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1.0 Introduction

Information provided in this manual is for standard Tri Lok configuration only. Specific instructions for non-standard materials of construction, temperature range, etc... should be referred to the factory.

This manual covers Tri Lok valves in the following range:

ASME Classes	Sizes	Body Style
150, 300, 600 and 900	3" - 48" (80mm - 1200mm)	Wafer Lug Double Flange Buttweld

The Tri Lok metal seated valve is fully rated to ASME B16.34, and complies with API 609.

Tri Lok is torque-seated. Torque must be continually applied by an actuation device (manual gearbox or power valve actuator) to the valve stem to ensure the valve seals against the line pressure.



WARNING

Do not remove or de-energize actuation devices while the valve is under line pressure.

The valve is inherently fire safe, and has been qualified to ISO 10497 and API 607 sixth edition standards.

The preferred direction of valve installation is with the upstream line pressure on the stem side and the body seat on the downstream side.

The preferred direction of flow is indicated by an arrow on the valve nameplate.

2.0 Safety Information

2.1 Definition of Terms



WARNING

indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

2.2 ATEX Directive 94/9/EC



WARNING

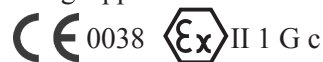
When using this product in hazardous environments, the national directives and laws which apply in your country for hazardous areas must be followed. The specifications of the examination certificate valid in country of operation must be also observed.

2.2.1 Marking

Certificate Number: LRVL 10ATEX0003X

Certification Code:

Non-Mining Applications



Mining Applications



Ambient Range: TX See Special Conditions for Safe Use

Serial Number: As appropriate

Year of Manufacture:

Warnings:

2.2.2 Special Conditions for Safe Use

The following factors must be carefully considered in order to ensure the valve is compatible with the atmosphere in which it is applied. The system designer and/or end user should formally address each item and carefully document the reasoning behind specific measures taken to ensure continued compliance throughout the life of the Tri Lok valve.

Material Considerations

Titanium is not to be used in Group I mining applications due to the potential of ignition from sparks caused by mechanical impacts. Please consult factory for details regarding material limitations.

Temperature Considerations

The surface temperature of the Tri Lok valve is wholly dependent on the ambient temperature in combination with the temperature of the process medium. The maximum surface temperature of the Tri Lok valve may be calculated from the maximum ambient temperature plus the maximum process medium temperature as shown below:

Equation 1 - Surface Temperature Calculation

$$T_{s(\max)} = T_{a(\max)} + T_{p(\max)}$$

The system designer is responsible for ensuring the maximum temperature, either inside the valve body or on the external surface, will remain well below the ignition temperature of the atmosphere. Additional protective devices may be required to ensure a sufficient thermal safety margin, including but not limited to: thermal shut-off devices and cooling devices.

For operating temperatures above 200°C (392°F) Bray recommends thermal insulation of the valve body.

Static Electricity Considerations

Where the process medium is a liquid or semi-solid material with a surface resistance in excess of 1 G-ohms, special precautions should be taken to ensure the process does not generate electro-static discharge. This may be done through ensuring the flow rate of the process media remains below 1 m/s or providing sufficient discharge points along the process path to eliminate electrostatic build-up. Consultation to

EN 50404 is recommended.

Appropriate grounding may be necessary through the use of grounding straps or other means.

Stray Electric Current Considerations


When the Tri Lok valve is used near sources of high current or magnetic radiation, a secure bonding to earth ground should be made so as to prevent ignition due to inductive currents or a rise in temperature due to these currents.

3.0 Installation

1. Tri Lok is designed to be installed between ASME B16.5, B16.47 or ISO 7005 flanges. When the valve is open, a portion of the disc may protrude into the pipe. Wafer and lug configurations will protrude on both sides of the valve. In the double flange version and some gate sizes, the open disc may protrude into the pipe on the seat side of the valve. Adjacent piping must be large enough to allow the open disc to clear the pipe.

Table 1 shows the minimum allowable pipe ID. In general, Class 150 valves will clear Schedule 40 pipe and Class 300 will clear Schedule 80 pipe without interference.

2. The valve closes with clockwise rotation of the stem and opens with counterclockwise rotation.



CAUTION

Avoid uncontrolled rotation of the disc beyond fully-open position (counterclockwise) as this could damage the sealing surfaces.

3. To benefit from the most favorable low operating torque and best sealing conditions, install the valve with the stem on the upstream (pressure side) of the installation. The valve tag is marked with an arrow indicating the preferred direction of flow.

4. Whenever possible, install with the stem horizontal. If this installation is not possible, orient the stem at an inclined angle with the actuator above the horizontal centerline. This will prevent debris from accumulating in the bearing area. With the valve stem horizontal, the weight of the disc will be supported along the full length of the bearing journals; thus minimizing operational wear.

5. Flange gaskets should conform to the requirements of ASME B16.20 (supersedes API Standard 601) for ASME B16.5 flanges. Spiral wound gaskets conforming to ASME B16.20 are recommended.

6. When bolting the valve into the line, use standard bolting torque as recommended by applicable piping standards. The valve body seat is independent of the flange bolting. Additional force from the flange bolts is not required.

Table 1
Minimum Allowable Pipe ID for Tri Lok Installation

Valve/Pipe Size		Minimum Pipe ID			
		Class 150		Class 300	
In	mm	In	mm	In	mm
3	80	2.3	51	2.3	51
4	100	3.3	78	3.3	78
6	150	5.3	128	5.1	121
8	200	7.0	172	6.8	165
10	250	8.9	221	8.9	219
12	300	10.9	270	10.9	277
14	350	12.1	300	11.6	294
16	400	14.1	350	13.5	335
18	450	15.9	392	15.3	381
20	500	17.7	450	17.1	427
24	600	21.5	540	21.1	267
30	750	26.9	684	26.7	677
32	800	29.1	740	—	—
36	900	33.1	841	32.6	828
40	1000	36.6	929	—	—
42	1050	38.7	982	37.5	951
48	1200	44.6	1134	43.2	1096

Notes for Table 1

- Minimum allowable ID of pipe with recommended clearances (per API 609).
- This table assumes that the valve is centered in the pipe flanges.
- A minimum of 1/16" (1.6 mm) thick gasket is used between the pipe flange and the face of the valve body.

