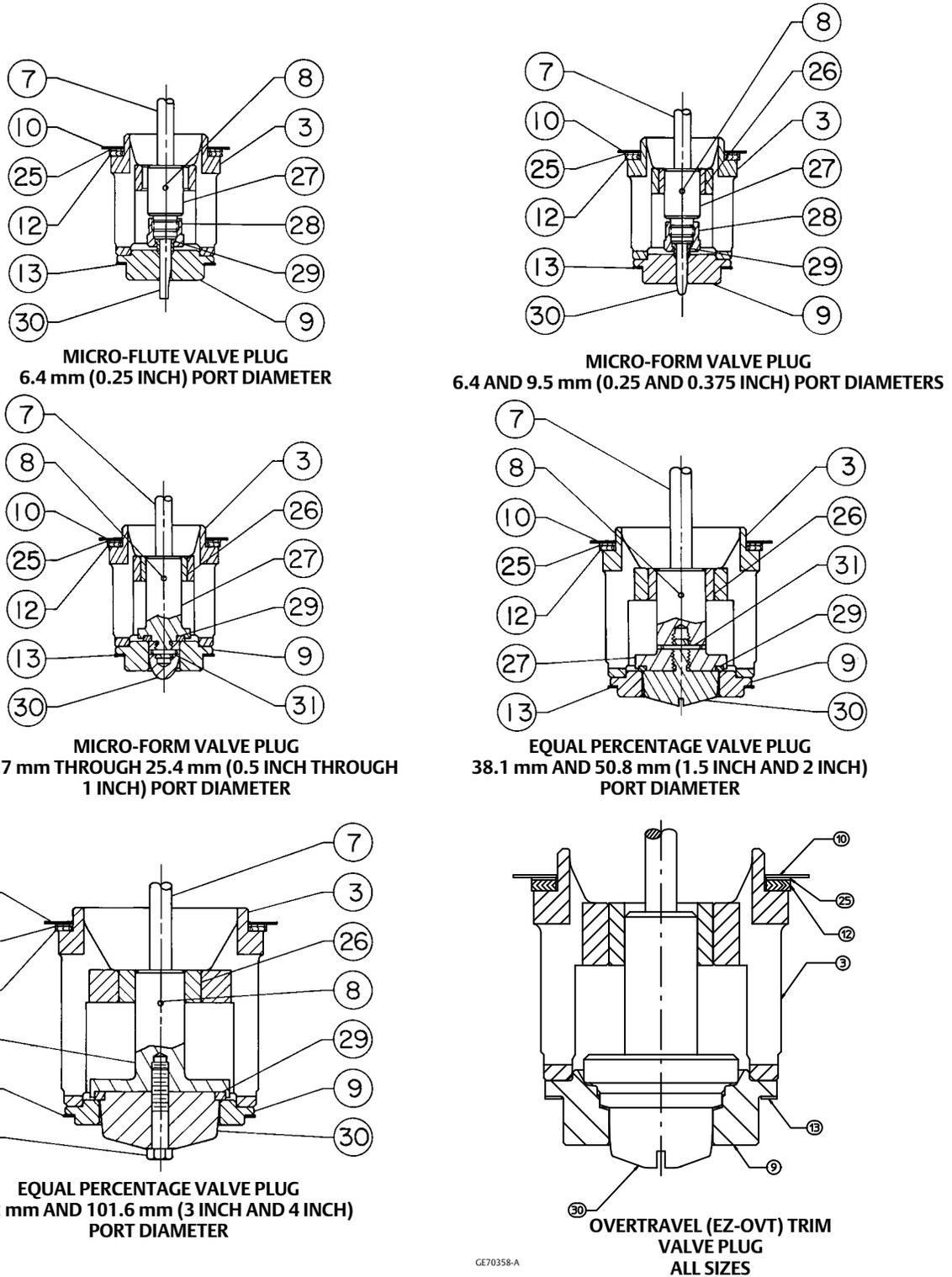
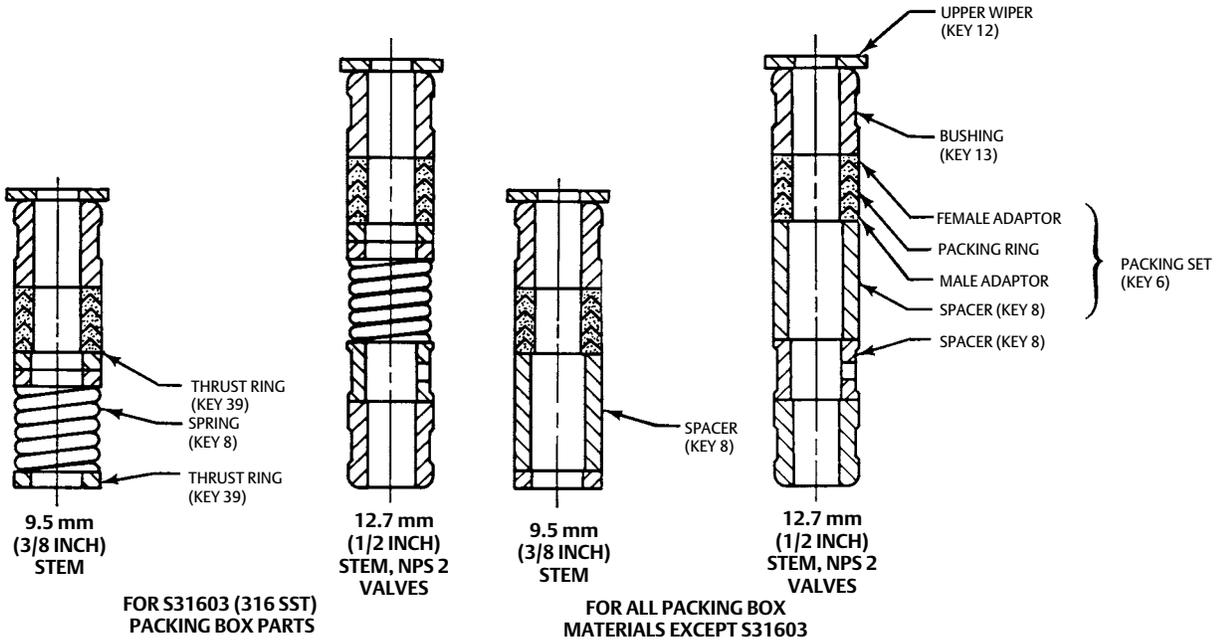
