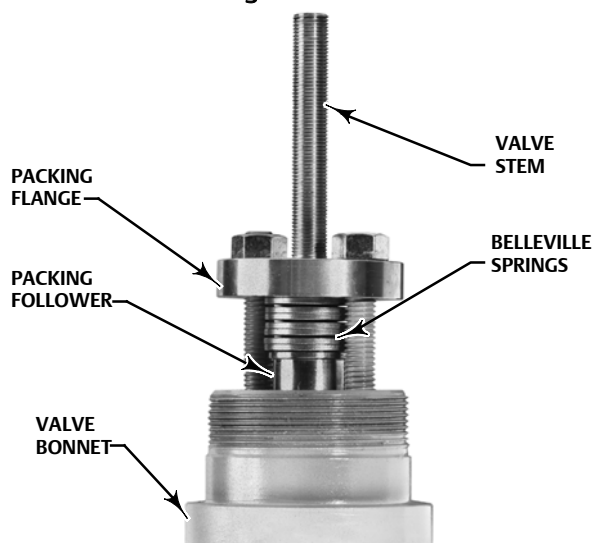


Fisher® ENVIRO-SEAL™ Packing System for Sliding-Stem Valves

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Figure 1. Fisher easy-e Valve Bonnet with ENVIRO-SEAL Packing



Introduction

Scope of Manual

This instruction manual includes installation and parts information for Fisher ENVIRO-SEAL live-loaded packing systems (see figure 1). These systems are available for Fisher sliding-stem valves with 9.5, 12.7, 19.1, 25.4, 31.8, and 50.8 mm (3/8, 1/2, 3/4, 1, 1-1/4, and 2 inch) diameter stems. The system can be used with many sliding-stem valves as shown in the Applications section of the Specifications. Refer to appropriate valve and actuator instruction manuals for necessary information relating to the disassembly and assembly of the valve and actuator. ENVIRO-SEAL packing systems for sliding-stem valves utilize a Belleville (coned-disk) spring system in the pressure/temperature ranges shown in the specifications. For higher pressure/temperature ratings, refer to the HIGH-SEAL ULF Live-Loaded Packing System instruction manual, D101453X012.

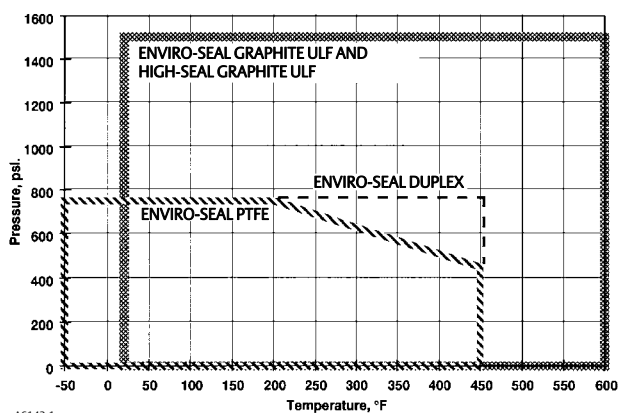
Do not install, operate, or maintain ENVIRO-SEAL live-loaded packing systems without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.



Table 1. Specifications

Applicable Product Types and Stem Diameters See tables 2 and 3 TÜV Certification TÜV has certified the stem sealing capabilities of ENVIRO-SEAL PTFE and Graphite ULF packing systems for sliding-stem valves with TA Luft emission control requirements. See figures 8 and 9 for copies of these certificates	Pressures and Temperatures⁽²⁾ See figure 2. Figure 2 applies only to ENVIRO-SEAL packing for 100 ppm service. Pressure and temperature ratings for non-environmental service are in the packing bulletins. See the appropriate valve instruction manual for additional pressure and temperature ratings.
1. For availability of ENVIRO-SEAL packing system with a specific valve, please contact your Emerson Process Management sales office. 2. The pressure/temperature limits in this manual, in the valve literature, and any applicable code or standard limitation, should not be exceeded.	

