



Figure 1 Model 320 AxFlo

Principles of Operation

Dyna-Flo 320 AxFlo trim is a high resistance, multi-stage, axial flow path trim, which means process fluid will flow through AxFlo valves parallel to the axis of the plug and cage (refer to Figure 1). This design is well suited to reduce clogged flow passages in applications involving fluids with entrained particles.

You can expect enhanced trim life when using AxFlo trim because pressure gets distributed over the length of the valve plug across multiple Stages, this means each Stage is not exposed to the full pressure differential. On properly sized 320 valves, the amount of pressure drop per Stage is controlled to prevent cavitation problems and to minimize erosion issues.

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Notice

These instructions are meant to be used with the Dyna-Flo 320 Technical Bulletin as they refer to Figures and Tables therein. If you do not have the Technical Bulletin, contact Dyna-Flo immediately, or visit www.dynaflo.com

It is the responsibility of the purchaser and end user to source and reference the latest edition of any technical or instructional literature related to the safe operation of this equipment.

Each control valve is factory checked. Check the calibration for the specific application, before a valve is put into service.

It is the intention of this document to provide users with an accurate guide for safe installation and maintenance of the 320 Control Valves. Revisions are available at above mentioned website.

WARNING - GENERAL INFORMATION

The following instructions are to be thoroughly reviewed and understood prior to installing, operating or performing maintenance on this equipment. Work on this equipment should be done by experienced personnel and it is the responsibility of the end user to perform regular maintenance and inspections on this equipment. Throughout the manual, safety warnings and caution notes appear and must be strictly followed to prevent serious injury or equipment malfunction.

WARNING - SCOPE OF MANUAL

The control valve configuration and construction materials were selected to meet particular pressure, temperature, and process conditions. Some material combinations are limited in their pressure and temperature ranges. It is the responsibility of the purchaser and end user to ensure that this equipment meets the required construction material combinations for safe usage in the intended process control application. Do not apply any conditions outside the intended factory manufactured specifications to the valve without first contacting your Dyna-Flo sales office.

This manual is written to be a practical and useful guide to maintaining the Dyna-Flo 320 Control Valve.

WARNING - SAFETY INFORMATION

Only well trained experienced technicians should perform these procedures. Use safe work practices and lock out procedures when isolating valves and actuators. It is also important to wear the proper protective equipment when performing any installation or maintenance activity. It is the responsibility of the end user of this product to select the proper parts and materials rated for the process being used, temperature requirements/limitations, operating conditions, and environmental conditions products will be used in. Special paint systems are available to alleviate effects of corrosion.

To avoid personal injury or installation damage as a result of the sudden release of process pressure or damage to equipment, do not install the valve assembly where service conditions could exceed the limits stated in this manual, sales bulletin or on the equipment nameplates. Use government codes, accepted industry standards and good piping practices, and select proper pressure-relieving equipment for protection of your installation. Always be aware of flammable process and instrument gas.

Always be aware of the hazards of actuators, especially spring-loaded actuators. Be sure that the actuator is de-energized or in the failed position before performing any maintenance procedure. Refer to any appropriate auxiliary equipment, instrumentation, and actuator instruction manuals; also enquire with your safety department or process engineer for additional protection measures.

These valves have dangerous pinch points. Never put your hands inside the valve unless you are certain that the plug and stem will not move.

Specifications

Configurations

The Model 320 AxFlo control valve is a multi-stage anti-cavitation valve designed for dirty service. Refer to Table 1.

Metal Seat Available.

Consult your Dyna-Flo sales office for other available configurations.

Valve Sizes and Connection Styles (Refer to Table 1)

Model:	320
Size:	ASME Class 300 & 600: 2" (50 DN) to 8" (200 DN) ASME Class 900 & 1500: 2" (50 DN) to 6" (150 DN)
Body:	Globe (All Sizes)
Rating:	ASME Class 300 / 600 / 900 / 1500
Connection:	RF & RTJ: All Sizes NPT / BWE / SWE: Refer to Table 1

Maximum Inlet Pressures and Temperatures

Flanged valves consistent with ASME Class 300, 600, 900 & 1500 rating as per ASME B16.34, unless limited.

Shutoff Classification

Class V as per ANSI/FCI 70-2 and IEC 60534-4.

Maximum Pressure Drops

Refer to Table 2.

Maximum Seating Force

Class V seat load requirements.

Characteristic and Flow Direction

Linear - Flow Up.

Maximum Valve Sizing Coefficients

Refer to Tables 14 & 15 of Sales Bulletin.

Dimensions

Valve Outline Dimension Diagram: Refer to Figure 2 of Sales Bulletin.

Valve Assembly Dimensions: Refer to Tables 6 to 9 of Sales Bulletin.

Port Diameters and Maximum Valve Plug Travel

Refer to Tables 3 & 4 of Sales Bulletin.

Approximate Assembly Weights

Refer to Table 3.

Materials

Body material options include:

LCC (A350-LF2 optional* bonnet material)

WCC (A350-LF2 optional* bonnet material)

CF8M (A182-F316 optional* bonnet material)

***NOTE:** Dyna-Flo reserves the right to substitute a cast material with the forged bar equivalent in the event a casting is not available.

Refer to Tables 10 & 11 of Sales Bulletin for valve parts construction materials. Refer to Table 12 of Sales Bulletin for trim selections.

Temperature Limitations

Refer to Tables 10, 11 & 13 of Sales Bulletin for material temperature limitations.

Valve Assembly Cross-Section

Refer to Figures 3 & 4 of Sales Bulletin.

Packing Type

The Standard packing is PTFE V-ring. Live-loaded low emission, graphite, KALREZ[®] and other packing arrangements are available. Refer to Figure 5 of Sales Bulletin.

For more information and other options contact your Dyna-Flo sales office.

Table 1

Available Valve Configurations

ASME Class & Trim Type	Valve Size Inch (DN)	End Connection			
		RF ⁽¹⁾ and RTJ ⁽²⁾ (Flanged)	BWE ⁽³⁾	SWE ⁽⁴⁾	NPT ⁽⁵⁾
Class 300 & 600 AxFlo 3-Stage	2 (50)	✓	✓	✓	✓
	3 / 4 / 6 / 8 (80 / 100 / 150 / 200)	✓	✓	✓	✗
Class 900 & 1500 AxFlo 4-Stage	2 (50)	✓	✓	✓	✗
	3 / 4 / 6 (80 / 100 / 150)	✓	✓	✗	✗
Notes:	1 - RF = Raised Face.				
	2 - RTJ = Ring Type Joint.				
	3 - BWE = Butt Weld.				
	4 - SWE = Socket Weld.				
	5 - NPT = Screwed.				

Table 2

Application Guidelines

ASME Class	Trim Type	KC=1		KC=0.8	
		Psid	Bar	Psid	Bar
Class 300 & 600	AxFlo 3-Stage, Level C	<1,500	<103	-	-
Class 900 & 1500	AxFlo 4-Stage, Level A	<1,850	<128	1,850 - 2,325	128 - 160
	AxFlo 4-Stage, Level B	<1,890	<130	1,890 - 2,360	130 - 163
	AxFlo 4-Stage, Level C	<2,600	<179	2,600 - 3,250	179 - 224

Table 3

Approximate Valve Weights

Trim Type	Valve Size Inch (DN)	End Connection			
		RF ⁽¹⁾ & RTJ ⁽¹⁾ (Flanged)		NPT ⁽²⁾ / BWE ⁽³⁾ / SWE ⁽⁴⁾	
		lb	Kg	lb	Kg
3-Stage	2 (50)	90	40	70	30
	3 (80)	155	70	110	50
	4 (100)	265	120	175	80
	6 (150)	610	275	510	230
	8 (200)	1130	510	980	445
4-Stage	2 (50)	210	95	185	85
	3 (80)	405	185	310	140
	4 (100)	750	340	620	280
	6 (150)	Contact Dyna-Flo	Contact Dyna-Flo	Contact Dyna-Flo	Contact Dyna-Flo
Notes:	1 RF = Raised Face. RTJ = Ring Type Joint.				
	2 NPT = Screwed. Screwed end connection only available for ASME Class 300 & 600 2 Inch Valves.				
	3 BWE = Butt Weld.				
	4 SWE = Socket Weld. Socket Weld end connection only available for 2 Inch Valves.				

Unpacking Valve From Shipping Container

Special Tools Required:

- Properly Rated Lifting Straps (2 – 4 Straps) refer to Table 3 for valve weights.
- Lifting Device (Example: Crane)

Check the packing list, verify that the list includes all the materials in the shipping container before unpacking. Valve information can be found on the nameplate (Key 35). Refer to Figure 2 for nameplate location.

! WARNING

Avoid sharp edges and corners when removing equipment from shipping container.

When lifting the valve assembly from shipping container, place properly rated lifting straps securely around the neck of the actuator, refer to Figure 2 for strap placement. Straps should be placed to avoid damage to tubing and other mounted accessories.

For valve assemblies without an attached actuator, use caution when lifting or positioning straps so as not to damage the valve stem.

Lift the valve/actuator assembly using proper lifting techniques.

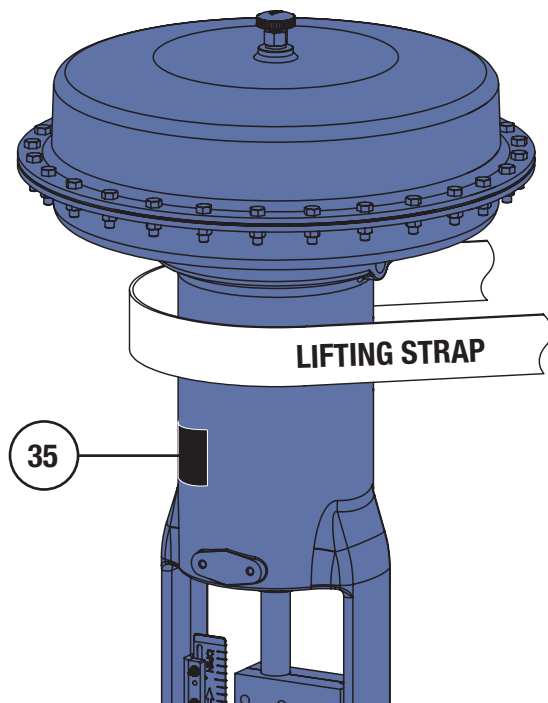


Figure 2 Actuator Lifting Strap Placement Suggestion

Installation

! WARNING

Before You Begin:

- Read the Warnings on Page 2.
- Sudden movement of actuator can cause damage or injury. De-energized the actuator before performing any work.
- Use safe work practices and lock out procedures before placing valve or actuator in-line.
- Always wear the appropriate personal protective equipment.
- Standard actuators accept 1/4" (6 mm) NPT connections.
- Do not use operating pressure that exceeds the Maximum Actuator Casing Pressure.
- Property damage, environmental harm, and personal injury can result from the use of supply gas other than clean, non-corrosive, oil and moisture free air.
- Operating medium must be controlled and directed, if a positioner was not ordered or unavailable, use a loading device such as a 4-way switching valve or regulator. For more information on positioner installation and operation, refer to the appropriate positioner instruction manual for your positioner type.
- Valve packing leakage could cause property damage or personal injury. Valve packing was properly tightened in factory, however, it is recommended that packing tightness be checked prior to installation.
- For butt weld valve bodies, depending on the body material, post-weld heat treatment might be required. Soft parts, seals, some metal trim, threading and shrink-fit parts can be damaged by post-weld heat treatment. If post-weld heat treatment is required, it is recommended that all internal valve parts be removed from the valve body. Contact Dyna-Flo for more information.

Parts Required:

- Appropriate Line Flange Nuts and Bolts.
- Appropriate Line Flange Gaskets.
- If the valve has small internal flow passages such as Anti-Cavitation or Low-Noise trim, the installation of an upstream strainer should be considered to prevent clogging of these small passages.

Installation Steps:

- 1 Check the packing box bolting (Key 26) for proper tightness. Refer to Packing Installation on Page 18 for proper packing tightening instructions.

Installation (Continued)

Installation Steps (Continued):

- 2 The valve assembly may be installed in any position unless limited by vibration considerations, it is however recommended that the valve be installed with the valve stem (Key 8) perpendicular to the ground. **NOTE:** For some non-vertical orientations, the valve actuator may need to be supported.
- 3 Install the valve with flow through the valve in the direction shown by the flow arrow on the valve body.
- 4 Install the appropriate line flange gaskets.
- 5 Apply Permatex® Nickel Anti-Seize to the threads of the flange studs and install.
- 6 When possible, before tightening the line bolting, stroke the valve and check for smooth operation through the full stroke. Unsteady valve stem movement could be an indication of an internal problem.
- 7 Tighten the line flange bolting in even increments in a crisscross pattern until the correct line bolt torque specification is reached.

Air Piping:

Before You Begin:

NOTE: Standard actuators accept 1/4" (6 mm) NPT connections.

- Refer to the appropriate actuator instruction manual when necessary.

Piping Installation Steps:

- 1 Use 3/8" (outside diameter) tubing (or equivalent) for air lines.
- 2 Install the required line vents, valves, drains, seals, and filters to the actuator.

Periodic Inspection

! WARNING

Before You Begin:

- Read the Warnings on Page 2.
- Sudden movement of actuator can cause damage or injury. De-energized the actuator before performing any work, vent any pneumatic loading pressure and relieve any spring preload. Disconnect supply lines (air or gas), electric power, or control signal to the actuator.
- Use safe work practices and lock out procedures before taking valve out of line.
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve (especially valve packing). Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. Refer to the appropriate valve instruction manual and enquire with your safety department or process engineer for additional protection measures.
- It is the responsibility of the end user to perform regular maintenance and inspections on this equipment.

