

**FEDERAL RAILROAD ADMINISTRATION**

# **Tank Car Manway Assembly Inspection**



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**Have you ever watched a movie that showed you the last scene and then rewound to the beginning?**



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## Non-Accidental Releases



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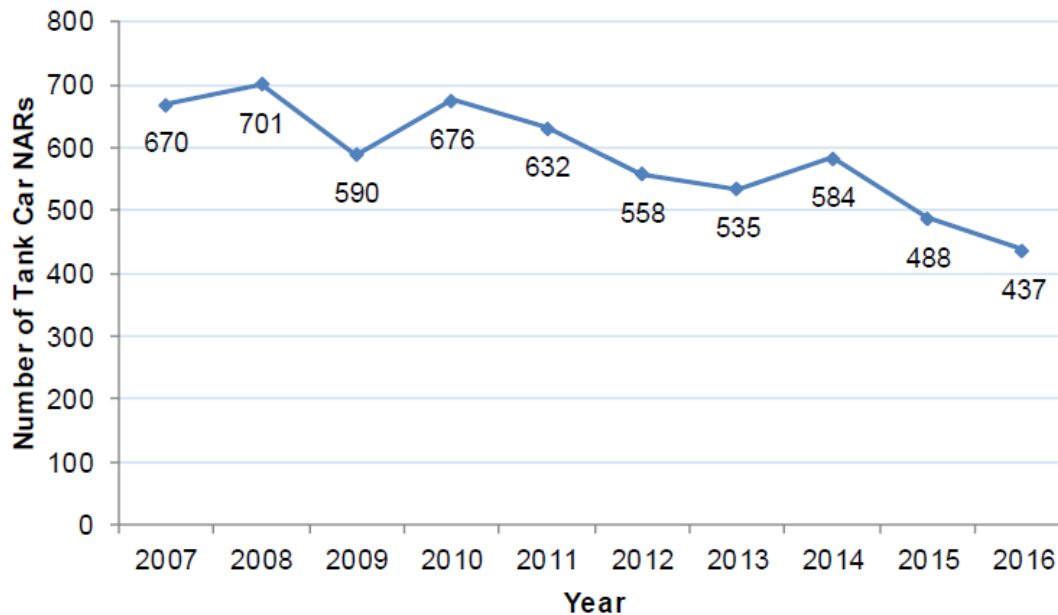


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## AAR/BOE Tank Car NAR Breakdown

Number of Tank Car Non-Accident Releases, U.S. and Canada: 2007-2016\*



\*Number of tank car NARs in 2015 was 488 instead of 542 from last year's report (This did not affect other Exhibits in last year's report as it was a typo in this particular Exhibit only).



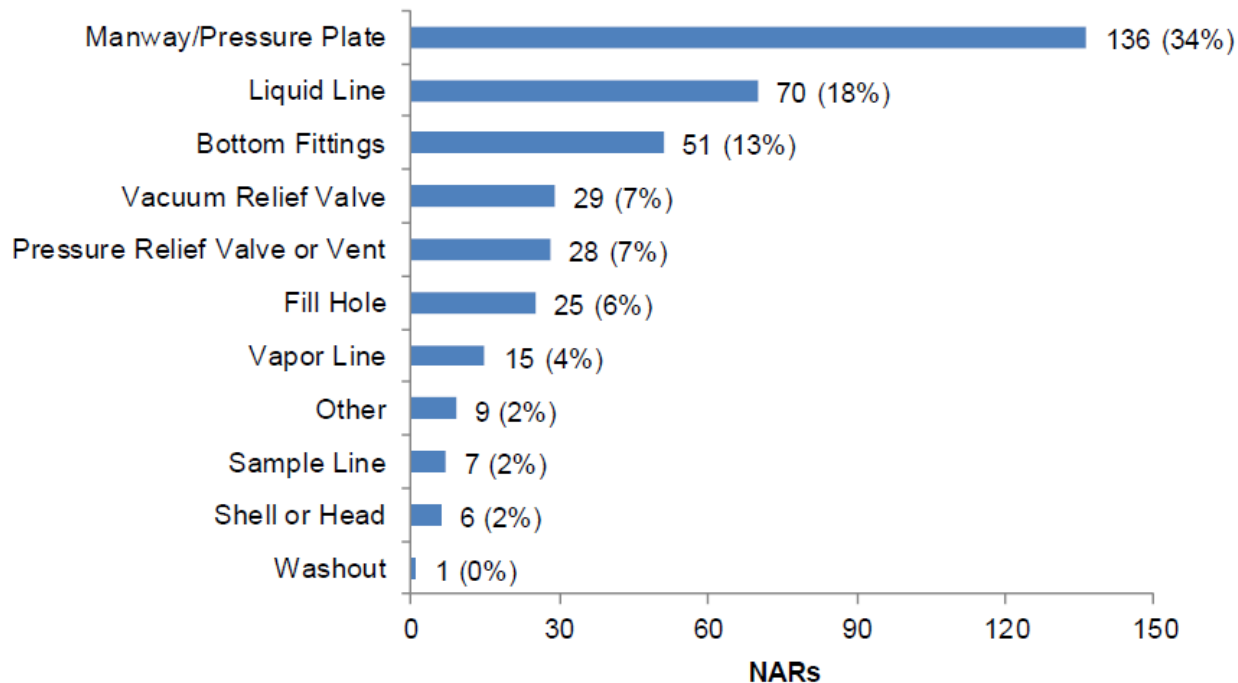
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## AAR/BOE Tank Car NAR Breakdown

Number of Non-Pressure Tank Car Non-Accident Releases  
by Component\*, U.S. and Canada: 2016



\*10 NARs did not have a cause assigned.

