

Lower Convection Pass Casing Enclosure and Economizer Hoppers

Purpose

This plant service bulletin (PSB) advises owners and operators to inspect the lower convection pass casing enclosure and economizer hopper supports for damage due to erosion, corrosion, excessive ash accumulation or abnormal temperature variations. It also recommends that ash level instrumentation be added to all economizer ash hoppers to avoid overfilling them.

Problem

PSB-36 was issued in 1988 and recommended inspecting the economizer hopper area for wear

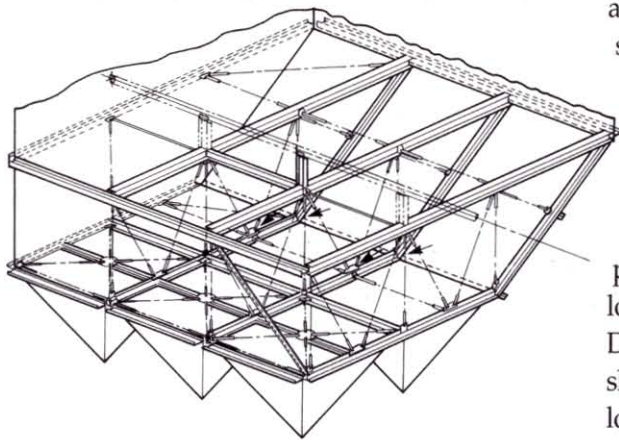


Figure 1 Typical economizer hopper, trusses and supports that may experience erosion damage.

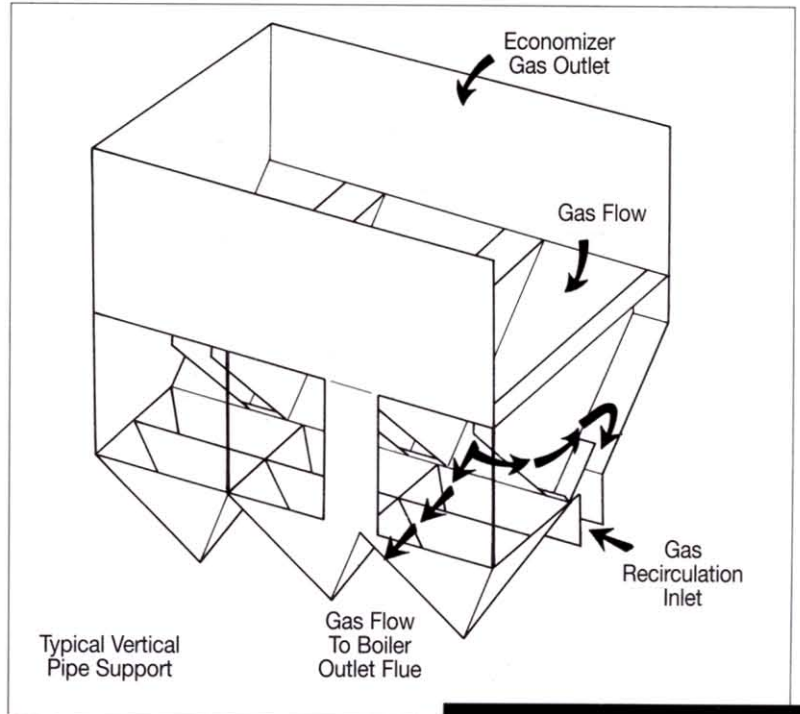


Figure 2 Typical envelope-supported hoppers.

and damage to assure structural integrity is maintained. Excessive accumulation of fly ash below the economizer can have a significant impact on the structural integrity of the entire lower casing enclosure, economizer hoppers and convection pass support system. In addition to the overload, excessive ash accumulation can lead to significant temperature differentials within the structural system, causing potentially damaging thermal loads and load redistribution. Damage from fatigue may not show up for years, since thermal loads may be time related. These temperature- and ash-related loads can be significant and **must** be avoided.

Background

B&W Carolina-type boilers have convection passes that are enclosed by tube walls over most of the length of the convection pass. These walls are supported from top structural steel by a system of hangers. The lower portion of the convection pass is enclosed by steel casing supported from the upper tube walls, which generally enclose the economizer. In addition to this casing, the gas outlet flue and the economizer hopper structural components are subject to possible damage due to erosion, corrosion, excessive ash accumulation and abnormal temperature variations. Typical configurations can be seen in Figures 1 and 2.

As shown in Figure 3, the economizer ash-collection hoppers are the pyramidal-shaped cavities located below the economizer outlet flue. The structure between the economizer and the top of the ash-collection hoppers is the economizer outlet flue. Structural failure may result in the economizer outlet flue or hoppers separating from the steam-cooled convection pass enclosure due to the following:

- Erosion
- Corrosion
- Operation with excessive gas temperatures

- Temperature differentials due to ash deposits
- Improper structural modifications or repairs
- Excessive ash accumulation

The boiler structure is typically designed to support an ash load to the top of the economizer ash-collection hoppers. Ash accumulation above the ash hoppers may result in significant overload to the boiler and hopper supports. Ash will accumulate in the outlet flue if the hoppers are not emptied regularly. A tube leak in the convection pass area can add significant amounts of

water to the ash, making ash removal difficult and significantly increasing ash density.

