

# Type A31A High Performance Butterfly Valve (NPS 14 through 24)

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## Introduction

### Scope of Manual

This instruction manual includes installation, maintenance, and parts ordering information for NPS 14 through 24, Type A31A High-Performance Butterfly Valves (see figure 1). Refer to separate instruction manuals for information covering the actuator and accessories.

Do not install, operate, or maintain a Type A31A High-Performance Butterfly Valve without first

- being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance, and
- carefully reading and understanding the contents of this manual. If you have any questions about these instructions, contact



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Figure 1. Type A31A Valve with Bettis® Actuator and DVC6020 Digital Valve Controller

your Emerson Process Management™ sales office before proceeding.

## Description

The valve is available in either a flangeless wafer body or a single-flange (lugged) body design, with a variety of seals and internal components. The pressure-assisted seal provides tight shutoff against the full class pressure range for the specific type. The keyed shaft combines with a variety of handlevers, handwheels, pneumatic piston or spring-and-diaphragm actuators. Maximum inlet pressure/temperature ratings are consistent with CL150 and 300.

### Note

**Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.**

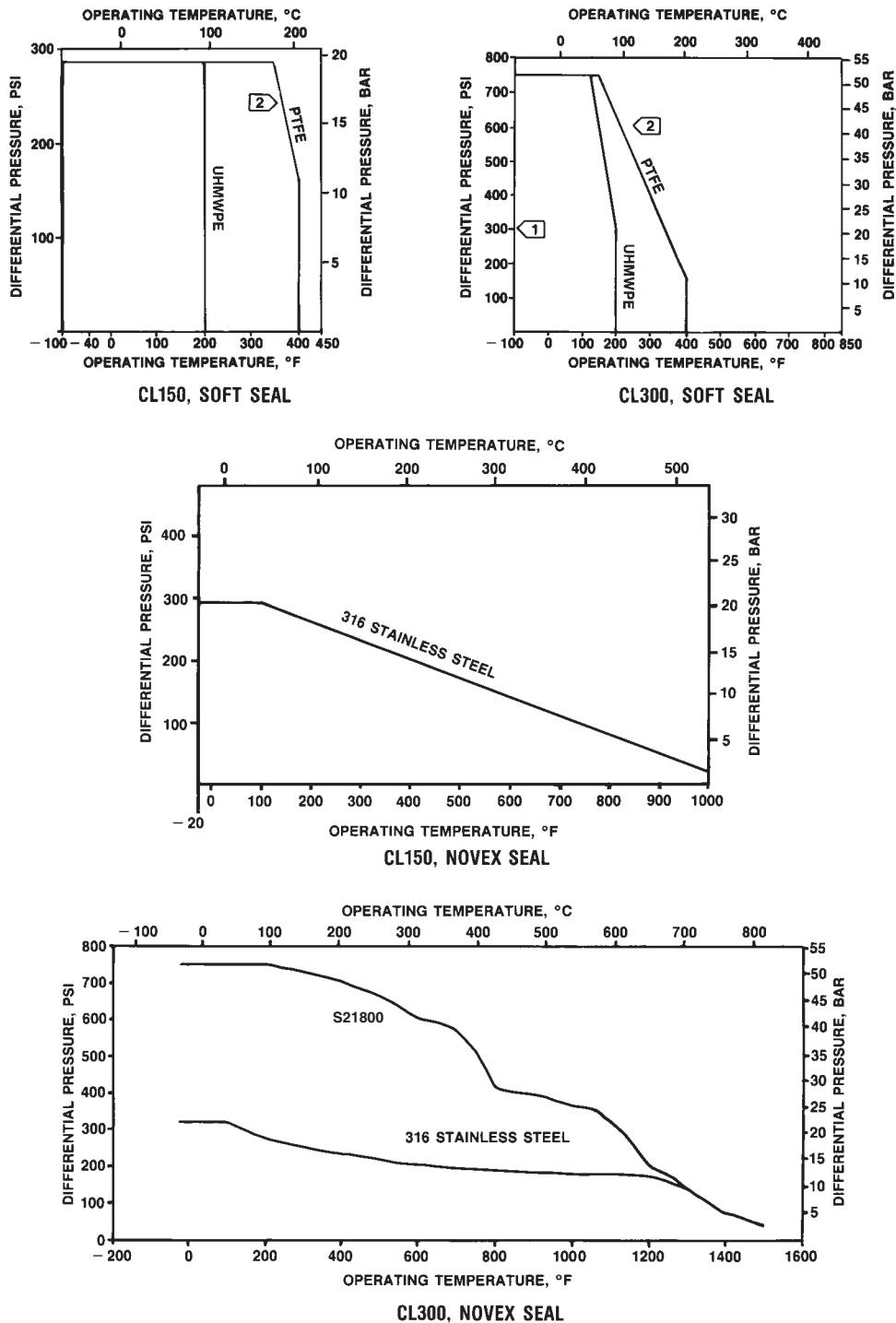


# A31A Valve

Table 1. Specifications

<p><b>Valve Size and End Connection Styles</b> NPS ■ 14, ■ 16, ■ 18, ■ 20, and ■ 24 valves, and in ■ wafer-style (flangeless) or ■ single-flange (lugged) with raised-face flanges, CL150 or 300</p> <p><b>Maximum Pressure Drop<sup>(1)</sup></b> Consistent with CL150 and 300 pressure/temperature ratings per ASME B16.34 unless further restricted by values given in figure 2</p> <p><b>Shutoff Classification Per ANSI/FCI 70-2 and IEC 60534-4 or MSS SP-61</b> <b>Standard Soft Seal:</b> Bidirectional shutoff Class VI (bubble-tight) <b>NOVEX Seal:</b> Unidirectional shutoff MSS SP-61 (reverse flow direction only) Class VI optional <b>Phoenix III Seal:</b> Bidirectional shutoff Class VI (bubble-tight) <b>Phoenix III Seal for Fire-Tested Applications:</b> Unidirectional shutoff Class VI (reverse flow direction only) (bubble-tight). Fire Tested per API 607 Rev. 4</p> <p><b>Available Seal Configurations</b> <b>Standard Constructions</b> See figure 3 and table 2</p> <p><b>Standard Construction Materials</b> See table 2</p> <p><b>Material Temperature Capabilities<sup>(1)</sup></b> See table 2</p> <p><b>Flow Characteristic</b> Modified equal percentage</p> <p><b>Flow Coefficients</b> See Catalog 12 and bulletin 21.1:A31A</p>	<p><b>Flow Coefficient Ratio<sup>(2)</sup></b> 100 to 1</p> <p><b>Noise Levels</b> See Catalog 12 for sound/pressure level prediction</p> <p><b>Valve In-Line Position</b> Shaft horizontal. See figure 4</p> <p><b>Valve/Actuator Action</b> With diaphragm or piston rotary actuator, field-reversible between: ■ push-down-to-close (extending actuator rod closes valve) and ■ push-down-to-open (extending actuator rod opens valve)</p> <p><b>Valve Body Classification</b> Face-to-face dimensions are in compliance with MSS SP68 and API 609 standards; Valve bodies are designed for installation between ASME B16.5 CL150 and 300 raised-face flanges</p> <p><b>Disc Rotation</b> Clockwise to close (when viewing from the drive shaft end) through 90 degrees rotation</p> <p><b>Shaft Diameter and Approximate Weight</b> See tables 3 and 4</p> <p><b>ENVIRO-SEAL<sup>®</sup> Packing</b> This optional packing system provides improved sealing, guiding, and transmission of loading force to control liquid and gas emissions. Contact your Emerson Process Management sales office for availability of ENVIRO-SEAL packing</p>
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1. The pressure/temperature limits in this manual, and any applicable code or standard limitation should not be exceeded.  
2. Ratio of maximum flow coefficient to minimum usable flow coefficient may also be called rangeability.



NOTE:

1) BECAUSE OF POTENTIAL EROSIVE EFFECTS AND PREMATURE SEAL FAILURE THAT CAN OCCUR, THROTTLING PTFE SEALS AT DIFFERENTIAL PRESSURES GREATER THAN 20.7 BAR (300 PSID) AT DISC ANGLES LESS THAN 20° OPEN IS NOT RECOMMENDED.

2) TEMPERATURE LIMITATIONS DO NOT ACCOUNT FOR THE ADDITIONAL LIMITATIONS IMPOSED BY THE BACKUP RING USED WITH THIS SEAL. TO DETERMINE THE EFFECTIVE TEMPERATURE LIMITATION OF THE APPROPRIATE SEAL/BACKUP RING COMBINATION, REFER TO TABLE 2.