Figure 2. Applications Guidelines for 100 ppm Service



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NOTE:
FOR MAXIMUM CYCLE LIFE, GRAPHITE ULF PACKING SHOULD BE USED IN SERVICES WHERE THE VAST MAJORITY OF THE VALVE CYCLES OCCUR AT TEMPERATURES OF 150°C (300°F) OR GREATER.

Description

ENVIRO-SEAL packing systems, with exceptional sealing capabilities, can be easily installed into your existing valves or can be purchased with new valves. These systems help seal your process to conserve valuable fluids, and protect the environment against the emission of hazardous or polluting liquids and gases. The external live-loading provides a constant load over the life of the packing material, which reduces your need for packing box adjustment and maintenance.

If the piping and valve are insulated, do not allow insulation to extend above the yoke boss surface, covering the ENVIRO-SEAL packing arrangement. Keep the ENVIRO-SEAL packing arrangement exposed to ambient air conditions.

Installation

ENVIRO-SEAL packing systems are designed for quality performance over extended periods. This longevity allows for packing maintenance to be performed as it should be, at regularly scheduled plant outages or turn-arounds.

Use these instructions to install ENVIRO-SEAL packing in valves that have standard packing or when inspecting or replacing ENVIRO-SEAL packing.

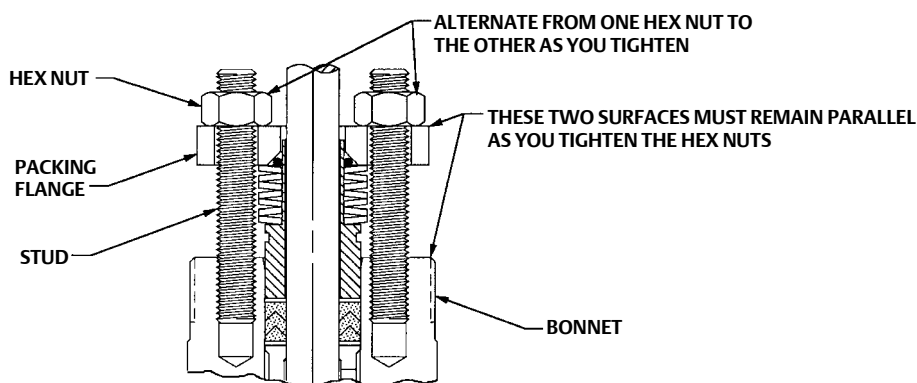
If you are changing the packing system material to a different material, such as PTFE to Graphite ULF, it is good practice to review actuator sizing, as packing friction will change. See tables 4, 5, and 6 for information on packing friction.

⚠ WARNING

Avoid personal injury from sudden release of process pressure or uncontrolled movement 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 power 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 other hazards that may be present from exposure to process media.

Figure 3. ENVIRO-SEAL Packing Assembly Procedure



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Table 2. Fisher Sliding-Stem Product Availability for ENVIRO-SEAL Duplex Packing

VALVE (1)	STEM DIAMETER, mm (INCHES)						
	9.5 (3/8)	12.7 (1/2)	15.9 (5/8)	19.1 (3/4)	25.4 (1)	31.8 (1-1/4)	50.8 (2)
A	X	X	---	X	X	X	---
DBQ	---	X	---	X	X	X	---
easy-e (ED, ES, ET, EW, EZ)	X	X	---	X	X	X	---
EH	---	X	---	X	X	X	X
FB	---	---	---	---	X	X	X
HP	---	X	---	X	X	X	---
HS	---	X	---	X	X	---	---
SS-83	---	---	---	X	X	X	---
YD	X	X	---	X	X	X	---
YS	X	X	---	X	X	X	---

1. Contact your Emerson Process Management sales office for valves not listed.

Table 3. Fisher Sliding-Stem Product Availability for ENVIRO-SEAL PTFE and Graphite ULF Packing Systems

