

Yoke Type Hinged Closures Installation, Operation & Maintenance

Caution: Operating a closure can be a hazardous activity and certain precautions should be exercised. Proper installation and maintenance of Tube Turns Hinged Closures have a direct bearing on the safety of the operator. All instructions should be read carefully by personnel engaged in installation, operation and maintenance.

Tube Turns Hinged Closures are designed so that the head, hub and yoke are the only pressure containing parts. Proper containment of pressure depends on the O-ring being in place and the head and yokes being completely closed. The nuts and bolts serve the purpose of drawing the yokes into position.

Since a metal-to metal contact between the laps of the head, hub and yoke is a primary requirement for successful and safe operation of these closures, it is imperative that during the installation, maintenance and operations described below that these surfaces be kept clean and dry.

Installation

The H type closure is designed for installation and operation in the horizontal plane (opens like a car door). The standard hinge orientation is left hand such that the head opens from right to left. Right hand hinging is also available; it must be specified at time of order.

The V type closure is designed for installation and operation in the vertical plane (opens like a car hood).

The S type closure may be installed in either the horizontal or vertical plane.

To guard against possibilities of distortion and to protect the contact surfaces from weld spatter, the closure head and yokes should be closed during all welding operations. Closures are shipped with a standard Buna-N O-ring gasket installed which should be removed before any welding on the closure. Special compound O-rings gaskets are packed separately. The O-ring gasket should be installed after all attachment welding and stress relieving.

The closure should be joined to the pipe end or vessel nozzle by a circumferential butt-weld, employing the standard technique most appropriate to the particular installation. The closure hub is equivalent to a short, thin, close tolerance, pipe nipple and all precautions that are normally required in fabrications of this type must be taken.

The welding of nozzles, sight glass frames, structural attachments, etc. to the closure should be done at the factory Whenever possible. If it is necessary to make field welds on the vessel in the vicinity of the closure, they should be made before the closure is attached to the pipe or vessel.

Stress Relieving: When the closure attachment weld must be stress relieved, local stress relief treatment is recommended. Careful control is required during this operation to assure that the fabricator does not warp the closure. The use of proven procedures is required. If care is exercised, local stress relief can eliminate the need for disassembly and reassembly of the unit.

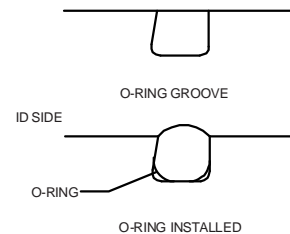
When it is necessary to stress relieve the entire vessel, the following steps should be taken to prevent distortion of the closure during heat treating: (1) Remove O-ring gasket, (2) Close the head and draw the yoke halves tightly together, (3) Remove the yoke holding bolts and provide substitute bolting, (4) Remove all sealed bearings, (5) Support all structural attachments and, (6) After stress relieving, remove substitute bolting and replace with the original yoke holding bolts. (See **Disassembly and Reassembly** procedures on following pages.)

Gasket: Closures are shipped with a standard Buna-N gasket installed. Special compound O-ring gaskets are packed separately. The O-ring gasket should be installed after all welding or stress relieving of the closure is completed.

If it is necessary to perform more than one hydrostatic test, the o-ring should be inspected for damage before each test. If it is damaged, it should be replaced.

The O-ring should be installed per the following procedure which is intended to be a general guide for the installation of O-Ring gaskets in Tube Turns Yoke Style Double Bolt Closures. Please contact the factory for specific questions or situations not covered by this procedure.

BACKGROUND The O-ring groove used in these closures is a single dovetail, with the dovetail on the ID side of the groove, as shown below. The O-ring diameter is deliberately made smaller than that of the groove into which it will be installed. This puts the O-ring in tension, holding it against the dovetail, which keeps the O-ring in the groove and prevents accidental removal.



PROCEDURE There are three important aspects to the installation procedure; cleaning, lubrication and uniform installation.

Cleaning - The O-ring groove and the seating surfaces must be free of all foreign material and corrosion before the O-ring is installed. Foreign material such as grease, oil, dirt, etc can be removed with a rag and, if required, a solvent. Corrosion can be removed, MANUALLY, with a fine emery paper or wire brush. DO NOT USE POWER TOOLS.

Lubrication - The O-ring should be lightly coated with a lubricant such as vaseline or silicone grease. **WARNING:** too much lubricant on the O-ring or in the groove will prevent proper seating of the O-ring in the groove and possibly lead to premature o-ring failure.