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Figure 2. Maximum Pressure/Temperature Ratings

Table 2. Material Temperature Ratings

COMPONENT AND MATERIAL OF CONSTRUCTION <sup>(1)</sup>		TEMPERATURE RANGE	
		°C	°F
<b>Valve Body</b> Carbon Steel (WCC or SA 516-70) <sup>(5)</sup> CF8M (316 SST) CL150 CF8M FMS 20B16 (0.04% min. carbon) CL300		-29 to 427 -198 to 538 -198 to 816	-20 to 800 -325 to 1000 -325 to 1500
<b>Disc</b> CF8M (316 SST) w/ or w/o Hard coating CF8M with CoCr-A edge (Alloy 6)		-198 to 538 -198 to 816	-325 to 1000 -325 to 1500
<b>Shaft</b> S20910 S17400 (17-4 PH 1025) S17400 (17-4 PH H1150M)		-198 to 538 -73 to 454 -196 to 454	-325 to 1000 -100 to 850 -320 to 850
<b>Bearings</b> PEEK <sup>(2)</sup> (standard) S31600 <sup>(3)</sup>		-73 to 260 -198 to 816	-100 to 500 -325 to 1500
<b>Packing</b> PTFE Packing and PTFE ENVIRO-SEAL Packing Graphite packing Graphite packing with oxidizing media		-54 to 232 -198 to 916 -198 to 538	-65 to 450 -325 to 1500 -325 to 1000
<b>Seal Ring and Backup Ring</b>	<b>PTFE Seal Ring</b>		
	Nitrile Backup O-Ring	-29 to 93	-20 to 200
	Chloroprene Backup O-Ring	-43 to 149	-45 to 300
	EPR Backup O-Ring	-54 to 182	-65 to 360
	Fluorocarbon Backup O-Ring	-29 to 204	-20 to 400
	PTFE Backup O-Ring	-73 to 204	-100 to 400
	<b>UHMWPE<sup>(4)</sup> Seal Ring (CL150 Only)</b>		
	Nitrile Backup O-Ring	-29 to 93	-20 to 200
	Chloroprene Backup O-Ring	-43 to 93	-45 to 200
EPR Backup O-Ring	-54 to 93	-65 to 200	
Fluorocarbon Backup O-Ring	-29 to 93	-20 to 200	
PTFE Backup O-Ring	-73 to 93	-100 to 200	
<b>Phoenix III and/or FireTested Construction</b>			
S31600 and PTFE Seal Ring with Nitrile Backup O-Ring	-40 to 149	-40 to 300	
Chloroprene Backup O-Ring	-54 to 149	-65 to 300	
EPR Backup O-Ring	-62 to 204	-80 to 400	
Fluorocarbon Backup O-Ring	-40 to 232	-40 to 450	
<b>Seal Ring</b>			
NOVEX S31600 Seal <sup>(3)</sup> Ring (CL150)	-46 to 538	-50 to 1000	
NOVEX S31600 Seal <sup>(3)</sup> Ring (CL300)	-46 to 816	-50 to 1500	
NOVEX S21800 Seal Ring (CL300)	-46 to 816	-50 to 1500	

1. NACE trim constructions are available; consult your Emerson Process Management sales office.  
2. PEEK stands for poly-ether-ether-ketone.  
3. For a complete material description, contact your Emerson Process Management sales office.  
4. UHMWPE stands for ultra high molecular weight polyethylene.  
5. Cast or wrought/plate grades used interchangeably, depending upon availability—unless specified by customer.

## Installation

The valve is normally shipped as part of a control valve assembly, with the power actuator mounted on the valve. If the valve or actuator have been purchased separately, or if the actuator has been removed for maintenance, mount the actuator on the valve, and adjust actuator travel before installing the valve into the line. This is necessary due to the measurements that must be made during the actuator calibration adjustment process. Refer to the Actuator Mounting section of this manual and to the separate actuator instruction manual for mounting and adjusting instructions before proceeding.



**WARNING**

**To avoid personal injury or property damage resulting from the sudden release of pressure:**

- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
- Do not install the valve assembly where service conditions could exceed

the limits given in this manual or on the nameplates.

- Use pressure-relieving devices as required by government or accepted industry codes and good engineering practices to protect from over-pressurizing the system.
- 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.

### 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 rests solely with the purchaser and end-user. Since some body/trim material combinations are limited in their pressure drop and temperature range capabilities, do not apply any other conditions to the valve without first contacting your Emerson Process Management sales office.

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, shut off all pressure lines to the power actuator, release pressure from the actuator, and disconnect the pressure lines from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you are working on the equipment.

### WARNING

See the WARNING at the beginning of the Maintenance section for more information before removing the valve from the pipeline.

2. Install a three-valve bypass around the control valve assembly if continuous operation is necessary during inspection and maintenance of the valve.

3. Inspect the valve to be certain that it is free of foreign material.

### CAUTION

Damage to the disc will occur if any pipe flanges or piping connected to the valve interfere with the disc rotation path. If piping flange has a smaller inner diameter than specified for schedule 80 piping, measure carefully to be certain the disc rotates without interference before placing the valve into operation. Minimum inside diameters for flanges or pipe mating with valves are shown in tables 3 and 4.

Be certain that adjacent pipelines are free of any foreign material, such as pipe scale or welding slag, that could damage the valve sealing surfaces.

### Valve Orientation

The valve can be installed in any orientation, however, it is recommended that the valve drive shaft be horizontal and the actuator vertical as shown in figure 5.

Install the valve with the high-pressure shutoff side in the direction noted by the flow arrow for proper installation, and see figure 4 for more information.

### Before Installing the Valve

### WARNING

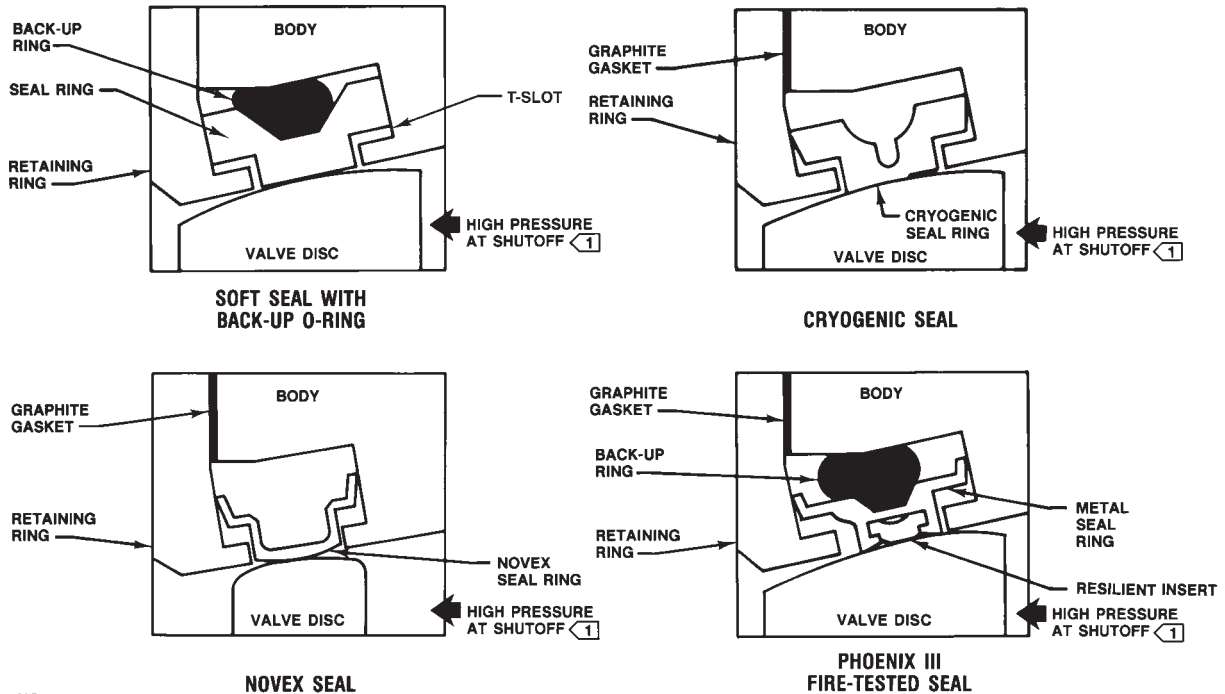
The edges of a rotating valve disc (key 2, figure 9) close with a shearing, cutting motion. To avoid personal injury, keep hands, tools, and other objects away from the disc while stroking the valve.

If the Type A31A valve is equipped with a fail-open actuator, cycle the valve into the fully closed position. Ensure the valve cannot open during installation by using travel stops, a manual actuator, a constant supply pressure to the pneumatic actuator, or other steps as necessary.

Table 3. Valve Body Data, CL150

VALVE SIZE, NPS	SHAFT DIA. AT YOKE BEARING	FACE-TO-FACE DIMENSION <sup>(1)</sup>	MINIMUM I.D. <sup>(2)</sup>	APPROXIMATE WEIGHT	
				Wafer	Single- Flange
				kg	
14	30.2	92.1	331.2	71.7	94.8
16	31.75	101.6	375.2	93.9	137.9
18	38.1	114.3	418.8	139.3	178.3
20	44.45	127.0	464.1	166.9	223.6
24	57.15	154.0	580.9	255.4	350.6
				Pounds	
14	1-3/16	3-5/8	13.04	158	209
16	1-1/4	4	14.77	207	304
18	1-1/2	4-1/2	16.49	307	393
20	1-3/4	5	18.27	368	493
24	2-1/4	6-1/16	22.87	563	773

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.  
2. Minimum I.D. is the minimum pipe or flange I.D. required for disc swing clearance.