4.0 Long Term Storage

If valves are to be stored before installation, storage must be carried out in a controlled manner as follows:

1. Valves must be stored in a closed, clean and dry environment.
2. Valve disc to be in closed position and the body end faces must be covered with appropriate flange protection.
3. Periodically, the valves should be checked to ensure the above conditions are maintained.
4. These are general guidelines for valve storage. Please consult the factory for information regarding specific requirements.

5.0 Handling Requirements

Packed Valves

1. Crates: Lifting and handling of the packed valves in crates will be carried out by a fork lift truck, by means of the appropriate fork hitches.
2. Cases: The lifting of packed valves in cases will be carried out in the lifting points and in the center of gravity position which have been marked. The transportation of all packed material must be carried out safely and following the local safety regulations.

Unpacked Valves

1. Lifting and handling of valves should be carried out by using appropriate means and observing the carrying limits. Handling must be carried out on pallets, protecting all machined surfaces to avoid any damage.
2. With large bore valves, rigging the load must be carried out by using the appropriate tools to prevent the valve from falling or moving during the lifting and handling.

6.0 Recommended Lubricants

Molykote® Plus CU-7439 (grease) or equivalent for Fasteners

Molykote® Spray 321 R (dry lubricant) or equivalent for Disc Seal Ring

Light Mineral Oil for Packing and Gasket interface areas (Disc Seal Ring and gasket grooves)



CAUTION

For valve handling and/or lifting, the lifting equipment (fasteners, hooks, etc.) must be sized and selected while taking into account the valve weight indicated in our packing list and/or delivery note. Lifting and handling must be made only by qualified personnel.

Fasteners must be protected by plastic covers in sharp corner areas.

Caution must be taken during the handling to avoid this equipment passing over the workers or over any other place where a possible fall could cause injury or damage. In any case, local safety regulations must be respected.

7.0 Travel Stop Setting Instructions

Preface

Tri Lok is a quarter turn, metal-seated valve. There is no mechanical stop in the valve at the “closed” position.

Purpose

The following travel stop-setting instructions are designed to provide a maintenance or service person clear direction and procedures for executing these important adjustments.

Methodology

When installing ANY type of actuator on a Tri Lok valve, the following general instructions should be followed closely. These general instructions include all actuation types: manual gear, pneumatic, hydraulic and electric actuators.

- A. Select a desired orientation for the actuator mounting relative to the valve. The disc should be oriented with the disc indicator marked on the stem.
- B. Rotate BOTH valve and actuator to either the full “open” or full “closed” position to establish a common reference point.
- C. Mount actuator to the valve and secure.

Notes:

- With valve/actuator in the closed position, it may be necessary to loosen the “closed” mechanical stop to allow the mounting holes to align properly.
- Special applications may require more specific instructions. Please consult the factory for further instruction.



CAUTION

Valves can be damaged if proper care is not exercised during the setting of Open and /or Closed stops.

Actuator Stop Settings

The Tri Lok valve is a torque seated valve. During normal operation, only the open mechanical stop on the actuator should function. Set the opening stroke stop to stop the disc rotation in the fully open (90°) position.

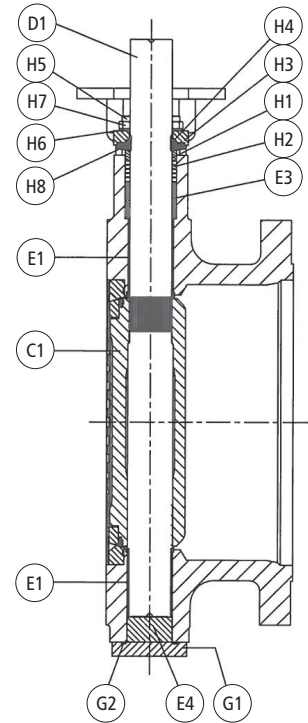
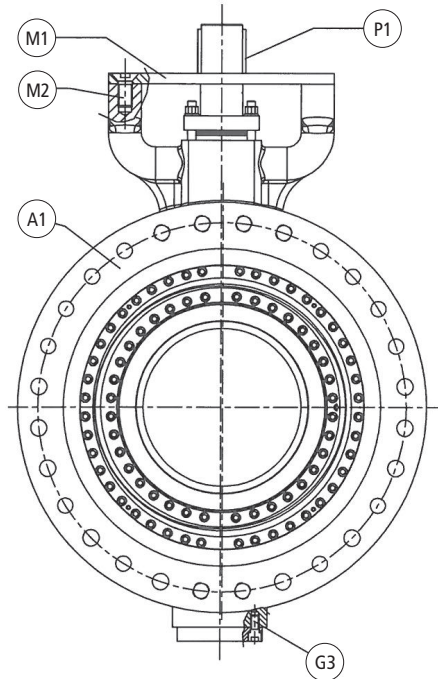
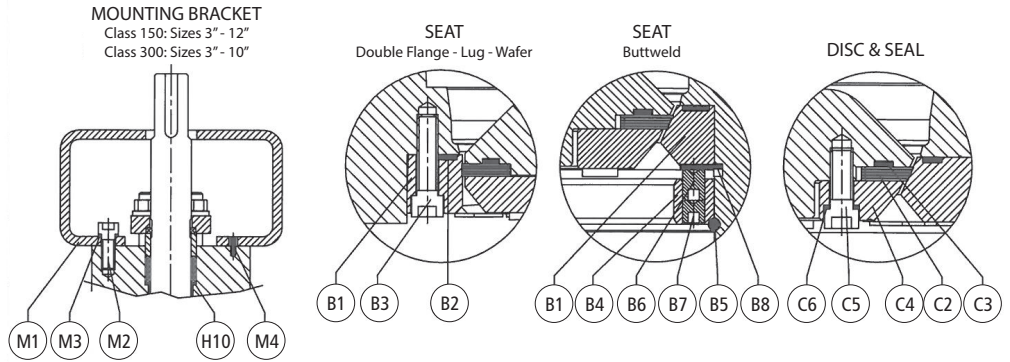
For safety reasons, the closed mechanical stop shall be set as follows:

1. Unscrew the closing stroke mechanical stop.
2. Close the valve applying the correct end-to-close torque required for the particular service. Check that the mechanical stop is free.
3. Adjust mechanical stop until engagement.
4. Loosen the mechanical stop 1-1½ turns to ensure there is enough travel for the valve to receive the required torque and to protect the valve from excessive torque.
5. Tighten the stop lock nut with the torque specified in the actuator operating manual.
6. Mark the closing stop set position.

