Graphite Ribbon/Filament Packing for Fisher™ Sliding-Stem Valves

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Introduction

Scope of Manual

This manual provides instructions for installing graphite ribbon and filament packing in sliding-stem valves—either as part of the field maintenance procedure for valves that originally were equipped with this kind of packing or when field-replacing other kinds of packing.

Use this manual along with the appropriate valve body instruction manual. Refer to the valve body manual for disassembly, packing removal, reassembly after the packing has been installed, and for packing part numbers and kits.

Do not install, operate, or maintain this packing 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

Graphite ribbon/filament packing is a low-chloride, corrosion-resistant packing for use with hard-to-handle fluids, especially high-temperature steam or water. It can be used in temperatures from -18 to 538 °C (0 to 1000 °F) in non-oxidizing service or from -18 to 371 °C (0 to 700 °F) in oxidizing service. Because the packing rings are certified to contain no more than 100 ppm of chloride, this packing is also frequently used in radioactive nuclear service and will withstand a gamma radiation dosage to $1.0 \times 10^7$ Rads or 50 R/hour.

Graphite ribbon/filament packing comes in three different arrangements of graphite ribbon rings, graphite filament rings, and sacrificial zinc washers. The three different arrangements are single (figures 1 and 2), double (figure 3), and leak-off (figure 4).
The graphite ribbon rings are made from a long ribbon of flexible graphite which is wound into a ring and then pressed tightly together. The flexible graphite contains a non-metallic, inorganic, passivating inhibitor for corrosion and oxidation resistance. Graphite filament rings consist of filaments of graphite braided together. One sacrificial zinc washer is used under each graphite ring to protect the valve from pitting and corrosion attack.

Storage and Startup

If a valve will be stored for a long period of time, remove the packing rings from the packing box to prevent corrosion. When ordering a valve that will be stored, notify Emerson Automation Solutions and the valve will be shipped from the factory with the packing box empty and a special packing follower with O-ring gland seal installed between the packing flange and bonnet shoulder. All the other packing parts shown in figure 2, 3, or 4 will be shipped with the control valve assembly but in a separate bag or wrapper.

Leave the special packing follower in place until after any hydrostatic testing is completed. Then remove the follower, thoroughly air-dry the packing box, and install all the packing parts according to the appropriate arrangement drawing. The special packing follower can be saved for future hydrostatic testing, or discarded if it will no longer be used.

⚠️ WARNING

Personal injury could result from packing leakage. Valve packing was tightened prior to shipment; however some readjustment will be required to meet specific service conditions.

⚠️ CAUTION

When using any packing at low temperatures, frost must not be allowed to form on the valve stem. Valve stem frost can damage packing as the stem travels through the packing rings.

Packing Installation

Packing parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement of parts depends upon the severity of service conditions or the requirements of local, state, and federal rules and regulations.

⚠️ 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.

1. Refer to the appropriate valve body and actuator instruction manuals. Disassemble the control valve as required to gain access to the packing box. Remove the packing box components.
2. Examine the valve stem. The surface that contacts the packing must be smooth and free of scratches and nicks. If another style of graphite packing had been installed, the packing may have left a black deposit of graphite coating on the stem. If this deposit has built up or has affected the valve stem finish, the stem should be polished to a 0.1 micro-meter (4 micro-inch) RMS finish.
3. Thoroughly clean and dry the packing cavity, valve stem, and all metal packing parts (packing box ring, lantern ring, and packing follower). Also, clean the threads of the packing flange studs and nuts (figure 1). Lubricate these threads and the faces of the packing flange nuts during the remainder of the installation with a moly disulfide or equivalent type of lubricant.
4. Select the correct installation figure reference according to the valve design and packing arrangement (single, double, or leak-off).
5. Install the metal packing parts (figures 2, 3, or 4) that go to the bottom of the packing cavity.

**WARNING**

To avoid valve leakage during operation or personal injury, it is necessary, when installing the packing, to avoid trapping air between the rings and to give side support to the rings so they do not spread out under the compression of adding more rings. This may be accomplished by installing only one ring at a time.

6. Install only one packing ring at a time. Push each of the new packing rings into the packing box until it presses against the ring below it.

If installing double or leak-off packing, start the last lower packing ring and then force all the lower packing rings and lantern ring(s) all the way into the packing cavity. Then install the upper packing rings in the same manner.

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**Figure 1. Typical Single Packing Arrangement Shown Installed in Bonnet**
Figure 2. Single Packing Arrangements

![Diagram of single packing arrangements]

NOTE:
0.102mm (0.004 INCH) THICK SACRIFICIAL ZINC WASHERS; USE ONLY ONE BELOW EACH GRAPHITE RIBBON RING.