Inspection Steps:

- 1 Check for visible signs of leakage around all seal and gasket areas.
- 2 Check the valve for damage, especially damage caused by corrosive fumes or process drippings.
- 3 Clean and repaint the areas as required.
- 4 Ensure all accessories, mounting brackets, and fasteners are secure.
- 5 Clean any dirt and foreign material from the valve stem (Key 8).

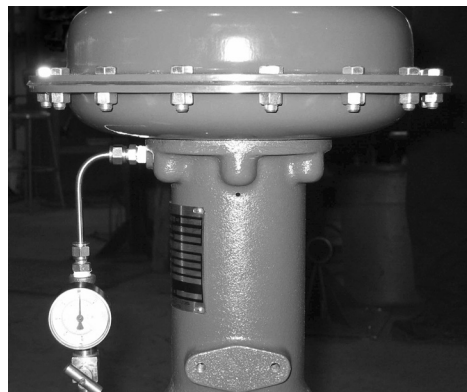


Figure 3 Needle Valve with Gauge Setup

Actuator Removal

NOTE: Actuator removal does not require that the valve be removed from the pipeline. Refer to the appropriate actuator instruction manual for actuator installation instructions.

! WARNING

Before You Begin:

- Read the Warnings on Page 2.
- Sudden movement of actuator can cause damage or injury. De-energized the actuator before performing any work, vent any pneumatic loading pressure and relieve any spring preload. Disconnect supply lines (air or gas), electric power, or control signal to the actuator.
- Do not separate the actuator from the valve while the actuator is still pressurized and do not remove the stem connector while spring force or loading pressure is applied.

Tools Required:

- Properly Rated Lifting Straps or Chains
- Lifting Device (Example: Crane)
- Hammer and Blunted Chisel

- 1 Refer to the appropriate actuator instruction manual for more information regarding the actuator removal.
- 2 If the valve has been removed from the pipeline, place the valve assembly on a flat work surface that can support the weight. If not, refer to the Periodic Inspection WARNING and drain the process fluid from the valve.
- 3 Before the actuator is removed, support the actuator using lifting hooks or straps rated to support the weight of the actuator. It may also help to mark the orientation of the actuator on the bonnet.
- 4 If the actuator is a spring and diaphragm actuator, determine if that actuator is fail open or fail closed. Fail closed actuators will need to be energized to remove downward force from the stem connector (refer to Figure 5). Connect a supply line to the inlet port of the actuator, be sure not to exceed the maximum casing pressure. Refer to Figure 3 for recommended needle valve and gauge setup.
- 5 Remove the stem connector (Refer to Figure 5).
- 6 Use a blunted heavy chisel to loosen the yoke nut (Key 33). Unscrew the yoke nut and remove the actuator from the valve. If the actuator was energized during removal, de-energize the actuator (Refer to Figure 4).
- 7 Remove the jam nut and hex nut (Keys 31 & 32) and travel indicator from the valve stem (Key 8).

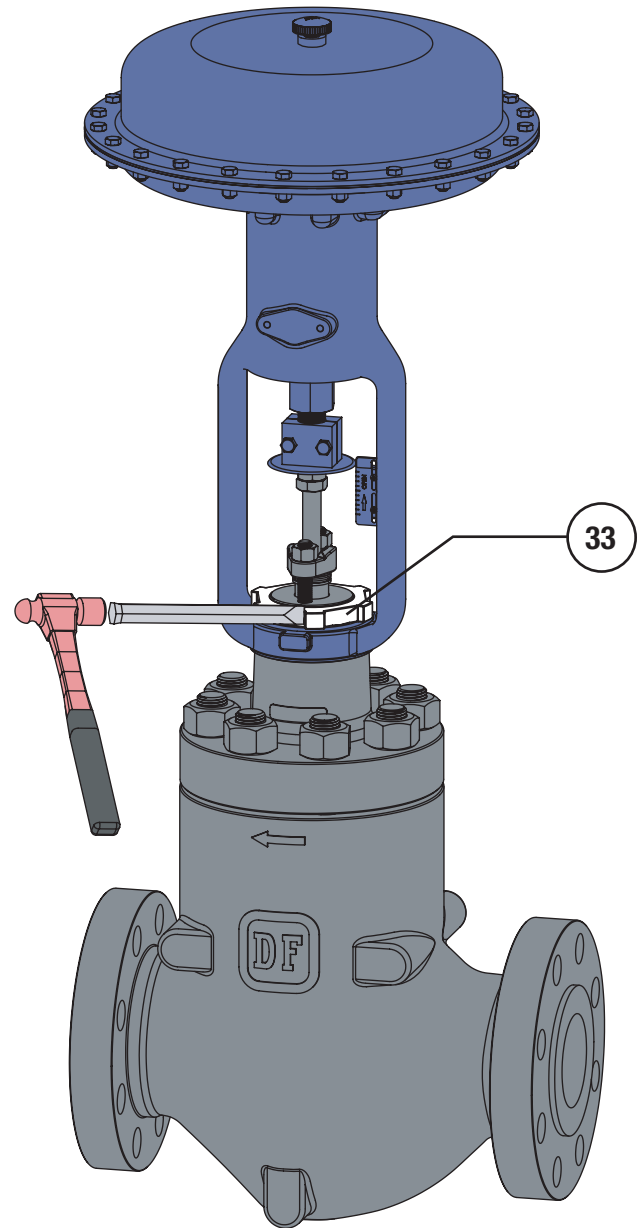


Figure 4 Yoke Nut Loosening Technique

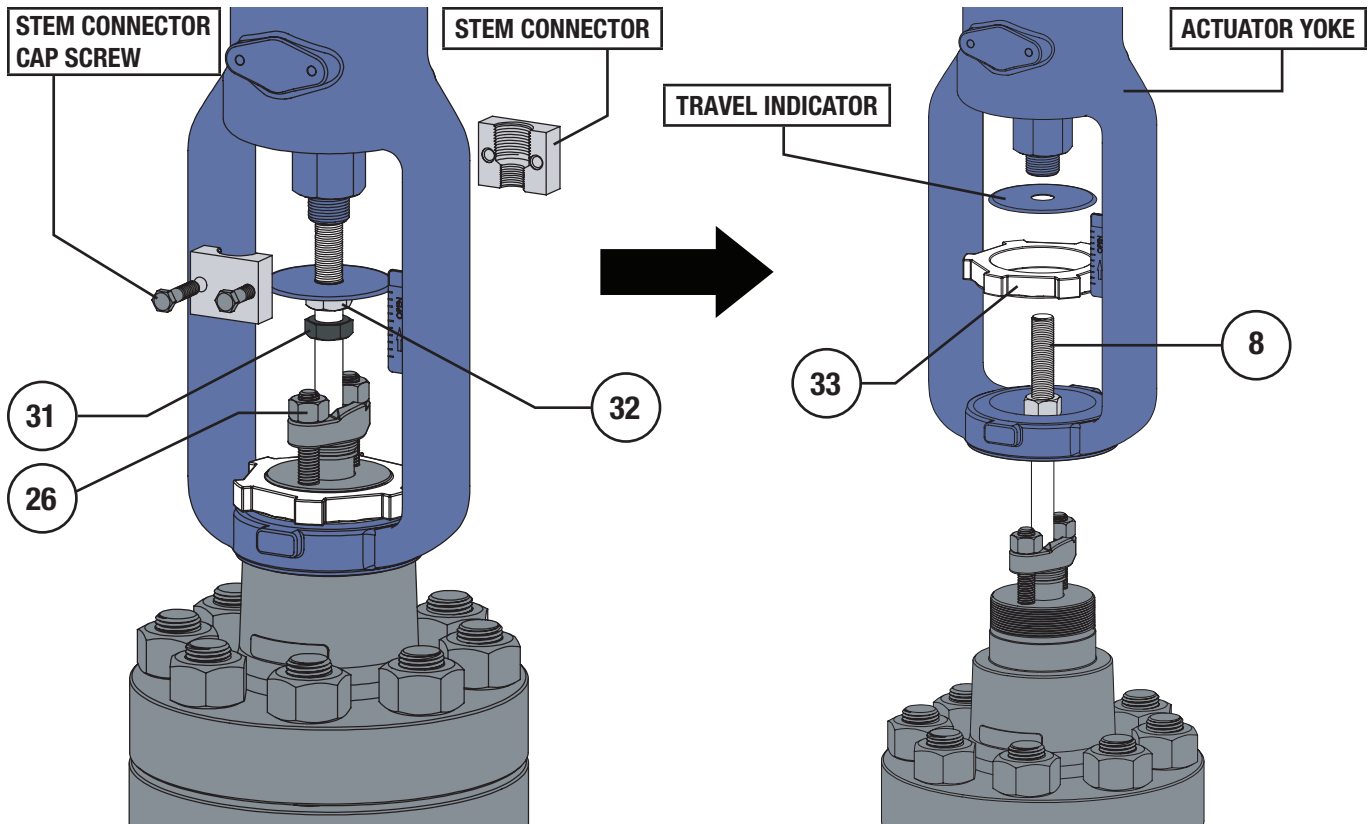


Figure 5 Actuator Removal Steps

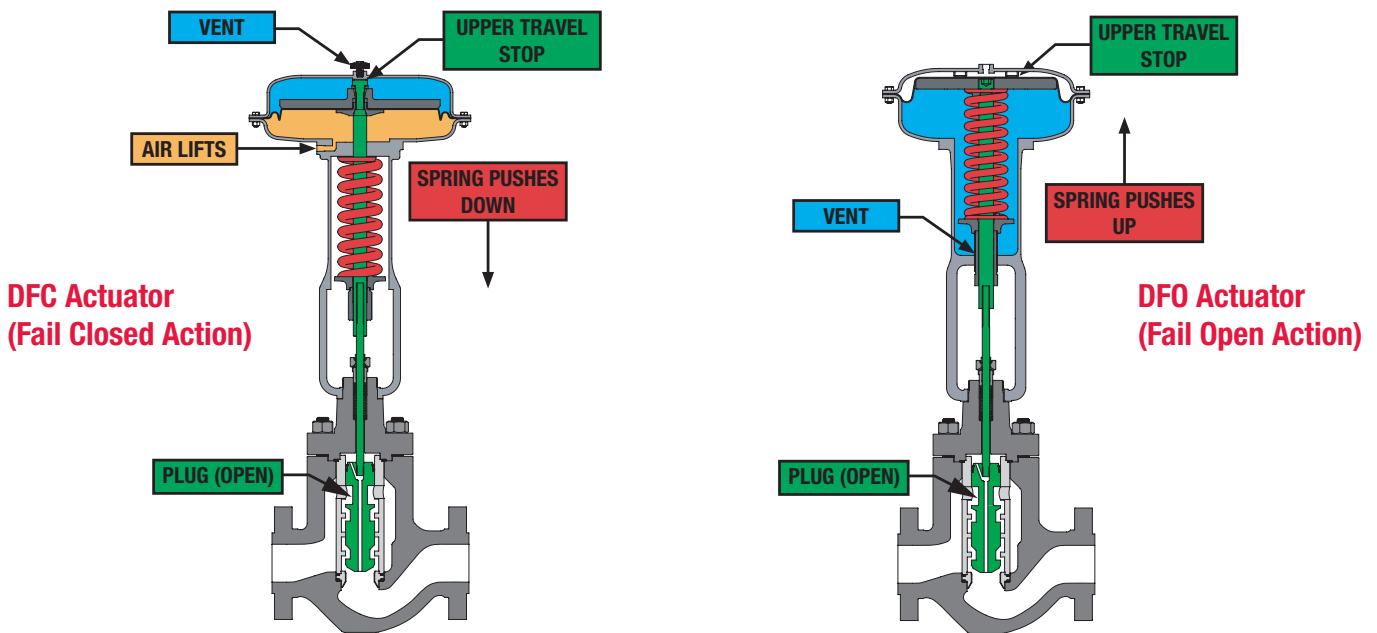


Figure 6 Actuator Operation and Valve Plug Placement

Maintenance

NOTE: Seals, soft parts, and packing (including live loaded packing) should all be inspected frequently for leaks, wear and damage. Maintenance to the valve can be performed while the valve is still in-line, the actuator must be removed to replace packing (Refer to Page 7 for Actuator Removal instructions).

WARNING

Before You Begin:

- Read the Warnings on Page 2.
- Refer to the Periodic Inspection WARNING and the Actuator Removal WARNING.
- Use safe work practices and lock out procedures before working on equipment.
- Be aware of potentially hazardous process material that may be present in-line and in-valve (especially valve packing).
- It is the responsibility of the end user to perform regular maintenance and inspections on this equipment.
- Determine if valve has standard or live loaded packing (Refer to Figures 26, 28, 29, & 30).
- Follow Steps 1 – 6 of Before You Begin from Periodic Inspection (Page 6).

If the packing is leaking, proper tightening of the packing may correct the leak. If re-tightening the packing to the proper specifications does not stop the leakage it is possible that the stem or wall of the packing box is damaged. Replace or repair parts as necessary.

For instructions on packing removal only, refer to the Disassembly, Packing Removal section.

1 Determine the type of packing installed in the valve.

For Single PTFE V-Ring Packing (Spring-Loaded):

Tighten the packing nuts (Key 26) evenly in an alternating pattern until the shoulder of the packing follower (Key 23) makes contact with the top face of the bonnet (Key 15). Proceed to tighten the packing nuts to the torque specification listed in Tables 7 & 8. Refer to Figure 26.

For Double PTFE V-Ring and Graphite Packing:

Tighten the packing nuts (Key 26) evenly in an alternating pattern to the minimum recommended torque specifications listed in Tables 7 & 8 on Page 26, continue tightening until leakage stops or the maximum torque specification is reached. If leakage continues after reaching the maximum recommended torque the packing will need to be replaced, do not tighten the packing past the maximum recommended torque as this will cause excessive packing friction.