Structurally damaging thermal stresses and strains can be developed in the hopper support system from ash accumulation in the outlet flue. These thermal stresses may result from ash covering the lower portion of the support system, while the upper portion is exposed to hot gases. Thermal stresses also may result from cool air cooling the upper portion of the boiler, while the hot ash prevents the lower structure and casing from

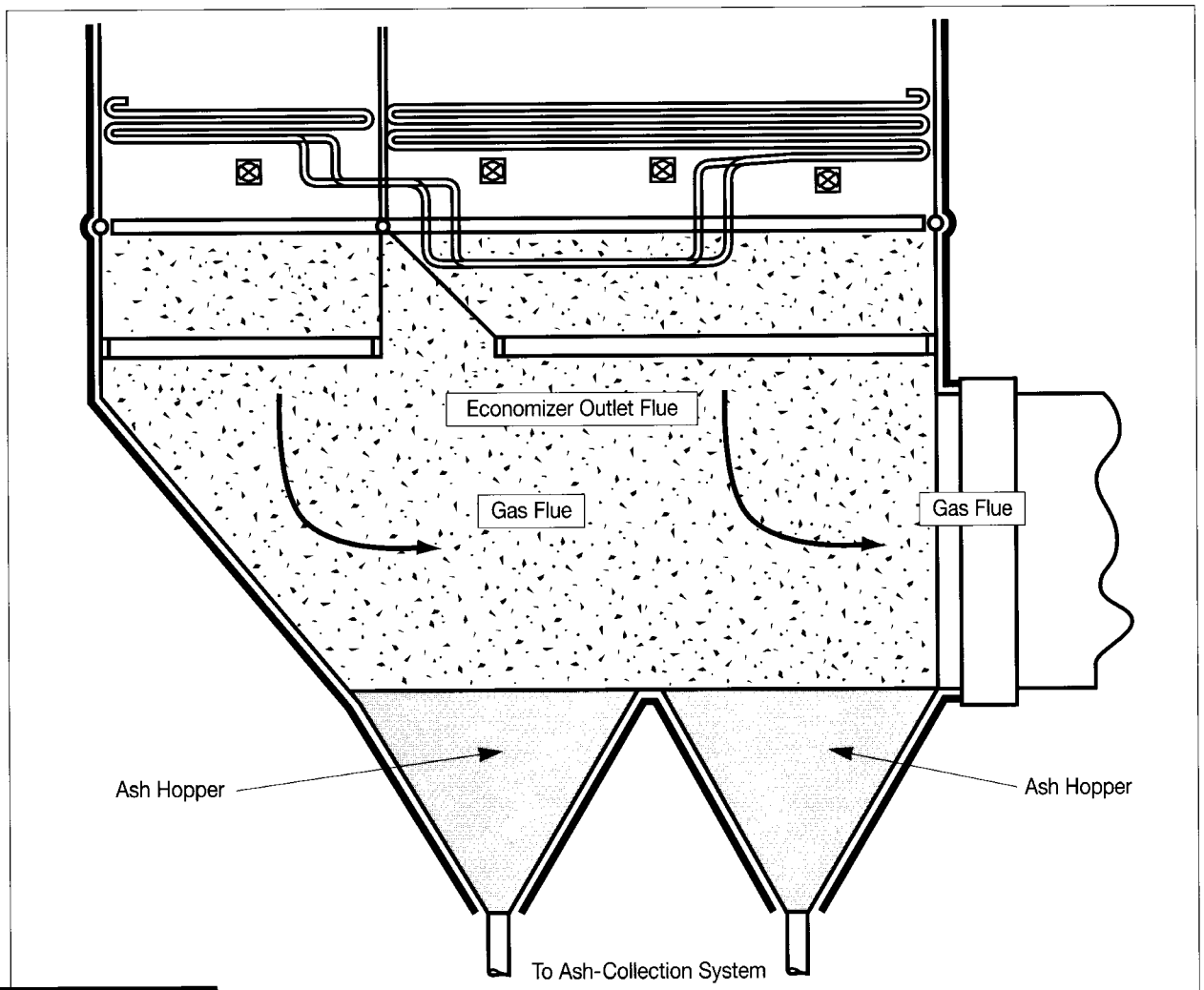


Figure 3 Typical boiler/economizer gas outlet flue and ash hopper.

cooling. In either case, significant temperature differentials may occur. Gas temperatures in excess of design specifications — resulting from out-of-tune burners, severe slagging or fouling — also may contribute to structural failure.

Recommendations

Plant operators must empty the hoppers regularly and avoid overfilling them. If it is known or suspected that the economizer outlet flue/ash hopper area has been overloaded in the past, or has been operated at gas temperatures in excess of design conditions, a thorough inspection of the following areas is recommended during the next scheduled outage:

- Ash hopper support components
- Outlet flue attachments to the convection pass lower wall headers
- Convection pass wall support components
- Associated top supporting steel

(It also is recommended that these areas be inspected periodically as part of routine maintenance, even if these conditions are not known or suspected to have occurred.)

It is important for plant operators to know when excessive accumulation occurs in the economizer outlet flue. Hopper level indicators, which warn of excessive ash accumulation, are a worthwhile investment that provides information so plant operators can prevent excessive accumulation of ash in the economizer outlet flue. If your unit does not have these indicators, B&W recommends installing this instrumentation at the next available opportunity.

It also is important for plant operators to be aware of excessive gas temperatures in the area of hopper supports. Thermocouples added to the hopper support trusses will provide valuable information to the operator, allowing corrective action to be taken to avoid the overheating of structural members.

Support

Contact Field Service Engineering through your local B&W district service office to coordinate your inspection and repair efforts, and to answer any questions.

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