NOTE:  
 FOR OPTIMUM SEAL PERFORMANCE, THE PREFERRED VALVE ORIENTATION AT SHUTOFF IS WITH THE RETAINING RING DOWNSTREAM FROM THE HIGH PRESSURE SIDE OF THE VALVE.

Figure 3. Available Seal Configurations

Table 4. Valve Body Data, Wafer-Style Valves, CL300

VALVE SIZE, NPS	SHAFT DIA. AT YOKE BEARING	FACE-TO-FACE DIMENSION <sup>(1)</sup>	MINIMUM I.D. <sup>(2)</sup>	APPROXIMATE WEIGHT	
				Wafer	Single-Flange
				mm	
14	44.45	117.5	304.3	125.2	231.3
16	44.45	133.4	346.2	189.2	300.7
18	57.15	149.2	389.4	237.7	411.4
20	69.9	155.6	442.0	370.6	551.1
24	69.9	181.0	523.2	477.2	828.7
				Pounds	
				Inches	
14	1-3/4	4-5/8	11.98	276	510
16	1-3/4	5-1/4	13.63	417	663
18	2-1/4	5-7/8	15.32	524	907
20	2-3/4	6-1/8	17.40	817	1215
24	2-3/4	7-1/8	20.59	1052	1827

1. Face-to-face dimensions are in compliance with MSS SP68 and API 609 specifications.  
2. Minimum I.D. is the minimum pipe or flange I.D. required for disc swing clearance.

Table 5. Hex Head Screw, Stud Bolt and Cap Screw Data<sup>(1)</sup>

VALVE SIZE, NPS	NUMBER OF CAP SCREWS		NUMBER OF STUD BOLTS		SIZE-DIAMETER INCH AND THREAD		LENGTH OF CAP SCREWS, INCH		LENGTH OF STUD BOLTS, INCH	
	CL150	CL300	CL150	CL300	CL150	CL300	CL150	CL300	CL150	CL300
<b>Single-Flange Style<sup>(2)</sup></b>										
14	24	40	---	---	1-8	1-1/8-8	2-3/4	3-1/2	---	---
16	32	40	---	---	1-8	1-1/4-8	3	3-3/4	---	---
18	32	48	---	---	1-1/8-8	1-1/4-8	3-1/4	4	---	---
20	40	48	---	---	1-1/8-8	1-1/4-8	3-1/2	4	---	---
24	40	48	---	---	1-1/4-8	1-1/2-8	3-1/2	4-1/2	---	---
<b>Wafer-Style</b>										
14	---	8	12	16	1-8	1-1/8-8	---	3-1/2	9-1/2	12
16	---	8	16	16	1-8	1-1/8-8	---	3-3/4	10	13-1/2
18	---	8	16	16	1-1/8-8	1-1/4-8	---	4	11	13-3/4
20	---	8	20	20	1-1/8-8	1-1/4-8	---	4	12	14-1/2
24	---	8	20	20	1-1/4-8	1-1/2-8	---	4-1/2	14	16-1/2

1. Thread engagement in accordance with ASME B31.3 "Process Piping".  
2. Bolting lengths are based on installation of valve between standard raised face flanges and utilizing flange gaskets with a final compression thickness of 1/8 inch. When gaskets used have a final compression thickness of less than 1/8 inch, reduce bolting lengths shown by 1/4 inch.

**CAUTION**

When using an actuator, the actuator travel stop (or actuator travel, for actuators without adjustable stops) must be adjusted so the disc stop in the valve does not absorb the output of the actuator. Failure to limit the actuator travel as described in the Adjusting the Actuator Travel Stops or Travel steps can result in damage to the valve, shaft(s), or other valve components.

A Type A31A valve is normally shipped as part of an assembly with an actuator and other accessories

such as a valve positioner. If the valve and actuator have been purchased separately or if the actuator has been removed for maintenance, properly mount the actuator and adjust valve/actuator travel and all travel stops before inserting the valve into the line.

**CAUTION**

Damage to the disc will occur if any pipe flanges or piping connected to the valve interfere with the disc rotation path. Be certain to align the valve accurately to avoid contact between the disc (key 2) and the flanges.

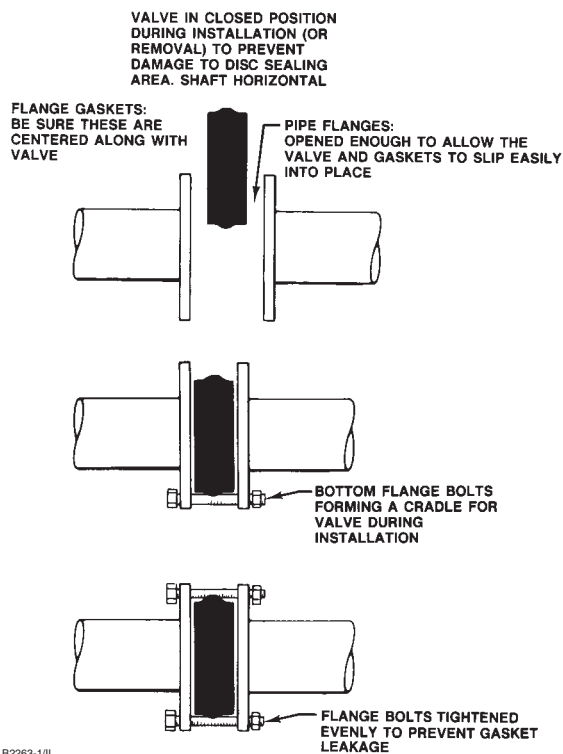


Figure 4. Proper Installation Steps

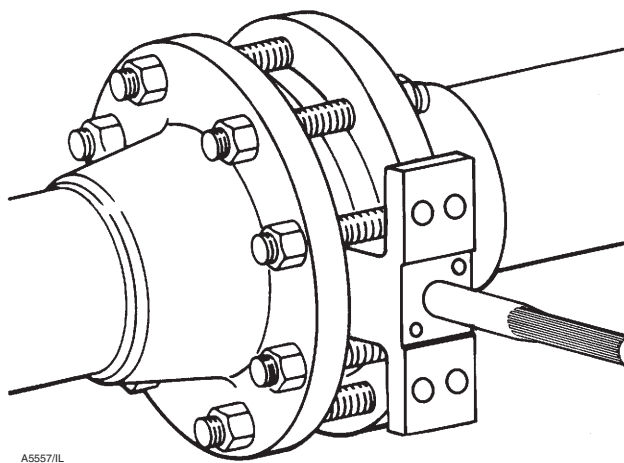


Figure 5. Properly Installed Wafer-Style Valve

## Adjusting the Actuator Travel Stops or Travel

Key number locations are shown in figure 9, unless otherwise noted.

1. Refer to the actuator instruction manual to locate the actuator travel stop that control the closed

position of the valve disc (key 2). When adjusting the travel stop or travel, make sure that the disc is from 0 to 0.76 mm (0 to 0.030 inch) away from the internal stop in the valve body (see figure 8). This adjustment is necessary to be certain that the actuator output torque is fully absorbed by the actuator travel stop or by the actuator. The internal travel stop in the valve body should not absorb any of the actuator torque.

## CAUTION

**When using an actuator, the actuator travel stop (or actuator travel, for actuators without adjustable stops) must be adjusted so the disc stop in the valve does not absorb the output of the actuator. Failure to limit the actuator travel as described in the Adjusting the Actuator Travel Stops or Travel steps can result in damage to the valve, shaft(s), or other valve components.**

2. Before installing the valve/actuator assembly in the process line, cycle the valve several times to be sure the valve disc returns to the proper position.

## Installing the Valve

The maximum allowable inlet pressures for Type A31A valves are consistent with the applicable ASME pressure/temperature ratings except where limited by the material capabilities as shown in table 2 or figure 3.

Refer to table 5 for the quantity and size of line bolting required to install the valve in the pipeline.

## CAUTION

**To avoid damage to the valve disc during installation, the valve must be in the fully closed position. If the Type A31A valve is equipped with a fail-open actuator, remove the actuator before installing the valve/actuator assembly or cycle the valve into the fully closed position. Then, take appropriate steps to be sure that the actuator does not cause the valve to open during installation.**

1. See figure 5 for recommended valve orientation.

- **For Wafer-Style Valves:** Install the lower flange bolts first to form a cradle for the valve (see figure 4). See table 5 for flange bolt specifications.



- **For Single-Flange Valves:** Position the valve between the flanges. Be sure to leave enough room for the flange gaskets. Install the lower flange bolts.

2. **For all Valves:** Select the appropriate gaskets for the application. Flat sheet, spiral wound, or other gasket types, made to the ASME B16.5 standard or user's standard, can be used on Type A31A valves depending on the service conditions of the application.

3. **For Wafer-Style Valves:** Properly orient the valve according to the specific application. Place the valve in the line so the flow properly enters the valve as indicated by the flow tag. Then, install the valve and the gaskets between the flanges into the cradle formed by the flange bolts.

4. Install the remaining flange bolts.

- **For Wafer-Style Valves:** Make sure the gaskets are centered on the gasket sealing surfaces of the flange and valve body.