For Live-Loaded Packing:

Refer to the Sliding Stem Live-Loaded Packing Manual (P-LLPS) for proper maintenance procedures.

Disassembly

WARNING

Before You Begin:

- Read the Warnings on Page 2.
- Use safe work practices and lock out procedures before working on equipment.
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve (especially in valve packing). Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. Refer to the appropriate valve instruction manual and enquire with your safety department or process engineer for additional protection measures.
- Remove the actuator from the valve (Refer to Actuator Removal Instructions and WARNINGS, Page 7).

Packing Removal:

For Live Loaded Packing refer to Figure 30 and the Live Loaded Sliding Stem Packing Manual (P-LLPS).

Special Tools Required:

- Mechanics Pick Set

NOTE: Packing box parts are easier to remove after the bonnet (Key 15) has been separated from the valve body (Key 1) and the valve stem (Key 8) has been removed. If the packing is all that needs to be removed, it is possible to extract packing box parts carefully using a mechanics pick set.

- 1** Remove the packing nuts (Key 26).
- 2** Remove the upper wiper (Key 24) if present, graphite packing does not include an upper wiper.
- 3** Remove the packing follower (Key 23).
- 4** It is recommended to proceed to the Bonnet Removal section to continue with valve disassembly. If the packing is all that needs to be removed, remove the contents of the packing box (Keys 18, 19, 20, 21, & 22) using a mechanics pick set being careful not to damage the valve stem (Key 8) or wall of the packing box of the bonnet (Key 15). For packing reassembly refer to Packing Installation section (Page 18).

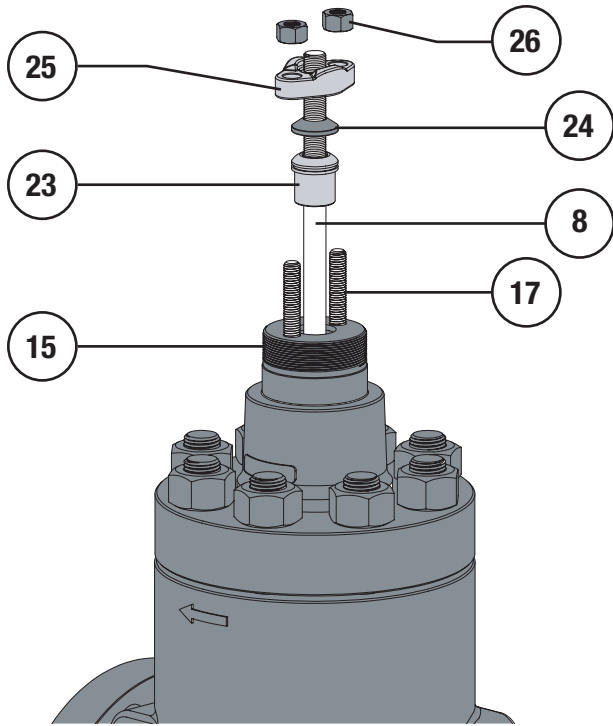


Figure 7 Packing Removal (Steps 1 - 3)

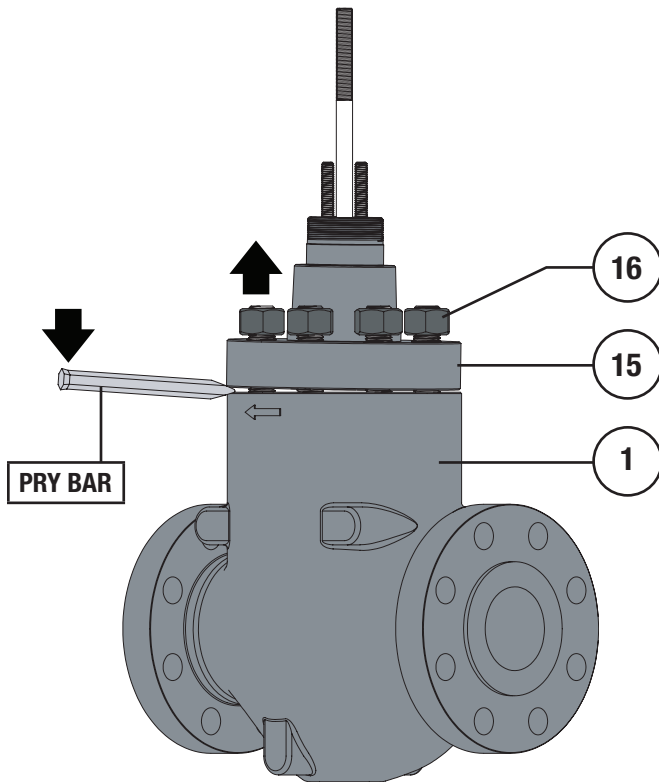


Figure 8 Bonnet Removal (Steps 1 & 2)

Disassembly (Continued)

! WARNING

Process medium and pressure may be trapped inside the valve body (Key 1), sudden release of this pressure could cause damage or injury. Use caution when removing the valve bonnet (Key 15). Refer to the WARNINGS on Page 2 and the following instructions. Do not use mechanical equipment to pull on a stuck bonnet, powerful mechanical equipment can deform material or store energy for recoil. Recoil from pulling can cause damage or injury.

Bonnet Removal:

- 1** Loosen the bonnet nuts (Key 16) 1 full turn after contact between the nuts and the top surface of the bonnet (Key 15) has been broken. Do not remove the bonnet nuts until any trapped process pressure has been vented. Refer to Figure 8.
- 2** Break the contact between the valve body (Key 1) and the bonnet (Key 15), use a pry bar or blunt chisel to help with the separation if necessary. Refer to Figure 8.
- 3** If no process fluid or gas escapes from the body-to-bonnet joint proceed by completely removing the bonnet nuts (Key 16). Refer to Figure 9.
- 4** Carefully lift the bonnet (Key 15) from the valve body (Key 1), be sure that the valve stem (Key 8) and plug (Key 6) assembly do not drop from the bonnet and get damaged. If the valve plug/stem assembly begin to lift with the bonnet, it may be necessary to gently tap the stem from the bonnet using a rubber mallet as the bonnet is being lifted.
- 5** The bonnet gasket (Key 13, 300/600) or spiral wound gasket (Key 14, 900/1500) may stick to the bonnet during removal. Remove the gasket when ready.

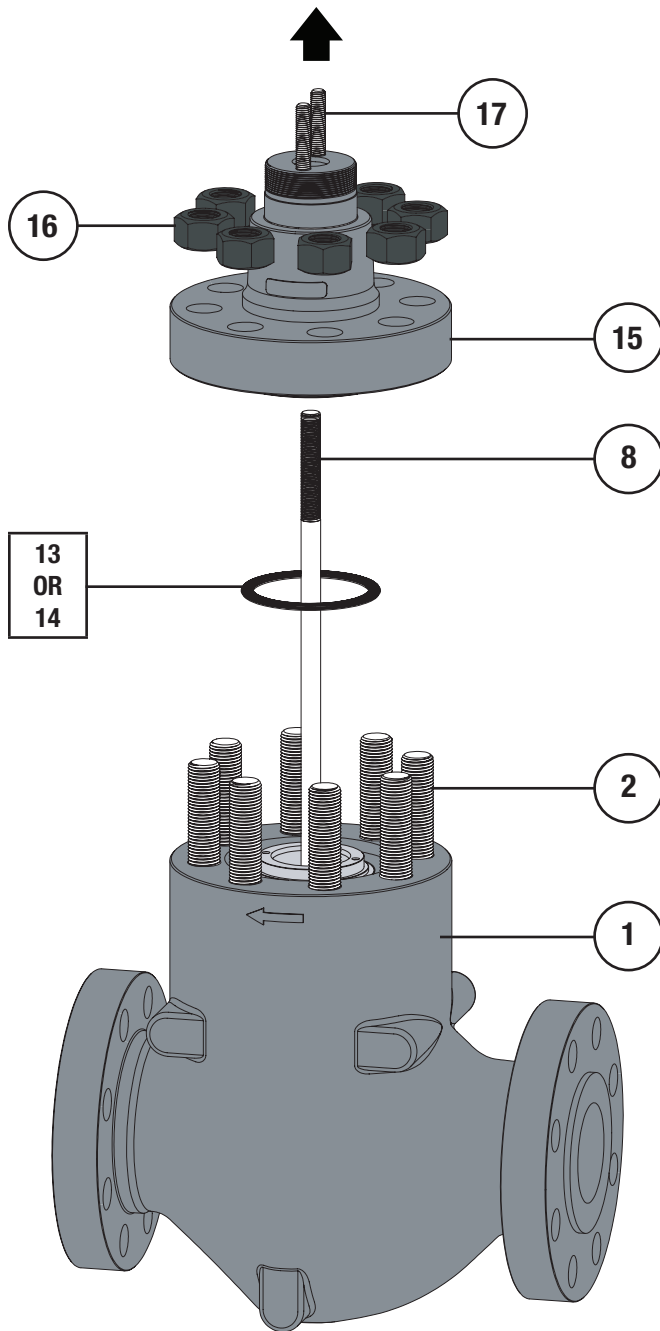


Figure 9 Bonnet Removal (Steps 3 & 4)

Disassembly (Continued)

Trim Parts Removal:

- 1 Remove the gasket (Key 13) or spiral wound gasket (Key 14) if they haven't already been removed. Refer to Figure 9.
- 2 Remove the valve stem (Key 8) / valve plug (Key 6) assembly from the valve body (Key 1), refer to Figure 10. Refer to Plug Seal Removal section for disassembly instructions.

- 3 Carefully remove the cage (Key 5), use the lifting holes in the top of the cage if necessary.
- 4 Remove the spiral wound gaskets (Key 3) and seat ring (Key 4).
- 5 Clean and inspect all parts for damage, especially gasket seal surfaces. Replace all damaged parts and gaskets with new parts as necessary, gaskets cannot be reused.

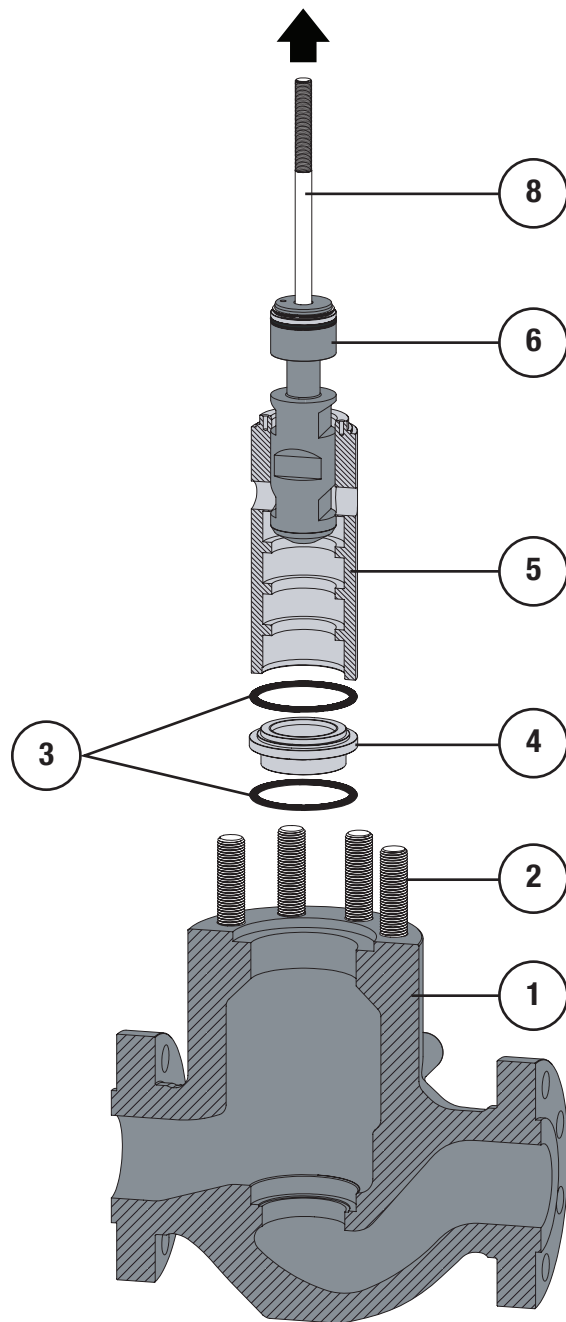


Figure 10 Standard Trim Parts Removal (Steps 1 - 6)

Disassembly (Continued)

⚠ WARNING
Compressed gasses could be trapped between packing rings, sudden release of this pressure could cause damage or injury.

Packing Parts Removal:

NOTE: For Live Loaded Packing refer to Figure 31 and the Live Loaded Sliding Stem Packing Manual (P-LLPS).

- Using a blunt or rounded tool or rod, carefully tap the packing parts (Keys 18, 19, 20, 21, and 22) out of the packing bore of the bonnet (Key 15). A mechanic's pick set can also be used to pull packing parts from the bore. For other packing arrangements, refer to Figures 28 to 30.
- Clean and inspect the bonnet for damage, pay particular attention to the packing bore surface and the gasket sealing surface. Replace or repair the bonnet as necessary. Metal packing parts can be reused if they are not damaged, all other packing parts should be replaced.

