Tool-less® Hinged Closure
Installation, Operation, & Maintenance

**CAUTION!**
Operating closures can be extremely hazardous and safety precautions must be exercised. Proper installation and maintenance of Tube Turns Tool-less® 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.

**ORIENTATION**

The "H" type closure is designed for installation and operation in the horizontal plane (door swings in and out). The standard hinge orientation is left hand such that the door swings open from right to left. Right hand hinging is also available and must be specified at time of order. The "H" type closure, regardless of left hand or right hand orientation, must be installed truly horizontal.

The "V" type closure is designed for installation and operation in the vertical plane (door raises and lowers for opening and closing, respectively). "V" type closures up to size 24" are provided with lifting davits that mechanically raise and lower the door. Larger sizes are provided with lifting lugs, requiring an external lifting source.

**WELDING**

The closure should be joined to a pipe end or vessel nozzle with 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 prior to final machining. 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.

**ATTENTION!**
The closure door, seal, and locking ring assembly must be removed before welding and post weld heat treatment.

**POST WELD HEAT TREATMENT**

When the closure attachment weld must be post weld heat treated, local heat treatment is recommended. Careful control is required during this operation to assure the closure is not warped. The use of proven procedures is required.

Section VIII, ASME Boiler and Pressure Vessel Code, recommends the following stress relieving temperatures and holding times for mild carbon and low alloy steels:

<table>
<thead>
<tr>
<th>Metal Temperature (Deg. F)</th>
<th>Holding Time (Hr./in. of Thickness)</th>
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</thead>
<tbody>
<tr>
<td>1100</td>
<td>1</td>
</tr>
<tr>
<td>1050</td>
<td>2</td>
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<tr>
<td>1000</td>
<td>3</td>
</tr>
<tr>
<td>950</td>
<td>5</td>
</tr>
<tr>
<td>900</td>
<td>10</td>
</tr>
</tbody>
</table>

(Use of a lower temperature and a corresponding increase in holding time tends to minimize possibilities of distorting the closure components.)

**ATTENTION!**
The closure door, seal, and locking ring assembly must be removed before welding and post weld heat treatment.

**OPERATION**

**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.

All closures are equipped with a pressure warning screw assembly that prevents the door from being opened while under internal pressure. The pressure warning screw assembly comprises of a pressure warning screw (PWS), safety interlock segment, and connecting arm. The PWS, when loosened under gaseous pressure, will generate a whistling noise to alert the operator that the closure is under pressure. If the pressurizing media is a liquid, the pressure warning screw will leak. The safety interlock segment is connected to the pressure warning screw via the connecting arm and prevents the locking ring from being unlocked while the pressure warning screw is installed.

**Opening the closure may be performed safely using the following steps:**
1) Loosen pressure warning screw (if any pressure or residual fluid is detected, re-tighten the pressure warning screw and do not attempt to continue opening the closure). Ensure all fluid is completely drained before continuing.
2) Completely remove pressure warning screw assembly from door.
3) Insert actuator handle (attached to closure) into crank from the bottom and rotate 180° counterclockwise. Actuator crank will “snap” as rotation is completed (locking ring completely collapsed).
4) Pull hinge handle (permanently attached to hinge) outward and swing head away from hub.
5) Lightly lubricate all sealing and contact surfaces with Vaseline or silicone grease shortly after to prevent corrosion of these critical surfaces.

**Steps 1 & 2**
Loosen PWS and remove assembly

**Steps 3 & 4**
Insert handle and rotate 180° PWS CCW. Swing door out from hub

**CAUTION!**
Do not place hand between the hub and door while opening or closing the door.
Closing the closure may be performed properly using the following steps:

1) Wipe off all sealing and contact surfaces and lightly re-coat with Vaseline or silicone grease. Ensure all deposits and corrosion has been removed.
2) Visually inspect seal for any damage including tears, excessive wear, swell, etc. If breaks or tears are present, the seal must be replaced to ensure seal reliability during operation.
3) Ensure seal groove in door is free from corrosion. Re-lubricate if necessary.
4) Push hinge handle (permanently attached to hinge) inward and carefully swing head into hub. Ensure door is completely seated against hub.
5) Insert actuator handle (attached to closure) into crank from the top and rotate 180° clockwise. Actuator crank will “snap” as rotation is completed (locking ring completely expanded and locked).
6) Insert pressure warning screw into threaded hole in door while placing safety interlock assembly into the locking ring gap.
7) Tighten the pressure warning screw to approximately 10 ft-lb.

CAUTION!
Do not place hand between the hub and door while opening or closing the door.