5. **For all Valves:** Tighten the flange bolts in an alternating criss-cross fashion to a torque value of one-fourth of the final bolting torque. Repeat this procedure several times, increasing the torque value each time by a fourth of the final desired torque. After applying the final torque value, tighten each flange bolt again to allow for gasket compression.

### ***Packing Adjustment and Shaft Bonding***

#### **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 of safety engineer for any additional measures that must be taken to protect against process media.**

1. **For PTFE or graphite packing:** Tighten standard packing follower nuts only enough to prevent shaft leakage. Excessive tightening of packing will accelerate wear and could produce higher rotating friction loads on the valve stem. If necessary, refer to the Packing Maintenance section.

#### **CAUTION**

**For non-ENVIRO-SEAL packing: Tighten the packing follower nuts only enough to prevent shaft leakage. Excessive tightening will accelerate wear of the packing and could produce higher friction loads on the valve stem.**

2. **ENVIRO-SEAL Packing Systems:** will not require this initial re-adjustment. Refer to the separate instruction manual, ENVIRO-SEAL Packing System for Rotary Valves – Form 5305, for repair and adjustment procedures.

3. For hazardous atmosphere or oxygen service valves, read the following **Warning**, and provide the bonding strap assembly mentioned below if the valve is used in an explosive atmosphere.

#### **WARNING**

**The valve shaft is not necessarily grounded when installed in a pipeline unless the shaft is electrically bonded to the valve.**

**To avoid personal injury or property damage resulting from the effects of a static electricity discharge from valve components in a hazardous atmosphere or where the process fluid is combustible, electrically bond the drive shaft (key 3) to the valve according to the following step.**

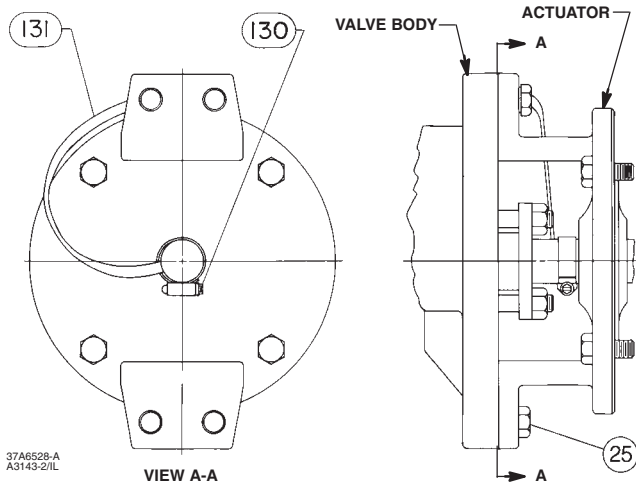
#### **Note**

**Standard PTFE packing is composed of a partially conductive carbon-filled PTFE female adaptor with PTFE V-ring packing. Standard graphite packing is composed of all conductive graphite ribbon packing. Alternate shaft-to-valve body bonding is available for hazardous service areas where the standard packing is not sufficient to bond the shaft to the valve (see the following step).**

4. Attach the bonding strap assembly (key 131, figure 6) to the shaft with the clamp (key 130, figure 6).

5. Connect the other end of the bonding strap assembly to the valve flange cap screws.

# A31A Valve



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Figure 6. Optional Shaft-to-Valve Body Bonding Strap Assembly

6. For more information, refer to the Packing Maintenance section below.

## Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions.

Key numbers in this procedure are shown in figure 9 unless otherwise indicated.



### WARNING

**Avoid personal injury from sudden release of process pressure. Before performing any maintenance operations:**

- 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 on both sides of the valve. Drain the process media from both sides of the valve.

- Vent the power actuator loading pressure.

- 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.

## Removing and Replacing the Actuator

Refer to the appropriate actuator instruction manual for actuator removal and replacement procedures. The actuator stops or travel stops must limit the rotation of the valve shaft. See the **CAUTION** below.

### CAUTION

When using an actuator, the actuator travel stop (or actuator travel stop, for actuators without adjustable stops) must be adjusted so the disc stop in the valve does not absorb the output of the actuator. Failure to limit the actuator travel can result in damage to the valve, shaft(s), or other valve components.

## Packing Maintenance

The Type A31A control valve is designed so the packing can be replaced without removing the valve from the process pipeline.

### CAUTION

For non-ENVIRO-SEAL packing: Tighten the packing follower nuts only enough to prevent shaft leakage. Excessive tightening will accelerate wear of the packing and could produce higher friction loads on the valve stem.

Usually, packing leakage can be eliminated by merely tightening the hex nuts (key 15) located above the packing follower (key 12) while the valve is in the pipeline. However, if leakage continues, the packing must be replaced.

For PTFE ENVIRO-SEAL packing system, refer to instruction manual, ENVIRO-SEAL Packing Systems for Rotary Valves – Form 5305 (see figure 10).

## CAUTION

**Never use a wrench or pliers on the keyed (upper) shaft (key 3). A damaged shaft could cut the packing and allow leakage.**

1. Before loosening any parts on the valve, release the pressure from the pipeline. Then, remove the hex nuts (key 15) and lift off the packing follower (key 12).
2. Remove the hex jam nuts (key 17) and the anti-blowout flange (key 10). Remove the packing follower (key 12). Refer to figure 7 for details of the anti-blowout protection parts.

The packing is now accessible.

3. Use a packing extractor to remove packing. Insert the corkscrew-like end of the tool into the first piece of packing and pull firmly to remove the packing. Repeat this process until all packing parts have been removed.

## CAUTION

**Be careful when cleaning the packing box. Scratches to the upper shaft (key 3) or inside diameter of the packing bore might cause leakage.**

4. Before installing new packing, clean the packing box.
5. Install new packing one ring at a time, using the packing follower as a driver. If using split-ring packing, stagger the splits in the rings to avoid creating a leak path.
6. Reinstall the packing parts. Refer to figure 10 for the sequence of packing parts.

## Removing the Valve

1. Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open the valve. Vent the power actuator loading pressure.
2. Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from either side of the valve.

## CAUTION

**Damage to the valve disc can occur if the disc is not closed when the valve is being removed from the pipeline. If necessary, stroke the actuator to place the disc in the closed position while removing the valve from the pipeline.**

3. Loosen the flange bolting that holds the valve. Make sure the valve cannot slip or twist while loosening and removing the bolting.
4. Before removing the valve from the pipeline, make sure the valve disc is closed. Removing the valve with the disc open could cause damage to the disc, piping, or pipe flanges.
5. After removing the valve from the pipeline, move the valve to an appropriate work area. Always support the valve properly.
6. When valve maintenance is complete, refer to the Installation procedures in this manual.

## Seal Maintenance

### Note

**For larger valves, it is possible to replace the seal (key 5) while the actuator is mounted to the valve and can be accomplished by cycling the valve to 90 degrees open.**

Key numbers in this procedure are shown in figure 9 unless otherwise indicated.

1. After removing the valve from the pipeline, remove the manual or power actuator. Manually rotate the upper shaft (key 3) counterclockwise until the disc has moved a full 180 degrees away from the closed position.

