

Betts Industries, Inc.

1800 Pennsylvania Ave. West
Warren, PA 16365 U.S.A.

Engineering Bulletin 7-2003

Date: October 27, 2003

Subject: Maintenance and Use of Betts Full Opening Pressure Manholes

To ensure optimal performance of your Betts Full Opening Pressure Manhole, the following steps must be followed. This information is intended to be used as a general guide. The end user may develop a more detailed maintenance procedure depending on product being hauled and service conditions.

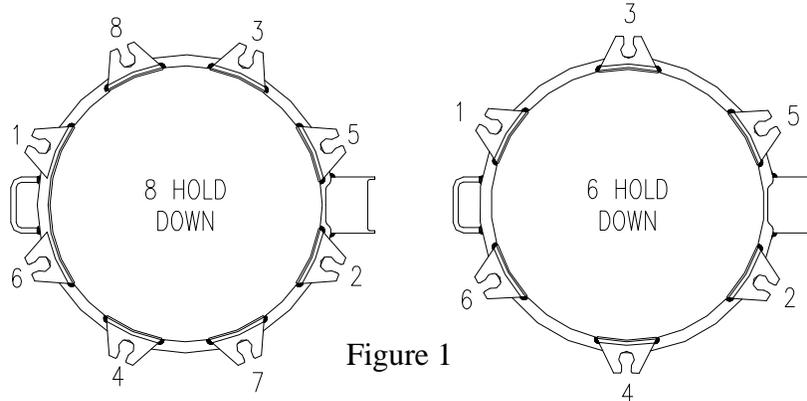
1. **Proper Manhole Installation:** Exercise care to insure collar remains flat and round during installation in the tank. If necessary, a welding fixture should be used to prevent distortion. Heat generated by welding should be kept to a minimum. A warped collar will not function properly.
2. **Gasket Material:** The choice of gasket material effects how well the manhole will seal. The gasket must be chosen taking into consideration product being hauled, working temperature, and working pressure. For example: braided packing is ideal for high temperature applications, yet does not seal as well as a homogenous elastomer gasket. See Table 1 for additional information.
3. **Visual Inspection:** It is important to visually inspect the manhole for potential problems before each load. Recognizing and addressing problems before there is an issue will help to reduce the probability of a costly accident.
 - a. **Gasket Inspection:** The gasket is the most important component to ensure the proper sealing of the manway. Inspect the gasket each load for nicks, wear, or cracking. A damaged or worn gasket must be replaced. Use only genuine Betts Industries replacement gaskets to insure proper manhole sealing. Select gasket material to ensure compatibility with product carried.
 - b. **Sealing surface inspection:** The gasket seals against the interior surface of the gasket channel and the top edge of the collar. A smooth finish in both areas is required for the gasket to seal. Nicks, gouges, or damage to the seat may cause the manhole to leak. Inspect the collar each load for damage.
 - c. **Hold Down Inspection:** The wingnuts, swingbolts, and hold down lugs must be in good condition to ensure integrity of the manhole. Damaged or worn components must be replaced. The threads of the swingbolts must be clean. A light lubrication may be used on the threads to resist galling. Replacement swingbolts for ASME units must meet code requirements – refer to catalog parts list for proper part numbers.

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- 4. Closing Instructions:** The cover should never be slammed or forced shut. Tighten the wingnuts following the closing sequence in figure 1. Start with wingnut #1 and snug all the wingnuts but do not completely tighten on the first go around. Repeat the sequence until all wingnuts are properly tightened enough to seal the manhole.



For some applications, hand tightening the wingnuts may be sufficient. In applications where the wingnuts must be torqued down, Betts recommends the use of a wingnut tool (part number 6469MS). A hammer should NOT be used to tighten the wingnuts. The wingnuts should never be tightened more than 45 foot-pounds.

The following table shows results that may be expected with a properly installed and maintained 20" ASME manhole with a new gasket and tested with water. Actual test may vary depending on installation and service.

Table 1	Torque Applied to Wingnuts					
	Hand Tight (16 ft/lbs)		30 ft/lbs		45 ft/lbs	
Gasket Material	6 Hold Downs	8 Hold Downs	6 Hold Downs	8 Hold Downs	6 Hold Downs	8 Hold Downs
Homogeneous Gaskets: Buna, Hypalon, Viton, EPDM	40 psig	50 psig	75 psig	75 psig	80 psig	160 psig
Synthetic Braided Fiber Impregnated w/ PTFE	20/30 psig	30/40 psig	35/50 psig	40/65 psig	50/60 psig	70/80 psig
Teflon Encapsulated Gaskets *	20/35 psig	20/35 psig	40/65 psig	40/65 psig	50 / 75 psig	95 / 100 psig

* See Engineering Bulletin 3-99 for additional info on Teflon Encapsulated Gaskets.

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5. **Opening Instructions:** All pressure must be relieved from the tank prior to loosening wingnuts.



Failure to relieve tank pressure may result in sudden, unexpected loss of pressure from manhole causing cover to blow open. Severe personal injury or death may result.

- Position your body off to the side of the manhole while opening. Never lean directly over the manhole or behind the hinge. Escaping air may blow up dust from top of tank; safety glasses are recommended
- Following the same sequence as shown in figure 1, loosen the wingnuts but **do not** swing them down next to the collar. The swingbolts must remain in the upright position engaged with the triangular cover hold-down lugs. If air begins to escape from the manhole back away from the manhole until pressure is fully released.
- With the wingnuts and swingbolts still in the upright position, pull up firmly on the cover to insure cover is released from the collar. The cover should lift off the seat approximately $\frac{3}{4}$ ", thus releasing any residual pressure. Only after all pressure is released, may you continue to open the manway.
- Swing down each swingbolt and fully lift cover.