\*Total NARs = 387



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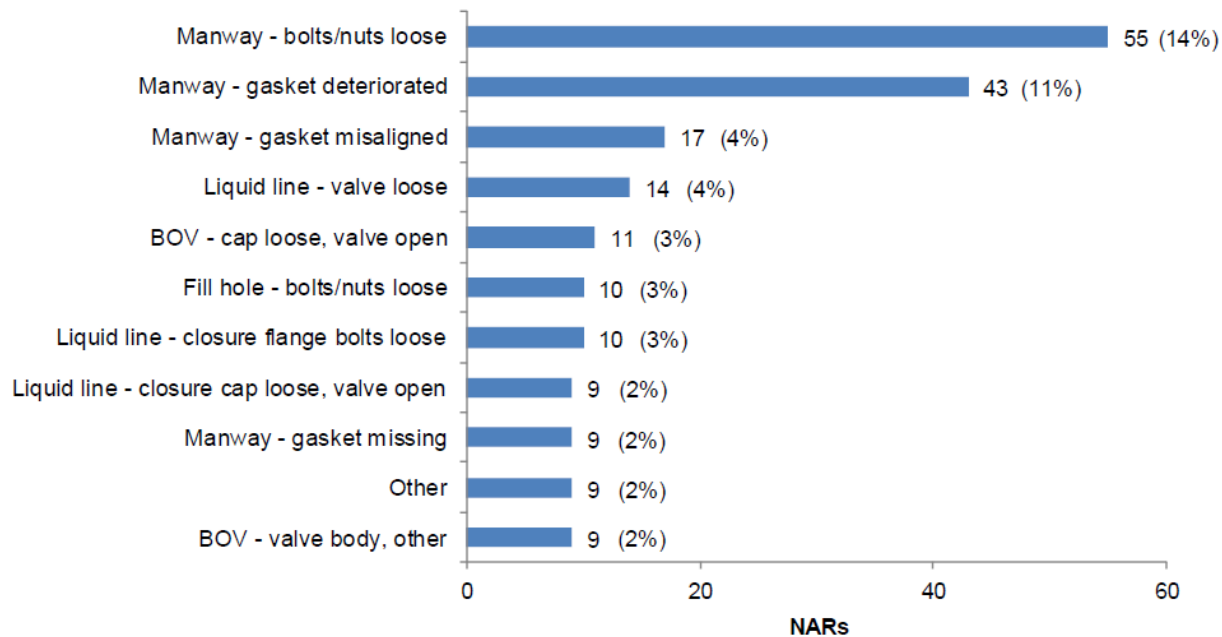


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## AAR/BOE Tank Car NAR Breakdown

Top Reported Non-Accident Release Causes for Non-Pressure Tank Cars\*,  
U.S. and Canada: 2016



\*3 Other Causes Had 7 NARs, 2 Other Causes Had 6 NARs, 1 Other Cause Had 5 NARs, 4 Other Causes Had 4 NARs, 6 Other Causes Had 3 NARs, 22 Other Causes Had 2 NARs, 57 Other Causes Had 1 NAR, 10 NARs did not have a cause assigned.

\*Total NARs = 387



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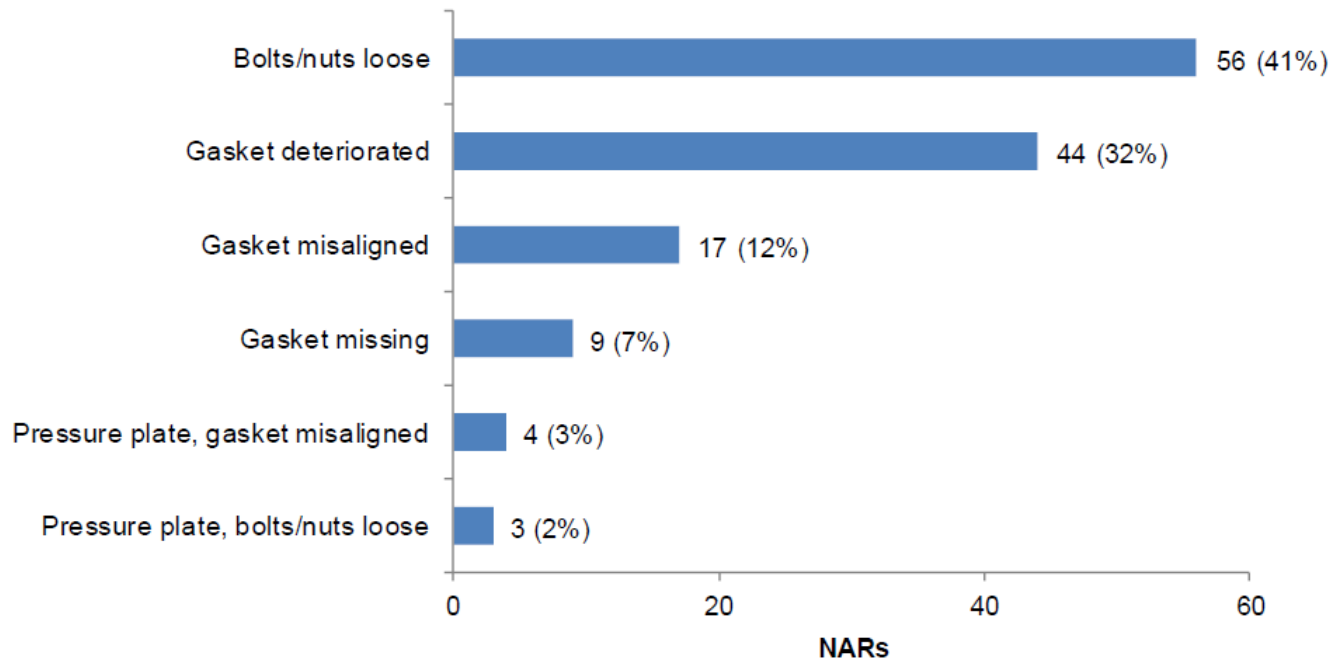


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## AAR/BOE Tank Car NAR Breakdown

Tank Car Non-Accident Releases by Manway Cause\*, U.S. and Canada: 2016



\*2 Other Causes Had 2 NAR Each, 1 Other Cause Had 1 NAR Each.