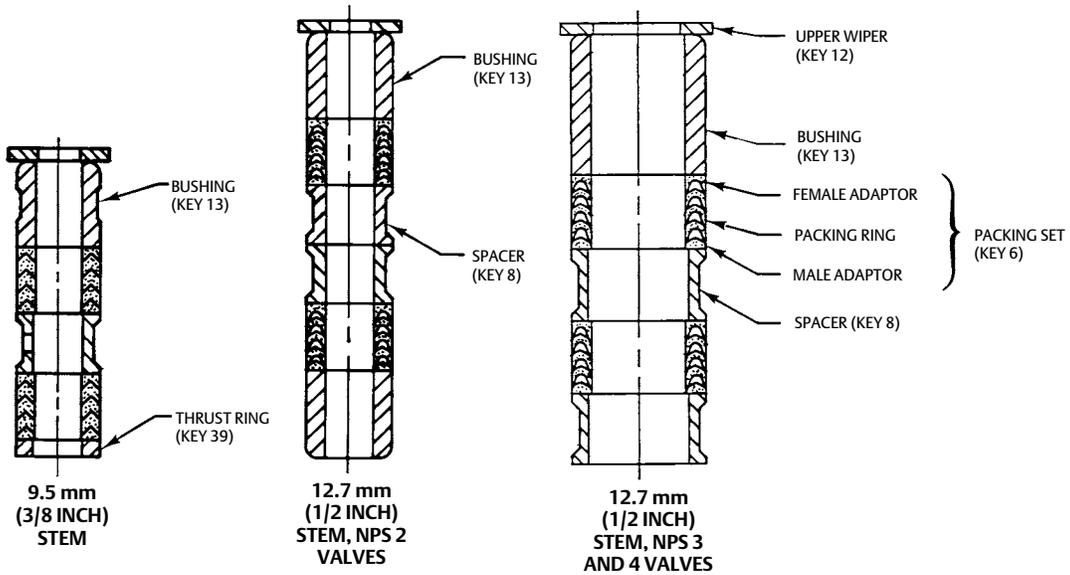