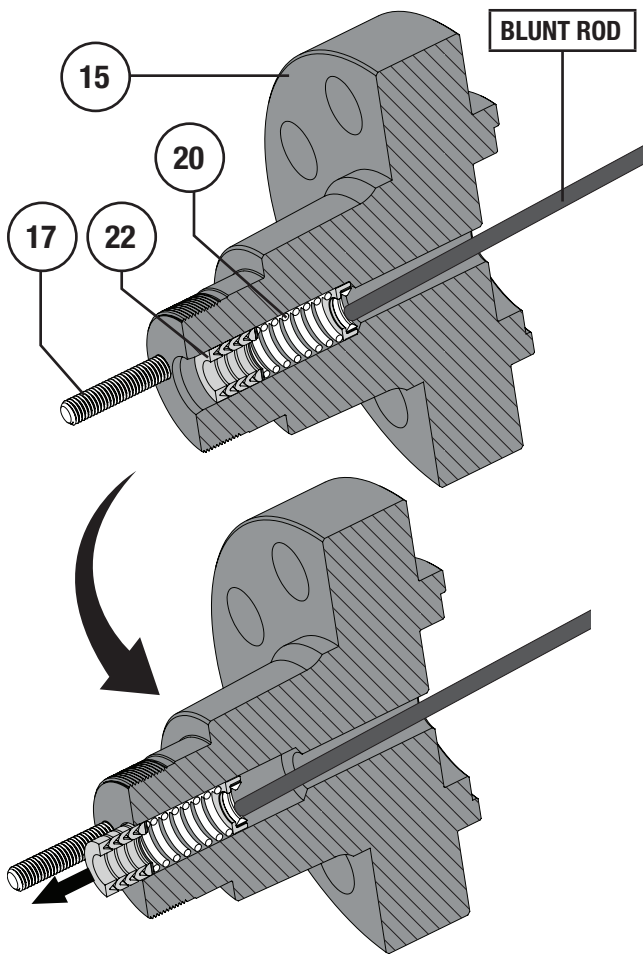


Figure 11 Packing Parts Removal (Steps 1 - 2)

Plug Seal Removal:

- Carefully remove the retaining ring (Key 12) from the plug groove, a pick set or flat screw driver may be required to separate the coiled rings. Refer to Figure 12.
- Remove the backup ring (Key 11). Remove the seal ring (Key 10). Remove the anti-extrusion rings (Key 9) if present.
- Clean and inspect all parts for damage, especially the stem (Key 8) and plug (Key 6) surfaces. Minor scratches can be buffed or lapped out, major scratches (scratches that will stop a finger nail) will need to be machined or replaced. Replace all damaged parts and soft parts with new parts.

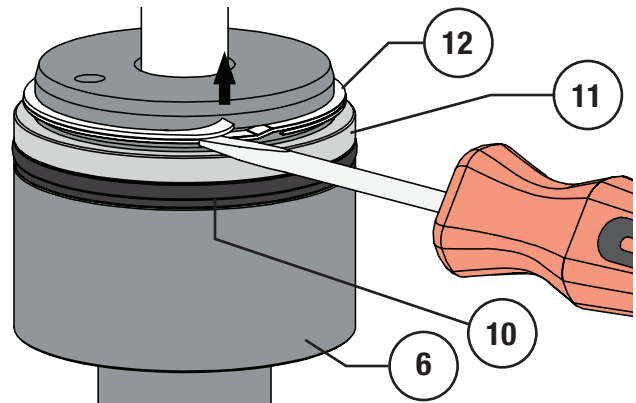


Figure 12 Packing Parts Removal (Steps 1 - 2)

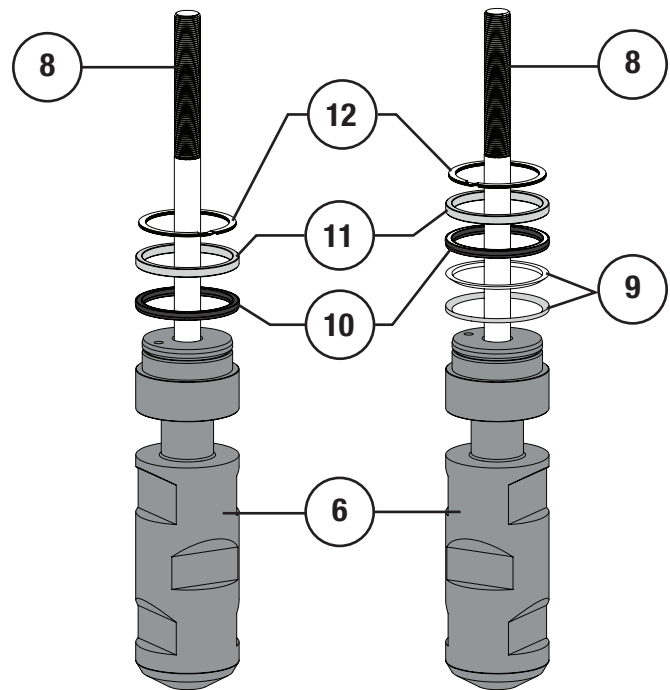


Figure 13 Packing Parts Removal (Steps 1 - 2)

Lapping

Expect a certain amount of leakage in valves with metal seats. In some cases where leakage has become excessive, lapping can improve sealing performance. Before performing the lapping process, insure all trim parts have been thoroughly cleaned and are free of debris.

NOTE: Spiral wound gaskets (Keys 3 & 14) make their seal by being crushed and cannot be reused, this includes gaskets required to be used during the lapping process. It may be desirable to use an already crushed gasket in the lapping process to be replaced with new gaskets during reassembly.

CAUTION

Once lapping has been performed with a previously crushed gasket, it is important to mark the position and alignment of all trim parts (Keys 4, 5, and 6) before removal and reassembly. If trim parts are reassembled out of their lapped alignment excessive leakage may result.

Special Tools Required:

- Soft felt marker
- Two wrenches that will slide over the valve stem (Key 8)
- 400 – 600 grit (fine grit) Loctite® Clover® compound (Key D)

Lapping Procedure:

- 1 Install the used seat ring gasket (Key 3) into the valve body (Key 1).
- 2 Install the seat ring (Key 4). Mark the position of seat ring using the marker.
- 3 Install the cage (Key 5). Mark the position of cage using the marker.
- 4 Do not install any plug seals into the valve plug (Key 6). Apply fine grit Clover® compound to the seating surface of the seat ring (Key 4) as shown in Figure 14. Install the valve plug / stem assembly (Keys 6, 7, 8) into the valve. Mark the position of the plug / stem assembly using the marker. **NOTE:** Be very careful when applying the lapping compound, lapping compound can easily damage parts.
- 5 Install used bonnet gaskets (Keys 13 or 14).
- 6 Carefully lift the bonnet (Key 15) into place and secure the bonnet using half of the bonnet nuts (Key 16). Mark the position of the valve plug (Key 6) on the bonnet (Key 15) using the marker.
- 7 Install the packing follower (Key 23), this will help to center the valve stem and plug (Keys 8 & 6).

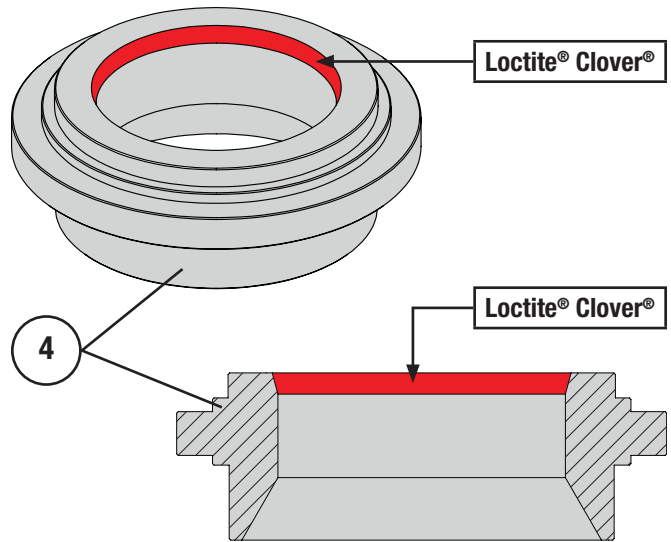


Figure 14 Lapping Compound Application Area

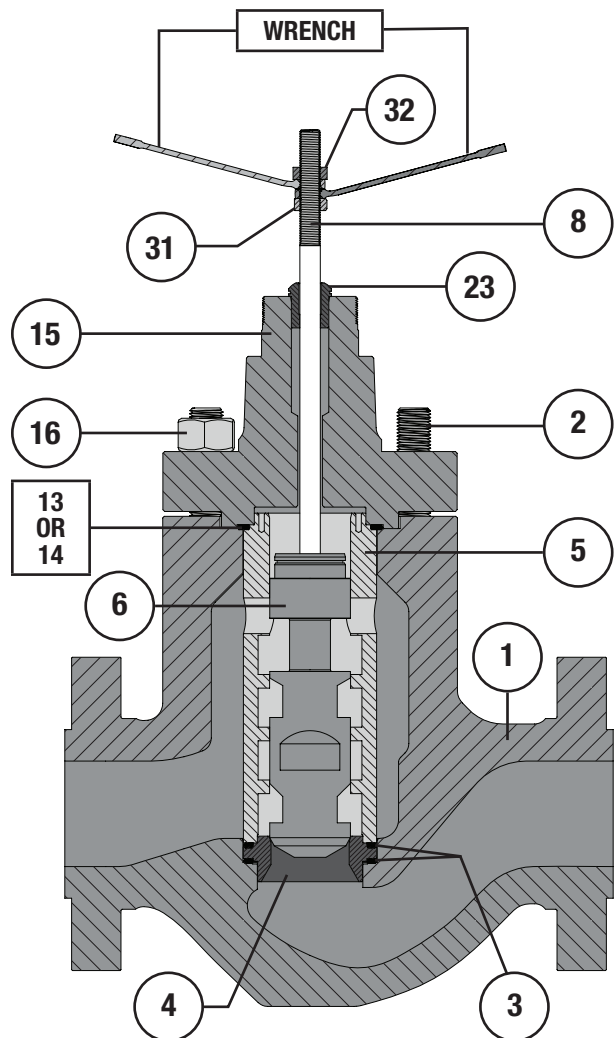


Figure 15 Lapping Procedure Setup (Steps 1 - 8)

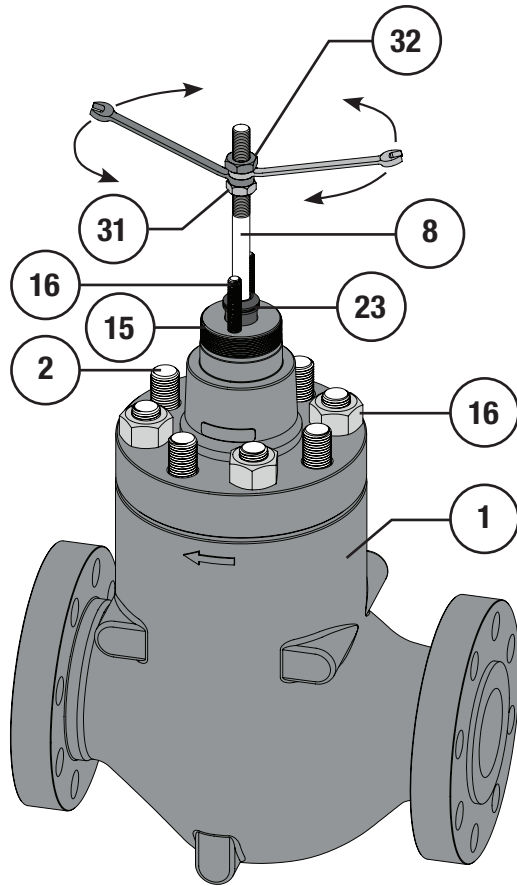


Figure 16 Packing Procedure Setup (Steps 8 - 10)

Lapping (Continued)

Lapping Procedure (Continued):

- 8** Install the jam nut (Key 31) on to the valve stem (Key 8) and build a handle as shown in Figure 15 and 16 using the two wrenches and the hex nut (Key 32).
- 9** Rotate the valve plug (Key 6) back and forth about a quarter of a full rotation (only a small amount of movement is required, do not make full rotations) over the seat ring (Key 4) using the wrench handles.
- 10** Once lapping is complete, disassemble the valve and thoroughly clean all parts. Be sure to clean away all traces of lapping compound.
- 11** If a seat leak test is to be performed after lapping to test valve shut off, disassemble the lapping setup after a few cycles of back and forth plug movement. Replace the used gaskets (Keys 3, 13 or 14) with new gaskets and reassemble the valve for testing. **NOTE:** Another set of new gaskets will need to be used for the final valve assembly if the lapping procedure needs to be repeated after seat leak testing.

Assembly

! WARNING

Before You Begin:

- Read the Warnings on Page 2.
- Clean and inspect all parts.
- Replace or repair damaged parts. Replace all soft parts (Seals, o-rings, gaskets).
- Always use properly rated studs (Key 2) and nuts (Key 16 approved by Dyna-Flo Control Valve Services with visible material grade identification marks. Service pressures can lead to excessive stress on material unapproved for use in this particular service, property damage or personal injury may result.

Lubricants Required:

- Permatex® Nickel Anti-Seize or equivalent (Key A)
- Dow Corning Molykote® 5 or equivalent (Key B)
- Lubriplate® No. 105 Grease or equivalent (Key C)

Stud Installation:

- 1** If the studs (Key 2) were replaced, removed, or never installed, apply Permatex® Nickel Anti-Seize (Key A) to the threads of the end of the stud without a material stamp.
- 2** Thread the studs (Key 2) into the valve body (Key 1) nickel anti-seize coated end first, until they are completely threaded into the valve body.

! WARNING

Never reuse a Stem (Key 8) when replacing a damaged Plug (Key 6). Plugs may be reused with a new Stem should the Stem need to be replaced. Contact Dyna-Flo for more information.

Plug Seal Installation:

- 1** Apply Lubriplate® No. 105 (Key C) to the surface of the anti-extrusion rings (Key 9) and install them as shown in Figure 17. **NOTE:** Not all assemblies use anti-extrusion rings.
- 2** Apply Lubriplate® No. 105 (Key C) to the surface of the seal ring (Key 10).
- 2** Install the seal ring (Key 10) onto the valve plug (Key 6), refer to Figure 17 for proper seal ring orientation.
- 4** Apply Lubriplate® No. 105 (Key C) to the backup ring (Key 11) and install the backup ring onto the valve plug (Key 6).