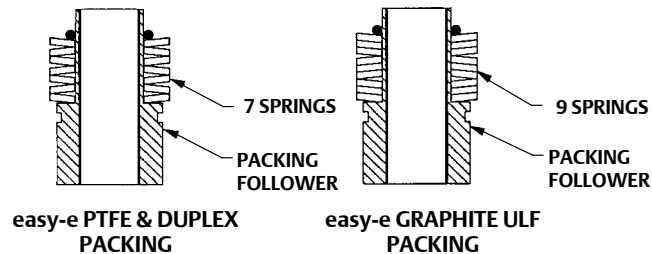
VALVE (1)	STEM DIAMETER, mm (INCHES)							STEM DIAMETER, mm	
	9.5 (3/8)	12.7 (1/2)	15.9 (5/8)	19.1 (3/4)	25.4 (1)	31.8 (1-1/4)	50.8 (2)	12 mm	16 mm
A	X	X	---	X	X	X	---	---	---
CAV4	---	---	---	X	X	X	X	---	---
D	---	X	---	---	---	---	---	---	---
DA	---	X	---	---	---	---	---	---	---
DBQ	---	X	---	X	X	X	---	---	---
DBQ-NS	---	X	---	---	---	---	---	---	---
easy-e (ED, ES, ET, EW, EZ)	X	X	---	X	X	X	---	---	---
E-NS	---	X	---	---	---	---	---	---	---
EH	---	X	---	X	X	X	X	---	---
ENA	---	---	---	---	---	X	X	---	---
ET-C	---	X	---	X	X	---	---	---	---
EWT-C	---	X	---	X	X	---	---	---	---
EZ-C	X	X	---	X	---	---	---	---	---
FB	---	---	---	---	X	X	X	---	---
HP	---	X	---	X	X	X	---	---	---
HS	---	X	---	X	X	---	---	---	---
SS-79	---	---	---	X	---	---	---	---	---
SS-83	---	---	---	X	X	X	X	---	---
SS-85	---	X	---	---	---	---	---	---	---
SS-95	---	X	---	---	---	---	---	---	---
SS-98	---	---	---	---	X	---	---	---	---
YD	X	X	---	X	X	X	---	---	---
YS	X	X	---	X	X	X	---	---	---

1. Contact your Emerson Process Management sales office for valves not listed.

If you are installing the system in a valve that is still connected to an actuator, remove the actuator from the valve to provide sufficient space to install the packing assembly. If a spring-return actuator is used, it is possible that disconnecting the stem connector will allow the spring to force the actuator to the end of its travel. Be sure the actuator spring is resting on its travel stop. Refer to the appropriate valve and actuator instruction manuals to remove the actuator.

Remove old packing parts from the packing box by using the valve instruction manual procedures. Both the valve stem surface condition and the packing bore are critical in obtaining a good seal. If the valve stem surface is scratched, nicked, or worn, replace the valve stem before installing the ENVIRO-SEAL Packing System. Check the condition of the packing bore and clean or hone it out, as necessary. Refer to the appropriate valve instruction manual to replace the valve stem.

Figure 4. Belleville Spring Stacking Order



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Table 4. Packing Friction with ENVIRO-SEAL PTFE Packing

VALVE STEM DIAMETER		PTFE PACKING	
mm	Inches	Newtons	Pounds (Force)
9.5	3/8	555	125
12.7	1/2	755	170
19.1	3/4	1110	250
25.4	1	1515	340
31.8	1-1/4	1890	425
50.8	2	3220	725

Table 5. Packing Friction with ENVIRO-SEAL Duplex Packing

VALVE STEM DIAMETER		DUPLEX PACKING	
mm	Inches	Newtons	Pounds (Force)
9.5	3/8	555	125
12.7	1/2	755	170
19.1	3/4	1110	250
25.4	1	1515	340
31.8	1-1/4	1890	425
50.8	2	3220	725

Table 6. Packing Friction with ENVIRO-SEAL Graphite ULF Packing

VALVE STEM DIAMETER		GRAPHITE ULF PACKING	
mm	Inches	Newtons	Pounds (Force)
9.5	3/8	935	210
12.7	1/2	1250	280
19.1	3/4	2350	530
25.4	1	3740	840
31.8	1-1/4	4800	1100
50.8	2	6000	1350

For key number locations refer to figures 5, 6, or 7. Then proceed as follows:

1. The original packing flange studs used for standard packing arrangements should be long enough to accommodate the retrofit kit parts. If you determine that the existing studs and nuts should be replaced however, due to their condition, replace them with the studs and nuts (keys 200 and 212) supplied in the retrofit kit.

