

Corrective Actions

1) Rigid and Crown staybolts incorrectly installed.

Due to the incorrect method of installation, all crown staybolts, and rigid staybolts must be removed and replaced. In order to properly install new staybolts, the firebox sheets must also be replaced due to the oversized, and damaged holes.

2) Flexible bolts installed via filet through torch cut holes which are between 1/8" to 5/8" oversized.

Due to the incorrect method of installation, all flexible staybolts must be removed and replaced. In order to properly install new staybolts, the firebox sheets must also be replaced due to the oversized, and damaged holes.

3) Holes for flexible sleeves thermally enlarged. Torch scale, slag, gouges, and striations not removed prior to welding.

Once all flexible bolts are removed, the accompanying sleeves will then need to be removed. This will facilitate reclaiming the holes in the external firebox sheets via welding following proper hole preparation.

4) Rivets do not meet the specifications set forth in ASTM A31-B

All rivets must be replaced with rivets made of code material. This would be done in conjunction with replacing the interior firebox sheets to correct for defects 1, and 2.

5) Interior Firebox Corners, Plate Misalignment, Lack of Full Penetration Weld

The defects associated with the corners require their replacement. This will be done in conjunction with items 1, 2, and 4.

6) A Portion Of The New Firebox Was Replaced With Flat Plate In A Tight Radius

This defect requires the replacement of the flat plate with a piece of material formed to properly match the centerline of the adjoining plate. This will be corrected in conjunction with items 1, 2, and 3.

7) “All Thread” Utilized As Staybolt Material

These pieces of non-code, improper design material will be replaced with flexible staybolts. This will be accomplished in conjunction with items 1, 2, 3, and 4.

8) “All Thread” Utilized As Studs At 62 Locations Around The Barrel And Firebox, Installed Into Torch Cut Holes

All “all thread” studs must be replaced with studs of a proper material, and utilizing a proper installation practice. There are 3 repair options and they would need to be discussed with the FRA to determine which they are most comfortable with, though all 3 do meet code requirements. The repair options are: 1) Full penetration welded installation of code material, 2) Weld build up and re-tapping of all effected holes, 3) Replace the boiler barrel with one of new, all welded construction.

While the 3rd option may seem intimidating, it is relatively simple and may well be the fastest and most cost-effective option. In the course of replacing the boiler barrel items would be addressed with new construction rather than rework.

9) Bolts Welded Into The Vessel As Studs For Attachment Of Delivery Tee, Bolts Installed Through Torch Cut Holes

The reinforcing ring requires replacement to correct for the torch cut holes. Depending upon the appearance of the fluesheet once the non-code material is removed, a patch may be required.

10) Non-compliant Application Of Nozzles And Scab Patches To Belly Of Barrel

The “scab patches” need to be removed need to be removed from the boiler barrel to facilitate liners of riveted attachment in keeping with OEM construction. Following the application of the liners, Huron washout sleeves will be applied in accordance with OEM practice which consists of threading them into the barrel.

11) Dome Studs Welded

All dome studs require replacement due to the seal welding.

12) Side Grate Bearers

The side grate bearers require replacement with an appropriate design, properly alloyed, iron casting.

13) Rigid Bolt Telltale Holes Drilled From Both Sides

All bolts with misaligned holes require replacement due to the inability to be able to clear the telltale with a drill bit. This condition has already revealed itself as a problem as evidenced by some 12+ drill bits having broken off due to the misaligned holes.

14) Incorrectly installed Saddle Bolts

Due to the oversized holes, the bottom of the smokebox will require replacement to accommodate the installation of custom machined, taper fitted bolts. This installation practice for ALCO, Baldwin, and Lima, as well as every mainline railroad within the United States.

15) Washout Plugs Of Incorrect Material, Holes Cross-Threaded

All cross-threaded holes will be re-threaded, and all plugs will be made new of SB-61/C922, code compliant, bronze material.

16) Dry Pipe Seal Welded To Front Tubesheet

Once the drypipe is removed it can be determined whether or not the effected portion is of iron or steel construction. If it is iron it will require replacement, if it is steel it can be repaired.

17) Attachment Of Smokebox To Boiler Barrel

All carriage bolts need to be removed and replaced with hot driven rivets in accordance with standard practice.

18) No Flexible Bolts In Backhead

While correcting items 1, 2, 4, and 5, 2 rows of flexible sleeves (and then bolts) need to be installed around the perimeter of the backhead staybolt pattern. This is required as a component of the AAR flexible pattern installed throughout the other appropriate areas of the firebox. Without the installation of these, the rigid bolts would break on a very regular basis.

19) The First Three Rows Of The Crownsheet Bolt Holes

These torch-cut, oversized, and then incorrectly repaired holes require replacement of the effected sheet. This will be accomplished in conjunction with items 1, and 2.

20) Crown To Doorsheet Fit-up

This defect requires replacement of either the doorsheet or the crownsheet. This will be accomplished in conjunction with items 1, 2, 4, 5, and 6.

21) Material Test Reports (MTRs)

Any new installation material, for which a material test report does not exist, must be replaced. Currently, there are no MTRs available for the staybolts, firebox sheets, flexible sleeves or caps, flues, rivets, etc.

At this point, even if MTRs were made available, there is no “chain of custody” which could show that the MTRs are applicable to the material which was installed. All recently installed material must then be replaced.

Corrective Costs

The cost associated with repairing these defects will be approximately 30% more than what has currently been invested into creating them. This is due to the required labor associated with the disassembly, repair of base material, and re-fabrication of new firebox components.