Water-cooled Wear Zone

VØLUND™ SYSTEMS TECHNOLOGY

An innovative, efficient and economical method for improving operational availability and productivity of waste-fired power plants.

Proper maintenance and operation of your plant is essential for achieving the full potential and performance of your plant. Babcock & Wilcox Renewable (B&W) offers a wide range of Vølund™ technology and service solutions that can upgrade, improve and simplify operation and maintenance while helping reduce downtime and save money.

Effective furnace wall protection immediately adjacent to the grate of a waste-fired boiler is critical in achieving productive long-term operation. This area of the boiler can experience high rates of erosion and corrosion if not properly protected.

B&W's water-cooled wear zone provides a relatively cool furnace surface that is resistant to slag buildup while providing good corrosion and erosion protection. It is designed to accommodate expansion between the top-supported boiler and the bottom-supported grate structure.

The low maintenance wear zone panel reduces the amount of uncooled refractory lining. With uncooled refractory, large amounts of slag can accumulate on the lower furnace walls which can hinder waste flow, increase furnace temperature, negatively impact combustion, reduce unit capacity, increase maintenance costs, and eventually result in operational stoppages.

Slag deposits in a furnace with uncooled refractory (left) and the rebuilt plant with water-cooled wear zone (right) after 4000 hours of operation.

Water-cooled wear zone advantages

- Absorbs approx. 65 to 100 kW/m^2. A typical system can receive 1.5 to 2.8 MW of extra energy – energy which is absorbed as radiant heat.
- The relatively cool wear zone (100 to 300 °C) inhibits slag deposits, thereby enabling the system to maintain its active grate area throughout the operational period.
- Operational stoppages due to wear zone slag removal are not required. Heat absorption in the wear zone is 5 to 10 times higher than in the boiler's two radiation passes.
- Heat absorption in the wear zone reduces the furnace temperature, allowing increased heating value and maintaining waste capacity.
- Replaces the refractory lining in the system's most heavily used area; operating experience demonstrates that a water-cooled wear zone has a significantly longer life than refractory lining.
- Upgrading to a water-cooled wear zone can be performed during a standard maintenance stoppage.
- Accommodates expansion between the top-supported boiler and the bottom-supported grate structure, significantly reducing the probability of a grate jam.

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Wear zone heat absorption applications

Directly connected to the boiler circuit: the wear zone is connected in natural circulation with the boiler drum and is an integrated part of the boiler. This coupling increases the overall efficiency of the plant. Due to the high operational temperature in this application, the wear zone must be covered with Inconel® weld overlay.

Indirectly connected: the heat absorption is used for air or condensation preheating so that the plant's efficiency is increased. The wear zone is fabricated with standard boiler tube material.

Externally connected: the heat absorption is used for district heating.

B&W has a wide range of experience with installation of water-cooled wear zones at many plants, both in new construction and as retrofits onto existing units. Our engineered designs are customized to provide optimized solutions for each application.

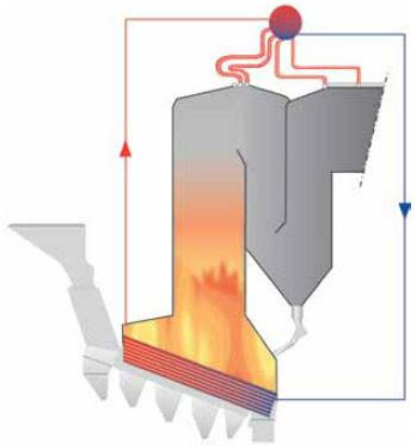
Project example: Waste-to-energy plant, Faroe Islands

Operational problems due to furnace slag deposits often occur on systems with narrow grates as waste flow is hindered by even small amounts of slag deposit.

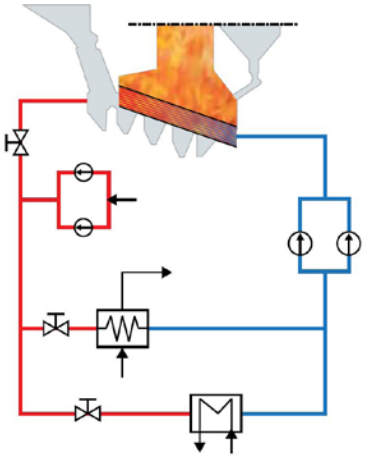
An older waste-to-energy plant was experiencing excessive slag accumulation on the furnace walls, resulting in loss of capacity and increased downtime to remove slag from the furnace.

After installation of a water-cooled wear zone by B&W, improvements included a 100% increase in availability, a reduction of dust at the ash conveyor, improved working conditions, and a 50% reduction in downtime for slag removal.

Project Results	Before	After	Units
Combustion capacity	48 to 50	57 to 58	tons/day
Heat production	5	6	MW
Post-combustion zone temperature	1000	950	°C



Direct Connection



External Connection

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