\*Total NARs = 138



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## Tank Car – Examination Before Shipping

- **CFR 49, Part 173.31(d)(1)**
- **Markings (Placards, Stencils, Decals)**
- **Shell**
- **Bolster Pad/Stub Sill/Coupler**
- **Service Equipment**

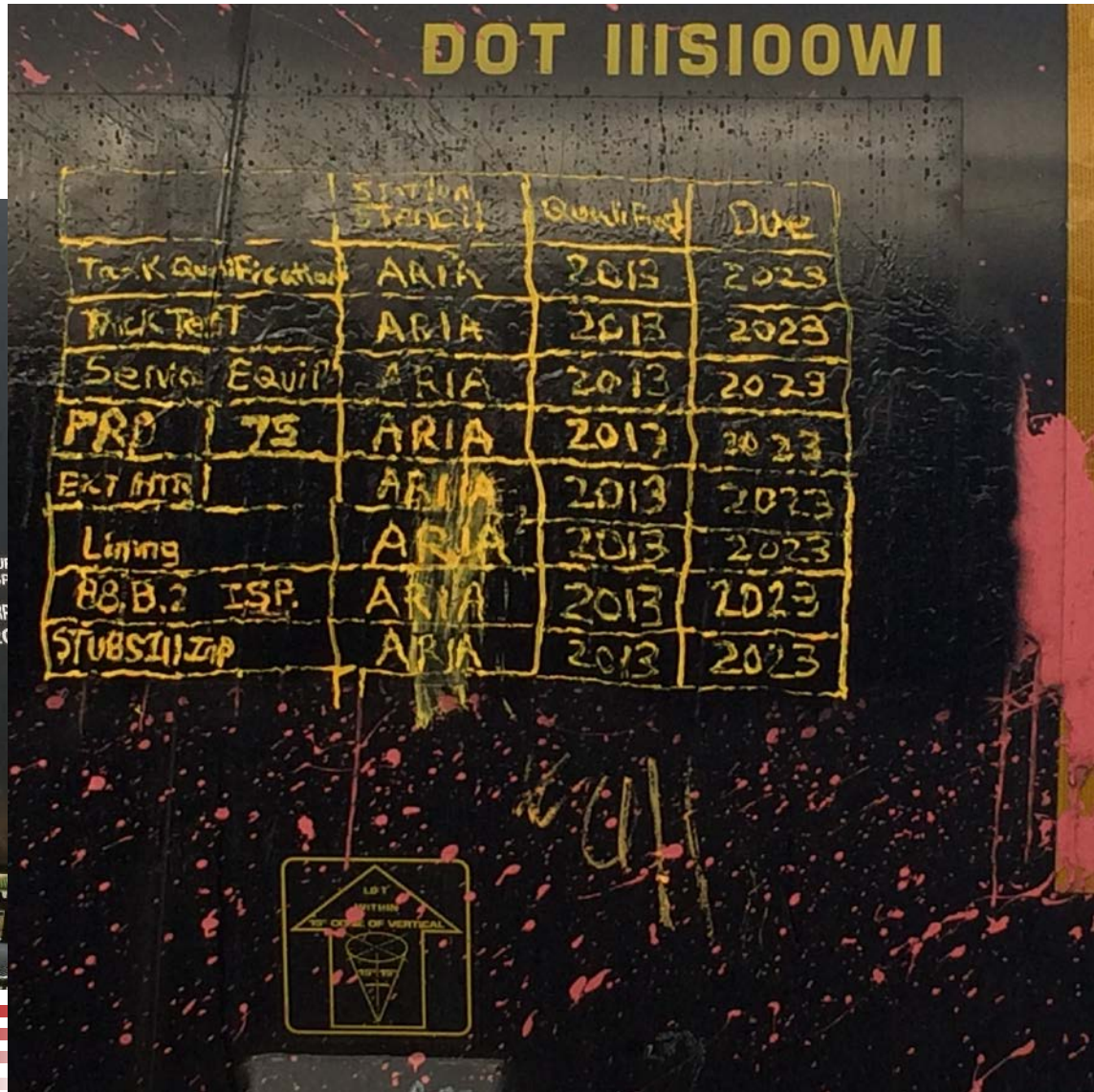


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## Tank Car Preloading Inspection

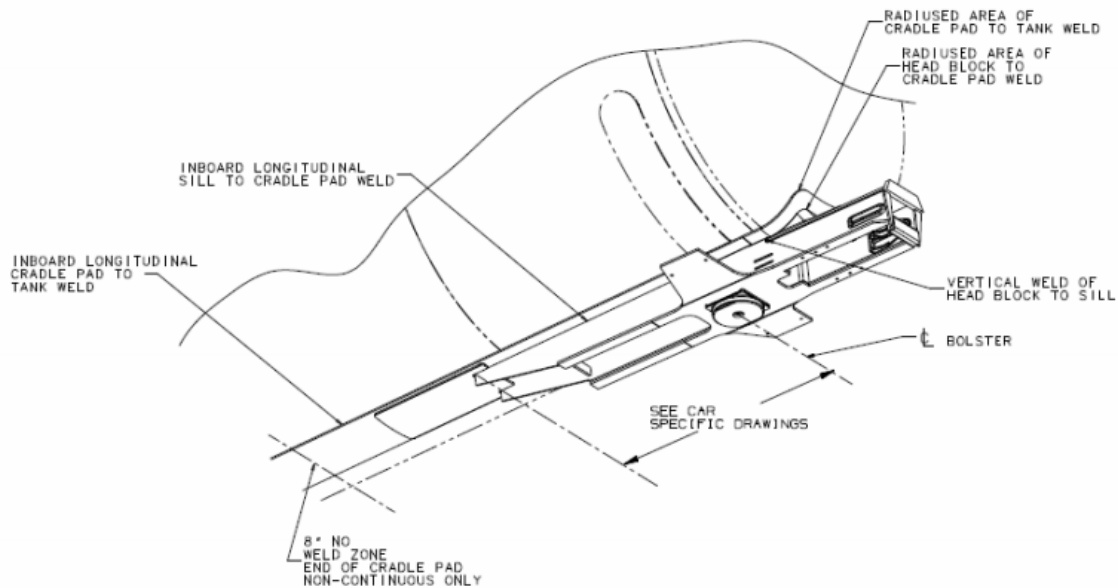
### Shell



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## Tank Car Preloading Inspection Bolster Pad/Stub Sill

A visual inspection of these components looking for;





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**Tank Car Preloading Inspection**  
**Bolster Pad/Stub Sill**



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## Tank Car Preloading Inspection

### Service Equipment

- Valves
- Flanges and Plugs
- Bolts, Nuts, Gaskets, and Fittings
- Manway Cover and Attaching Hardware