Plug Seal Installation (Continued):

- 5 Apply Lubriplate® No. 105 (Key C) to the retaining ring (Key 12) and install the retaining ring into the retaining ring groove on the valve plug (Key 6).
- 6 Allow time for the seal ring material to shrink back to its original size after being stretched over the valve plug before installing the plug assembly into the cage (Key 5).

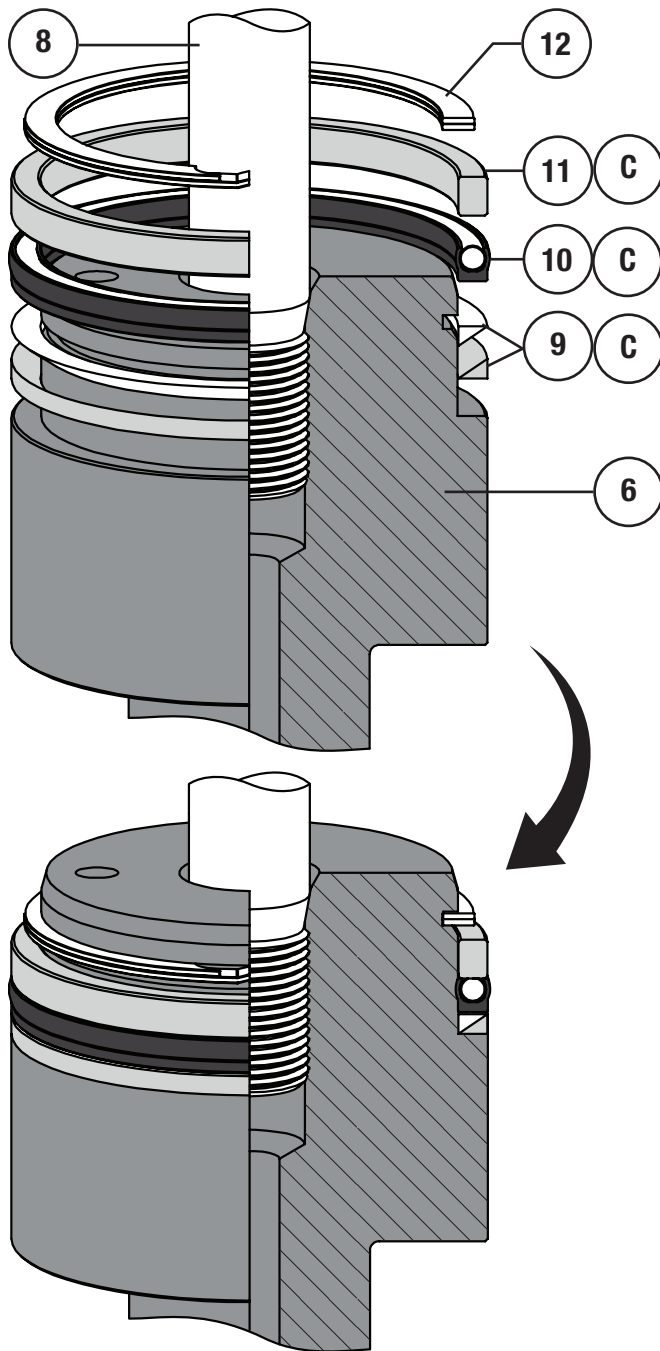


Figure 17 Three-Piece Plug Seal With Anti-Extrusion Rings

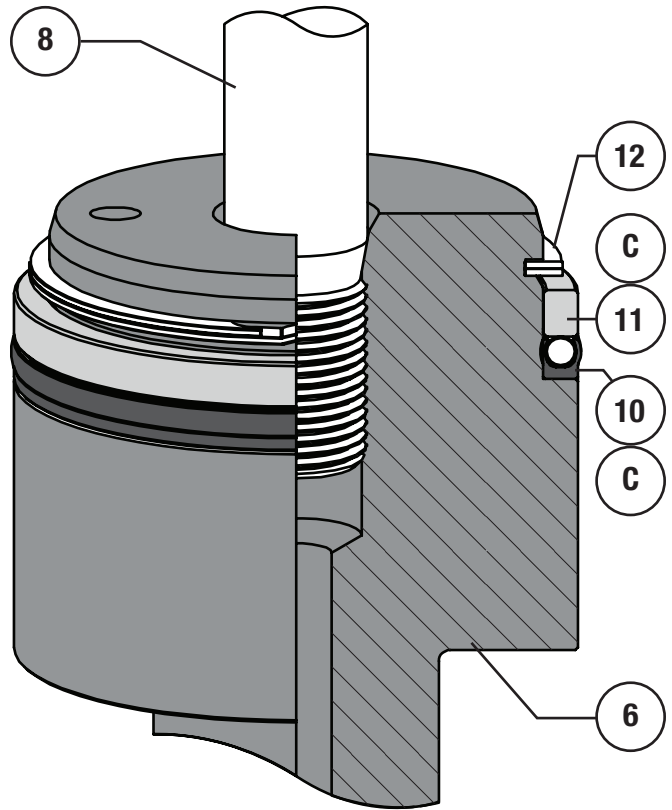


Figure 18 Three-Piece Plug Seal Setup

Trim Parts Installation:

! WARNING

Spiral wound gaskets (Key 3 & 14) make their seal by being crushed and cannot be reused. Replace all gaskets, regular gaskets (Key 13) should be replaced as well.

- 1 Apply Permatex® Nickel Anti-Seize (Key A) to the seat ring pocket of the valve body (Key 1) and top surface of the first spiral wound gasket (Key 3). Install the spiral wound gasket into the valve body (Key 1). Refer to Figure 19.
- 2 Apply Permatex® Nickel Anti-Seize (Key A) to the upper and lower gasket seating surfaces of the seat ring (Key 4). Install the seat ring into the valve body (Key 1).
- 3 Apply Permatex® Nickel Anti-Seize (Key A) to the top and bottom surface of the second spiral wound gasket (Key 3). Install the spiral wound gasket. Refer to Figure 19.
- 4 Install the cage (Key 5). Refer to Figure 19.

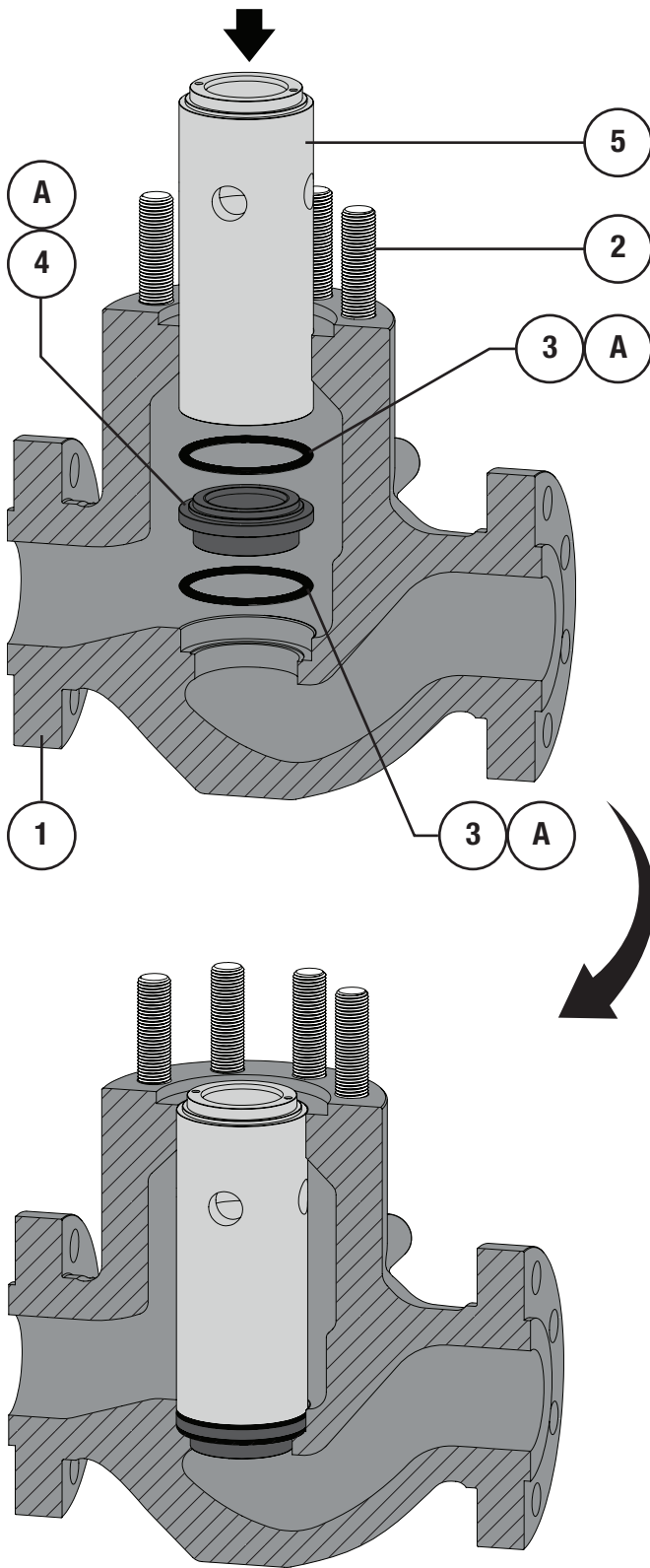


Figure 19 Trim Parts Installation (Steps 1 - 4)

Assembly (Continued)

Trim Parts Installation (Continued):

- 5 Apply Lubriplate® No. 105 (Key C) to the sides of the valve plug (Key 6). Install the valve plug assembly into the cage (Key 5), align any alignment marks made during disassembly or lapping. Refer to Figure 20.
- 6 Apply Permatex® Nickel Anti-Seize (Key A) to the gasket surface of the cage (Key 5) and bonnet (Key 15). Install the gasket as shown in Figure 21 or 22. **NOTE:** For 300-600 ASME class valves, a gasket (Key 13) is used. For 900-1500 ASME class valves, a spiral wound gasket (Key 14) is used.
- 7 Apply Permatex® Nickel Anti-Seize (Key A) to the top of the gasket (Key 13 or 14).

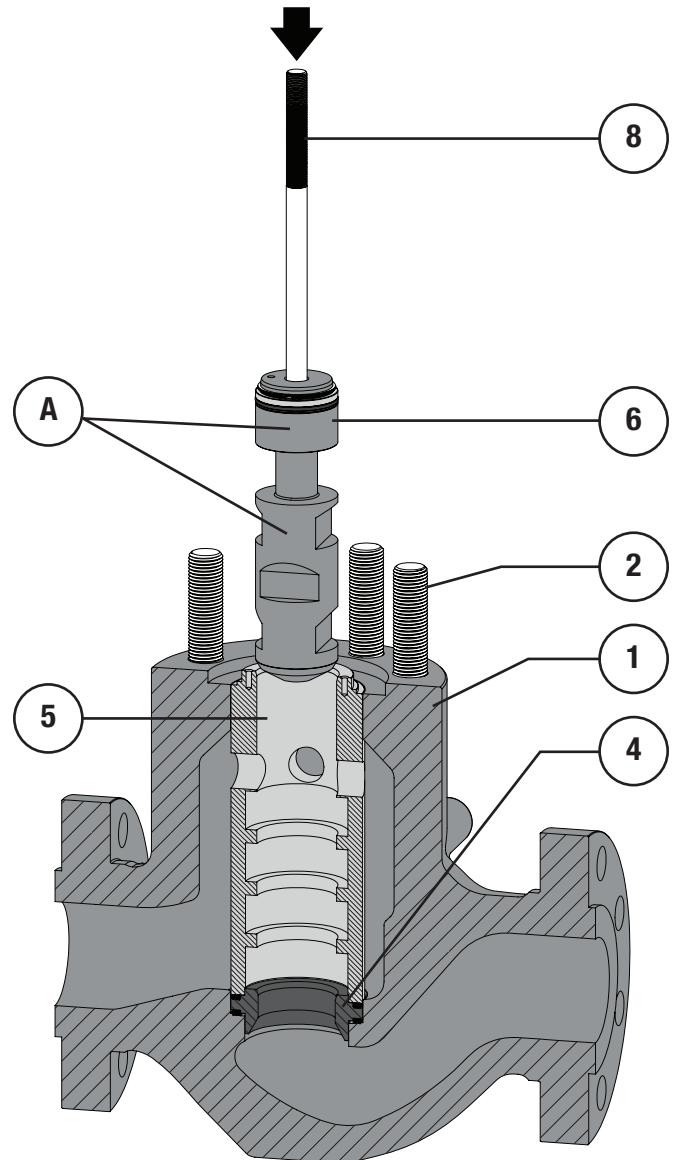


Figure 20 Trim Parts Installation (Step 5)

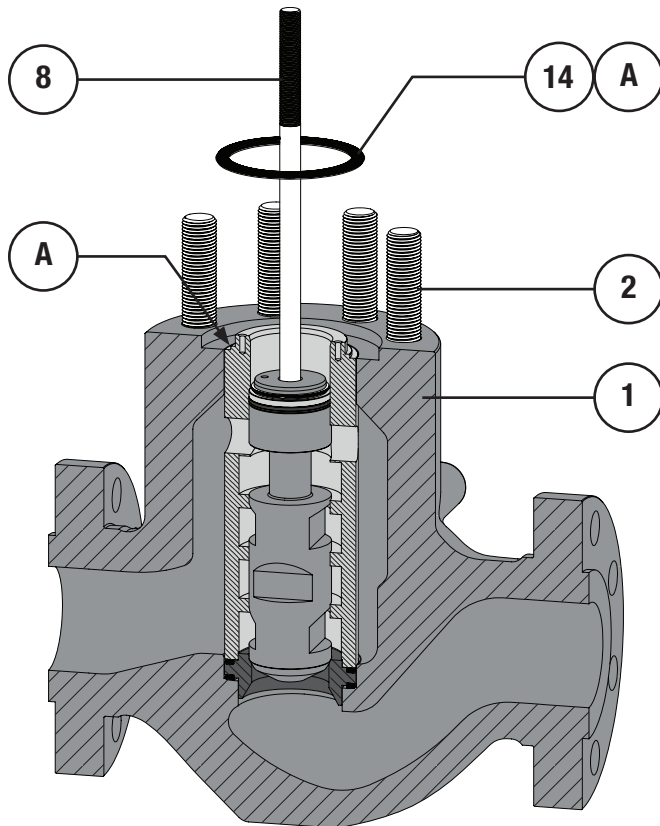


Figure 21 Trim Parts Installation (Step 6)

Bonnet Installation:

- 1 Apply Permatex® Nickel Anti-Seize (Key A) to the gasket sealing surface of the valve bonnet (Key 15).
- 2 Lift and lower the valve bonnet (Key 15) into place over the valve stem (Key 8). Be careful not to damage either the stem, bonnet, or valve body (Key 1).
- 3 Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the bonnet studs (Key 2). Thread the bonnet nuts (Key 16) onto the bonnet studs until hand tight.
- 4 Stroke the valve a few times to center the valve trim.
- 5 It may help to install the packing follower (Key 23) during bonnet installation to act as a visual cue indicating areas of uneven tightening. If the packing follower begins to bind or appear lop-sided, this is an indication that torquing procedures in Steps 6 & 7 need to be corrected to ensure even tightening. The packing follower should remain centered during the torquing/tightening process.
- 6 Torque each bonnet nut (Key 16) to ¼ (25%) of the torque value listed in Tables 4 & 5, torque the nuts in the crisscross pattern shown in Figure 24. Hot torquing of valve nuts is not recommended.