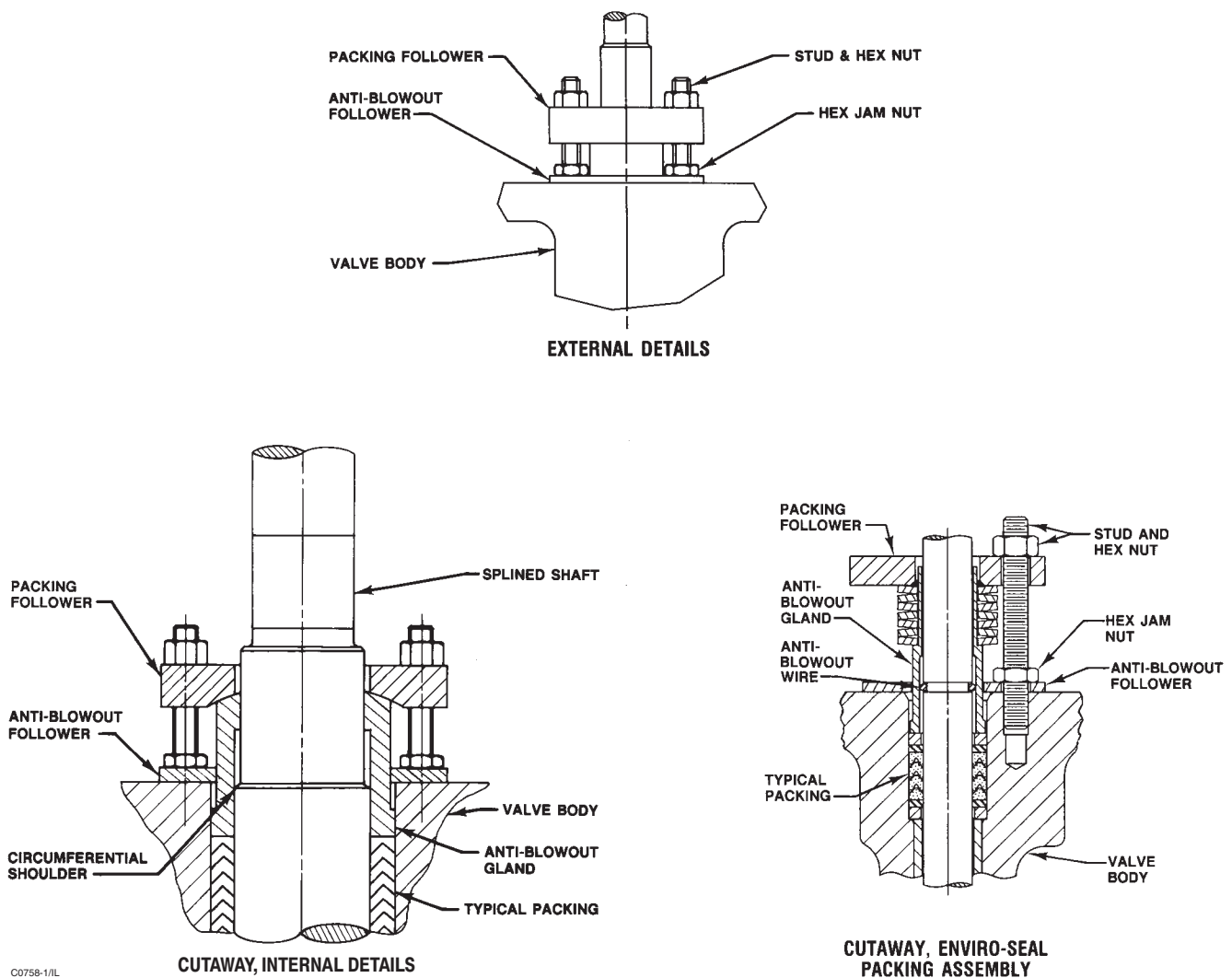


Figure 7. Anti-Blowout Design Details



### WARNING

**Avoid personal injury or property damage caused by the impact of a falling or tipping of a large valve. Support large valves during maintenance.**

2. Lay the valve flat on a work bench in a secure position with the retaining ring (key 18) and retaining ring screws (key 19) facing up. Properly secure the valve on a suitable worktable so it cannot slip, twist, or fall during maintenance. Remove all retaining ring screws.

3. Remove the retaining ring by placing a socket head cap screw from the retaining ring into each of the two retaining ring jacking screw holes. Slowly turn the screws until the retaining ring has been lifted from the valve body. Remove the retaining ring to expose the seal in the T-slot area of the valve body.

### Note

**The Type A31A is available with different seal designs and components. See figure 3 to identify the specific seal design.**

Table 6. Torque Values for Fasteners

FASTENER NOMINAL SIZE	RETAINING RING SCREWS		GASKET RETAINING BOLTS	
	N•m	In•lbs	N•m	In•lbs
#10	4.6	41	4.0	35
1/4	11	100	9.2	81
5/16	25	220	19	167
3/8	45	400	33	295
	N•m	ft•lbs	N•m	ft•lbs
7/16	72	53	53	39
1/2	112	83	80	59
9/16	161	119	117	86
5/8	225	166	161	119
3/4	401	296	286	210
7/8	651	480	447	330
1	976	720	651	480
1-1/8	1356	1000	837	617

Note: These values are based upon standard materials, S66286/N06600 screws and ASTM A193GRB6 bolts. For other special fastener materials, please contact your Emerson Process Management sales office.

**PTFE Seals**

A maintenance kit with installation tools is available through your Emerson Process Management sales office.

1. Locate the replacement seal ring (key 5) and note the shape of the ring. The ring is wider across one edge diameter and narrower across the other edge diameter as shown in figure 8. Around the outside circumference is one wide groove.

Before installing the seal ring into the valve body, place the O-ring (key 6) into the wide, outer groove of the seal ring. Refer to figure 8.

2. Install the seal ring and O-ring assembly in the valve body. The wider outside diameter of the seal ring, as marked in figure 8, goes into the T-slot area of the body (see figure 5). Start the edge with the wider diameter into the T-slot of the valve body using a blunt-end screwdriver. If you have a maintenance kit, use the seal installation tools.

3. Carefully tuck the O-ring downward into the body T-slot until the seal ring is completely entrapped in the body T-slot, and it completely covers the backup O-ring.

4. Re-install the retaining ring and the socket head cap screws. Tighten the cap screws just enough to eliminate any movement of the retaining ring. Do not over-tighten the retaining ring screws. Using a blunt-end tool, carefully tuck the lip of the seal ring under the retaining ring.

5. When the seal is under the lip of the retaining ring, continue to tighten the cap screws according to standard procedures. Do not fully torque screws at this time. Final tightening of screws is accomplished in step 7 of this procedure.

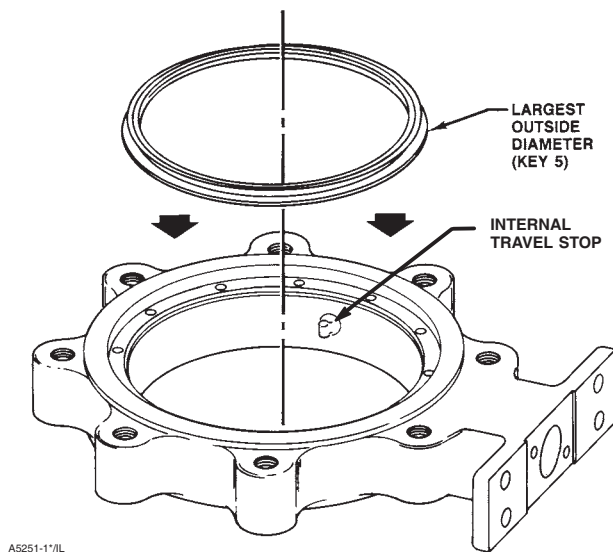


Figure 8. Typical Seal Installation

4. Insert a regular screw driver or other similar tool under the top edge of seal and gently pry the seal out of the T-slot area in the valve body. Take care not to damage the seal or T-slot area of the valve body. After the seal has been removed, clean the T-slot area, retaining ring and, if required, polish the disc (key 2) thoroughly with fine steel wool or other appropriate material.

To install a new seal, O-ring (key 6), and retaining ring gasket, follow the appropriate instructions given below.

# A31A Valve

6. Manually rotate the upper shaft clockwise 180 degrees to return the disc (key 2) to its closed position.

7. The final seating of the retaining ring cap screws can now be done. For the screw torque values, refer to table 6. The seal is now fully installed. Refer to the Installation procedures in this manual.

## **NOVEX, Phoenix III and/or Phoenix III Fire-Tested Seals**

A maintenance kit with installation tools is available through your Emerson Process Management sales office.

1. Locate the replacement seal ring (key 5) and note the shape of the ring. The ring is wider across one edge diameter and narrower across the other edge diameter as shown in figure 8. Around the outside circumference is one wide groove.

Install the seal ring (key 5) in the valve body by first placing the wider outside diameter of the seal ring into the T-slot area of the valve body which is shown in figure 3.

The backup O-ring (key 6) for the Phoenix III seal will have to be installed after placement of the seal ring in the valve body using a blunt-end screwdriver or the seal installation tool in the maintenance kit. Do not use the screwdriver or seal tool directly on the metal seat. Use tools on the O-ring only.

2. With the seal ring inserted all the way around the body T-slot now lay the O-ring into the opening between the valve body and the seal ring. Use the seal tool to apply pressure to the O-ring and carefully tuck the O-ring down into the T-slot between the valve body and the seal ring.

### **Note**

**On larger valves, it may be more efficient to have someone hold down the seal ring while you push the O-ring into the T-slot.**

3. Once the seal ring and backup O-ring have been fully installed into the body T-slot, the retaining ring gasket can be installed. This gasket is a thin graphite material. Punch one initial screw hole through the gasket for alignment, being careful not to cause additional damage to the gasket.

## **CAUTION**

**The retaining ring gasket is a thin graphite material. When you punch one initial screw hole through the gasket for alignment, be careful not to cause additional damage to the gasket.**

4. Install the retaining ring and align the screw holes in the retaining ring with the holes in the valve body. Install the first retaining ring screw through the punched hole in the ring gasket. Install the other ring screws by pushing the screws through the graphite gasket and threading them into the valve body.

5. Tighten the retaining ring socket head cap screws just enough to eliminate any movement of the retaining ring. Do not over-tighten the retaining ring screws.

## **WARNING**

**Avoid personal injury or property damage caused by the impact of a falling or tipping of a large valve. Support large valves during maintenance.**

6. To complete this step, stand the valve up. Support the valve securely using methods appropriate for the valve size. If a vise or other clamps are being used, be sure to not damage the flange gasket sealing area of the valve body.

7. Manually rotate the upper shaft (key 3) to turn the disc clockwise to meet the seal.

8. Tap the disc with a rubber mallet to drive it against the internal travel stop. When the disc makes contact with the stop, manually rotate the disc counterclockwise back out of the seal to a 90-degree open position. Repeat steps 7 and 8 three times.