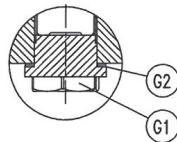
8.0 Valve Part Diagram - Class 150, 300

Sectional Drawing Standard Configuration Tri Lok Valve

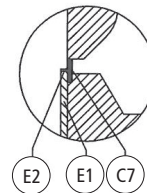
Item	Description
A1	Body
B1	Body seat (replaceable)
B2	Seat Gasket
B3	Seat Cap Screws
B4	Seat Retainer
B5	Seat retainer ring
B6	Seat Lower Dowel Fastener
B7	Seat Upper Dowel Fastener
B8	Seat Alignment Button
C1	Disc
C2	Seal ring
C3	Disc Seal Gasket
C4	Seal Ring Retainer
C5	Seal Ring Retainer Cap Screws
C6	Seal Ring Retainer Washers
C7	Disc Spacer
D1	Stem
E1	Upper/Lower Stem Bearing
E2	Bearing Protector
E3	Upper Spacer
E4	Lower Spacer
G1	Bottom Plate / Plug
G2	Bottom Plate Gasket
G3	Bottom Plate Cap Screws
H1	Gland Ring
H2	Packing
H3	Gland Retainer
H4	Anti Blow-Out Retaining Ring / Split Ring
H5	Gland Ring Stud Bolts
H6	Gland Ring Lock Washer
H7	Gland Ring Nuts
H8	Gland Ring Belleville Washer
H9	Grounding Washer
H10	Thrust Washer Packing
M1	Mounting Plate
M2	Mounting Plate Cap Screws
M3	Mounting Plate Lock Washer
M4	Mounting Plate Alignment Pin
N1	Identification Tag
N2	Drive Screws
P1	Stem Keys



BOTTOM FLANGE
Class 150: Sizes 3" - 12"
Class 300: Sizes 3" - 10"



UPPER /LOWER BEARING



ASME CLASS 150 & 300

9.0 Standard Maintenance for Class 150 and 300 Valves



WARNING

Precautions should be taken before beginning any work on the valve assembly.

Protective clothing, as required by appropriate safety codes, should be worn.

Relieve line pressure and close valve before:

- Removing any actuation
- Loosening any packing gland nuts

Do not pressurize the line without an actuation device properly installed and working on the valve.



CAUTION

The Tri Lok valve must be in the closed position to be removed from the line to prevent damaging the disc seal ring.

1. When replacing the seat and/or seal ring in a dead-end service, or with the piping on the body seat side removed, depressurize the line and partially open the disc before loosening any of the valve trim fasteners.
2. Clean the valve, removing any grit or scale. When handling, care should be taken not to scratch the seal ring, seat and gasket faces on both sides of the valve.
3. Replacement seat, disc seal ring, and other parts are available from authorized Tri Lok sales and service locations.
3. Remove all packing (H2), taking care not to scratch the stem or the bore of the valve body. Do not remove the thrust washer (H10) unless further valve disassembly is required.
4. Examine the valve body packing bore and the stem surface. Clean as necessary to remove any corrosion, foreign matter and minor surface imperfections.
5. Apply a small amount of grease to the stem end. Install new packing rings (H2) in valve body packing bore one at a time. Install the new packing rings (H2) into the stuffing box one at a time. First the external ring (H2), then internal rings (H2) and last the second external ring (H2).
6. Reinstall gland ring (H1), anti-blowout retaining ring (H4) and gland retainer (H3). Re-install lock washers (H6) and nuts (H7). Tighten gland nuts (H7) utilizing a cross bolting technique to the proper torque value given in **Table 2** (pg. 12).
7. Reinstall mounting bracket or mounting plate (M1) with cap screws and lock washers (M2 & M3). Remount actuation device on top of the valve.
8. Operate the valve open and closed several times to check for binding and to set the seal rings. Loosen gland nuts (H7) and retighten, utilizing a cross bolting technique, to torque value given in **Table 2** (pg. 12).
9. Install the stem and key(s). Then mount actuator, paying attention that the actuator is properly oriented.

9.1 Packing Replacement

Refer to parts diagram for parts identification by reference numbers. (Pg. 7)

1. If the valve is installed, relieve line pressure. Remove actuator from the valve. Remove socket head cap screws and lock washers (M2 & M3). Remove mounting bracket or mounting plate (M1), depending on valve size. Note assembly positions of the actuator and the mounting hardware for reinstallation.
2. Remove packing gland retainer nuts (H7) and lock washers (H6). Remove gland retainer (H3), anti-blowout retaining ring/split ring (H4) and gland ring (H1).

9.2 Seat Replacement

Refer to parts diagram. (Pg. 7)

It is highly recommended that both the seat (B1) and seal ring (C2) be replaced at the same time. However, individual components are not matched in pairs; and may be replaced separately if desired.



CAUTION

Exercise extra care when handling the seat and disc seal ring to avoid damage to the sealing surfaces.

