

# Generating Bank Casing-to-Sidewall Tube Welds on Two-Drum Boilers

**SAFETY ALERT  
WARNING**

Technical Service Bulletin

## Purpose

This Technical Service Bulletin alerts customers to a safety hazard which could occur in the event of a membrane furnace sidewall tube failure adjacent to the generating bank sidewall casing attachment on two-drum recovery boilers. The location and nature of the attachment outside the furnace tube enclosure creates a risk of **SERIOUS PERSONAL INJURY OR DEATH** in the event of a tube failure. Moreover, the risk is not necessarily limited to recovery boilers or to a specific boiler manufacturer.

## Problem

A problem has been detected on two-drum Babcock & Wilcox (B&W) recovery boilers where the generating bank hopper and sidewall casing attach to the furnace sidewall membrane wall tubes. Units that have a history of severe generating bank pluggage are believed to be more susceptible. Because the damage may initiate by stress-assisted corrosion cracks at the inside diameter (ID) of the tube, early detection requires nondestructive examination of the second sidewall tube in the vicinity of the generating bank sidewall casing attachment. See Figure 1.

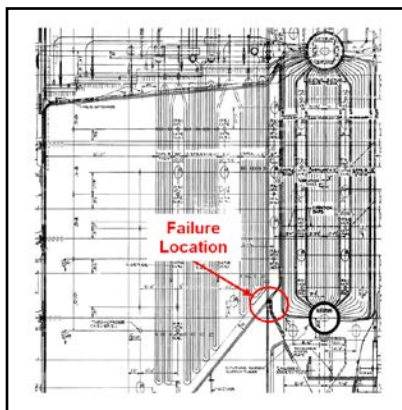


Figure 1 – Failure location

One incident reported was a catastrophic tube failure of the furnace sidewall tube adjacent to the generating bank hopper sidewall. The failure is believed to have been caused by stress-assisted corrosion fatigue from frequent temperature transients of the generating bank casing. Experience suggests that this mechanism could be aggravated by certain weld attachments and/or water chemistry. Because the buckstay and tie channel system is integral with the generating bank casing, any boiler ties between the buckstays or drums and the building structural steel near this area may cause additional distortion at the failure location. See Figures 2 and 3.

Severe generating bank pluggage causes increased pressure drop which leads to gas bypassing underneath the lower drum through and around the hopper gas baffle. This causes the generating bank hopper and sidewall casing to experience large temperature transients. The frequent temperature transients cause thermal stresses in the hopper sidewall casing which can lead to a fatigue failure

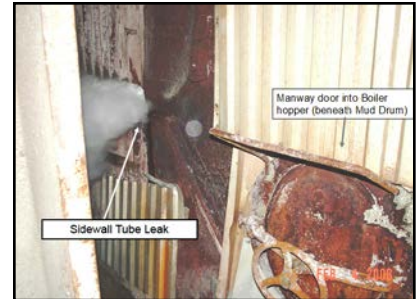


Figure 2 – Tube leak



Figure 3 – Tube failure

in the casing attachment at the sidewall tube.

The attachment is shown in Figure 4. The failure was at the approximate location defined by the red circled area in Figure 4, near where the membrane wall panel tie bar meets the generating bank tie channel at about the centerline of the lower drum elevation.

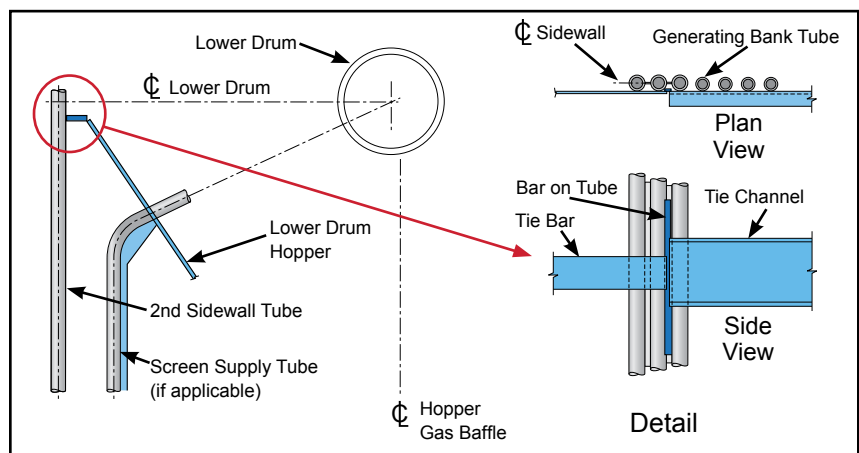


Figure 4 – Attachment

(Continued on reverse side)

## Inspection

Plant owners and operators should inspect the lower drum hopper baffle plate for evidence of distortion or gaps which can allow gas bypassing. If a history of generating bank pluggage with high pressure drop, and casing or hopper repairs and/or signs of gas bypassing is present, then inspect the sidewall tube-to-casing welds as soon as possible. The damage to the tube may originate in cracks at the tube ID, so radiographic inspection of the tube in the area of the casing attachment is required for early detection. See Figures 5 and 6.

## Recommendations

1. If evidence of gas bypassing is present, take whatever actions are needed, including additional sootblowing in the generating bank to reduce plugging, and repair the lower drum hopper baffle to prevent excessive bypassing.

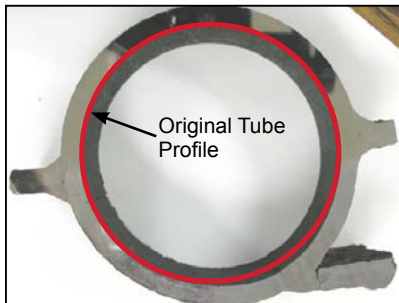


Figure 5 – Failed tube cross-section showing tube distortion and attachment damage



Figure 6 – Tube failure

2. Inspect adjacent tube and casing attachment welds for cracking, and repair as needed. Review all boiler ties to building structural steel near the generating bank and drums to assure they are installed correctly and are not damaged.
3. If the attachment is replaced and/or the tube section is removed, utilize an upgraded attachment as shown in Figure 7. This arrangement better distributes the casing load across the first and second sidewall tubes at the generating bank sidewall.

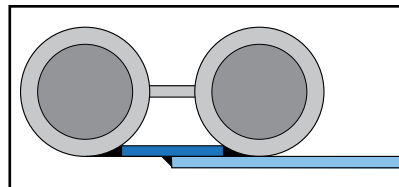


Figure 7 – Upgraded attachment

## Support

Contact B&W Field Engineering Services through your local district service office to coordinate your research and inspection efforts and to identify and locate potential corrosion damage. B&W is continuing the investigation of this problem and will keep customers informed of further developments.