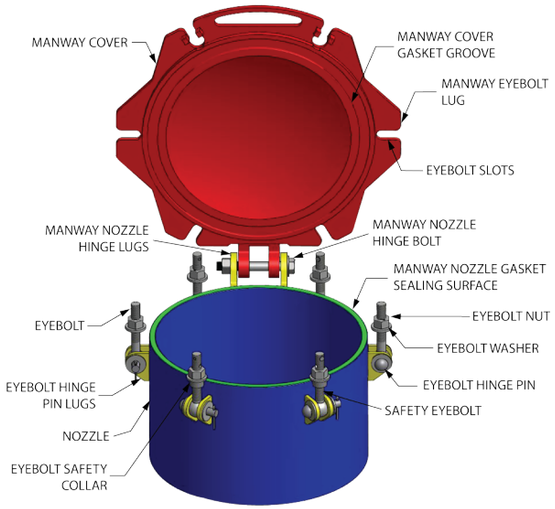
Hinged & Bolted Manway Nomenclature Illustration



The key to eliminating NAR's around a hinged & bolted manway requires a high-level process of assembly to ensure leak-free performance over a broad range of temperatures & pressures.

Common elements to consider when assembling a hinged & bolted manway include:

- Gasket-contact surface finish without unacceptable imperfections
- Suitable gasket
- Maintaining sufficient contact pressure on the manway cover, manway nozzle, & gasket surfaces (i.e., gasket stress)
- Condition of the eyebolt
- Maintaining sufficient contact pressure must consider the maximum & minimum temperature range & the internal pressure the joint may experience in service
- Bolt stretch, or relaxation, or gasket relaxation, or flow, may result because of changes in temperature & pressure
- Mechanical failure of an eyebolt may result from corrosion, fatigue, galling, self-loosening, stress corrosion cracking, & wear

It is the shipper's responsibility to ensure there are no contents of the tank car leaking from the manway before it is shipped.

Eliminating leaks around a hinged & bolted manway protects against the risks to life, property, & the environment.

By following these steps, an operator can achieve a consistent, high-level, process of assembling a hinged & bolted manway.

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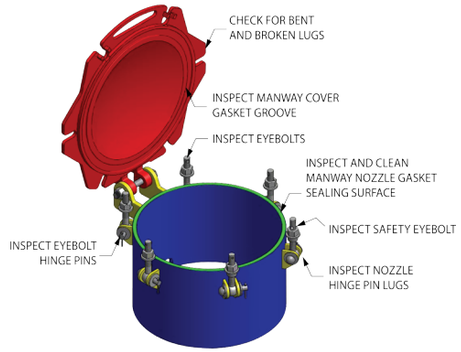
How to Properly Close a Tank Car Manway

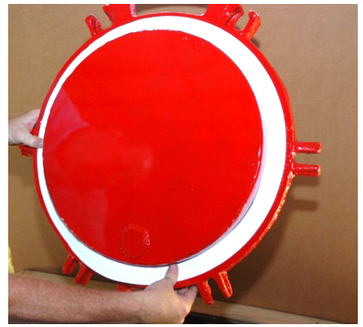
Follow these steps to ensure leak-free performance of a hinged & bolted manway

1. Inspect the Manway Area



- Examine the bolted manway cover for imperfections, bent & broken lugs, damaged manway gasket grooves, & detrimental residue on the gasket & sealing surfaces.
- Inspect the manway nozzle for imperfections.

2. Clean, Examine, & Install New Gaskets



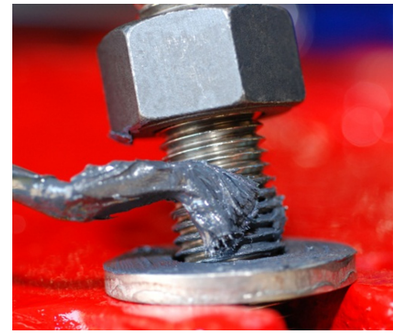
- Clean as necessary to observe imperfections.
- Replace gaskets that have indications of abrasion, cuts, tears, or other damage that may affect the fluid sealing capability.
- When there is a need to replace a gasket, remove the gasket from the manway cover and inspect the gasket-contact sealing surface on the cover.
- When transporting a flammable liquid consisting of a mixture or solution having different compositional elements, it is important to choose a gasket material compatible with each element. Replace with gasket suitable for service. Gasket selection should also consider cyclic service conditions.

For flammable liquid shipment, select a gasket material that is:

- Within the permissible leak rate to control fugitive emissions;
- Chemically compatible with the product, including compositional elements;
- Mechanically compatible with the joint makeup (*i.e.*, not over-compressed or under-compressed [receives proper compression/stress] by assembly bold load);
- Thermally compatible with the temperature range (*i.e.*, loading, off-loading, and transportation).

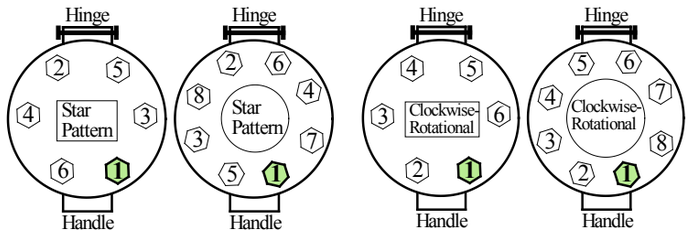
Download the entire 'Guidelines for Hinged & Bolted Manway Assembly - Flammable Liquids' at www.EthanolRFA.org/manwayguidelines

3. Inspect & Lubricate the Eyebolts



- Examine eyebolt threads and hinge pins.
- Examine each nut to ensure same design. Replace nuts that are broken, cracked, missing or rounded.
- Use a proper lubricant on the eyebolts, safety eyebolt(s), & bearing surface of the nuts. Ensure the lubricant is compatible with the product.

4. Identify Eyebolt Number & Tightening Sequence



- Recognize the numbering of the eyebolts beginning with the safety eyebolt near the right side of the lifting handle.
- Follow the numbered sequence in a star pattern when tightening each eyebolt on to the manway.
- Select a proper tool with appropriate torque setting.

5. Preferred Torque Sequence and Value

	VSP CYCLETIGHT® or Hard Gasket		SALCO Nozzle or Elastomeric Gasket	
Sequence	**6-Bolt**	**8-Bolt**	**6-Bolt**	**8-Bolt**
Snug Pass (Star Pattern)	Snug	Snug	Snug	Snug
1st Pass (Star Pattern)	75 ft-lbs	70 ft-lbs	50 ft-lbs	45 ft-lbs
2nd Pass (Star Pattern)	160 ft-lbs	140 ft-lbs	80 ft-lbs	70 ft-lbs
3rd Pass (Star Pattern)	250 ft-lbs	200 ft-lbs	115 ft-lbs	90 ft-lbs
4th Pass (Clockwise/Rotational)	250 ft-lbs	200 ft-lbs	115 ft-lbs	90 ft-lbs

- **ALWAYS** use approved fastener lubrication on threads and nut bearing surface.
- **ALWAYS** start with the #1 bolt.
- **DO NOT** use a **PIPE WRENCH**, this will under torque, resulting in a leak.
- **DO NOT** use a **CHEATER BAR**, this will over torque, bend the manway cover and, result in a leak.