Table 7. Graphite ULF Packing Torque⁽¹⁾

STEM SIZE		TORQUE		
mm	Inch	N•m	lbf•in	lbf•ft
9.5	3/8	4.3	38	3.2
12.7	1/2	8.5	76	6.3
19.1	3/4	21	187	16
25.4	1	47	420	35
31.8	1-1/4	56	495	41

1. For A, DBQ, easy-e, EH, FB, HP, YD, and YS valves.

CAUTION

To prevent product damage caused by scratching or damaging the packing box wall, take care when removing the old packing parts from the packing box.

- Carefully remove the old packing parts from the packing box. If the valve stem or packing box wall is scratched or damaged, it can cause excessive leakage. If the valve stem needs to be replaced, or any other valve part, refer to the appropriate valve instruction manual for replacement procedures. Complete all valve maintenance before installing the ENVIRO-SEAL packing system into the bonnet.

Note

ENVIRO-SEAL PTFE packing systems can be used in either vacuum or positive pressure service. It is not necessary to reverse ENVIRO-SEAL packing components in vacuum service.

Note

Ensure that the Belleville springs are stacked properly (see figure 4) and packing box parts are assembled in the correct order (see figures 5, 6, or 7). Packing parts cannot function properly if the Belleville springs or other packing parts are not stacked correctly.

- Use figures 5, 6, or 7 to ensure that the packing parts and spring pack are assembled in the correct order. Install the ENVIRO-SEAL packing parts into the packing box.
- Install the spring pack assembly (key 217), with the attached springs, onto the stem.
- Install the packing flange (key 201) and packing box nuts (key 212). Hand tighten them.

Note

In general, the following tightening procedure applies to all ENVIRO-SEAL packing systems--both sliding-stem and rotary.

Note

Lubrication is required for the packing studs and nuts.

Although it is important to properly lubricate the stud threads and internal nut threads, it is also important to properly lubricate the contacting face of the nut. See figures 5, 6, or 7 for lubrication locations.

Tightening Procedures

1. You will obtain maximum benefit from your ENVIRO-SEAL packing system when you tighten the packing flange nuts and compress the Belleville springs to their “target load”. The target load is the point where the Belleville springs are designed for optimum performance, when they are compressed to 85% of their maximum deflection, or nearly flat. (Maximum deflection is when the springs are 100% compressed, or completely flat.)

To obtain the target load of 85% compression of maximum deflection, perform the following:

- Tighten the packing flange nuts alternately and evenly, keeping the packing flange parallel with the valve flange (see figure 3), until the Belleville springs are compressed 100% (or completely flat), as detected by a rapid increase in nut torque.
- For PTFE or Duplex packing, loosen each packing flange nut 1/2 turn (180° of rotation).
- For Graphite ULF packing, loosen each packing flange nut 1/4 turn (90° of rotation).

The “target load” of 85% compression has now been reached.

2. Refer to the appropriate valve and actuator instruction manuals when connecting the valve to the actuator. Under normal conditions, the packing nuts should not require retightening.

However, when servicing, if the springs do not remain at the target load of 85% compression, retighten the packing box nuts according to step 1 above.

3. The “springs flat” procedure described above in steps 1 and 2 of Tightening Procedures is the preferred method of adjusting ENVIRO-SEAL packing. However, for Graphite ULF packing, the torque values in table 7 can also be used as a guideline for 85% spring compression. These values are based on generous lubrication of the packing studs and nuts with anti-seize lubricant. Loosening of the packing flange nuts is not required when these torques are used.