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## Tank Car Preloading Inspection Service Equipment



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## Tank Car Preloading Inspection Service Equipment





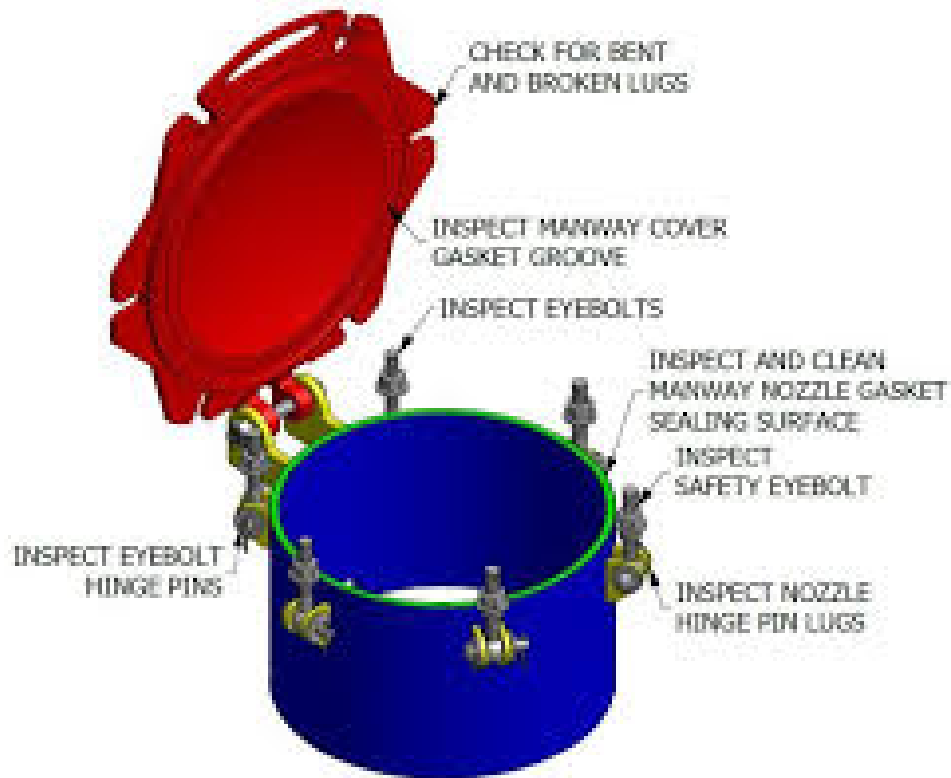
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## Tank Car Preloading Inspection Service Equipment



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## Manway Cover and Attaching Hardware



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## Manway Cover



# FEDERAL RAILROAD ADMINISTRATION

## Manway Cover





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## Manway Cover



# FEDERAL RAILROAD ADMINISTRATION

## Manway Cover - Gaskets



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## Manway Cover - Bent and Broken Lugs





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## Manway Cover - Bent and Broken Handles





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## Manway Cover – Altered/Modified



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## Manway Cover – Altered/Modified



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## Manway Cover - Eyebolt Hinge Pin





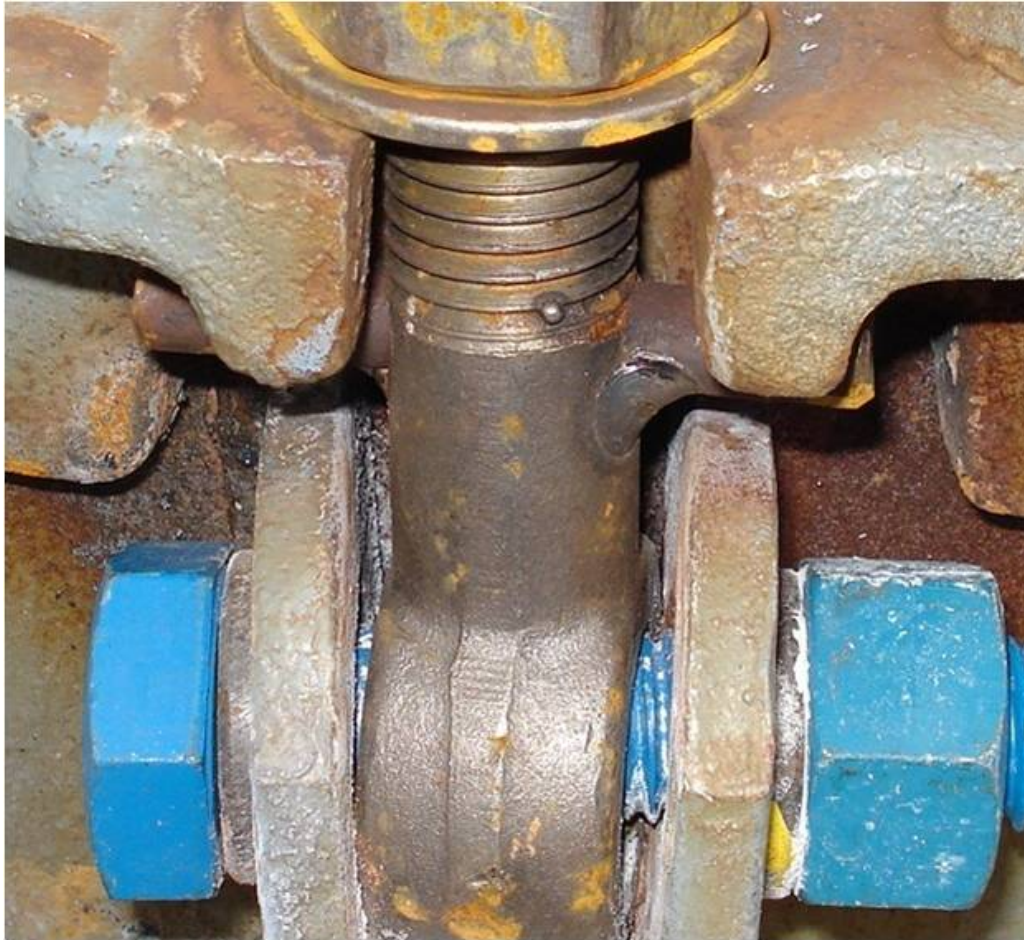
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## Manway Cover - Eyebolt Hinge Pin



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## Manway Cover - Eyebolt Hinge Pin



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**Manway Cover - Eyebolt Hinge Pin**



# FEDERAL RAILROAD ADMINISTRATION

## Manway Cover - Eyebolt Hinge Pin



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## Manway Cover - Eyebolt Washer





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## Manway Cover - Eyebolt Washer



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## Manway Cover and Attaching Hardware

M-1002 AAR Manual of Standards and Recommended Practices – Appendix D

### 6.0 HINGED AND BOLTED MANWAY COVER MAINTENANCE

At each tank qualification, the following inspections, maintenance operations, and tests shall be performed on each hinged and bolted nonpressure car manway assembly.