DISASSEMBLY & RE-ASSEMBLY

Door removal may be performed efficiently using the following steps:
1) Remove the pressure warning screw assembly and collapse the locking ring (see OPERATION section for ‘opening’ procedure).
2) Safely support the door in sling. Sling must suspend door in a balanced manner in order to perform the next step safely.
3) Remove hinge pins from upper and lower hub hinge arms (hinge arms welded to hub).
4) Door is ready to be removed from hub.

Door Re-installation may be performed efficiently using the following steps:
1) Strap door in sling and properly position door with respect to hub for re-installation.
2) Insert hinge pins in upper and lower hub hinge arms (hinge arms welded to hub). Make sure both pins pass through hinge beam bushings as well, properly supporting the weight of the door.
3) Expand the locking ring and install the pressure warning screw assembly (see OPERATION section for ‘closing’ procedure).
4) See DOOR ADJUSTMENT section for proper door alignment

PAINT PREPARATION

Perform the following steps before blasting and painting:
1) Mask off the entire locking ring assembly, pressure warning assembly, and tapered door surface
2) Protect bushings and holes from shot blasting grit
3) Once painted, apply a thin layer of anti-seize compound to unpainted door/hub surfaces (except door/hub sealing surfaces) for smooth operation and rust prevention.

DOOR ADJUSTMENT

Door Centralization is essential for proper functioning of the closure. A properly centered door should resemble Figure 4 whereby the door and hub centers are coincident. If the door is not centered as shown in Figure 5, vertical/horizontal adjustment must be made.

Vertical Adjustment may be performed using the following steps:
1) Place door in hub
2) Loosen the adjustable hinge bolt locknut (upper)
3) Tighten the adjustable hinge bolt hex nut (lower) until the door is jacked to the right height
4) Re-tighten the adjustable hinge bolt locknut (upper)

Horizontal Adjustment may be performed using the following steps:
1) Place door in hub
2) Loosen the adjustable hinge bolt locknut (upper)
3) Vertical/horizontal adjustment must be made.
4) Re-tighten head hinge bolts

GASKET INSTALLATION

There are three important aspects to the installation procedure: 1) Cleaning, 2) Lubrication, 3) Installation.

1) Clean the door seal groove from all foreign material and corrosion before installing the seal. Foreign material such as grease, oil, dirt, etc can be removed with a clean cloth and, if required, a solvent. Corrosion can be removed manually with a fine emery paper or wire brush. DO NOT USE POWER TOOLS ON THE GROOVE/SEALING SURFACES.

2) Lubricate the door seal with a thin coat of Vaseline or silicone grease. Too much lubricant on the seal or in the seal groove will prevent proper seating of the seal in the seal groove.
3) **Install** the door seal by pushing it into the seal groove at the 12, 3, 6, & 9 O’clock positions per the orientation indicated in Figure 6. The seal should be equally distributed about each quadrant. Firmly press in the remaining portions of the seal such that the entire seal is properly seated in the seal groove.

![Figure 6 – Seal shown in groove](image)

Closures are shipped with the door seal and o-ring (pressure warning screw seal) already installed.

**Maintenance**

**Locking Ring Maintenance** shall include the following:
1) Clean surfaces of the locking segments making contact with the head and hub. This may be done easily be opening the door and removing the locking ring assembly.
2) Coat contact surfaces with anti-seize compound for optimal performance and rust prevention (heavy grease may be used if the latter is not available).

**Door Maintenance** shall include the following:
1) Clean the sealing surface ensuring no debris or corrosion is present. Corrosion may be removed by hand sanding only. Lubricate the surface with a light coat of silicon grease.
2) Clean the tapered surface (making contact with the locking ring segments) ensuring no debris or corrosion is present. Corrosion may be removed by hand sanding only. Lubricate the surface with anti-seize compound (heavy grease may be used if the latter is not available).
3) Check for pressure warning screw threaded hole/sealing face for damage. Lubricate the sealing face with silicon grease.

**Hub Maintenance** shall include the following:
1) Clean the sealing surface ensuring no debris or corrosion is present. Corrosion may be removed by hand sanding only. Lubricate the surface with a light coat of silicon grease.
2) Clean the tapered surface (making contact with the locking ring segments) and fillet groove ensuring no debris or corrosion is present. Corrosion may be removed by hand sanding only. Lubricate the surface with anti-seize compound (heavy grease may be used if the latter is not available).

**Pressure Warning Screw Maintenance** shall include the following:
1) Check screw threads for damage. Clean debris from threads and slot. Lubricate the threads with anti-seize compound.
2) Remove and inspect the O-ring for damage or wear. Replace if necessary

**Door Seal Maintenance** shall include the following:
1) Inspect the door seal for damage. If noticeable damage is present, the seal must be replaced to ensure safety and reliability.
2) To replace the door seal, see section GASKET INSTALLATION.