Figure 14. PTFE Packing Arrangements for ENVIRO-SEAL Bellows Seal Bonnets



A5885

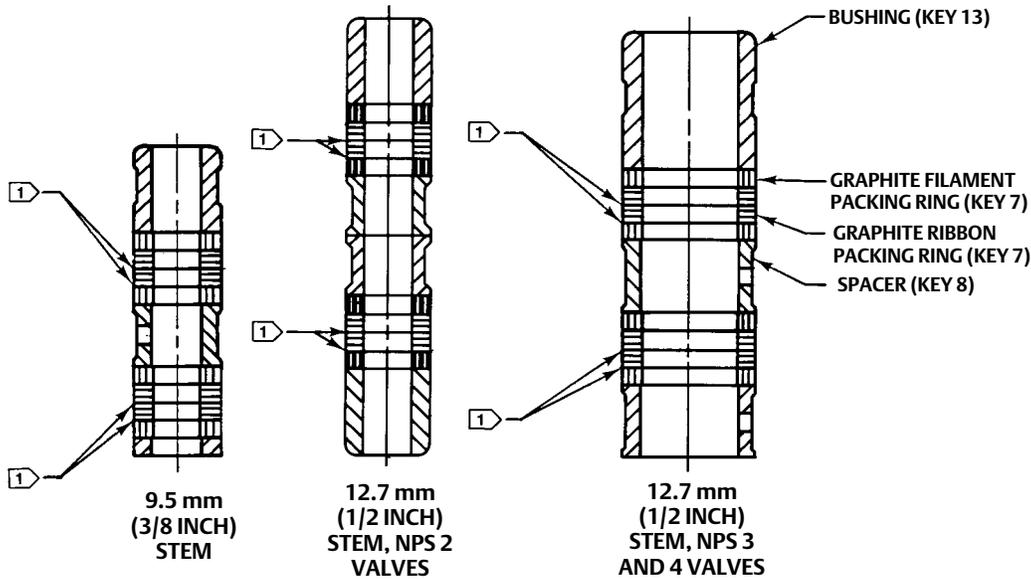
**SINGLE ARRANGEMENTS**



A5886-1

**DOUBLE ARRANGEMENTS**

Figure 15. Double Graphite Ribbon/Filament Arrangements for ENVIRO-SEAL Bellows Seal Bonnets



A5887-1

Note:

1 > 0.102 mm (0.004 inch) thick sacrificial zinc washers: Use only one below each graphite ribbon ring.

Group 1 Actuators

54, 71, & 90 mm (2-1/8, 2-13/16, & 3-9/16 Inch) Yoke Boss
472 & 473 585C & 585CR 1B 644 & 645 655 657 & 667--76 mm (3-inch) max travel 1008--except 90 mm (3-9/16 inch) yoke boss with 51 mm (2-inch) travel

Gasket Kit\*

Valve Size, NPS	Gasket Kits 2 <sup>(1)(2)</sup>	Gasket Kits 3 <sup>(1)(2)</sup>
1/2 - 3/4 & 1	RGASKETX162	10A8170X042
2	RGASKETX182	10A8172X032
3	RGASKETX202	10A8174X032
4	RGASKETX212	--(3)

1. Gasket kits contain key 10, 12, 13, and 25.  
2. See table below for description of gasket sets.  
3. Consult your [Emerson sales office](#) or Local Business Partner for gasket set part number.

Gasket Selection Criteria

Gasket Set	Seat Ring Gasket	Bonnet Gasket	Spiral Wound Gasket	Shim	Temperature Capabilities
2 <sup>(1)</sup>	316 SST/graphite flat sheet	316 SST/graphite flat sheet	N06600 / graphite	S31600	-198 to 593°C (-325 to 1100°F)
3	PTFE-coated N04400	PTFE-coated N04400	N04400/PTFE	N04400	-73 to 149°C (-100 to 300°F)

1. FGM gasket set.





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Emerson Automation Solutions  
Marshalltown, Iowa 50158 USA  
Sorocaba, 18087 Brazil  
Cernay 68700 France  
Dubai, United Arab Emirates  
Singapore 128461 Singapore

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