

**Caution:** Operating a closure can be a hazardous activity and certain precautions should be exercised. All instructions should be read carefully by personnel engaged in installation, operation and maintenance.

### Installation

The T-Bolt hinged closure is joined to the pipe or vessel nozzle by a circumferential butt-weld, employing standard welding techniques appropriate to the particular installation.

Improper welding, weld sequencing or vessel design can cause detrimental distortion in the closure. Welding of nozzles, sight glass frames, reinforcing rings, structural attachments, etc., to the closure should be done at the factory. If this is not possible, the following precautions must be followed for all welding performed after shipment from the factory.

- (1) Large nozzle(s) "stubbed" into the closure hub may distort the hub to the extent that the closure will not seal.
- (2) If nozzle(s) are to be "stubbed" in the vessel near the vessel-to-closure hub attachment weld, they should be completed before performing the vessel-to-closure hub attachment weld.
- (3) If any attachments are to be made to the head, the o-ring should be removed and the closure tightly closed before welding.
- (4) Do not remove the closure head from the hub. If absolutely necessary to remove the head, be sure to identify each head with its particular hub and reassemble before welding. Heads and hubs are not interchangeable.

### Installation procedure:

- (1) Remove O-ring if in place in the groove.
- (2) Close the head, tighten the bolts to guard against distortion and protect the sealing surfaces from weld splatter. Ends of matching pipe or vessel must line up squarely with hub so that there is a uniform gap for welding.
- (3) Place several small tack welds around the closure hub at the point of attachment to the vessel. The number of tacks required to retain the hub in correct shape during welding operation will depend on the closure size, mounting position, etc.
- (4) Welding should be performed in accordance with the applicable code procedure. Care should be taken to keep weld metal deposition and associated heat input as low as practicable. Weld should have a uniform cross section throughout its circumference.

**Gasket:** Remove all foreign material from the O-ring groove and sealing surface before the gasket is installed. The O-ring should be coated with a suitable lubricant such as Vaseline for ambient temperature service and silicone grease for higher temperatures before it is placed in position. The O-ring gasket is intentionally smaller than the groove diameter and must be stretched to effect a "snap-fit" when properly positioned. Best installation practice is to insert the O-ring into the groove at locations 90° apart, then work the O-ring into the groove from these positions, taking care not to "roll" the O-ring.

As mentioned above, do not install the O-ring until all welding on the closure is completed and the closure has cooled.

When used in the horizontal position, 22" and larger T-Bolt Closures must be prevented from sagging. If the vessel wall to which they are attached is equal to or greater than the following thicknesses-

22" thru 34" – 1/2"
36" thru 42" – 5/8"
over 42" – 3/4"

there should be no problem. However, if the vessel is lighter than above, a 1/2" x 3" wide reinforcing flange ring, rolled the hard way, should be installed around the closure hub below the hub nut mounts or adjacent to the weld joining the closure and vessel.

### Operation

To close the T-bolt hinged closure, first inspect the O-ring and seating surface and remove any foreign material, then close the head. All bolts should be swung into place and tightened. The bolts should be tightened in an alternating sequence in the same manner as flanges. The recommended torque, for operating conditions, for each bolt size is shown in the following table:

Bolt Size	Recommended Torque (Ft-Lbs)
1/2	20
5/8	40
3/4	65
7/8	100
1 – 1/8	225

**WARNING:** Do not attempt to open the closure until the pipe or vessel has been relieved of all internal pressure. Opening under pressure may result in injury to persons and damage to equipment.

To open the closure, relieve the internal pressure or vacuum in the pipe or vessel. Then, loosen the bolts by following a procedure the reverse of that described above for closing. However, **do not swing the bolts loose from the head lugs until it is absolutely certain that no pressure or vacuum exists in the vessel or pipe.** As loosening is continued, the presence or absence of pressure will become apparent and will indicate the safety with which opening can proceed.

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.

### Maintenance

**Gasket:** The O-ring should be inspected prior to every closing. Variations in service conditions will determine its useful life. Frequency of replacement 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.

The materials most often used for closure O-rings are discussed below. Technical information as to properties and usage of gasket materials are based on data and recommendations of the manufacturers of the materials.

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

The maximum temperatures are based on 100% compression set in 1000 hours. The O-rings may be used at higher temperatures but with an undetermined decreased life.

**"Buna-N"** - 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 nonaromatic fuels such as gasoline, kerosene, diesel fuel and fuel oils; anhydrous ammonia and water. Temperature limits **-30 °F to 250 °F**; special compounds suitable for **-65 °F**.

**"Viton"** - Generally used for high-temperature services. Resistant to synthetic lubricants, petroleum-base products, some chlorinated solvents, benzene, toluene, and many acids and alkalies. Temperature limits **-15 °F to 400 °F**.

**"Ethylene Propylene"** - Superior resistance to phosphate-ester type fluids, Skydrol, Pydrol, Cellulubes and glycol type coolants. Excellent resistance to mild acids and alkalies. Can be used in steam service. Temperature limits **-70 °F to 250 °F**.