1. Close the valve and remove the actuator. Place the valve on a flat stable surface with the body seat (B1) facing up.
2. Carefully clean the surface of the seat and remove all foreign matter from the hex sockets of seat retaining cap screws (B3). Use compressed air to blow out the gap between the seat OD and the wall of the retaining cavity in valve body (A1). Apply a suitable penetrant into the gap between the seat OD (B1) and the body (A1) to help in extracting the seat (B1) from the body cavity.
3. Using a wrench, remove all seat retainer socket cap screws (B3).
4. Using a hardwood or aluminum drift and a light hammer, tap the top of the seat (B1) lightly all around to loosen the seat in the retaining cavity.
5. Using full-threaded bolts or suitable threaded rod matched to the threads in all tapped jacking holes, begin jacking the seat (B1) evenly out from the retaining cavity. Tap the seat lightly with the drift as necessary to keep it in alignment with the walls of the retaining cavity in the body (A1). Remove the seat (B1) from the body (A1).
6. Using non-abrasive tools, carefully clean any remnants of old gasket and foreign matter within the retaining cavity. Blow out all threaded holes and gasket grooves with compressed air.
7. Remove the seal ring retainer screws (C5) and lock washers (C6) from seal ring retainer (C4). Remove disc seal ring retainer (C4). If the old seal ring (C2) is to be reinstalled, extract it carefully. Wipe the seal ring (C2) clean, removing all remnants of old gasket and foreign matter. Place the old seal ring (C2) aside for reinstallation.
8. Using soft tools and a suitable wire brush, carefully clean any remnants of old gasket and foreign matter from the face of the disc (C1). Blow out all threaded holes and the gasket groove with compressed air.
9. Place a new disc gasket (C3) into the groove on the disc face (C1). The mating side of the disc gasket may be lightly greased to improve retention in the groove. Place the seal ring (C2) onto the disc, making sure the alignment line on the seal ring matches the locating dimple in disc face. Place the seal retainer (C4) over the seal ring. Apply anti-seize compound to the seal ring retainer cap screws (C5). Install all disc seal ring retainer cap screws (C5) with lock washers (C6). The seal retaining flange cap screws (C5) should be fully threaded into the disc (C1), but remain only finger-tight at this time. Open the valve to approximately 20°.
10. Place the seat gasket (B2) into the groove of the seat (B1). It is highly recommended to apply grease to the mating side of the seat gasket to secure its position in the groove. Apply a suitable lubricant to the sealing surfaces of the seat (B1) and seal ring (C2). Insert the seat (B1) into the body (A1) making sure the alignment dimples in the seat (B1) and the retaining cavity in the body (A1) match. Apply anti-seize compound to seat retaining cap screws (B3) and install the screws (B3) finger-tight.
11. Verify that all four alignment marks match (body, seat, seal ring and seal ring retainer) and then tighten the seat retainer cap screws (B3) evenly and firmly using a cross bolting technique to the torque specified in **Table 3** (Pg. 12).
12. Lubricate the sealing surfaces of the seal ring (C2) and the seat (B1). Using a suitable actuator, close and open the valve 2-3 times, only closing the valve to the point where the seal ring engages with the seat. Check each time that the disc seal ring makes full contact without torquing into the seat. Attention should be paid in the closing stroke that the seat does not scratch the seal ring. This will allow the seal ring and seat to be properly aligned.

13. Close the valve. Tighten at least four screws in the seal ring retainer to prevent the seal ring from further movement. Open the valve approximately five degrees. Tighten all seal ring retainer screws (C5) using a cross bolting technique, to the torque specified in **Table 3** (Pg. 12).

14. Re-apply lubricant to the sealing surfaces of the valve. Reinstall actuation device and test the valve.

9.3 Seal Ring Replacement

Refer to parts diagram. (Pg. 7)



Exercise extra care when handling the seat and seal ring to avoid damage to the sealing surfaces.

The seal ring (C2) may be replaced in two ways: without removing the seat (B1); or replacing the seal ring (C2) with the seat (B1) removed.

To remove the seal ring (C2) without removing the seat (B1), the actuation device must be removed and the valve oriented in a manner that allows access to both sides. **This procedure is not suitable if the seal ring (C2) is to be replaced while the valve is installed in the pipeline. In addition, this procedure is not recommended for large valves where manipulating the valve may be more difficult than removing the seat (B1) and installing the seal ring (C2) solely from the seat side of the body.**

Seal ring replacement with the seat in the valve:

1. Remove valve from the pipeline. Remove the actuator from the valve.
2. Clean the surface of the valve with compressed air, blow out all debris around the seal ring retainer (C4) and clean out the hex sockets of the seal ring retainer cap screws (C5).
3. Loosen all seal ring retainer cap screws (C5), but leave them in the valve with the seal ring retainer (C4) attached to the disc (C1).
4. Using a wrench, rotate the valve stem (D1) counter-clockwise past the fully open position far enough so

the disc is in a position to allow seal ring retainer and seal ring removal (C2). Be careful not to over-rotate the stem (D1) to the point where the seal ring (C2) or disc edge (C1) contact the body (A1). Make sure the packing gland retainer nuts (H7) are tight enough to prevent the valve stem (D1) from rotating on its own under the eccentric weight of the disc (C1).

5. Remove the seal ring retaining cap screws (C5) and lock washers (C6), and extract disc seal ring retainer (C4) and the seal ring (C2).
6. Rotate the disc (C1) as necessary to access the seal face on the disc (C1). Using soft tools and suitable wire brush, carefully clean any remnants of old gasket and foreign matter from the face of the disc (C1). Blow out all threaded holes and the gasket groove with compressed air.
7. Rotate the disc (C1) to its previous position to facilitate installation of the seal ring (C2). Place a new seal ring gasket (C3) into the groove on the disc face (C1). The mating side of the seal ring gasket can be lightly greased to improve retention in the groove. Place the seal ring (C2) onto the disc (C1) making sure the alignment line on the disc seal ring matches the locating dimple on the disc face. Place the seal ring retainer (C4) over the seal ring. Apply anti-seize compound to the seal ring retainer cap screws (C5). Install all seal ring retainer cap screws (C5) with lock washers (C6). The cap screws (C5) should be fully threaded into the disc (C1), but remain only finger-tight at this time.
8. Lubricate (refer to lubrication table) the sealing surfaces of the seal ring (C2) and the seat (B1). Using a suitable actuator, close and open the valve 2-3 times, only closing the valve to the point where the seal ring engages the seat. Check each time that the seal ring makes full contact without torquing into the seat. Attention should be paid in the closing stroke that the seat does not scratch the seal ring. This will allow the seal ring and seat to be properly aligned.
9. Orient the valve with the seat side facing up. Verify that all four alignment marks (body, seat, seal ring and seal ring retainer) are aligned.