### **Note**

**When attaching the actuator to the valve, make sure the valve disc is not in contact with the valve internal travel stop (see figure 8). The valve disc should be positioned from 0 to 0.76 mm (0 to 0.030 inch) away from the internal stop in the valve body (see figure 8).**

9. Use an appropriate tool (such as a feeler gauge) to position the disc (key 2) from 0 to 0.76 mm (0 to 0.030 inch) away from the internal stop in the valve body.

This adjustment is necessary to be certain that the actuator output torque is fully absorbed by the **actuator travel stop or by the actuator**. The internal travel stop in the valve body should not absorb any of the actuator torque.

### CAUTION

When using an actuator, the actuator travel stop (or actuator travel, for actuators without adjustable stops) must be adjusted so the disc stop in the valve does not absorb the output of the actuator. Failure to limit the actuator travel as described in the **Adjusting the Actuator Travel Stops or Travel steps** can result in damage to the valve, shaft(s), or other valve components.

10. The final seating of the retaining ring screws can now be done. For the screw torque values, refer to table 6.

## Anti-Blowout Design, Packing, Valve Shaft(s), Disc, and Bearing Maintenance

### Note

The A31A valve has a two-piece shaft. In these procedures, the drive shaft (with keyed end) is called the upper shaft (key 3). The shaft opposite the upper shaft is called the lower (follower) shaft (key 4).

### CAUTION

When using an actuator, the actuator travel stop (or actuator travel adjustment, for actuators without adjustable stops) must be adjusted so the disc stop in the valve does not absorb the output of the actuator. Failure to limit the actuator travel as described in the next step can result in damage to the valve, shaft(s), or other valve components.

### CAUTION

When removing the actuator from the valve, do not use a hammer or similar tool to drive the lever off the valve shaft. Driving the lever or actuator off the valve shaft could damage the valve internal parts.

If necessary, use a wheel puller to remove the lever or actuator from the valve shaft. It is okay to tap the wheel puller screw lightly to loosen the lever or actuator, but hitting the screw with excessive force could also damage internal valve parts.

Key numbers in this procedure are shown in figure 9 unless otherwise indicated.

1. Remove the valve from the pipeline. Remove the actuator from the valve.

### WARNING

Avoid personal injury or property damage caused by the impact of a falling or tipping of a large valve. Support large valves during maintenance.

### CAUTION

Never use a wrench, pliers, or similar tool to turn the upper shaft. A damaged shaft can cut the packing and allow leakage.

### Note

It is not necessary to remove the retaining ring and valve seal when removing the shaft(s) and disc.

2. Properly secure the valve on a suitable worktable so it cannot slip, twist, or fall during maintenance.

3. Removing the Anti-Blowout Design:

a. **For PTFE or Graphite Packing:** Remove the hex nuts (key 15) and pull off the packing follower (key 12). Remove the hex jam nuts (key 17) and the anti-blowout follower (key 10). Remove the anti-blowout gland (key 12). Also, see figure 7.

b. **For ENVIRO-SEAL Packing System:** Remove the hex nuts (key 101), the packing

# A31A Valve

follower (key 102), jam nuts (key 17), anti-blowout flange (key 10), and the spring pack assembly (key 103). See figure 10.

4. Remove the packing from around the upper shaft.
5. Remove the tangential pins or disc pins. Locate the pins (key 25) in the upper shaft (key 3) and the pin in the lower shaft (key 4), if the valve has a two-piece shaft.
  - a. If a maintenance kit is available, use the pin extractor to remove the disc pins. Select the correct size pin extractor tip with screws of proper thread size to match the thread size in the disc pins. If you do not have a kit, see steps c and d below.
  - b. Screw the pin extractor tip into the pin as far as possible. With an upward, straight sliding motion, pull out the pin. Repeat the same procedure for the other pins.
  - c. You can use a threaded rod with an appropriate spacer (tube) and nut as an extractor tool. If you use a threaded rod, choose a rod with threads that fit the inside thread of the pins. The rod should extend several inches above the disc when it is screwed into a pin.
  - d. After screwing the rod into the pin, slide the spacer over the rod and pin. Thread a nut onto the rod and tighten it. As you tighten the nut, the nut will drive the spacer against the disc. The increasing force will draw the pin from the disc.

6. The gasket retainer (key 20) on the side of the valve opposite the upper shaft must be removed before removing the lower shaft.

Remove the hex head bolts (key 23) and lockwashers (key 22) from the gasket retainer and remove the gasket retainer and gasket (key 21) to expose the end of the lower shaft.

7. Before removing the lower shaft (key 4), be sure the valve disc is properly supported. Pull the lower shaft from the valve body. Use a shaft extractor screwed into the puller hole in the end of the lower shaft.
8. Before removing the upper shaft (key 3), be sure the valve disc is properly supported. Pull out the upper shaft (key 3) by hand-pulling or by using a shaft extractor screwed into the end of the shaft.

## CAUTION

**To avoid damage to the disc, seal, and T-slot area, do not force the disc past the seal or T-slot area. Remove the disc from the opposite side of the valve body.**

### Note

**Both the upper shaft and the lower shaft have a thrust bearing (key 24) between the disc and the bearings (key 7). The thrust bearing is located outside of the bearing bore which holds the bearings. Use care when removing the valve disc to avoid loss of or damage to the thrust bearings.**

9. After removing the shaft(s), remove the disc. Do not force the disc past the seal or T-slot area. Collect the thrust bearings.
10. Remove the bearings (key 7). Using a suitable punch or puller, drive or pull the bearings into the valve body bore from the upper shaft bearing bore. Remove the bearing from the lower shaft bearing bore.
11. Inspect the valve body bore, bearings, bearing bores, and packing box for damage.

## Installing the Two-Piece Shaft

### Note

**In these instructions, the drive shaft (with keyed end) is called the upper shaft (key 3). The shaft opposite the upper shaft is called the lower (follower) shaft (key 4).**

Key numbers in this procedure are shown in figure 9 unless otherwise indicated.

1. Properly secure the valve on a suitable worktable so it cannot slip, twist, or fall during maintenance. Be prepared to support the valve disc. Allow for easy access to the valve body bore, drive shaft bearing bore and follower shaft bearing bore.





**WARNING**

**Avoid personal injury or property damage caused by the impact of a falling or tipping of a large valve. Support large valves during maintenance.**

**Note**

**Replacement disc and shafts are provided as a matched set and both should be replaced at the same time.**

2. Inspect all parts removed from the valve for wear or damage. Replace any worn or damaged parts. Clean the valve body and all parts to be installed with an appropriate solvent or degreaser. Note: When installing the bearings, apply lubricant to the outside diameter of the bearing for ease of installation.

**CAUTION**

**Premature valve failure and loss of process control may result if bearings are improperly installed or are damaged during installation.**

3. When installing the lower bearings (key 4), insert one or more bearings into the lower shaft bearing bore so it is flush with the body bore.

The number of bearings required changes with valve size and construction. Two bearings are required in the upper shaft and two bearings in the lower shaft. If using an NPS 14 CL150 valve with metal bearings, four bearings in the upper and four in the lower shaft will be required.

4. Hold the lower shaft thrust bearing (key 24) in the valve body bore against the counterbore of the lower shaft bearing bore. Push the lower shaft into the bearing bore just enough to hold the thrust bearing.

5. When installing the upper bearing (key 7), insert one or more bearings into the upper shaft from the body bore into the bearing bore below the packing box. Use caution to prevent damage to the bearing.

**CAUTION**

**Use caution to prevent damage to the bearing when installing the upper bearing in the previous step.**

6. Hold the upper shaft thrust bearing (key 24) in the valve body bore against the counterbore of the upper shaft bearing bore. Push the upper shaft through the packing box side into the bearing bore just enough to hold the thrust bearing.

7. When installing the lower bearing (key 4), insert one or more bearings into the lower shaft bearing bore so it is flush with the body bore.

8. Insert the lower shaft through the bore in the valve body uncovered by removal of the gasket retainer. Hold the lower shaft thrust bearing (key 24) in the valve body bore against the counterbore of the lower shaft bearing bore. Push the lower shaft into the bearing bore just enough to hold the thrust bearing.

**CAUTION**

**To avoid damage to the disc, seal, and T-slot area, do not force the disc past the seal or T-slot area. Install the disc from the opposite side of the valve body.**

9. Place the flat side of the disc on a flat surface and insert wooden blocks to raise the disc approximately 50.8 mm (2 inches) from the worktable surface. Then, suspend the valve body over the disc so the seal/T-slot area is facing up. Align the shaft bores through the disc with the upper shaft and lower shaft bores. Lower the valve body over the disc using caution not to dislodge or damage the thrust bearings placed on the ends of the shafts.

10. With the disc (key 2) properly positioned in the valve body (key 1), push the upper shaft and lower shaft the rest of the way through the thrust bearings and into the shaft bores in the valve disc.

11. Align the holes in the shafts with the holes in the disc.

**CAUTION**

**To avoid damage to the tangential pins, disc pins, valve disc, or shaft(s) resulting from the application of**

# A31A Valve

**excessive force, use appropriate care when driving the pins into the disc hub and shaft(s). Use the right tool. Do not use excessive force.**

12. Install the appropriate tangential pins, and disc pins. Use 2 tangential pins that will go through the upper shaft and 1 disc pin that will go through the lower shaft.