Installation - It is important that the O-ring be installed in the following manner to provide equal distribution of the O-ring in the groove.

a. Push the O-ring into the groove in (4) sequential steps as shown in Figure 1.

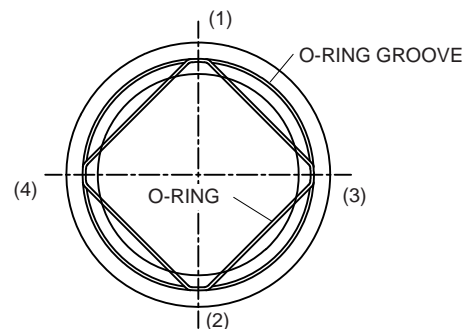


FIGURE 1

b. "Split the difference" between these (4) points and push the O-ring into the groove as shown in Figure 2.

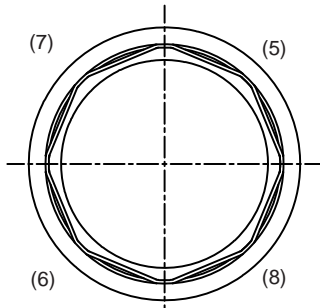


FIGURE 2

c. Complete the installation by pushing the O-ring into the groove in between the initial installation points above. If the O-rings are of a high hardness (90 durometer) or are being installed in cold weather it may be necessary to use a block of soft wood and a small hammer to tap the o-ring into its fully seated position in the groove.

Operation

Opening

Caution: Do not attempt to open the closure until all incoming pressure lines have been closed off and the pipe or vessel has been relieved of all internal pressure. Opening under pressure may result in injury to persons and damage to property.

The closures are equipped with pressure warning devices which serve a dual purpose. Their primary purpose is as a safety device to prevent the closure from being opened under pressure or pressurized while not being fully closed. If the internal pressure has not been completely relieved in a vessel containing gas, they will produce a whistling sound. Conversely, if the vessel contains a liquid, the Pressure Warning Device will leak when the holding screw is loosened. Their secondary purpose is to assure that the yokes are approximately in the proper location in the closed position. **THESE DEVICES ARE NOT BLEEDER PLUGS AND ARE NOT DESIGNED TO RELIEVE INTERNAL PRESSURE.**

Prior to opening the closure, relieve internal pressure or vacuum in the pipe or vessel.

For H and V type closures open pressure warning devices. Lift positioning plates. Spread the yoke halves by turning both yoke bolts with a hand wrench, either simultaneously or by turning one bolt until it reaches its limit of movement (as indicated by an increase of turning effort) and then turning the other bolt, alternating this procedure. If an impact wrench is used, it must be operated very carefully to avoid uneven tightening that will result in imposing binding action on either of the bolts. This can actually break the smaller yoke bolts and bend the larger yoke bolts.

Caution: If excessive torque is required to turn the bolts after two full turns, internal pressure may still exist in the closure. Stop and check to determine if all internal pressure has been completely relieved from the pipe or vessel.

When both yoke halves clear the flange of the closure head, it may be swung open on its hinge affording full access to the interior.

The springs on the V type closures are intended only to assist the operator in lifting the closure head. Table 1 gives the approximate force required to lift the heads of V type closures (equipped with springs) of various sizes and classes.

For S closures open pressure warning device and loosen the swing bolt nut with a hand wrench until it will clear the lug. **DO NOT USE AN IMPACT WRENCH**

Size In Inches	Type		
	150	300	600
8	3	5	8
10	6	9	14
12	9	14	21
14	11	17	26
16	15	24	36
18	20	31	48
20	26	41	62
22	33	51	78
24	40	64	95
26	49	77	118
28	59	92	141
30	70	110	168
32	82	*	*
36	109	*	*
38	124	*	*
40	141	*	*
42	159	*	*

* Springs are not available. Contact manufacturer for alternate methods of lifting heads.

Closing

For H and V type closures: To close the unit, first inspect the O-ring, O-ring groove and seating surfaces to see that the O-ring is properly in place and remove all foreign material. Swing the head to the closed position, and draw the yoke halves over the head flange by tightening the yoke bolts, turning the bolts either simultaneously or one at a time alternately with a hand wrench. If an impact wrench is used, it must be operated very carefully to avoid uneven tightening that will result in imposing binding action on either of the bolts. This can actually break the smaller yoke bolts and bend the larger yoke bolts. Tighten the yoke bolts to the torque shown in Table 3, the "splits" between the yokes (top and bottom) should be equal within 1/16" (1.5 mm). Tighten the pressure warning device holding nuts to the torque shown in Table 2 below.