Other Considerations

When retrofitting an existing packing system or repacking a valve with ENVIRO-SEAL packing that has been in service, check the condition of the packing bore after you have removed the packing. An easy method for cleaning debris and minor imperfections from the bore is to use a brake cylinder hone attached to an electric drill. This method will do a good job of cleaning the packing bore without changing the dimension of the bore.

When you have completed this exercise, a good guideline to use in checking the condition of the packing bore is the 20/20 rule. **If less than 20% of the surface area of the bore is pitted and if there are no pits deeper than 0.020 inch, then your packing should work as designed.** This does not need to be an exact measurement; visual inspection is adequate. If the packing bore does not meet this criteria, however, you should replace the bonnet.

Note

This check is only valid for rotary ENVIRO-SEAL packing systems and sliding-stem ENVIRO-SEAL or HIGH-SEAL packing systems.

Parts Ordering

Each valve assembly is assigned a serial number that can be found on the valve body. Refer to this serial number when contacting your Emerson Process Management sales office for technical assistance. When ordering replacement parts,

refer to this serial number and to the part description and part number from the following parts list. 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.

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Process Management 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.

Retrofit Kits

Stems and packing box constructions that do not meet Emerson Process Management stem finish specifications, dimensional tolerances, and design specifications, may adversely alter the performance of this packing kit.

easy-e, A, EH, HP, YD, and YS Retrofit Kits

Retrofit kits include parts to convert existing easy-e, A, EH, HP, YD, and YS valves to the ENVIRO-SEAL packing box construction. See table 3 for a complete listing of ENVIRO-SEAL packing systems for sliding-stem valves. PTFE kits include keys 200, 201, 211, 212, 214, 215, 217, 218, tag, and tie cable. Graphite ULF kits include keys 200, 201, 207, 208, 209, 210, 211, 212, 214, 216, 217, tag, and tie cable. Duplex kits include keys 200, 201, 207, 209, 211, 212, 214, 215, 216, 217, tag, and tie cable.

Fisher easy-e, A, EH, HP, YD, and YS Retrofit Kits

STEM DIAMETER	YOKE BOSS DIAMETER	KITS PACKING MATERIAL		
		Double PTFE (carbon-filled)	Single Graphite ULF	Duplex
9.5 (3/8)	54 (2-1/8)	RPACKXRT012	RPACKXRT262	RPACKXRT212
12.7 (1/2)	71 (2-13/16)	RPACKXRT022	RPACKXRT272	RPACKXRT222
19.1 (3/4)	90 (3-9/16)	RPACKXRT032	RPACKXRT282	RPACKXRT232
25.4 (1)	127 (5)	RPACKXRT042	RPACKXRT292	RPACKXRT242
31.8 (1-1/4)	127 (5, 5H)	RPACKXRT052	RPACKXRT302	RPACKXRT252

Repair Kits

Stems and packing box constructions that do not meet Emerson Process Management stem finish specifications, dimensional tolerances, and design specifications, may adversely alter the performance of this packing kit.

easy-e, A, EH, HP, YD, and YS Repair Kits

Repair kits include parts to replace the “soft” packing materials in valves that already have ENVIRO-SEAL packing arrangements installed or in valves that have been upgraded with ENVIRO-SEAL retrofit kits. PTFE repair kits include keys 214, 215, and 218. Graphite ULF repair kits include keys 207, 208, 209, 210, and 214. Duplex repair kits include keys 207, 209, 214, and 215.

Fisher easy-e, A, EH, HP, YD, and YS Repair Kits

STEM DIAMETER	YOKE BOSS DIAMETER	KITS PACKING MATERIAL		
		Double PTFE (carbon-filled)	Single Graphite ULF	Duplex
9.5 (3/8)	54 (2-1/8)	RPACKX00192	RPACKX00592	RPACKX00292
12.7 (1/2)	71 (2-13/16)	RPACKX00202	RPACKX00602	RPACKX00302
19.1 (3/4)	90 (3-9/16)	RPACKX00212	RPACKX00612	RPACKX00312
25.4 (1)	127 (5)	RPACKX00222	RPACKX00622	RPACKX00322
31.8 (1-1/4)	127 (5, 5H)	RPACKX00232	RPACKX00632	RPACKX00332