#### 6.4 Eyebolts and Nuts

**6.4.1** Inspect eyebolts for corrosion, damaged threads, excess paint, and residual commodity. Any defect that prevents the required nut engagement by hand is cause for cleaning, repair, or replacement.

**6.4.2** Gauge the major diameter of the external eyebolt threads over the nut clamping surface using a calibrated GO-NOGO gauge per ANSI/ASME B1.2, Table 1, or an equivalent calibrated gauge. The limiting dimension shall be the Class 1A minimum major diameter thread size.

**6.4.3** Inspect eyebolt hinge pins. Pins are to be replaced if wear or corrosion exceeds 25% of original thickness.

**6.4.4** Inspect to ensure that all manway eyebolt nuts on a given car are of the same configuration and size (i.e., heavy square or heavy hex).

**6.4.5** Inspect safety eyebolts to ensure the cover cannot be opened while the tank is under pressure.



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## Manway Cover – Nuts



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## Manway Cover – Nuts



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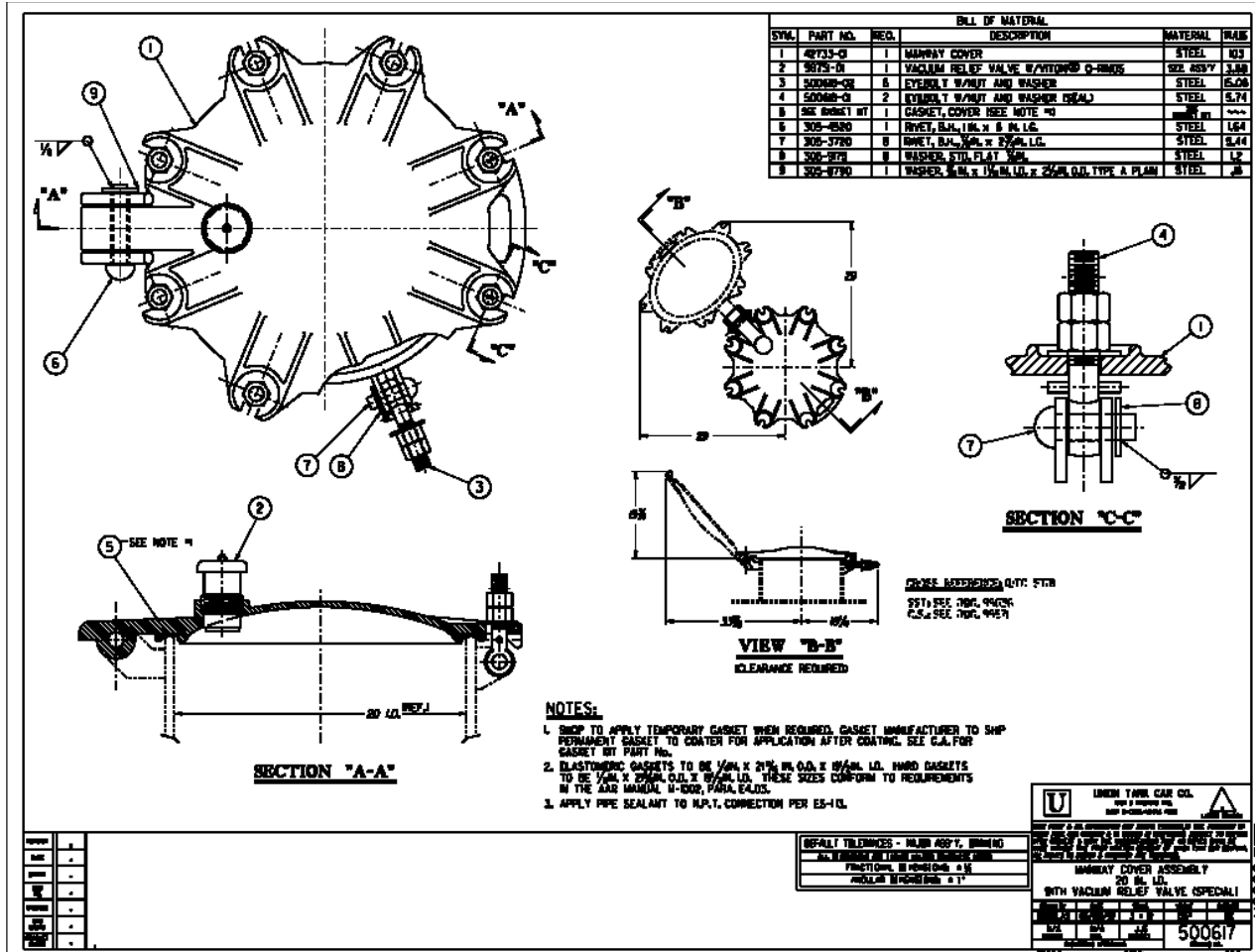
## Manway Cover – Nuts





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## Manway Cover – Nuts



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## Manway Cover – Nut Stops

- Tack Welds
- Chisel Checks
- Welded Washers
- Drive Rivets



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## Nut Stop – Tack Weld





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## Nut Stop – Chisel Check



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## Nut Stop – Welded Washer



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## Nut Stop – Drive Rivet



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# Manway Cover - Eyebolt Washers, Nut Stops, and other Non-Critical Eyebolt Issues

- If a tank car is not leaking, a car with a cupped washer, loose/missing nut stop, or other “non-critical” eyebolt issues need not be immediately bad-ordered.
- The safety issue is at the loading/unloading rack.
- Non-conformities should be identified and reported to the tank car and/or the service equipment owner.
- **REMEMBER !!** An OTMA (One Time Movement Approval) will be required prior to movement.