For closures furnished with Secondary Bolt Assemblies: Please follow these instructions: (1) Ensure the primary Yoke Bolts have been assembled to the recommended minimum torque values as listed in Table 3, (2) Assemble the secondary nuts and studs to the secondary yoke bolt lugs and hand tight, and (3) Torque these nuts to 20 ft.-lbs. The nuts only need to be tightened to the point that they will not loosen due to system vibration and environmental factors.

TABLE 2 - RECOMMENDED TORQUE FOR
PRESSURE WARNING DEVICE HOLDING NUTS

NOMINAL SIZE OF CLOSURE (IN.)	MAJOR DIAMETER OF NIPPLE THREAD (IN.)	MAXIMUM TORQUE (FT-POUNDS)
2 - 18	5/8	10-15
20 - 30	7/8	20-25
32 AND LARGER	1 & 1 1/4	25-30

TABLE 3 - RECOMMENDED MINIMUM BOLT TORQUE FOR OPERATING
CONDITIONS - INCREASE BY 50% FOR HYDROSTATIC PRESSURE TEST

Closure Nominal Diameter	Class 150		Class 300		Class 600		Class 900		Class 1500	
	Bolt Dia.	Torque (ft-lbs)	Bolt Dia.	Torque (ft-lbs)	Bolt Dia.	Torque (ft-lbs)	Bolt Dia.	Torque (ft-lbs)	Bolt Dia.	Torque (ft-lbs)
8"	5/8"	30	5/8"	30	5/8"	30	3/4"	40	1"	50
10"	3/4"	40	3/4"	40	3/4"	40	1"	50	1 1/8"	90
12"	3/4"	40	3/4"	40	1"	50	1 1/8"	55	1 1/4"	110
14"	3/4"	40	3/4"	40	1"	50	1 1/4"	60	1 1/2"	120
16"	7/8"	45	7/8"	45	1 1/8"	55	1 1/2"	70	1 1/2"	160
18"	7/8"	45	7/8"	45	1 1/4"	60	1 1/2"	80	1 3/4"	250
20"	7/8"	45	1"	50	1 1/2"	80	1 3/4"	100	2"	340
22"	7/8"	45	1 1/8"	55	1 1/2"	80	1 3/4"	120	2"	410
24"	7/8"	45	1 1/4"	60	1 3/4"	100	2"	150	2 1/4"	550
26"	1"	50	1 1/4"	60	1 3/4"	100	2"	170	2 1/2"	700
28"	1"	50	1 1/2"	80	1 3/4"	100	2 1/4"	220	2 1/2"	810
30"	1"	50	1 1/2"	80	2"	140	2 1/4"	260		
32"	1 1/8"	55	1 1/2"	80	2"	140	2 1/2"	320		
34"	1 1/8"	55	1 3/4"	125	2 1/4"	160	2 3/4"	400		
36"	1 1/8"	55	1 3/4"	125	2 1/4"	160	3"	510		
38"	1 1/4"	60	1 3/4"	125	2 1/2"	200	3"	530		
40"	1 1/4"	60	2"	150	2 1/2"	200	3 1/4"	630		
42"	1 1/4"	60	2"	150	2 3/4"	270	3 1/4"	670		

To properly close a closure equipped with chain and sprocket driven yoke bolts, apply a force of approximately 50 lbs to the single crank arm. If the closure is equipped with a handwheel, apply a force of 50 lbs to each side of the handwheel.