Figure 5. PTFE Sliding-Stem ENVIRO-SEAL Packing for Fisher easy-e Valves

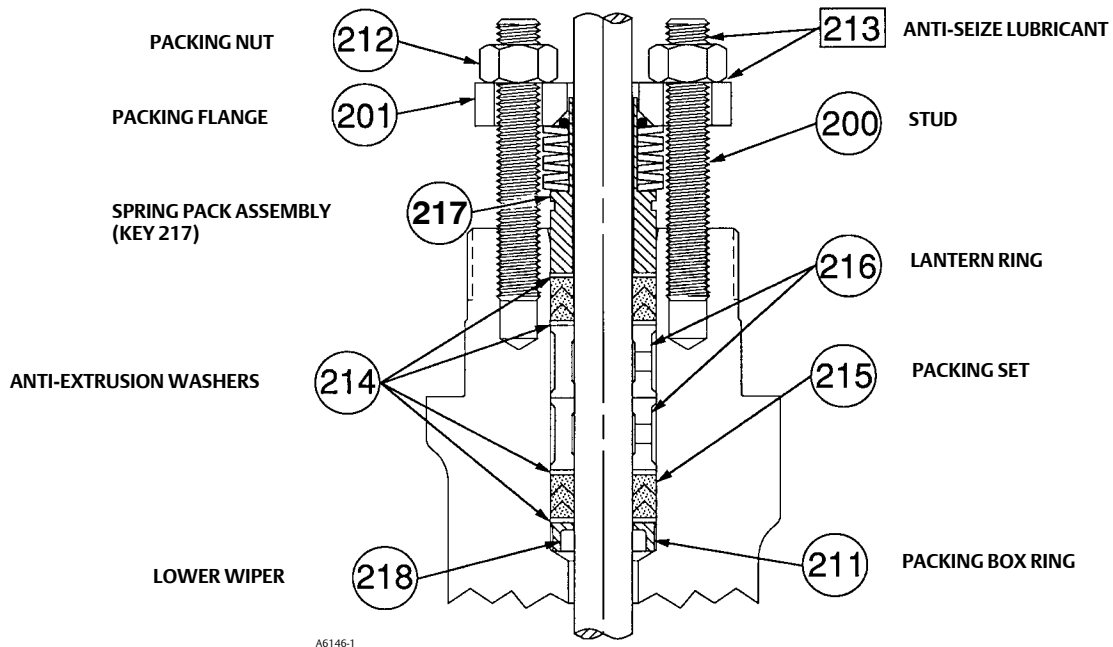


Figure 6. ENVIRO-SEAL Duplex Packing for Fisher easy-e Valves

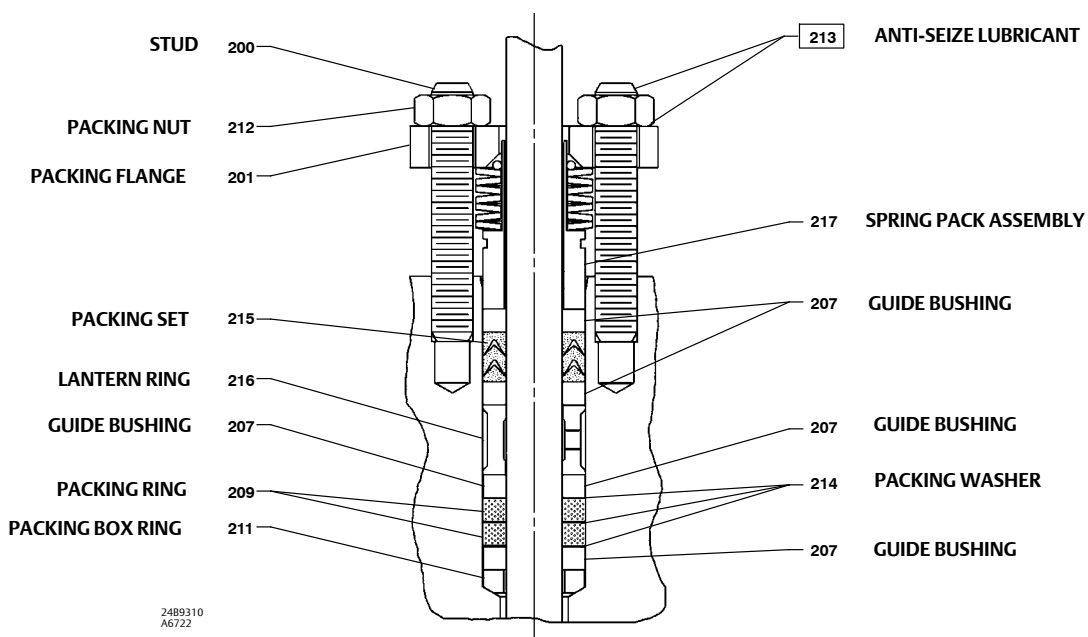


Figure 7. ENVIRO-SEAL Graphite ULF Packing for Fisher easy-e Valves

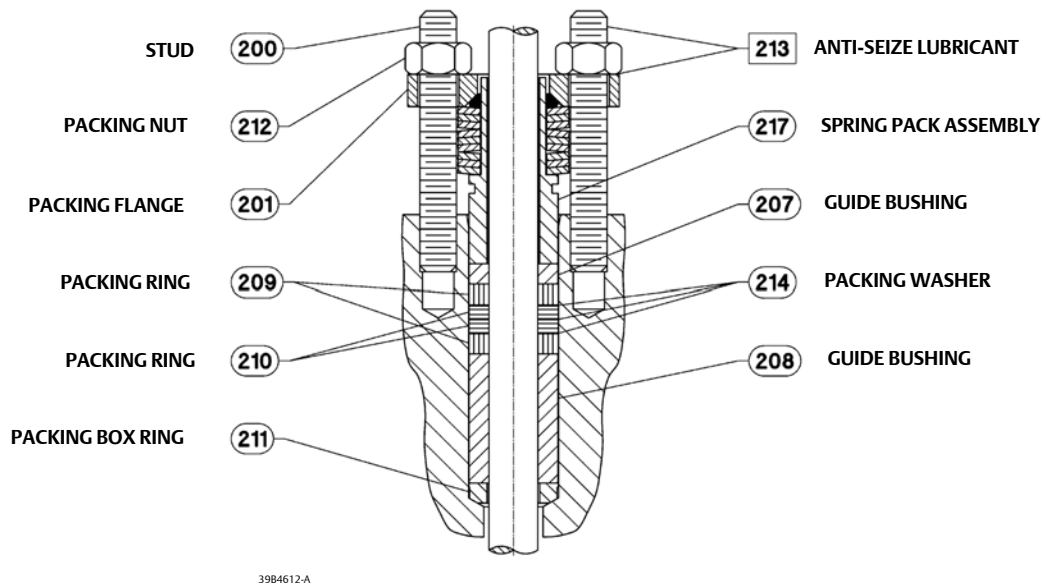


Figure 8. Copy of TÜV Certificate

**TÜV
SAARLAND**

C E R T I F I C A T E

TÜV Saarland e.V.
We herewith certify the equivalence of stem sealing
With TA-Luft-Packing

Type : Drawing Nr. 13 B 7183 / B and 12 B 6932 / A
Type : Drawing Nr. 12 B 8529 / B and 12 B 6927 / A

EMERSON PROCESS MANAGEMENT
Rue Paul Baudry
B.P. 10
F- 68701 Cernay Cedex

to stem sealing with pre-boding system additional safety packing

This comparison is based on the requirements as described in
TA-Luft Section 5.2.6.4

The required tightness was achieved on a representative test specimen with nearly 1 000
cycles, 40 bar internal pressure and room temperatur.

Register-Nr.: 842-99-5010

Montigny-lès-Metz, 21.06.2004

TÜV Saarland e.V.

Dipl. Ing. J. Maffert

TAH.FB.008, Rev. 0

Figure 9. Copy of TÜV Certificate



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