10. Tighten the seal ring retainer cap screws (C5) using a cross bolting technique to the torque specified in **Table 3** (Pg. 12).

11. Re-apply lubricant to the sealing surfaces of the valve. Reinstall operator or actuator and test the valve.

Seal ring replacement with the seat removed from the valve

This procedure follows the instructions for replacement of the seat (B1) described above. If the old seat (B1) is to be reused, exercise extra care when extracting it from the retaining cavity in the valve body (A1). When using jacking bolts to extract the seat, avoid forcing the jack screws unevenly which could result in permanent deformation of the seat (B1). If the old seat (B1) is to be reused, make absolutely certain that the seat (B1) slides out of the retaining cavity easily; in a balanced and level manner.

9.4 Bottom Flange Gasket Replacement

Refer to parts diagram. (Pg. 7)

Bottom Plate/Plug

1. If the valve is installed, remove line pressure.
2. Completely remove the bottom plate screws (G3). Remove the bottom plate (G1) and the bottom plate gasket (G2).
3. Clean the bearing area of residual gasket and foreign materials. Grease the body/bottom plate gasket groove area.
4. Place the new gasket (G2) on the bottom plate (G1) and install it onto the body.
5. Reinstall the bottom plate screws (G3) and using a cross bolting technique, tighten them according to the torque specified in **Table 3** (Pg. 12).

Bottom Plug

1. If the valve is installed, remove line pressure.
2. Remove the bottom plug (G1) and the bottom plug gasket (G2).
3. Clean the bearing area of residual gasket and foreign materials. Grease the body/bottom plug gasket area.
4. Place the new gasket (G2) on the bottom plug (G1) and install it onto the body.
5. Tighten the bottom plug according to the torque specified in **Table 3** (Pg. 12).

ASME CLASS 150 & 300

Table 2
Torque Values for Gland Retaining Nuts

Valve Size		Gland Nut Torque - Class 150		Gland Nut Torque - Class 300	
in	mm	Lb-in.	Nm	Lb-in.	Nm
3	80	35	4.0	45	5.1
4	100	35	4.0	45	5.1
6	150	45	5.1	65	7.3
8	200	45	5.1	80	9.0
10	250	65	7.3	100	11.3
12	300	65	7.3	100	11.3
14	350	80	9.0	125	14.1
16	400	80	11.3	150	16.9
18	450	100	11.3	150	16.9
20	500	100	11.3	150	16.9
24	600	100	16.9	200	22.6
30	750	650	73.4	1090	123.2
32	800	650	73.4	-	-
36	900	850	96.0	1200	135.6
40	1000	1090	123.2	-	-
42	1050	1090	123.2	1600	180.8
48	1200	1200	135.6	2100	237.3

ASME CLASS 150 & 300

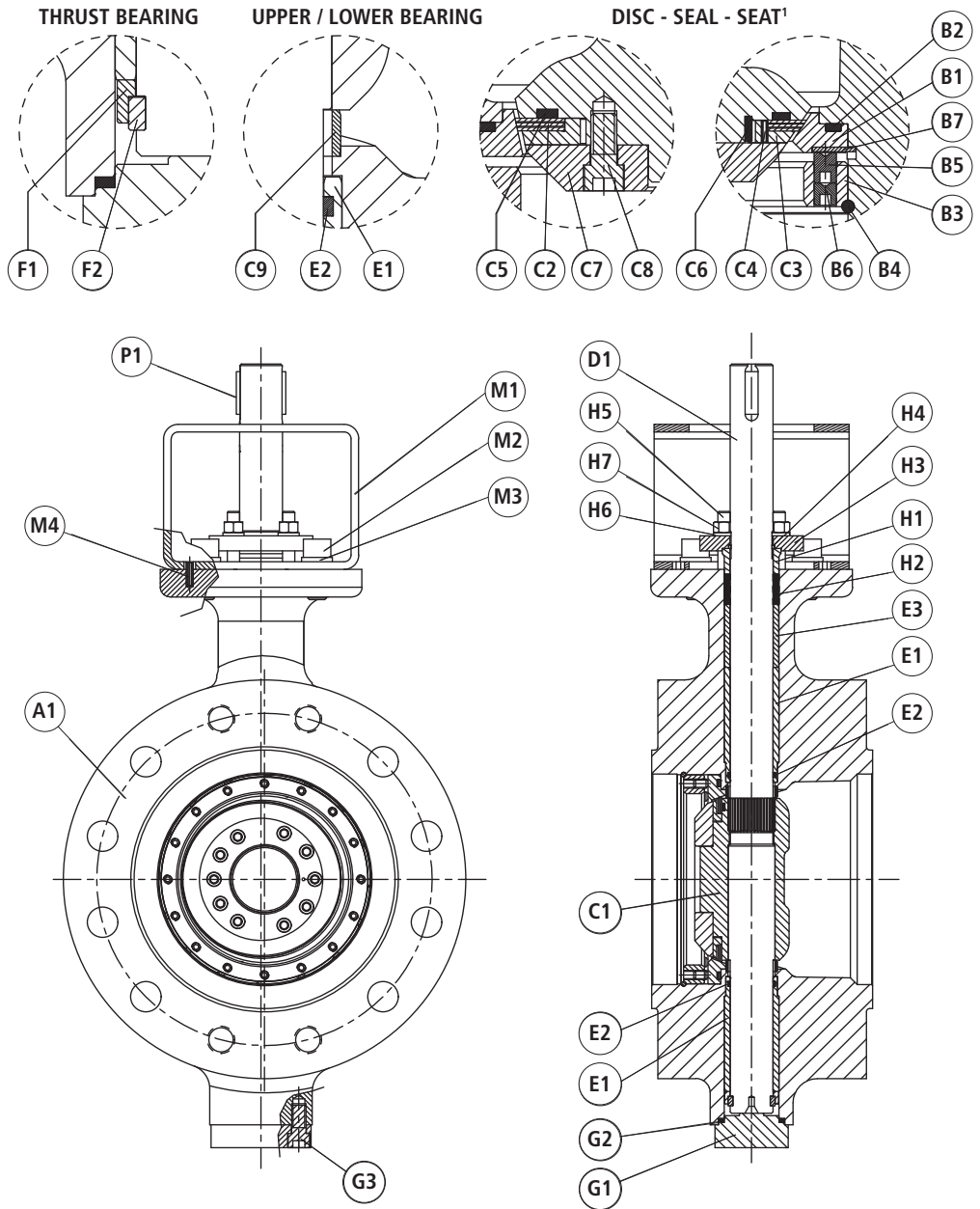
Table 3
Torque Values For Seat Retaining Cap Screws and Seal Retainer Cap Screws