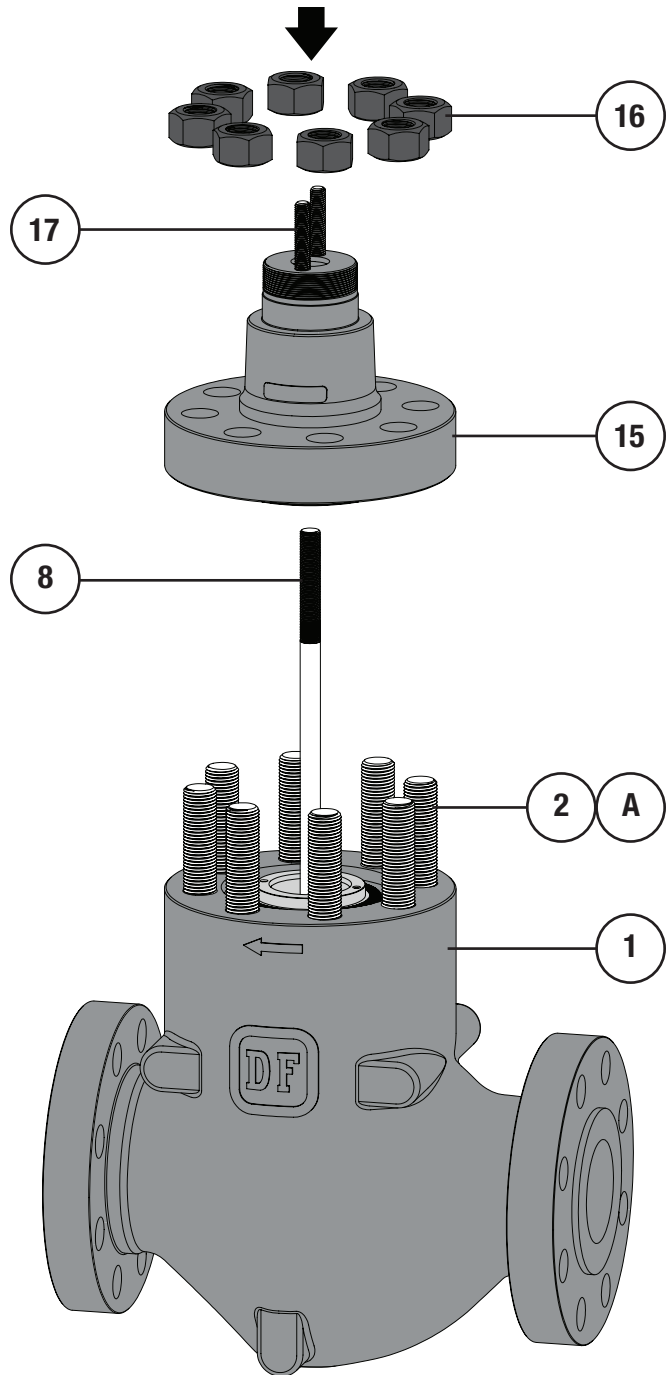


Figure 22 Bonnet Installation (Step 2)

- 7 Continue tightening the bonnet nuts (Key 16), increasing the torque by ¼ (25%) of the final torque specification each round of tightening while repeating the crisscross pattern until the final torque specification is reached.
- 8 Double check the tightness of all nuts by torquing the nuts to the final torque specification one more time after the final torque value was reached.

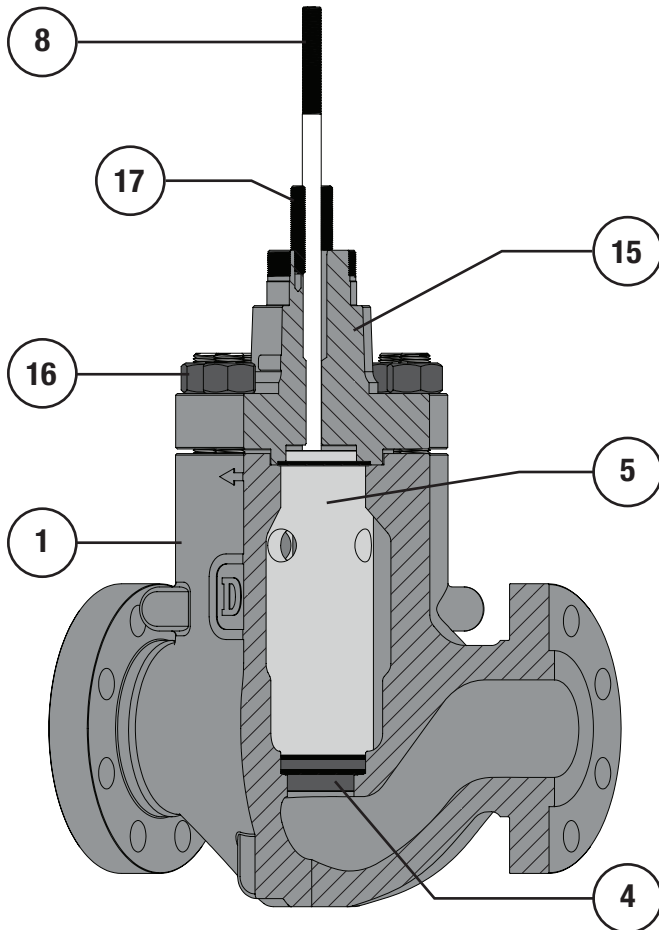


Figure 23 Installed Bonnet

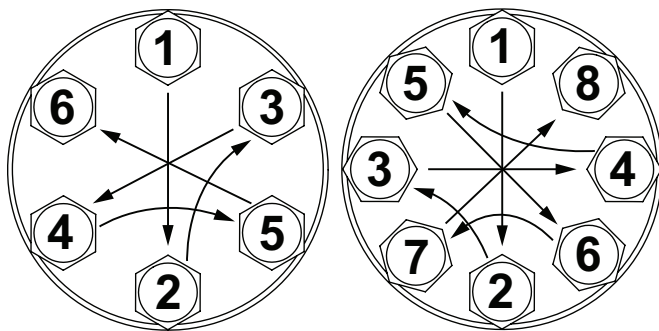


Figure 24 Bonnet Nut Tightening Pattern

Assembly (Continued)

Packing Installation:

For Live Loaded packing instructions see the Live Loaded Sliding Stem Packing Manual (Part Number P-LLPS). For other packing arrangements refer to Figures 26, 28, 29, 30.

! WARNING

- Do not lubricated packing intended for use in oxygen service. Fire, explosion, property damage or personal injury may result from applying Molykote® 5 or any other lubrication to packing that will be installed into oxygen service.

Lubricants Required:

- Permatex® Nickel Anti-Seize or equivalent (Key A)
- Dow Corning Molykote® 5 or equivalent (Key B)
- Lubriplate® No. 105 Grease or equivalent (Key C)

NOTE: To prevent trapping air between packing during installation, it is recommended that packing rings be installed one at a time using the packing follower (Key 23) to push the packing rings in place. Do not force packing rings below the chamfer of the packing bore before adding another ring, packing rings should only be pushed down the thickness of the added ring. Refer to Figure 25.

- If the packing studs (Key 17) were replaced, removed, or never installed, apply Permatex® Nickel Anti-Seize (Key A) to the threads of the end of the stud without a material stamp.
- Thread the studs (Key 17) into the valve bonnet (Key 15) anti-seize coated end first until they are completely threaded into the bonnet.

For Single PTFE V-Ring Packing (Spring-Loaded):

- Apply Molykote® 5 (Key B) to the lower stem wiper (Key 18). Insert the lower stem wiper into the packing box ring (Key 19). Insert the packing box ring into the packing bore of the valve bonnet (Key 15). **NOTE:** For oxygen service do not apply Molykote® 5.
- Install the packing spring (Key 20).
- Install the special washer (Key 21).
- Apply Molykote® 5 (Key B) to the PTFE packing rings (Key 22). Install the packing rings one ring at a time (as shown in Figure 25) in the proper order and orientation as shown in Figure 26.
- Install the packing follower (Key 23).

Assembly (Continued)

Packing Installation (Continued):

For Single PTFE V-Ring Packing (Spring-Loaded) (Continued):

- 6 Install the upper stem wiper (Key 24).
- 7 Install the packing flange (Key 25).
- 8 Apply Permatex® Nickel Anti-Seize (Key A) to the top threads of the packing studs (Key 17). Thread the packing nuts (Key 26) onto the threads of the packing studs, tighten the packing nuts evenly in an alternating pattern until the shoulder of the packing follower (Key 23) makes contact with the bonnet (Key 15). Proceed to tighten the packing nuts to the torque specification listed in Tables 7 & 8.

For Double Style PTFE Packing:

- 1 Apply Molykote® 5 (Key B) to the lower stem wiper (Key 18). Insert the lower stem wiper into the packing box ring (Key 19). Insert the packing box ring into the packing bore of the valve bonnet (Key 15). **NOTE:** For oxygen service do not apply Molykote® 5.
- 2 Apply Molykote® 5 (Key B) to the first set of packing rings (Key 22). Install the packing rings one ring at a time (as shown in Figure 25) in the proper order and orientation as shown in Figure 28.
- 3 Install the lantern ring (Key 27).
- 4 Apply Molykote® 5 (Key B) to the second set of packing rings (Key 22). Install the packing rings one ring at a time (as shown in Figure 25) in the proper order and orientation as shown in Figure 28.
- 5 Install the packing follower (Key 23).
- 6 Install the upper stem wiper (Key 24).
- 7 Install the packing flange (Key 25).
- 8 Apply Permatex® Nickel Anti-Seize (Key A) to the top threads of the packing studs (Key 17).
- 9 Thread the packing nuts (Key 26) onto the threads of the packing studs, tighten the packing nuts evenly in an alternating pattern until one of the packing nuts reaches the minimum torque requirement shown in Tables 7 & 8. Tighten the remaining packing flange nut until the packing flange (Key 25) becomes level (is parallel with the top face of the bonnet), refer to Figure 27.

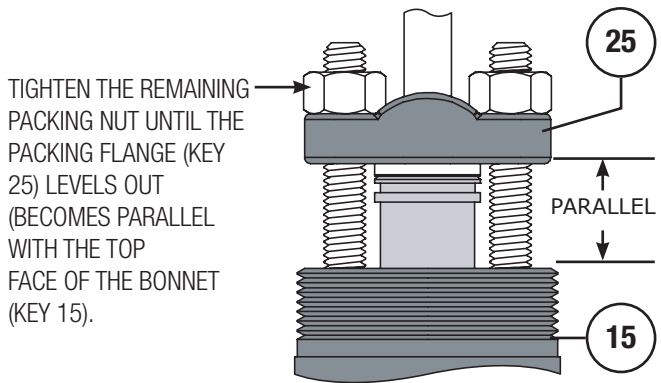
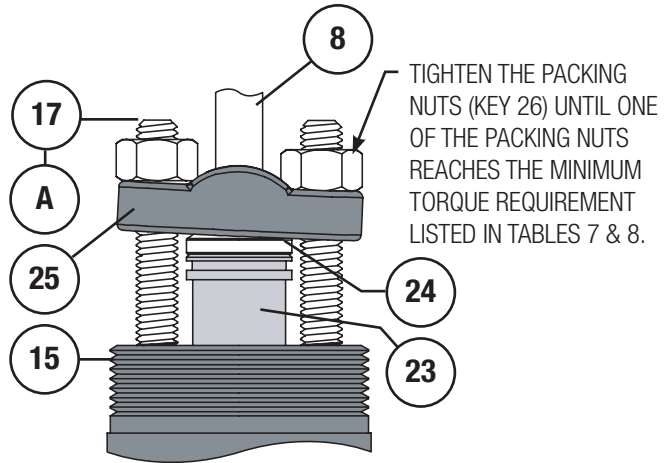


Figure 27 Double PTFE V-Ring Packing Tightening

For Graphite Packing:

- 1 Install the packing box ring (Key 19).
- 2 Install the first lantern ring (Key 28).
- 3 Install the second lantern ring (Key 27).
- 4 Install 1 ring of graphite filament (Key 29) as shown in Figure 25. **NOTE:** Graphite filament is a wound material that typically looks like rope and is split.
- 5 Install 1 ring of graphite ribbon (Key 30) as shown in Figure 25. **NOTE:** Graphite ribbon is compressed into rings and not split like the graphite filament.
- 6 Install the remainder of the graphite filament (Key 29) and graphite ribbon (Key 30) one at a time (as shown in Figure 29) in the proper order and orientation as shown in Figure 29.