**"Silicone Rubber"** - Good resistance to high and low temperature dry gases, air, oxygen and ozone. May be satisfactory in high-aniline oils, but not recommended for use with most petroleum base products. Temperature limits **65 °F to 450 °F**.

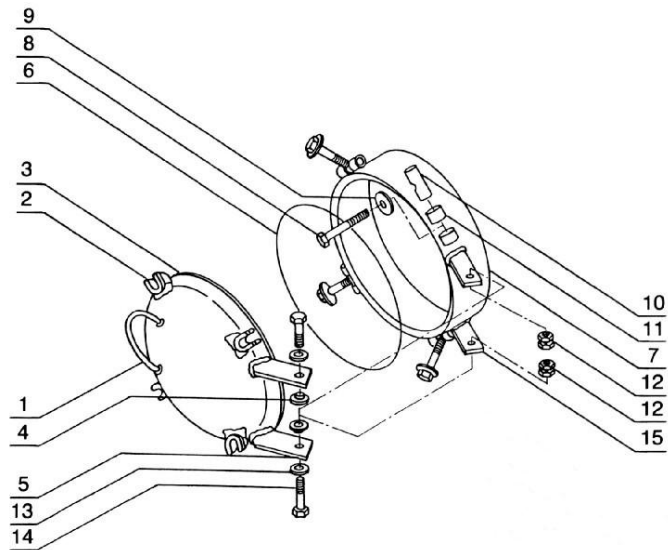
**"Teflon"** encapsulated O-rings with a core of Silicone or Viton are available for use with various chemicals. Temperature limits **-80 °F to 400 °F** for Silicone core and **-10 °F to 300 °F** for Viton core.

**"PFA Teflon"** encapsulated o-rings with a core of silicone are available for use with various chemicals. Temperature limits **-65 °F to 500 °F**.

**Bolts:** Lubricate the bolts periodically in accordance with the frequency and severity of the service involved. Inspect the head bolts periodically for thread wear. **Over-tightening can cause excessive thread wear and should be avoided.**

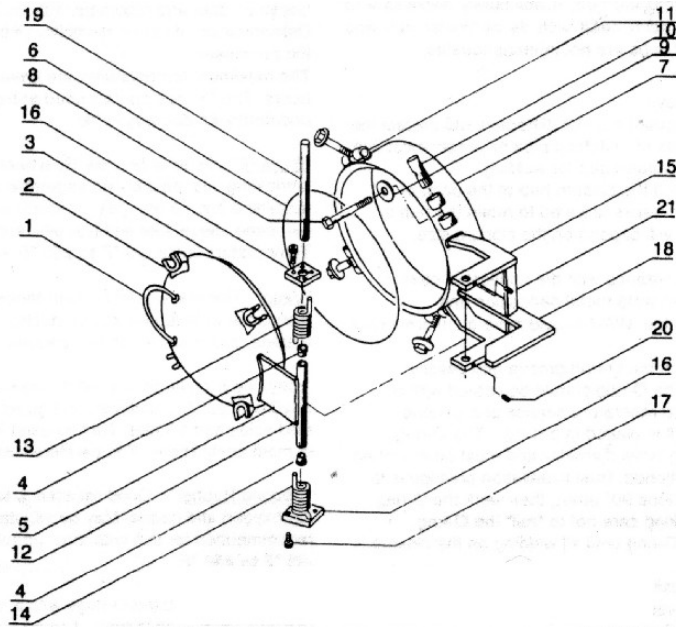
**Paint:** If the closure is to be painted, do so with the head in **closed** position to prevent paint from being applied to the seating surfaces. Paint on these surfaces may impede proper operation. It is recommended that the sealing surfaces and O-ring be coated with a grease, described above, before closing for painting. The bolt threads should **not** be painted.

**Spare Parts:** Stock two extra O-rings per closure for each individual closure. If several closures of the same size are installed close to one another, the number of extra O-rings may be reduced. Replacement bolts and swing nuts are readily available from Tube Turns.



### T-Bolt Closures Horizontal Parts List

1. Head Handle	5. Head Hinge Arms	9. Head Bolt Washer	13. Hinge Bolt Washer
2. Head Bolt Lug	6. O-Ring	10. Tapped Swing Nut	14. Hinge Bolt
3. Head	7. Hub	11. Hub Nut Mounts	15. Hub Hinge Arms
4. Hinge Bushings	8. Head Bolt	12. Hinge Bolt Nut	



### T-Bolt Closures Vertical Parts List

1. Head Handle	7. Hub	12. Hinge Tube	17. Lock Screw
2. Head Bolt Lug	8. Head Bolt	13. Spring (R.H.)	18. Head Stop
3. Head	9. Head Bolt Washer	14. Spring (L.H.)	19. Hinge Rod
4. Hinge Bushings	10. Tapped Swing Nut	15. Hub Hinge Arms	20. Hinge Rod Set Screw
5. Head Hinge Arm	11. Hub Nut Mounts	16. Adjusting Plate	21. Hinge Brace
6. O-Ring			



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