Valve Size		Class 150								Class 300							
		Seat Torque		Seal Ring Retainer Torque		Plug Torque		Bottom Plate Cap Screw Torque		Seat Torque		Seal Ring Retainer Torque		Plug Torque		Bottom Plate Cap Screw Torque	
in	mm	Lb-in	Nm	Lb-in	Nm	Lb-in	Nm	Lb-in	Nm	Lb-in	Nm	Lb-in	Nm	Lb-in	Nm	Lb-in	Nm
3	80	50 - 60	5.6 - 6.8	40 - 50	4.5 - 5.1	720	81	-	-	50 - 60	5.6 - 6.8	40 - 50	4.5 - 5.1	720	81	-	-
4	100	100 - 120	11.3 - 13.6	60 - 70	6.8 - 7.9	720	81	-	-	100 - 120	11.3 - 13.6	60 - 70	6.8 - 7.9	720	81	-	-
6	150	100 - 120	11.3 - 13.6	100 - 110	11.3 - 12.4	840	95	-	-	170 - 180	19.2 - 20.3	110 - 120	12.4 - 13.6	960	110	-	-
8	200	170 - 180	19.2 - 20.3	120 - 130	13.6 - 14.7	960	110	-	-	300 - 320	33.9 - 36.2	160 - 180	18.1 - 20.3	1,080	122	-	-
10	250	300 - 320	33.9 - 36.2	170 - 190	19.2 - 21.5	1,080	122	-	-	300 - 320	33.9 - 36.2	210 - 230	23.7 - 26.0	1,440	163	-	-
12	300	300 - 320	33.9 - 36.2	220 - 240	24.9 - 27.1	1,200	136	-	-	300 - 320	33.9 - 36.2	230 - 250	26.0 - 28.2	-	-	380	43
14	350	300 - 320	33.9 - 36.2	230 - 250	26.0 - 28.2	-	-	380	43	500 - 530	56.5 - 59.9	320 - 340	36.2 - 38.4	-	-	500	57
16	400	300 - 320	33.9 - 36.2	310 - 330	35.0 - 37.3	-	-	500	57	500 - 530	56.5 - 59.9	360 - 380	40.7 - 42.9	-	-	750	85
18	450	500 - 530	56.5 - 59.9	330 - 350	37.3 - 39.5	-	-	750	85	500 - 530	56.5 - 59.9	440 - 470	49.7 - 53.1	-	-	750	85
20	500	500 - 530	56.5 - 59.9	400 - 430	45.2 - 48.6	-	-	750	85	800 - 840	90.4 - 94.9	470 - 500	53.1 - 56.5	-	-	700	79
24	600	500 - 530	56.5 - 59.9	470 - 500	53.1 - 56.5	-	-	700	79	800 - 840	90.4 - 94.9	540 - 570	61.0 - 64.4	-	-	1,200	136
30	750	930-950	105 - 107	440 - 460	50 - 52	-	-	1,200	136	990 - 1010	112 - 115	470 - 490	54 - 56	-	-	1,600	181
32	800	990-1010	112 - 114	490 - 510	56 - 58	-	-	1,200	136	-	-	-	-	-	-	-	-
36	900	920-940	104 - 106	590 - 610	67 - 69	-	-	1,600	181	990 - 1010	112 - 115	610 - 630	69 - 72	-	-	1,600	181
40	1000	990-1010	112 - 114	510 - 530	58 - 60	-	-	1,850	209	-	-	-	-	-	-	-	-
42	1050	1040-1080	117 - 122	540 - 560	62 - 64	-	-	1,850	209	1090 - 1110	124 - 126	550 - 570	63 - 65	-	-	2,400	271
48	1200	1180-1210	133 - 137	590 - 610	67 - 69	-	-	2,000	226	1190 - 1210	135 - 137	590 - 610	67 - 69	-	-	2,200	249

10.0 Valve Parts Diagram - Class 600, 900

Sectional Drawing Standard Configuration Tri Lok Valve

Item	Description
A1	Body
B1	Replaceable Seat
B2	Seat Gasket
B3	Seat Retainer
B4	Seat Retainer Ring
B5	Seat Lower Dowel Fastener
B6	Seat Upper Dowel Fastener
B7	Seat Alignment Button
C1	Disc
C2	Seal Ring
C3	Seal Ring Collar
C4	Seal Ring Collar Pin
C5	Seal Ring Gasket
C6	Seal Ring Reference Button
C7	Seal Ring Retainer
C8	Seal Ring Retainer Cap Screws
C9	Disc Spacer
D1	Stem
E1	Upper/Lower Stem Bearing
E2	Bearing Protector
E3	Upper Spacer
F1	Thrust Bearing
F2	Thrust Bearing Washer
G1	Bottom Plate
G2	Bottom Plate Gasket
G3	Bottom Plate Cap Screws
H1	Gland Ring
H2	Packing
H3	Gland Retainer
H4	Anti Blow-Out Retaining Ring / Split Ring
H5	Gland Ring Stud Bolts
H6	Gland Ring Lock Washer
H7	Gland Ring Nuts
M1	Mounting Plate
M2	Mounting Cap Screws
M3	Mounting Lock Washer
M4	Mounting Alignment Pin
N1	Identification Tag
N2	Drive Screws
P1	Stem Keys



ASME CLASS 600 & 900

1. Disc - Seal - Seat illustrations depict bolted and push designs

11.0 Standard Maintenance For Class 600 and 900 Valves



WARNING

Precautions should be taken before beginning any work on the valve assembly.