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## Inspection of Manway Cover Safety Eyebolts

CFR 49 § 179.201-6(a)

Manways and manway closures.

- (a) The manway cover for specification DOT 104W, 111A60–ALW1, 111A60W1, 111A100ALW1, 111A–100W1, 111A100W3, or 111A100W6 must be designed to make it impossible to remove the cover while the interior of the tank is subjected to pressure.

Other specification tank cars may be required to have manway safety bolts if they were originally designed and constructed with them. Obtain the Certification of Construction and manway drawings to determine if they do.



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# Determining if the Safety Bolts are Functioning Correctly

- If the safety bolts are functioning correctly, the manway cover has to be raised approximately  $\frac{3}{4}$ " off the manway nozzle to get the swing bolts disengaged and out of the slots of the manway cover.
- If the safety swing bolt(s) located nearest the manway cover handle can be removed from the slots without having to raise the manway cover, then the safety swing bolts are NOT operating correctly.
- If the nuts can be completely removed from the safety swing bolts, then the manway cover could open with the swing bolts still in the slots.

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## Inspection of Manway Cover Safety Eyebolts

### Common Types of Manway Safety Eyebolts

- Sleeve (aka Collar)
- Pin
- Shoulder
- Interference
- Others



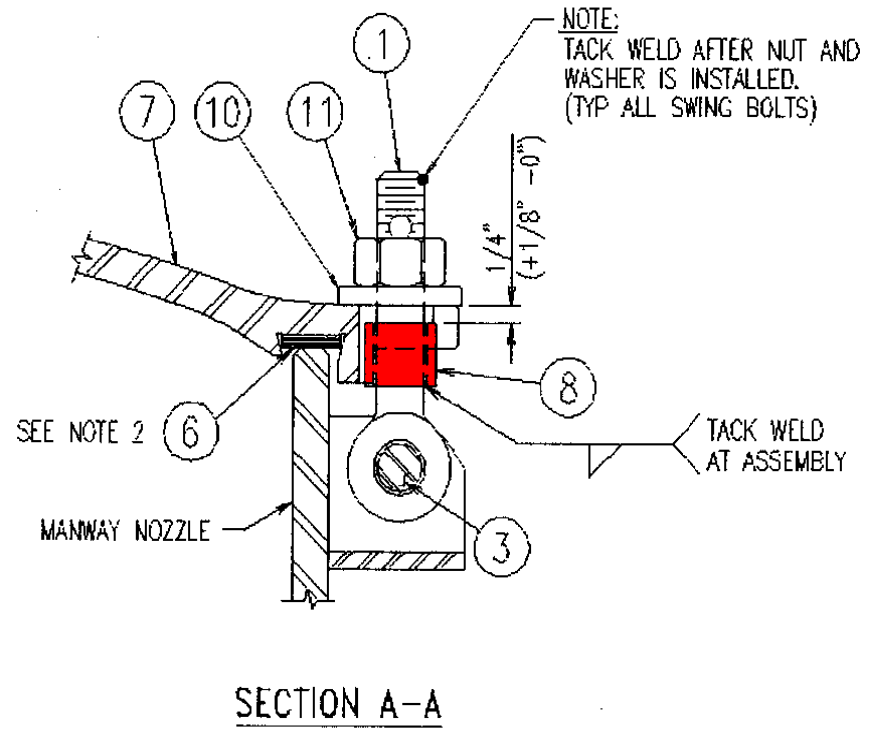
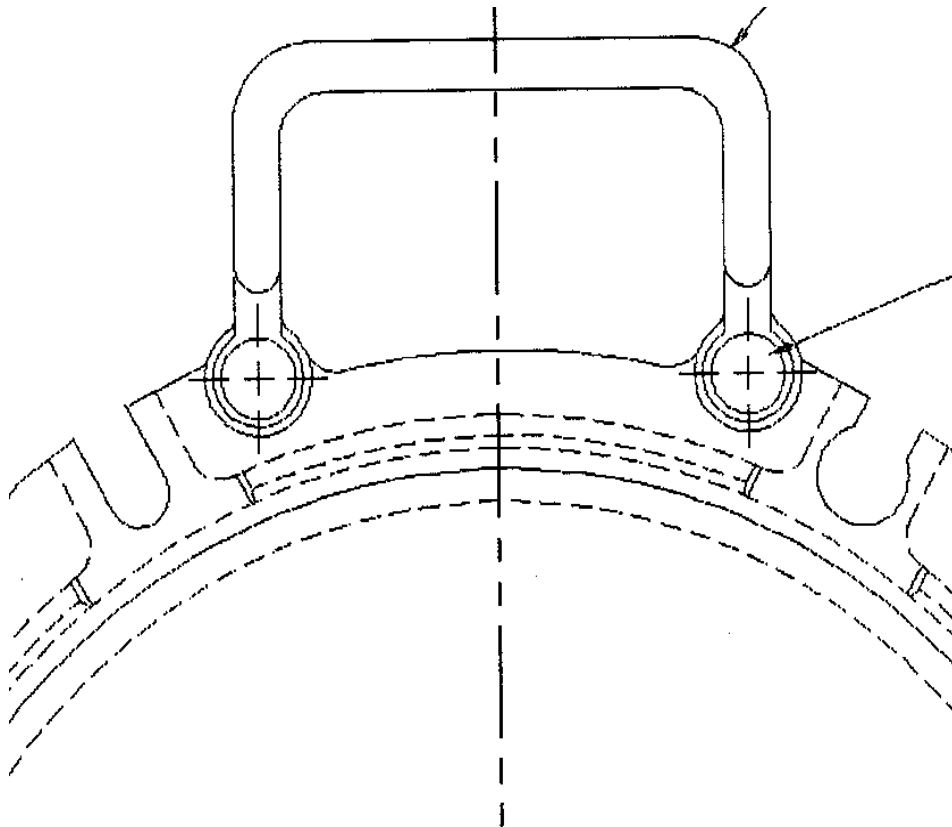
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## Inspection of Manway Cover Safety Eyebolts