13. Refer to Packing Maintenance and the Anti-Blowout Design procedures in this manual to re-install the packing and anti-blowout design.

## Gasket Retainer

Valves with a two-piece shaft use a gasket retainer and gasket (keys 20 and 21) to cover the lower shaft opening in the valve body. The gasket is held in place by the gasket retainer and four hex head bolts and lockwashers (keys 23 and 22). When reassembling the valve, use a new gasket.

Be sure to center the gasket over the lower shaft bore before retightening bolts. Tighten down bolts evenly in a crossover or star pattern.

Refer to table 6 for proper torque values.

## Parts Ordering

When replacement parts are required, always use genuine Fisher® parts.

Typical parts are shown in figure 9.

When corresponding with your Emerson Process Management sales office about a Type A31A valve, please identify the valve as a Type A31A and provide the valve serial number. For valve/actuator combinations assembled at the factory, the valve

serial number is stamped on the nameplate attached to the actuator.



## 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 will void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.**

### Note

**Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.**

## Retrofit Kits

Retrofit kits include all parts required for installation of the ENVIRO-SEAL packing system into existing high-performance butterfly valves. Retrofit kits are available for single PTFE packing. See table 7 for retrofit kit included parts.

Note: Key 103, the spring pack assembly, is made up of the packing spring stack held in place by an O-ring on the packing follower.

See table 8 for retrofit kit part numbers.

Table 7. Retrofit Kit Included Parts

Key	Description	Quantity
10	Anti-blowout follower	1
17	Jam nut	1
100	Packing stud	2
101	Packing nut	2
102	Packing flange	1
103	Spring pack assembly	1
105	Packing Set	1
106	Anti-extrusion washer	2 <sup>(1)</sup>
107	Packing box ring	2 <sup>(2)</sup>
111	Tag	1
112	Cable	1

1. Not included in graphite packing kit.  
2. Only 1 req'd for NPS 18 CL300, NPS 20 CL150 and NPS 24 CL150.

**Repair Kits**

PTFE Repair kits include a single PTFE packing set and anti-extrusion washers. Graphite packing sets

include graphite packing rings and carbon anti-extrusion rings. See table 8 for PTFE repair kit part numbers.

Table 8. Retrofit and Repair Kit Part Numbers

VALVE SIZE, NPS	PRESSURE RATING	SHAFT DIAMETER <sup>(1)(2)</sup> , mm (Inch)	RETROFIT KITS	REPAIR KITS
			PTFE	PTFE
14	CL150	34.9 (1-3/8)	RRTYXRT0592	RRTYX000172
	CL300	50.8 (2)	RRTYXRT0602	RRTYX000182
16	CL150	38.1 (1-1/2)	RRTYXRT0612	RRTYX000192
	CL300	57.2 (2-1/4)	RRTYXRT0622	RRTYX000202
18	CL150	44.5 (1-3/4)	RRTYXRT0632	RRTYX000212
	CL300	63.5 (2-1/2)	RRTYXRT0642	RRTYX000222
20	CL150	50.8 (2)	RRTYXRT0652	RRTYX000182
24	CL150	63.5 (2-1/2)	RRTYXRT0662	RRTYX000222

1. Shaft diameter: Diameter through the packing box.  
2. For larger shaft sizes, consult your Emerson Process Management sales office.

**Parts List**

**Note**

Part numbers are shown for recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.

Key	Description	Part Number	Key	Description	Part Number
1	Valve Body If you need a valve body as a replacement part, order the valve size, ASME rating and desired material. Contact your Emerson Process Management sales office.		13*	Packing Set, Graphite, CL150 (continued)	
2	Disc			NPS 18	V111028X012
3	Drive Shaft			NPS 20	V111438X012
4	Follower Shaft			NPS 24	V111442X012
5*	Seal Ring (See following table)			CL300	
6*	Backup Ring (See following table)			NPS 14	V111438X012
7*	Bearing (See following table)			NPS 16	V111696X012
8	Bearing Stop			NPS 18	V111442X012
10	Anti-Blowout Flange			NPS 20	V111705X012
11	Packing Flange			NPS 24	V111709X012
12	Packing Follower		14	Stud (2 req'd)	
13*	Packing Set		15	Hex nut (2 req'd)	
	PTFE, V-Ring		17	Hex Jam Nut (2 req'd)	
	CL150		18	Retaining Ring	
	NPS 14	V111433X012	19	Retaining Ring Screw	
	NPS 16	V167865X012	20	Gasket Retainer	
	NPS 18	V110460X012	21*	Gasket (See following table)	
	NPS 20	V111437X012	22	Lockwasher (4 req'd)	
	NPS 24	V111699X012	23	Cap Screw (4 req'd)	
	CL300		24*	Thrust Bearing (See following table)	
	NPS 14	V111437X012	25	Disc Pin	
	NPS 16	V110631X012	26*	Retaining Ring Gasket	
	NPS 18	V111699X012		NOVEX and Phoenix III Seal	
	NPS 20	V111704X012		Standard & NACE	
	NPS 24	V111708X012		CL150	
	Graphite			NPS 14	V161467X012
	CL150			NPS 16	V161468X012
	NPS 14	V111434X012		NPS 18	V161469X012
	NPS 16	V167864X012		NPS 20	V112062X012
				NPS 24	V161471X012
				CL300	
				NPS 14	V113741X012
				NPS 16	V112064X012
				NPS 18	V161469X012
				NPS 20	V112062X012
				NPS 24	V124867X012
				Oxygen Service	
				CL150	
				NPS 14	V161467X022
				NPS 16	V161468X022
				NPS 18	V161469X022

\*Recommended spare parts

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Key	Description	Part Number	Key	Description	Part Number
26*	Retaining Ring Gasket, Oxygen Service, CL150 (continued)		105*	Packing Set (continued)	
	NPS 20	V169962X012		NPS 14	13B1964X012
	NPS 24	V161471X022		NPS 16	14B3647X012
	CL300			NPS 18	12B7782X012
	NPS 14	V113741X022		NPS 20	13B9164X012
	NPS 16	V112064X022		NPS 24	14B5730X012
	NPS 18	V161469X022		Use with Graphite packing	
	NPS 20	V112062X022		CL150	
	NPS 24	V124687X022		NPS 14	14B3541X112
27	Cap Screw – Actuator (4 req'd) (not shown)			NPS 16	14B3541X122
28	Hex Nut – Actuator (4 req'd) (not shown)			NPS 18	14B3541X032
29	Nameplate (not shown)			NPS 20	14B3541X082
30	Drive Screw (2 req'd) (not shown)			NPS 24	14B3541X042
31	Key			CL300	
33	Flow Direction Arrow (not shown)			NPS 14	14B3541X082
34	Packing Box Ring			NPS 16	14B3541X052
35	Disc/Shaft/Pin Assembly (not shown)			NPS 18	14B3541X042
				NPS 20	14B3541X062
				NPS 24	14B3541X072
			106*	Anti-Extrusion Ring, Composition/graphite filled PEEK (2 req'd)	
				Single PTFE packing w/std packing box	
				CL150	
				NPS 14	14B3489X012
				NPS 16	14B3494X012
				NPS 18	13B9159X012
				NPS 20	13B9168X012
				NPS 24	12B7783X012
				CL300	
				NPS 14	13B9168X012
				NPS 16	14B3642X012
				NPS 18	12B7783X012
				NPS 20	13B9168X012
				NPS 24	14B5734X012
			107	Packing Box Ring	
			111	Tag (not shown)	
			112	Cable Tie (not shown)	
			113	Lubricant	

## ENVIRO-SEAL® Packing System (See figure 10)

10	Anti-Blow Flange				
17	Hex Jam Nut (4 req'd)				
100	Packing Flange Stud (4 req'd)				
101	Packing Flange Nut (4 req'd)				
102	Packing Flange, SST				
103	Spring Pack Assembly				
105*	Packing Set				
	Use with PTFE packing				
	CL150				
	NPS 14	14B3490X012			
	NPS 16	14B3495X012			
	NPS 18	13B9155X012			
	NPS 20	13B9164X012			
	NPS 24	12B7782X012			
	CL300				

### Key 5\* Seal Ring

VALVE SIZE, NPS	SOFT SEAL		PHOENIX III SEAL			METAL SEAL
	PTFE(1)	UHMWPE(2)	PTFE	ETFE	PTFE for oxygen service	NOVEX
<b>CL150</b>						
14	V168932X012	V168932X022	V140831X012	V140831X022	V140831X032	V159013X012
16	V111337X012	V111337X022	V140857X012	V140857X022	V140857X032	V159014X022
18	V111340X012	V111340X022	V114458X012	V114458X022	V114458X032	V159026X022
20	V111343X012	V111343X022	V142359X012	V142359X022	V142359X022	V159044X022
24	V111349X012	V111349X022	V142384X012	V142384X022	V142384X032	V159146X022
<b>CL300</b>						
14	V111626X012	V111626X022	V142584X012	V142584X022	V142584X032	V164731X022
16	V111629X012	V111629X022	V140837X012	V140837X022	V140837X032	V168015X032
18	V111632X012	V111632X022	V114459X012	V114459X022	V114459X032	V167979X022
20	V111635X012	V149634X012	V114462X012	V114462X022	V114462X032	V167658X022
24	V111638X012	V111638X012	V142372X012	V142372X022	V142372X032	V164730X022