Protective clothing, as required by appropriate safety codes, should be worn.

Relieve line pressure and close valve before:

- Removing any actuation
- Loosening any packing gland nuts

Do not pressurize the line without an actuation device properly installed and working on the valve.



CAUTION

The Tri Lok valve must be in the closed position to be removed from the line to prevent damaging the disc seal ring.

1. When replacing the seat and/or seal ring in a dead-end service, or with the piping on the body seat side removed, depressurize the line and partially open the disc before loosening any of the valve trim fasteners.
2. Clean the valve, removing any grit or scale. When handling, care should be taken not to scratch the seal ring, seat, and gasket faces on both sides of the valve.
3. Replacement seat, seal ring, and other parts are available from authorized Tri Lok sales and service locations.

10.1 Packing Replacement

Refer to parts diagram. (Pg 13)

1. If the valve is installed, relieve line pressure. Close the valve with its actuator, without applying torque. Remove actuator from the valve. Remove socket head cap screws and lock washers (M2 & M3). Remove mounting bracket or mounting plate (M1), depending on valve size. Note assembly positions of the actuator and the mounting hardware for reinstallation.
2. Remove the packing gland retaining nuts (H7), lock washers (H6) and the stem key(s).
3. Disassemble the gland retainer (H3), split ring (H4) and gland ring (H1).
4. Remove all packing rings (H2) taking care not to scratch the stem or valve body bore.
5. Examine the valve body packing bore and the stem surface. Clean as necessary to remove any corrosion, foreign matter, and minor surface imperfections before installing the new packing rings (H2).
6. Apply a small amount of grease to the stem end. Install new packing rings (H2) in valve body packing bore one at a time. Install the new packing rings (H2) into the stuffing box one at time. First the external ring (H2), then internal rings (H2) and last the second external ring (H2).
7. Reinstall gland ring (H1), split ring (H4), gland retainer (H3), lock washers (H6) and packing gland retaining nuts. Tighten the nuts using a cross bolting technique to the torque specified in **Table 6** (Pg. 17).
8. Install the stem and key(s). Then mount actuator, paying attention that the actuator is properly oriented.

The Ultimate Critical Service Triple Offset Valve

11.2 Seat Replacement

Refer to parts diagram. (Pg 13).

1. If valve is actuated with fail close or fail open pneumatic/hydraulic actuator, remove it from the valve. A suitable gearbox must be installed to perform maintenance on the valve.
2. When the gearbox is installed on the valve, open it until the seal ring is disengaged from the seat. Clean the surface of the valve, blow out all debris and clean out all the hex sockets of the seal ring retainer cap screws.
3. Using the appropriate size hex key, completely remove the upper dowel fasteners (B6) from the seat retaining ring (B3).
4. Below these dowels are seat retainer lower dowels (B5) that compress the seat (B1) against the valve body. Unscrew them until the Seat retainer snap ring (B4) above the retaining ring is free to move. Remove the seat retainer snap ring (B4) from the body. Carefully clean the seat retaining ring (B3) and upper dowel fasteners (B6)
5. Extract the seat ring retainer (B3), remove the seat alignment button (B7) that retains the seat within the body and then remove the seat (B1).
6. Slightly grease (refer to lubrication table) the gasket groove in the replacement seat, install the new seat gasket (B2), place this seat/gasket sub-assembly into the valve body paying attention that the groove of the seat is aligned with the body groove and insert the seat alignment button (B7).
7. Replace dowels if necessary.
8. Adjust the seat retaining ring lower dowels (B5) until they are flush with the bottom of the seat retaining ring (B3). Install the seat retaining ring (B3) and the seat retainer snap ring (B4) in its groove in the body.
9. Using a cross bolting technique, tighten the seat retainer lower dowels (B5) to 50% of torque specified in **Table 5** (Pg. 17). Once all dowels are tightened to the same torque, proceed to fully tighten them to 100% of the listed torque value.
10. Assemble the seat retaining ring upper dowels (B6) and using a cross bolting technique, tighten them according to the torque specified in **Table 5** (Pg. 17).

11. Rotate the disc (C1) to its previous position to facilitate installation of the seal ring (C2). Place a new disc seal gasket (C5) into the groove on the disc face (C1). The mating side of the disc seal ring gasket can be lightly greased to improve retention in the groove. Be sure that the new seal ring (C2) is assembled with the seal ring collar (C3) and kept together with the seal ring collar pin (C4). Place the seal ring and collar onto the disc making sure the collar groove is aligned with the seal ring collar alignment button (C6). Place the seal ring retainer (C7) over the seal ring. Apply anti-seize compound to the seal ring retainer cap screws (C8). All of the cap screws (C8) need to be fully threaded into the disc (C1), but remain only finger-tight at this time. Lubricate the sealing surfaces of the seal ring (C2) and the seat (B1).
12. Cycle the valve with the actuator 2-3 times, only closing the valve to the point where the seal ring engages with the seat. Check each time that the seal ring makes full contact with the seat without torquing into the seat. Attention should be paid in the closing stroke that the seat does not scratch the seal ring. This will allow the seal ring and seat to be properly aligned. Tighten at least four screws in the seal retainer ring to prevent the seal ring from further movement. Open the valve approximately five degrees, verify that all alignment marks (disc, seal ring and seal ring retainer) are aligned. Tighten the seal ring retainer cap screws (C8) using a cross bolting technique, to 50% of the torque specified in **Table 4** (Pg. 16). Once all screws are tightened at the same torque, proceed to fully tighten them to 100% of the listed torque value.
13. Remove the gearbox (if installed), mount the valve actuator and test the valve.

11.3 Seal Ring Replacement

Refer to parts diagram. (Pg 13).