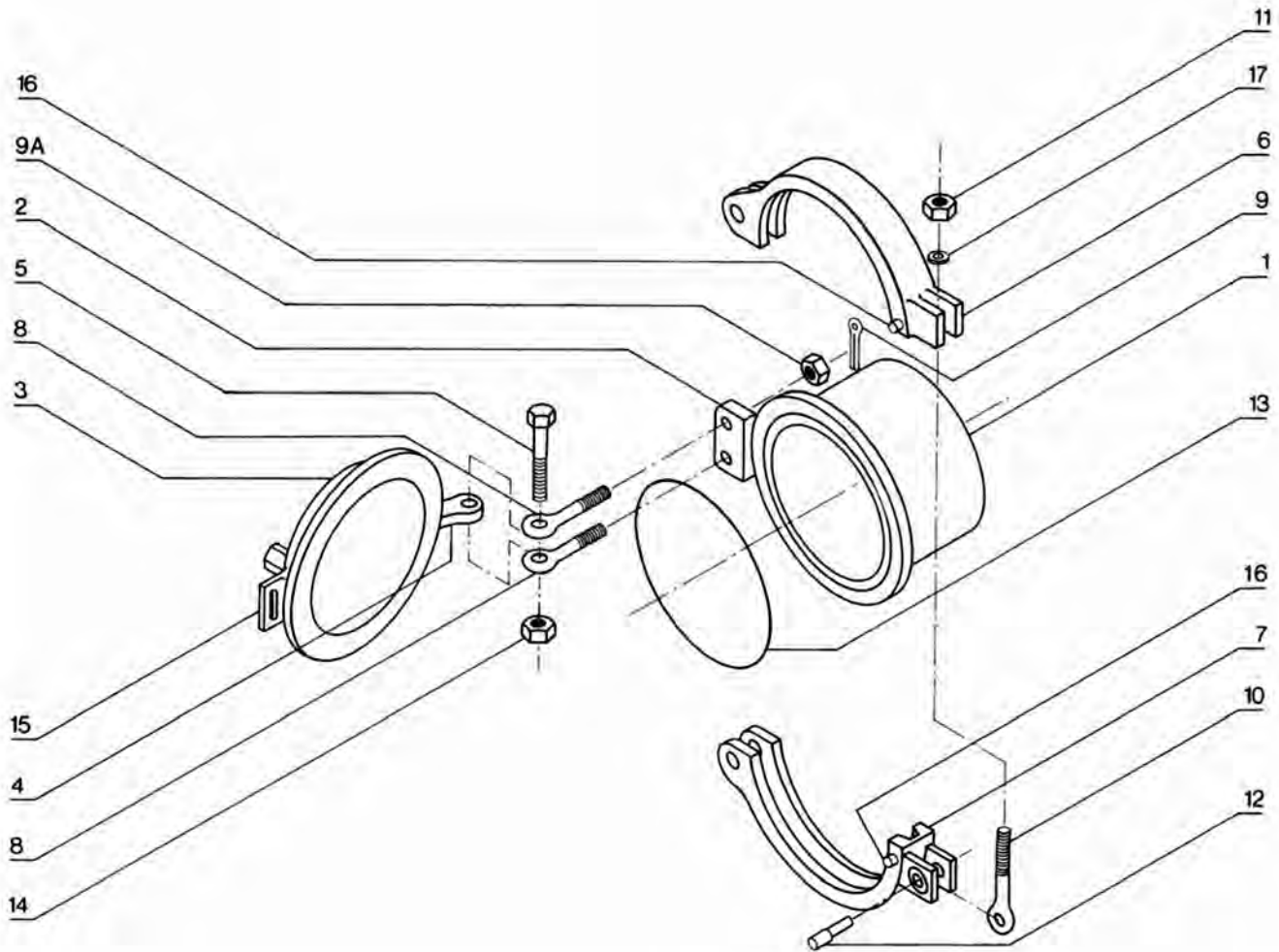
**Type S/Swing-Bolt
Parts List**

Disassembly & Reassembly

1. Hub	5. Hinge Pin (2" thru 6")	8. Hinge Eye Bolt	11. Swing Bolt Nut	15. PWD - see last page
2. Hub Hinge Lug	5A. Hinge Bolt (8" only)	9. Cotter Pin (2" thru 6")	12. Swing Bolt Pin	16. Positioning Lugs
3. Head	6. Yoke (Upper)	9A. Eye Bolt Nut (8" only)	13. O-Ring	17. Swing Bolt Washer
4. Hinge Arm	7. Yoke (Lower)	10. Swing Bolt		

As indicated by examination of the exploded view, removal of the hinge bolt permits quick and easy disassembly of the hinged closure. The components may be removed in sequence most convenient for the specific job. During disassembly, however, each part should be clearly marked so that it can be replaced in the same relative position and on the same closure unit. This is particularly important when more than one closure of the same size is to be disassembled.

During reassembly, care must be exercised to insure that all components are properly aligned before operating the closure. Misalignment can cause excessive wear and leakage.



S/Swing-Bolt Spare Parts Recommendations

1. START UP AND COMMISSIONING
 - a. O-Ring Seals (Part No. 13) – One o-ring seal should be stocked for each closure for a quantity of three or less. For quantities greater than three add one seal for each increment of three.
 - b. Pressure Warning Device (PWD) Gaskets – Four PWD gaskets should be stocked for each closure.
2. OPERATION
 - a. O-Ring Seals (Part No. 26) – Two O-ring seals should be stocked for each closure. If several identical closures are in operation in a given area, one o-ring per closure may be stocked.
 - b. Pressure Warning Device (PWD) Gaskets (Part No. 2 of PWD parts breakdown) – Four PWD gaskets should be stocked for each closure.
3. These recommendations are for normal service; the frequency of opening, extreme environmental conditions and amount of maintenance may require adjustments, either up or down, in the quantities of spares stocked.