Packing Installation (Continued):

For Graphite Packing (Continued):

- 7 Install the packing follower (Key 23).
- 8 Install the packing flange (Key 25).
- 9 Apply Permatex® Nickel Anti-Seize (Key A) to the top threads of the packing studs (Key 17). Thread the packing nuts (Key 26) onto the threads of the packing studs, tighten the packing nuts evenly in an alternating pattern until the packing nuts reach the maximum recommended torque shown in Tables 7 & 8. Loosen the packing nuts and retighten them to the minimum recommended torque shown in Tables 7 & 8.

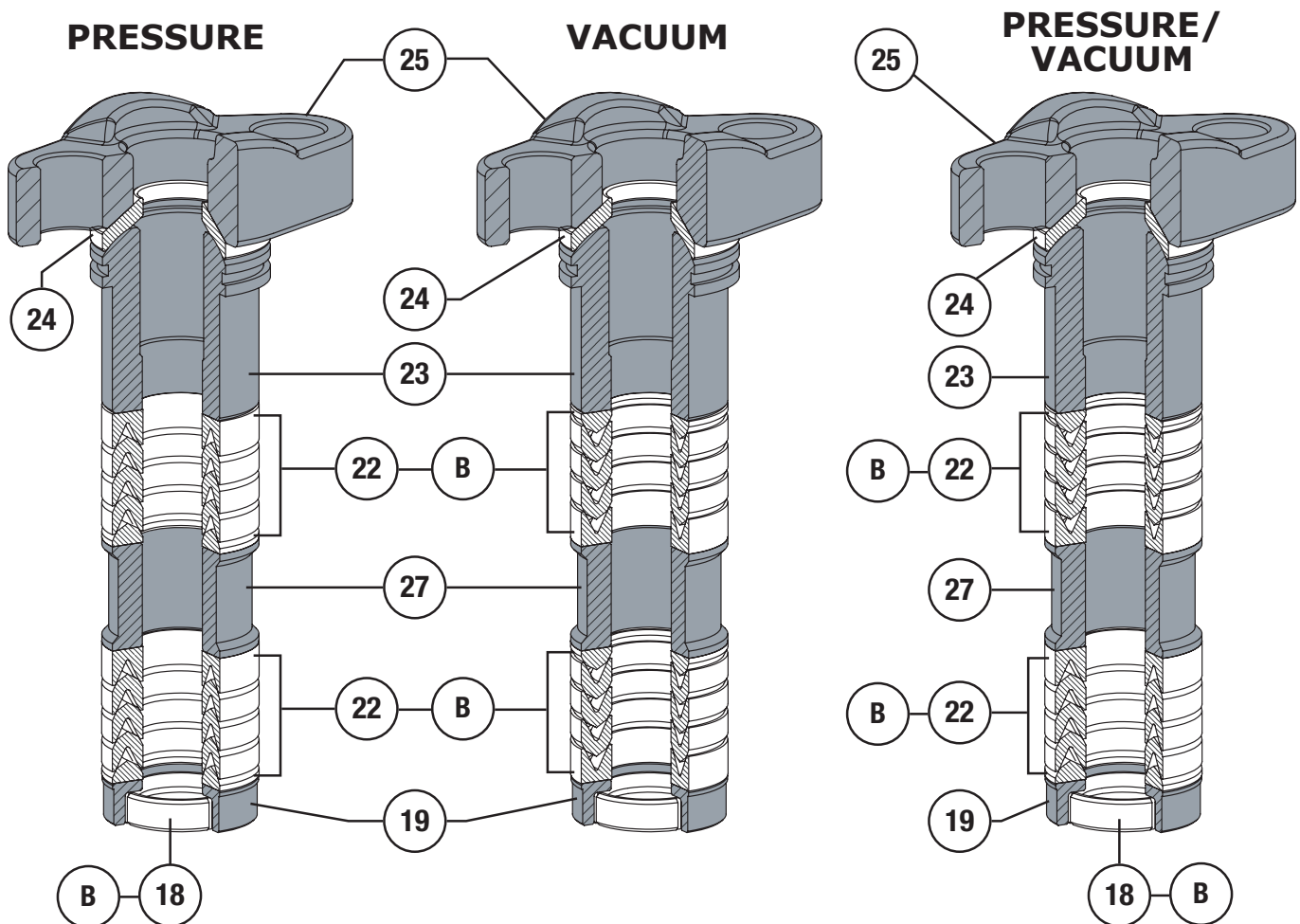


Figure 28 PTFE Packing Arrangement Diagrams

*NOTE: BONNET ROTATED 90° FOR CLARITY.

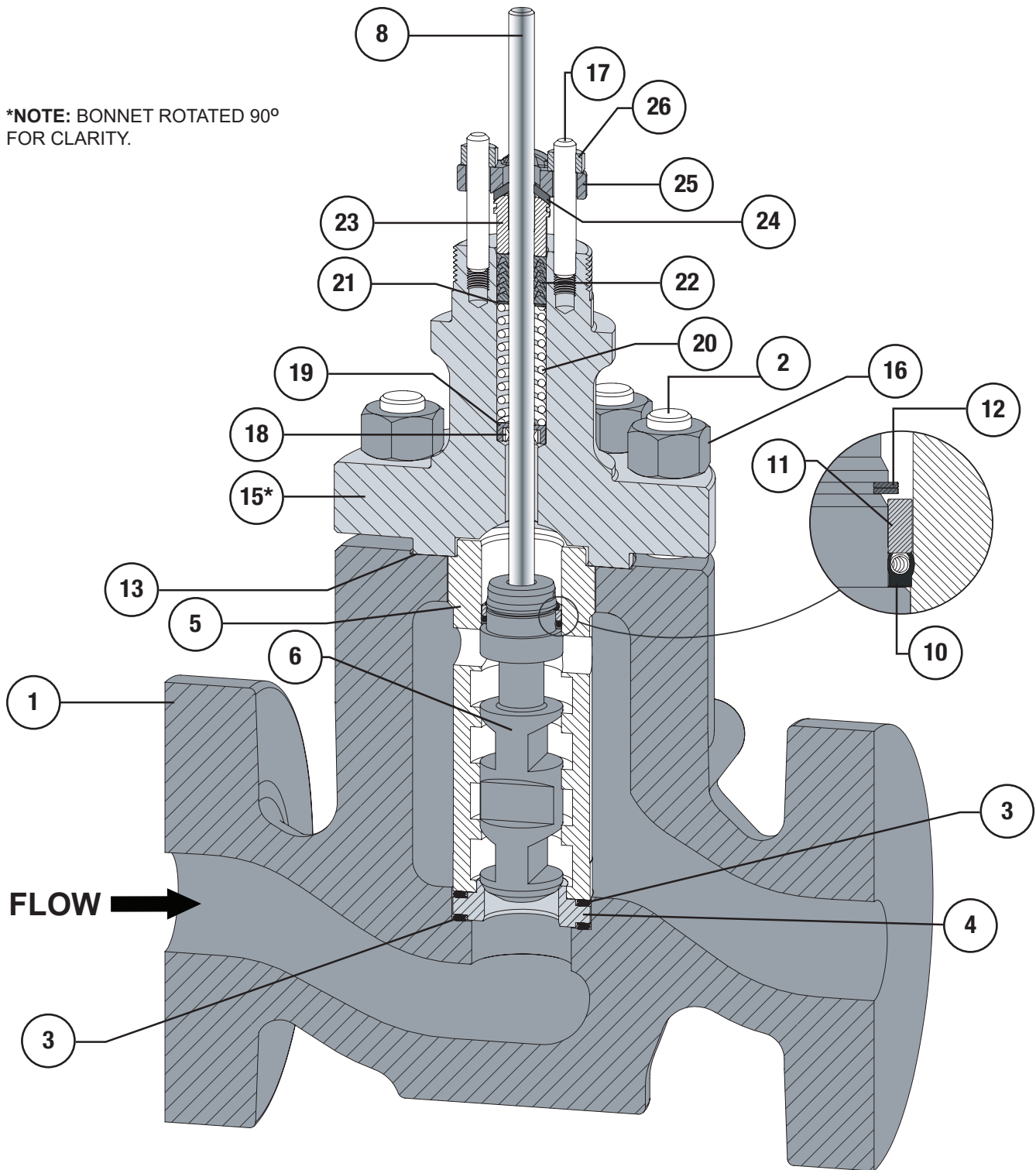


Figure 31 ASME Class 300 & 600 320 AxFlo Trim Valve Cross-section

Table 4

ASME Class 300/600 Body to Bonnet Nut Torque (Key 16)

Valve Sizes (Inch)	Bolt Torques					
	B7 B7 Fluorokote #1		B8M CL2 (strain hardened)		B8M CL1 (annealed)	
	N•m	lbf-ft.	N•m	lbf-ft.	N•m	lbf-ft.
2	88	65	71	52	43	32
3	175	129	141	104	87	64
4	312	230	250	184	153	113
6	549	405	549	405	370	273
8	746	550	746	550	544	401

Table 5

AMSE Class 900/1500 Body to Bonnet Nut Torque (Key 16)

Valve Sizes Inch	Stud Size	Bolt Torques B7, B8M CL2	
		N•m	lbf-ft.
2	7/8"	372	275
3	1-1/8"	711	525
4	1-1/4"	942	695
6	1-1/2"	1654	1220

Table 6

Valve Stem Connection Assembly Torque and Pin Replacement

VSC (Valve Stem Connection) Diameter Inches (mm)	Torque lbf-ft. (N•m)		Hole Size Inches (mm)
	Minimum	Maximum	
1/2 (12.7)	60 (81)	85 (115)	0.126 - 0.128 (3.20 - 3.25)
3/4 (19.1)	175 (237)	250 (340)	0.189 - 0.192 (4.80 - 4.88)
1 (25.4)	310 (420)	355 (481)	0.251 - 0.254 (6.38 - 6.45)

Table 7

ASME Class 300/600 Packing Nut Torque Values (Key 26)

Valve Stem Diameter Inch (mm)	ASME Class	PTFE Single and Double Type Packing				Graphite Single and Double Type Packing			
		Minimum Torque		Maximum Torque		Minimum Torque		Maximum Torque	
		lbf-in.	N•m	lbf-in.	N•m	lbf-in.	N•m	lbf-in.	N•m
1/2 (12.7)	300	27	3	44	5	58	7	89	10
	600	35	4	58	7	80	9	124	14
3/4 (19.1)	300	62	7	97	11	133	15	204	23
	600	89	10	133	15	186	21	274	31
1 (25.4)	300	106	12	159	18	230	26	336	38
	600	150	17	221	25	310	35	469	53

Table 8

ASME Class 900\1500 Packing Nut Torque Values (Key 26)

Valve Stem Diameter Inch (mm)	ASME Class	Packing Flange Nuts			
		Minimum Torque		Maximum Torque	
		lbf-in.	N•m	lbf-in.	N•m
1/2 (12.7)	900	106	12	159	18
	1500	133	15	195	22
3/4 (19.1)	900	239	27	363	41
	1500	301	34	443	50
1 (25.4)	900	372	42	549	62
	1500	496	56	735	83

Parts

Key	Description	Part Number
1	Body If you need a body as a replacement part, order by valve size and stem diameter, serial number and desired material.	
2	Stud, Bonnet/Body	
	- B7	
	2 inch (8 Required) All Classes	
	3 inch (8 Required) All Classes	Contact Dyna-Flo
	4 inch (8 Required) All Classes	
	6 inch (12 Required) Class 300/900	
	6 inch (8 Required) Class 900/1500	
	- B8M	
	2 inch (8 Required) All Classes	
	3 inch (8 Required) All Classes	Contact Dyna-Flo
	4 inch (8 Required) All Classes	
	6 inch (12 Required) Class 300/600	
	6 inch (8 Required) Class 900/1500	
3	Spiral Wound Gasket, Seat Ring, N06600/Graphite	
	2 Required	Refer to Table 10
4	Seat Ring	Refer to Table 11
5	Cage	Refer to Table 12
6	Plug	Refer to Table 13
7	Pin, S31600, Included with Plug/Stem Assemblies	Refer to Table 13
8	Stem	Refer to Table 13
9	Anti-Extrusion Rings, PolyEtherEtherKetone (PEEK)	
	1-1/2 inch (38.1 mm) Port	21B9339X01D
	2-3/16 inch (55.6 mm) Port	27B1174X01D
	2-7/8 inch (73.0 mm) Port	22B2617X01D
	4-3/8 inch (111.1 mm) Port	21B9341X01D
10	Spring-Loaded Seal Ring, Carbon-filled PTFE/Elgiloy	
	1-1/2 inch (38.1 mm) Port	13A8521XF1D
	2-3/16 inch (55.6 mm) Port	16A1968XF1D
	2-7/8 inch (73.0 mm) Port	10A4215XF1D
	4-3/8 inch (111.1 mm) Port	10A4223XF1D
11	Backup Ring, S31600/S31603 Dual Grade	
	1-1/2 inch (38.1 mm) Port	13A8520X02D
	2-3/16 inch (55.6 mm) Port	16A1967X01D
	2-7/8 inch (73.0 mm) Port	10A4217X02D
	4-3/8 inch (111.1 mm) Port	10A4224X02D
12	Retaining Ring, S31600	
	1-1/2 inch (38.1 mm) Port	13A8519X01D
	2-3/16 inch (55.6 mm) Port	16A1969X02D
	2-7/8 inch (73.0 mm) Port	10A4219X01D
	4-3/8 inch (111.1 mm) Port	10A4225X01D
13	Gasket, Body/Bonnet, Class 300/900, S31600/Graphite	Refer to Table 10