Table 1. Single Packing Arrangements

<table>
<thead>
<tr>
<th>STEM DIAMETER</th>
<th>Inch</th>
<th>ARRANGEMENT ASSEMBLY DRAWING</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5 mm (3/8 INCH) STEM</td>
<td>3/8</td>
<td>14A3411</td>
</tr>
<tr>
<td>12.7 mm (1/2 INCH) STEM</td>
<td>1/2</td>
<td>13A9775</td>
</tr>
<tr>
<td>19.1 mm (3/4 INCH) STEM</td>
<td>3/4</td>
<td>13A9776</td>
</tr>
<tr>
<td>25.4 mm (1 INCH) STEM</td>
<td>1</td>
<td>14A2340</td>
</tr>
<tr>
<td>31.8 mm (1-1/4 INCH) STEM</td>
<td>1-1/4</td>
<td>14A3412</td>
</tr>
<tr>
<td>50.8 mm (2-INCH) STEM</td>
<td>2</td>
<td>14A3419</td>
</tr>
</tbody>
</table>

**CAUTION**

Loss of packing performance and damage to the valve stem could result if metal parts such as the packing follower come in contact with the valve stem. When installing packing parts or making packing adjustments, make sure that the inside diameter of the packing follower does not contact the valve stem.

7. Replace the packing follower, packing flange, and packing flange nuts.

**Note**

If the packing needs additional tightening after the valve is in service, the packing flange nuts may be tightened to the recommended maximum torque. Excessive valve stem friction may result if the recommended maximum torque is exceeded. The recommended minimum torque is necessary to maintain a stem seal.
Figure 3. Double Packing Arrangements

Table 2. Double Packing Arrangements

<table>
<thead>
<tr>
<th>STEM DIAMETER</th>
<th>mm</th>
<th>Inch</th>
<th>ARRANGEMENT ASSEMBLY DRAWING</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5 mm (3/8 INCH) STEM</td>
<td>12.7</td>
<td>1/2</td>
<td>14A2153, 14A1849</td>
</tr>
<tr>
<td>12.7 mm (1/2 INCH) STEM</td>
<td>19.1</td>
<td>3/4</td>
<td>14A1780</td>
</tr>
<tr>
<td>19.1, 25.4, &amp; 31.8 mm (3/4, 1, &amp; 1-1/4 INCH) STEM</td>
<td>25.4</td>
<td>1</td>
<td>14A3413</td>
</tr>
<tr>
<td>25.4</td>
<td>31.8</td>
<td>1-1/4</td>
<td>14A3414</td>
</tr>
<tr>
<td>31.8</td>
<td>50.8</td>
<td>2</td>
<td>14A3418</td>
</tr>
</tbody>
</table>

8. Evenly tighten the packing flange nuts to force the packing rings against the lantern ring(s). Continue to evenly tighten the nuts until the maximum recommended torque shown in table 4 is reached. Then, loosen the packing flange nuts and retighten to the recommended minimum torque in table 4.

9. Reassemble the control valve assembly according to the instructions in the appropriate instruction manual.
Figure 4. Leak-Off Packing Arrangements

Table 3. Leak-Off Packing Arrangements

<table>
<thead>
<tr>
<th>Stem Diameter</th>
<th>Arrangement Assembly Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5 mm (3/8 INCH) STEM</td>
<td>15A5377</td>
</tr>
<tr>
<td>12.7 mm (1/2 INCH) STEM</td>
<td>14A2485</td>
</tr>
<tr>
<td>19.1 mm (3/4 INCH) STEM</td>
<td>14A3415</td>
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<tr>
<td>25.4 mm (1-INCH) STEM</td>
<td>15A5378</td>
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<td>31.8 mm (1-1/4 INCH) STEM</td>
<td>15A7085</td>
</tr>
<tr>
<td>50.8 mm (2-INCH) STEM</td>
<td>15A5472</td>
</tr>
</tbody>
</table>

NOTE:
- 0.102 mm (0.004 INCH) THICK SACRIFICIAL ZINC WASHERS;
- USE ONLY ONE BELOW EACH GRAPHITE RIBBON RING.
### Parts Ordering

Refer to the appropriate valve body instruction manual for all bonnet packing parts.

Determine the parts needed from the appropriate packing arrangement in figures, 2, 3, or 4. Include the serial number of the valve in all correspondence concerning replacement parts or maintenance.

⚠️ **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.