When ordering spare parts, give amount, description, part number and size, pressure class and serial number of closure (located on front of yoke or ASME nameplate).

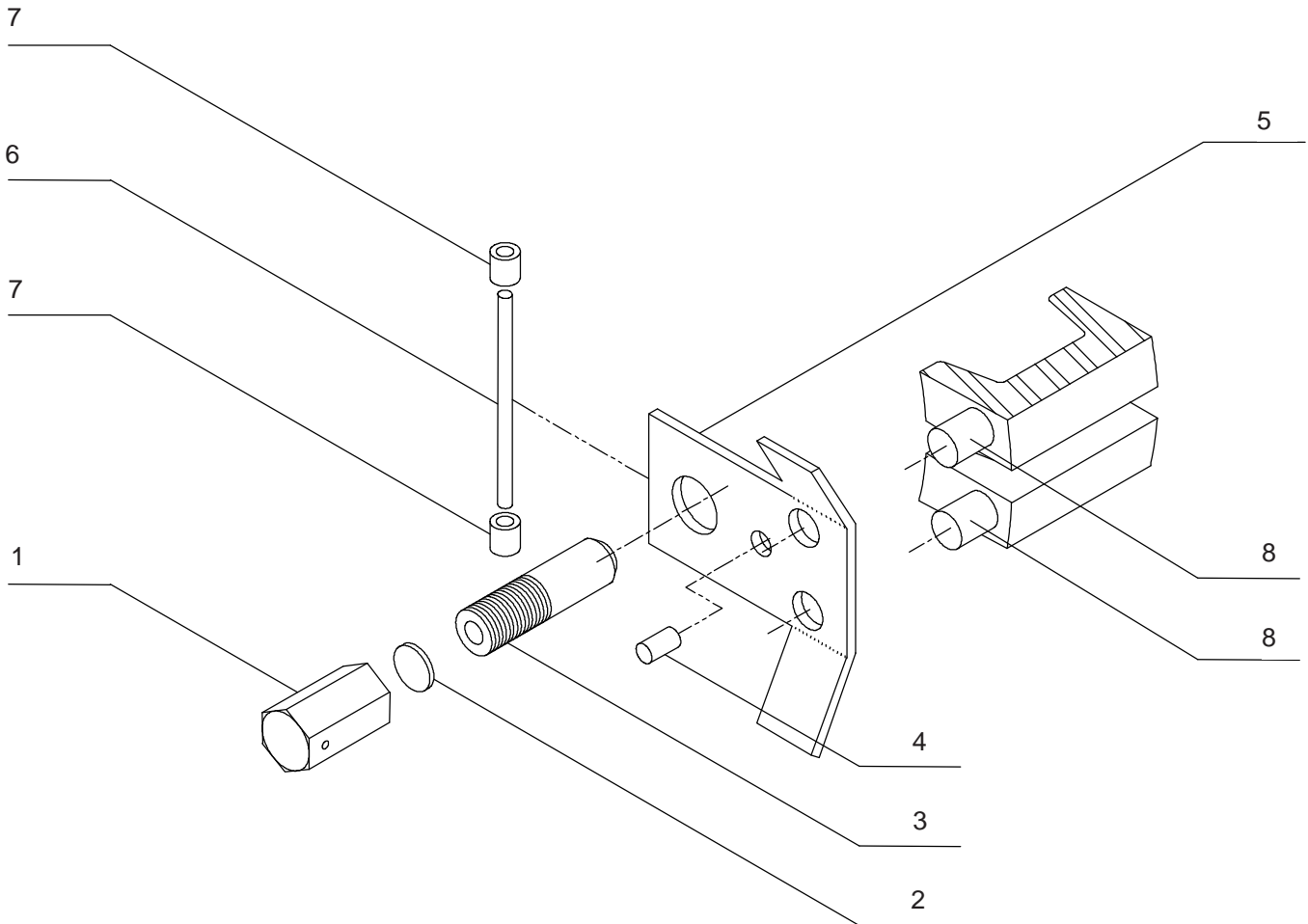
Example:(1) Buna-N O-ring - Part Number 13 - 8" CL 600 - S/N 13845

**Pressure Warning Device
Parts List**

- 1. Holding Nut
- 2. Gasket
- 3. Nipple
- 4. Plate Stop
- 5. Positioning Plate
- 6. Hinge Pin

**For Yoke Type
Closures**

- 7. Hinge
- 8. Positioning Lugs



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