14	Spiral Wound Gasket, Body/Bonnet, N06600/Graphite	Refer to Table 10
15	Bonnet If you need a body as a replacement part, order by valve size and stem diameter, serial number and desired material.	
16	Nut, Body/Bonnet, Class 300/900	
	- 2H	
	2 inch (8 Required) All Classes	
	3 inch (8 Required) All Classes	Contact Dyna-Flo
	4 inch (8 Required) All Classes	
	6 inch (12 Required) Class 300/900	
	6 inch (8 Required) Class 900/1500	
	- 2H Fluorokote #1	
	2 inch (8 Required) All Classes	
	3 inch (8 Required) All Classes	Contact Dyna-Flo
	4 inch (8 Required) All Classes	
	6 inch (12 Required) Class 300/600	
	6 inch (8 Required) Class 900/1500	
	- 8M	
	2 inch (8 Required) All Classes	Contact Dyna-Flo
	3 inch (8 Required) All Classes	
	4 inch (8 Required) All Classes	
	6 inch (12 Required) Class 300/600	Contact Dyna-Flo
	6 inch (8 Required) Class 300/600	
17	Studs, Packing, B8M (2 Required)	Contact Dyna-Flo
18	Lower Wiper, Teflon	Refer to Table 9
19	Packing Box Ring, S31600/S31603 Dual Grade	Refer to Table 9
20	Spring, Stainless Steel	Refer to Table 9
21	Special Washer, Stainless Steel	Refer to Table 9
22	Packing Set, PTFE	Refer to Table 9
23	Packing Follower, S31600/S31603 Dual Grade	Contact Dyna-Flo
24	Upper Wiper, Felt	Refer to Table 9
25	Packing Flange, S31600/S31603 Dual Grade	Contact Dyna-Flo
26	Nut, Packing, 8M (2 Required)	Contact Dyna-Flo
27	Lantern Ring, S31600/S31603 Dual Grade	Refer to Table 9
28	Lantern Ring, Lower, S31600/S31603 Dual Grade	Refer to Table 9
29	Graphite Filament Ring, Graphite	Refer to Table 9
30	Graphite Ribbon, Graphite	Refer to Table 9
31	Jam Nut, Zinc Plated Steel	Contact Dyna-Flo
32	Hex Nut, Zinc Plated Steel	Contact Dyna-Flo
33	Yoke Locknut, Steel Plated	Contact Dyna-Flo
34	Flow Arrow, S30400	Contact Dyna-Flo
31	Name Plate, S30400	Contact Dyna-Flo

Parts (Live Loaded Packing)		
Key	Description	Part Number
901	Live Loaded Packing Flange Refer to the P-LLPS Manual	Contact Dyna-Flo
902	O-Ring Refer to the P-LLPS Manual	Contact Dyna-Flo
903	Spring Washers Refer to the P-LLPS Manual	Contact Dyna-Flo
904	Live Loaded Packing Follower Refer to the P-LLPS Manual	Contact Dyna-Flo
905	Live Loaded Packing Box Ring Refer to the P-LLPS Manual	Contact Dyna-Flo
906	Live Loaded Lower Wiper Refer to the P-LLPS Manual	Contact Dyna-Flo
907	Live Loaded V-Ring Packing Set Refer to the P-LLPS Manual	Contact Dyna-Flo
911	Anti-Extrusion Ring Refer to the P-LLPS Manual	Contact Dyna-Flo
914	Live Loaded Lantern Ring Refer to the P-LLPS Manual	Contact Dyna-Flo

Table 9

Packing Repair Kits

Packing Type	Kit Content	Stem Diameter Inch (mm)	Part Number
Single PTFE	Keys 18 / 19 / 20 / 21 / 22 / 24	1/2 (12.7)	RPACKX0002D
		3/4 (19.1)	RPACKX0003D
		1 (25.4)	RPACKX0034D
Double PTFE	Keys 18 / 19 / 22 (quantity 2) / 24 / 27	1/2 (12.7)	RPACKXD005D
		3/4 (19.1)	RPACKXD006D
		1 (25.4)	RPACKX0036D
Single Graphite	Keys 19 / 27 / 28 / 29 (quantity 2) / 30 (quantity 2)	1/2 (12.7)	RPACKXD011D
		3/4 (19.1)	RPACKXD012D
		1 (25.4)	RPACKX0053D

Table 10

Replacement Gasket Kits

Valve Size Inch (DN)	ASME Class	Kit Content	Part Number
2 (50)	300/600	Key 3 (quantity 2) / Key 13 (quantity 1)	RGKT320261D
	900/1500	Key 3 (quantity 2) / Key 14 (quantity 1)	RGKT320251D
3 (80)	300/600	Key 3 (quantity 2) / Key 13 (quantity 1)	RGKT320361D
	900/1500	Key 3 (quantity 2) / Key 14 (quantity 1)	RGKT320351D
4 (100)	300/600	Key 3 (quantity 2) / Key 13 (quantity 1)	RGKT320461D
	900/1500	Key 3 (quantity 2) / Key 14 (quantity 1)	RGKT320451D
6 (150)	300/600	Key 3 (quantity 2) / Key 13 (quantity 1)	RGKT320661D
	900/1500	Key 3 (quantity 2) / Key 14 (quantity 1)	RGKT320651D

Table 11

Seat Ring (Key 4)

Valve Size Inch (DN)	Port Size Inch (mm)	ASME Class	Material	Part Number
2 (50)	1-1/2 (38.1)	All	S44004	320R2694X4D
			S31600 ⁽¹⁾ / ALLOY 6 Seat & Bore	320R2695X5D
3 (80)	2-3/16 (55.6)	All	S44004	320R3694X4D
			S31600 ⁽¹⁾ / ALLOY 6 Seat & Bore	320R3695X5D
4 (100)	2-7/8 (73.0)	All	S44004	320R4694X4D
			S31600 ⁽¹⁾ / ALLOY 6 Seat & Bore	320R4695X5D
6 (150)	4-3/8 (111.1)	All	S44004	320R6694X4D
			S31600 ⁽¹⁾ / ALLOY 6 Seat & Bore	320R6695X5D
NOTES:		(1) - All S31600 barstock is dual grade S31600/S31603 (316/316L).		

Table 12

Cage (Key 5)

Valve Size Inch (DN)	Port Size Inch (mm)	ASME Class	AxFlo Stage	Characteristic	Material	Part Number
2 (50)	1-1/2 (38.1)	300/600	3-Stage	LVL-C	S17400 H900	320C2601X1D
		300/600	3-Stage	LVL-C	S17400 DH1150	320C2601X2D
		300/600	3-Stage	LVL-C	S20910	320C2601XND
		900/1500	4-Stage	LVL A/B/C	S17400 H900	320C2901X1D
		900/1500	4-Stage	LVL-A/B/C	S17400 DH1150	320C2901X2D
		900/1500	4-Stage	LVL-A/B/C	S20910	320C2901XND
3 (80)	2-3/16 (55.6)	300/600	3-Stage	LVL-C	S17400 H900	320C3601X1D
		300/600	3-Stage	LVL-C	S17400 DH1150	320C3601X2D
		300/600	3-Stage	LVL-C	S20910	320C3601XND
		900/1500	4-Stage	LVL-A/B/C	S17400 H900	320C3901X1D
		900/1500	4-Stage	LVL-A/B/C	S17400 DH1150	320C3901X2D
		900/1500	4-Stage	LVL-A/B/C	S20910	320C3901XND
4 (100)	2-7/8 (73.0)	300/600	3-Stage	LVL-C	S17400 H900	320C4601X1D
		300/600	3-Stage	LVL-C	S17400 DH1150	320C4601X2D
		300/600	3-Stage	LVL-C	S20910	320C4601XND
		900/1500	4-Stage	LVL-A/B/C	S17400 H900	320C4901X1D
		900/1500	4-Stage	LVL-A/B/C	S17400 DH1150	320C4901X2D
		900/1500	4-Stage	LVL-A/B/C	S20910	320C4901XND
6 (150)	4-3/8 (111.1)	150-600	3-Stage	LVL-C	S17400 H900	320C6601X1D
		150-600	3-Stage	LVL-C	S17400 DH1150	320C6601X2D
		150-600	3-Stage	LVL-C	S20910	320C6601XND
		900/1500	4-Stage	LVL-C	S17400 H900	320C6901X1D
		900/1500	4-Stage	LVL-C	S17400 DH1150	320C6901X2D
		900/1500	4-Stage	LVL-C	S20910	320C6901XND
8 (200)	4-3/8 (111.1)	300/600	3-Stage	LVL-C	S17400 H900	
		300/600	3-Stage	LVL-C	S17400 DH1150	
		300/600	3-Stage	LVL-C	S20910	320C8601XND

Table 13

Plug/Stem Assemblies (Keys 6, 7 & 8) for 3 Piece Seals (Keys 10, 11 & 12) - Standard Stem Diameters

Valve Size Inch (DN)	C _v	ASME Class	AxFlo Stage	Characteristic	Stem Diameter Inch (mm)	Material	Part Number
2 (50)	9.30	300/600	3-Stage	LVL-C	1/2 (12.7)	S44004	320N2611N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N2613N5D
	4.55	900/1500	4-Stage	LVL-A	3/4 (19.1)	S44004	320N2911N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N2913N5D
	6.63	900/1500	4-Stage	LVL-B	3/4 (19.1)	S44004	320N2921N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N2923N5D
	8.85	900/1500	4-Stage	LVL-C	3/4 (19.1)	S44004	320N2931N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N2933N5D
3 (80)	20	300/600	3-Stage	LVL-C	3/4 (19.1)	S44004	320N3621N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N3623N5D
	8.90	900/1500	4-Stage	LVL-A	3/4 (19.1)	S44004	320N3911N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N3913N5D
	14.6	900/1500	4-Stage	LVL-B	3/4 (19.1)	S44004	320N3921N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N3923N5D
	16.8	900/1500	4-Stage	LVL-C	3/4 (19.1)	S44004	320N3931N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N3933N5D
4 (100)	34	300/600	3-Stage	LVL-C	3/4 (19.1)	S44004	320N4611N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N4613N5D
	15.4	900/1500	4-Stage	LVL-A	3/4 (19.1)	S44004	320N4911N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N4913N5D
	24.1	900/1500	4-Stage	LVL-B	3/4 (19.1)	S44004	320N4921N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N4923N5D
	29.3	900/1500	4-Stage	LVL-C	3/4 (19.1)	S44004	320N4931N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N4933N5D
6 (150)	59.5	300/600	3-Stage	LVL-C	3/4 (19.1)	S44004	320N6611N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N6613N5D
	61	900/1500	4-Stage	LVL-C	1 (25.4)	S44004	320N6931N4D
						S31600 ⁽¹⁾ /ALLOY 6 Seat and Guide	320N6933N5D
NOTES:	(1) - All S31600 barstock is dual grade S31600/S31603 (316/316L).						

MODEL NUMBERING SYSTEM

SAMPLE PART NUMBER: 320-2BFL-1P3-CCS5

BODY STYLE						-
-	GLOBE	E	GLOBE PED 2014/68/EU			
VALVE SIZE						2
2	2 INCH	3	3 INCH	4	4 INCH	6
8	8 INCH					
ASME RATING						B
B	300	C	600	D	900	E
						1500
END CONNECTION						F
F	RF	J	RTJ	L	BWE SCH 80	U
P	BWE SCH 160	S	SOCKET WELD	N	NPT	
BODY MATERIAL						L
L	LCC	W	WCC	M	CF8M	
BOLTING						-
-	B7 / 2H	K	B7 / 2H FLUOROKOTE #1		B	B8M / 8M
TRIM						1
1	A1	2	A2	3	A3	4
						A4
PACKING STYLE						P
P	SINGLE PTFE V-RING (PRESSURE)			J	DOUBLE PTFE V-RING (PRESSURE)	
G	SINGLE GRAPHITE (PRESSURE)			V	DOUBLE PTFE V-RING (VACUUM)	
R	DOUBLE PTFE V-RING (VACUUM / PRESSURE)			L	LIVE LOADED PTFE V-RING (PRESSURE)	
T	LIVE LOADED GRAPHITE (PRESSURE)			D	LIVE LOADED DUPLEX (PRESSURE)	
K	LIVE LOADED KALREZ® (PRESSURE)			F	LIVE LOADED KALREZ® FIRE SAFE (PRESSURE)	
YOKE BOSS SIZE						3
2	2-13/16" (1/2" STEM)	3	3-9/16" (3/4" STEM)	5	5" (1" STEM)	
PAINT						-
-	DFPS-01 (STANDARD)			2	DFPS-02 (SEVERE SERVICE)	
3	DFPS-03 (HIGH TEMPERATURE)					
BACKUP RING / SEAL RING / PISTON RING						C
C	S31600 / CARBON-FILLED PTFE - ELGILOY					
R	S31600 / CARBON-FILLED PTFE - ELGILOY W/ PEEK AE RINGS					
CHARACTERISTIC						C
A	ANTI-CAVITATION LVL-A LINEAR			B	ANTI-CAVITATION LVL-B LINEAR	
C	ANTI-CAVITATION LVL-C LINEAR					
BONNET STYLE						S
S	STANDARD					
SHUT-OFF CLASS						4
5	CLASS V					

Curtiss-Wright Flow Control Company Canada, doing business as Dyna-Flo Control Valve Services

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