### Sleeve Design





# Is this safety bolt installed correctly?



# NAR Caused by a Defective Safety Bolt



# Threaded Sleeve





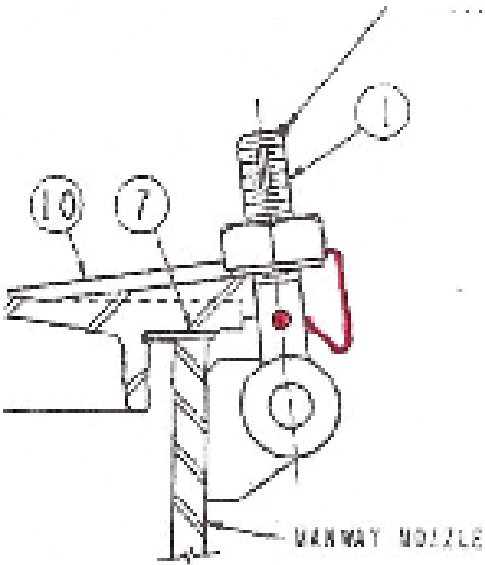
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**Inspection of Manway Cover Safety Eyebolts**  
**Sleeve Design**



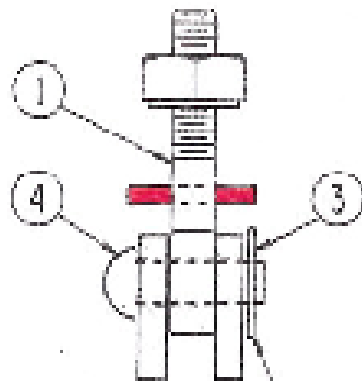
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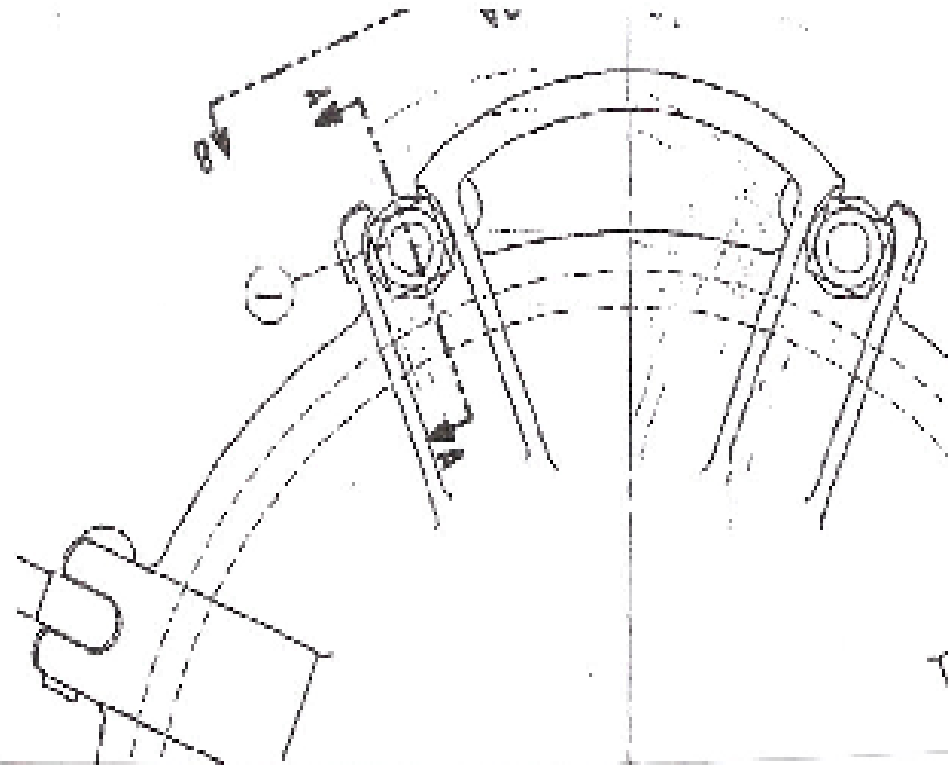
# Pin Design



SECTION A-A



SEE NOTE #1  
VIEW B-B



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**Inspection of Manway Cover Safety Eyebolts**  
**Pin Design**



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# Is this safety bolt installed correctly?