**Seal Replacement** frequency will depend upon such factors as operating pressure and temperature, shrinkage and swelling caused by product absorption, the corrosiveness of the product in the system and frequency of operation.

**Common Seal Materials** used for seal are discussed below. Technical information as to properties and usages of lip seal material are based on data and recommendations of the manufacturers of the materials.

- **Buna-N** is used for general service. Resistant to petroleum-base hydraulic and lubricating oils; animal and vegetable oils; gases such as butane, propane, acetylene, and natural gas, aromatic and non-aromatic fuels such as gasoline, kerosene, diesel fuel and fuel oils; anhydrous ammonia, and water. Temperature limits -40 °F to 250 °F; special compounds suitable for -76 °F.

- **Fluoroplastic (FKM)** is generally used for high-temperature services. Resistant to synthetic lubricants, petroleum-base products, some chlorinated solvents, benzene, toluene, and many acids and alkalis. Temperature limits -40 °F to 400 °F

**ATTENTION!**

Determination of the compatibility, of the O-ring material is the responsibility of the purchaser.

**Storage**

**Closures** are recommended to be stored inside in a protective environment, away from humidity and moisture (to prevent corrosion). If the closure is stored outside, it should be covered and sealed with a plastic tarp.

**Seals** must be stored in sealed bags and away from fluorescent light. Shelf lives for Buna-N and Viton are 7 years and 10 years, respectively.

**Spares Parts**

**Start-Up & Commissioning** requires the following spares:
1) One door seal per closure
2) Two pressure warning screw O-ring per closure

**Operation**
1) Two* door seals per closure
2) Four* pressure warning screw O-rings per closure

*These recommendations are for normal service; spare quantities may require adjustment based on service and operating conditions.

**For Spare Parts Orders**, supply the following information:
1) Quantity required
2) Description
3) Part number
4) Size and pressure class
5) Closure serial number

**Example:**

Qty: 8  
Material: Buna-N Door Seal  
Part No.: 37  
Size & Class: 8” CL600  
Type: H  
Serial No.: TL00109
Tool-less® Closure
Parts List

1. Hinge Plain Bushing
2. Hinge Beam
3. Head Hinge Arm
4. Hinge Thrust Bushing
5. Head Hinge Bolt
6. Head Hinge Washer
7. Pressure Warning Screw
8. PWS O-Ring
9. PWS Spring Pin
10. Safety Interlock Segment

11. PWS Connecting Arm
12. Crank Handle
13. Crank
14. Crank Spacer
15. Actuator Ear
16. Door
17. Ear Stop Stud
18. Hub
19. Holding Clip
20. Holding Clip Spacer

21. Holding Clip Screw
22. Holding Clip Washer
23. Hinge Bolt
24. Hinge Bolt Hex Nut
25. Hub Hinge Arm
26. Hinge Bolt Thrust Washer
27. Hinge Set Screw
28. Hinge Bolt Jam Nut
29. Actuator U-Plate
30. Locking Segment Screw

31. Locking Segment
32. Connecting Band
33. Hub Hinge Pin
34. Actuator Ear Screw
35. Actuator Ear Washer
36. Head Hinge Pin
37. Door Seal (Not Shown)
Tool-less® Closure
Parts List

1. Hinge Bolt
2. Hinge Bolt Jam Nut
3. Hinge Plain Bushing
4. Hinge Beam
5. Hinge Bolt Hex Nut
6. Hinge Bolt Thrust Washer
7. Hinge Thrust Bushing
8. Head Hinge Arm Screw
9. Head Hinge Arm Washer
10. Hinge Arm
11. Pressure Warning Screw
12. PWS Spring Pin
13. PWS O-Ring
14. Safety Interlock Segment
15. PWS Connecting Arm
16. Crank Handle
17. Crank
18. Crank Spacer
19. Actuator Ear
20. Ear Stop Stud
21. Door
22. Hub
23. Holding Clip
24. Holding Clip Spacer
25. Holding Clip Screw
26. Holding Clip Washer
27. Hub Hinge Pin
28. Hub Hinge Arm
29. Hinge Pin Set Screw
30. Actuator U-Plate
31. Locking Segment
32. Ring Segment Screw
33. Connecting Band
34. Actuator Ear Screw
35. Actuator Ear Screw
36. Head Hinge Pin
37. Door Seal (Not Shown)
### Tool-less® Closure

#### Parts List

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<th>Part Name</th>
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#### 8” – 24” Type ‘V’ Vertical

8” – 24” Type ‘V’ Vertical