1. Includes FKM (fluorocarbon), Nitrile, EPR Chloroprene and PTFE  
2. Includes FKM, Nitrile, EPR and Chloroprene



# A31A Valve

## Key 6\* Backup Ring

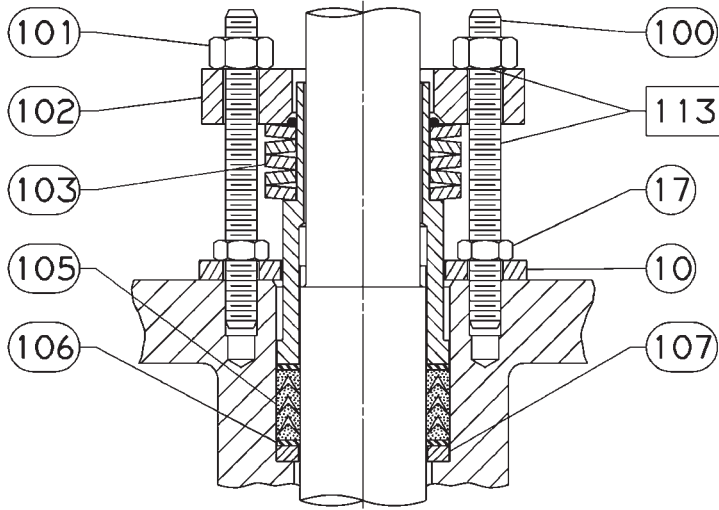
VALVE SIZE, NPS	FKM	NITRILE	EPR	CHLOROPRENE	PTFE <sup>(1)</sup>
<b>Soft Seal PTFE / UHMWPE</b>					
<b>CL150</b>					
14	V111360X012	V111360X022	V111360X032	V111360X042	V111358X012
16	V111365X012	V111365X022	V111365X032	V111365X042	V111363X012
18	V111370X012	V111370X022	V111370X032	V111370X042	V111368X012
20	V111375X012	V111375X022	V111375X032	V111375X042	V111373X012
24	V111385X012	V111385X022	V111385X032	V111385X042	V111383X012
<b>CL300</b>					
14	V111648X012	V111648X022	V111648X032	V111648X042	---
16	V111653X012	V111653X022	V111653X032	V111653X042	---
18	V111370X012	V111370X022	V111370X032	V111370X042	---
20	V111375X012	V111375X022	V111375X032	V111275X042	---
24	V111658X012	V111658X022	V111658X032	V111658X042	---
<b>Phoenix III 316/PTFE, ETFE &amp; Oxygen Service</b>					
<b>CL150</b>					
14	V111647X012	V111648X022	V111648X032	V111648X042	---
16	V111360X012	V111360X022	V111360X032	V111360X042	---
18	V111365X012	V111365X022	V111365X032	V111365X042	---
20	V111375X012	V111375X022	V111375X032	V111375X042	---
24	V111385X012	V111385X022	V111385X032	V111385X042	---
<b>CL300</b>					
14	V110203X012	V110203X022	V110203X032	V110203X042	---
16	V111360X012	V111360X022	V111360X032	V111360X042	---
18	V111365X012	V111365X022	V111365X032	V111365X042	---
20	V111370X012	V111370X022	V111370X032	V111370X042	---
24	V111375X012	V111375X022	V111375X032	V111375X042	---

1. Not available in UHMWPE

## Key 7\* Bearing

VALVE SIZE, NPS	QUANTITY NEEDED	PEEK	316 / NITRIDE	BRONZE/MICROSEAL	PTFE / COMPOSITION
<b>CL150</b>					
14	3 <sup>(1)</sup>	---	V161474X022	V161474X042	V161474X052
	2 <sup>(2)</sup>	---	V111398X032	V111398X042	V111398X052
	7 <sup>(3)</sup>	V157057X012	---	---	---
16	4 <sup>(3)</sup>	V157058X012	V161472X022	V161472X042	V161472X052
18	4 <sup>(3)</sup>	V157059X012	V131700X022	V131700X042	V131700X012
20	4 <sup>(3)</sup>	V157060X012	V169414X012	V169414X032	V169414X042
24	4 <sup>(3)</sup>	V157061X012	V127742X032	V127742X042	V127742X012
<b>CL300</b>					
14	4 <sup>(3)</sup>	V168185X012	V168528X022	V168528X042	V168528X052
16	4 <sup>(3)</sup>	V168186X012	V128066X032	V128066X052	V128066X012
18	4 <sup>(3)</sup>	V168187X012	V170455X012	V170455X032	V170455X042
20	4 <sup>(3)</sup>	V168188X012	V131699X042	V131699X032	V131699X012
24	4 <sup>(3)</sup>	V168189X012	V131703X042	V131703X052	V131703X012

1. Upper bearing  
2. Lower bearing  
3. Both upper and lower bearings



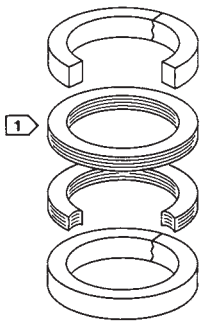
34B7524-B

PTFE PACKING SYSTEM



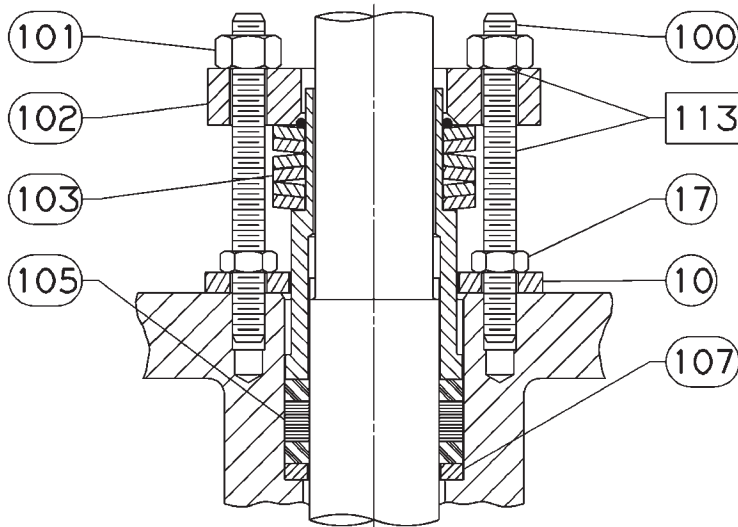
14B0095-A / DOC

STACKING ORDER OF PTFE PACKING RINGS



14B0086-A/DOC

STACKING ORDER OF GRAPHITE PACKING RINGS



34B7524-B

GRAPHITE PACKING SYSTEM

NOTES:

- ☐ VALVES WITH SHAFTS LARGER THAN 38.1 mm (1-1/2 INCH) USE GRAPHITE RINGS

Figure 10. ENVIRO-SEAL® Packing Systems

# A31A Valve

## Key 21\* Gasket

VALVE SIZE, NPS	SOFT SEAL	METAL / PHOENIX III	SOFT SEAL & METAL / PHOENIX III
	Standard and Nace	Standard and Nace	For Oxygen Service
<b>CL150</b>			
14	V125000X022	V125000X012	V125000X032
16	V125001X012	V125001X012	V125001X032
18	V125002X022	V125002X012	V125002X032
20	V124604X022	V124604X022	V124604X032
24	V124603X022	V124603X012	V124603X032
<b>CL300</b>			
14	V124604X022	V124604X012	V124604X032
16	V139033X022	V139033X012	V139033X032
18	V139502X022	V139502X012	V139502X032
20	V139619X022	V139619X012	V139619X032
24	V135138X022	V135138X012	V135138X032

1. Includes FKM, Nitrile, EPR Chloroprene and PTFE  
2. Includes FKM, Nitrile, EPR and Chloroprene

## Key 24\* Thrust Bearing

VALVE SIZE, NPS	QUANTITY NEEDED	PEEK	316/NITRIDE	BRONZE/MICROSEAL	PTFE/COMPOSITE
<b>CL150</b>					
14	2	V159686X012	V169332X022	V169332X042	V169332X052
16	2	V159687X012	V168511X022	V168511X032	V168511X042
18	2	V159688X012	V131701X022	V131701X042	V131701X012
20	2	V159689X012	V111417X022	V111417X012	V111417X042
24	2	V159690X012	V127739X032	V127739X052	V127739X012
<b>CL300</b>					
14	2	V168180X012	V168530X022	V168530X042	V168530X052
16	2	V168181X012	V131681X022	V131681X042	V131681X012
18	2	V168182X012	V131702X022	V131702X042	V131702X012
20	2	V168183X012	V128345X022	V128345X042	V128345X012
24	2	V168184X012	V152839X012	V152839X042	V152839X052

\*Recommended spare parts

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