# Has this safety bolt been changed?

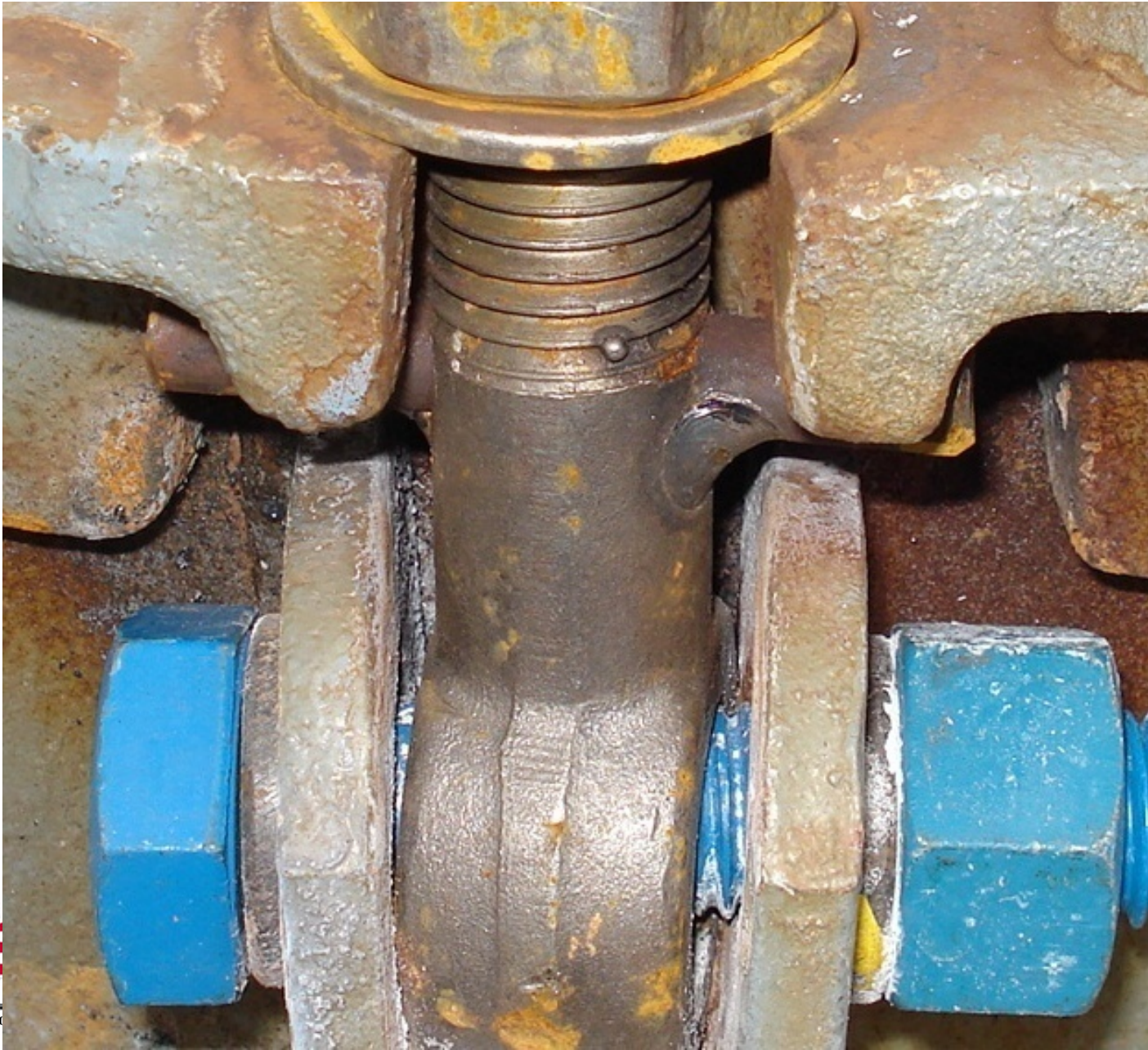




# Was the repair performed correctly?



# Incorrect Shop Repair







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## Inspection of Manway Cover Safety Eyebolts Wedge Design





# Wedge Safety Bolt Installed Backwards



# Repaired Incorrectly





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## Wedge Too Tall



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## Inspection of Manway Cover Safety Eyebolts Interference Design





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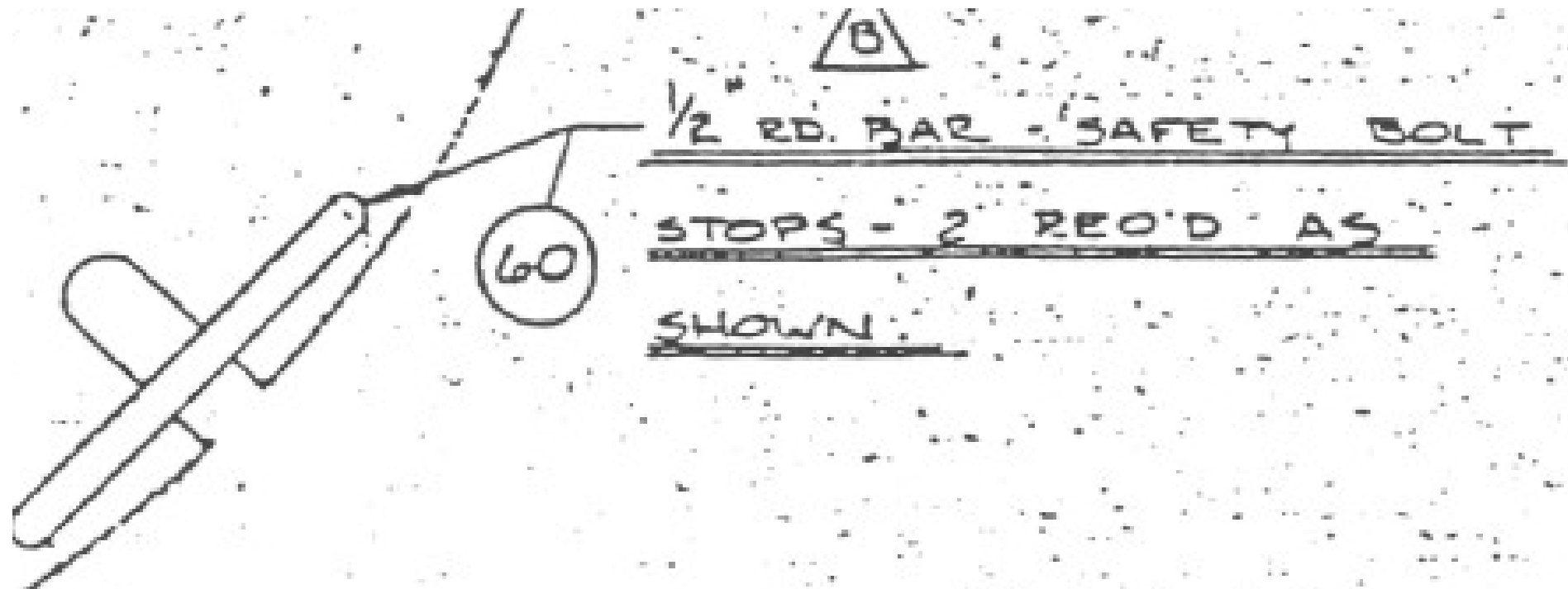
## Inspection of Manway Cover Safety Eyebolts Other



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## Inspection of Manway Cover Safety Eyebolts Other



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## Manway Cover and Attaching Hardware

**180.509(a) General.** Each tank car owner must ensure that a tank car facility:

(1) Inspects and tests each item according to the requirements specified in this section;

(2) Evaluates each item according to the acceptable results of inspections and tests specified in §180.511;

(3) Marks each tank car as specified in §180.515 that is qualified to transport hazardous materials;

(4) Prepares the documentation as required by §180.517 for each item qualified under this section. A copy of the documentation required by §180.517 must be sent to the owner as appropriate and according to the owner's instructions.



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## WHY DOES THIS MATTER?



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## Inspection of Manway Cover Safety Eyebolts

- Would you stand on a manway cover if the tank car only contained 1 psi?
- A tank car containing 1 psi exerts a **314** pound force against a 20” manway cover



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Questions?



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