1. If valve is actuated with fail close or fail open pneumatic/hydraulic actuator, remove it from the valve. A suitable gearbox must be installed to perform maintenance on the valve.
2. Once the gearbox is installed on the valve, open it until the seal ring is disengaged from the seat. Clean the surface of the valve, blow out all debris and clean out all the hex sockets of the seal ring retainer cap screws.
3. Loosen all the seal ring retainer cap screws (C8) but leave them in the valve with the seal ring retainer (C7) attached to the disc (C1).

4. Completely open the valve, remove the seal ring retainer cap screws (C8), extract the seal ring retainer (C7) and the seal ring with collar (C2 & C3) making sure not to damage the seat. If its necessary, open the valve past 90° to easily remove the seal ring retainer and seal ring. Using soft tools and a suitable wire brush, carefully clean any remnants of old gasket and foreign matter from the face of the disc (C1). Blow out all threaded holes and the gasket groove with compressed air.
5. Clean the seat (B1) by using very fine sandpaper to remove any small scratches or product deposits.
6. Rotate the disc (C1) to its previous position to facilitate installation of the seal ring (C2). Place a new seal ring gasket (C3) into the groove on the disc face (C1). The mating side of the seal ring gasket can be lightly greased to improve retention in the groove. Be sure that the new seal ring (C2) is assembled with the seal ring collar (C3) and kept together with the seal ring collar pin (C4). Place the seal ring and collar onto the disc making sure the collar groove is aligned with the seal ring reference button (C6). Place the seal ring retainer (C7) over the seal ring. Apply anti-seize compound to the seal ring retainer cap screws (C8). All of the cap screws (C8) need to be fully threaded into the disc (C1), but remain only finger-tight at this time. Lubricate the sealing surfaces of the disc seal ring (C2) and the seat (B1).
7. Cycle the valve with the actuator 2-3 times, only closing the valve to the point where the seal ring engages with the seat. Check each time that the seal ring makes full contact with the seat without torquing into the seat. Attention should be paid in the closing stroke that the seat does not scratch the seal ring. This will allow the seal ring and seat to be properly aligned. Tighten at least four screws in

the seal ring retainer to prevent the seal ring from further movement. Open the valve approximately five degrees, verify that all alignment marks (disc seal ring, disc seal ring retainer) are aligned. Tighten the seal ring retainer cap screws (C8) using a cross bolting technique, to 50% of the torque specified in **Table 4** (Pg. 16). Once all screws are tightened at the same torque, proceed to fully tighten them to 100% of the listed torque value.

8. Remove the gearbox (if installed), mount the valve actuator and test the valve.

11.4 Bottom Flange Gasket Replacement

Refer to parts diagram. (Pg 13).

1. If the valve is installed, remove line pressure.
2. Completely remove the bottom plate screws (G3). Remove the bottom plate (G1) and the bottom plate gasket (G2).
3. Clean the bearing area of residual gasket and foreign materials. Grease the body/bottom plate gasket groove area.
4. Place the new gasket (G2) on the bottom plate (G1) and install it onto the body.
5. Reinstall the bottom plate screws (G3) and using a cross bolting technique, tighten them according to the torque specified in **Table 7** (Pg. 17).

Table 4
Torque Values For Seal Ring Retainer Cap Screws

Valve Size		Class 600		Class 900	
in	mm	Lb-in	Nm	Lb-in	Nm
4	100	142 - 185	16 - 20	-	-
6	150	265 - 310	30 - 35	310 - 350	35 - 40
8	200	265 - 310	30 - 35	490 - 530	55 - 60
10	250	795 - 885	90 - 100	1000 - 1120	115 - 130
12	300	795 - 885	90 - 100	-	-
14	350	795 - 885	90 - 100	-	-
16	400	795 - 885	90 - 100	1000 - 1120	115 - 130
18	450	1685 - 1815	190 - 205	1860 - 1995	215 - 225
20	500	-	-	1860 - 1995	215 - 225

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Table 5
Torque Values for Seat Retainer

Valve Size		Class 600		Class 900	
		Seat Lower Dowel Fastener*		Seat Lower Dowel Fastener*	
in	mm	Lb-in	Nm	Lb-in	Nm
4	100	65 - 90	7-10	-	-
6	150	180 - 225	20-25	310 - 350	35-40
8	200	265 - 310	30-35	310 - 350	35-40
10	250	265 - 310	30-35	310 - 350	35-40
12	300	265 - 310	30-35	-	-
14	350	530 - 575	60-65	-	-
16	400	530 - 575	60-65	850 - 950	95-105
18	450	530 - 575	60-65	850 - 950	95-105
20	500	-	-	1240 - 11420	140-160

*Seat upper dowels require 1/3 the torque of the seat lower dowel fasteners.

Table 6
Torque Values for Gland Retainer Nuts

Valve Size		Class 600		Class 900	
		Lb-in	Nm	Lb-in	Nm
in	mm	Lb-in	Nm	Lb-in	Nm
4	100	130 - 155	15-17.5	-	-
6	150	265 - 310	30-35	265 - 310	30-35
8	200	265 - 310	30-35	620 - 750	70-85
10	250	490 - 530	55-60	750 - 840	80-95
12	300	620 - 750	70-85	-	-
14	350	620 - 750	70-85	-	-
16	400	750 - 840	80-95	1685 - 1815	190-205
18	450	1110 - 1240	125-140	1685 - 1815	190-205
20	500	-	-	1685 - 1815	190-205

Table 7
Torque Values for Bottom Flange Screws

Valve Size		Class 600		Class 900	
		Lb-in	Nm	Lb-in	Nm
in	mm	Lb-in	Nm	Lb-in	Nm
4	100	265 - 310	30-35	-	-
6	150	350 - 400	40-45	1240 - 1285	140-145
8	200	350 - 400	40-45	1860 - 1995	215-225
10	250	1240 - 1285	140-145	1860 - 1995	215-225
12	300	1240 - 1285	140-145	-	-
14	350	1860 - 1995	215-225	-	-
16	400	1860 - 1995	215-225	2560 - 2650	290-300
18	450	2560 - 2650	290-300	2560 - 2650	290-300
20	500	-	-	2560 - 2650	290-300



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