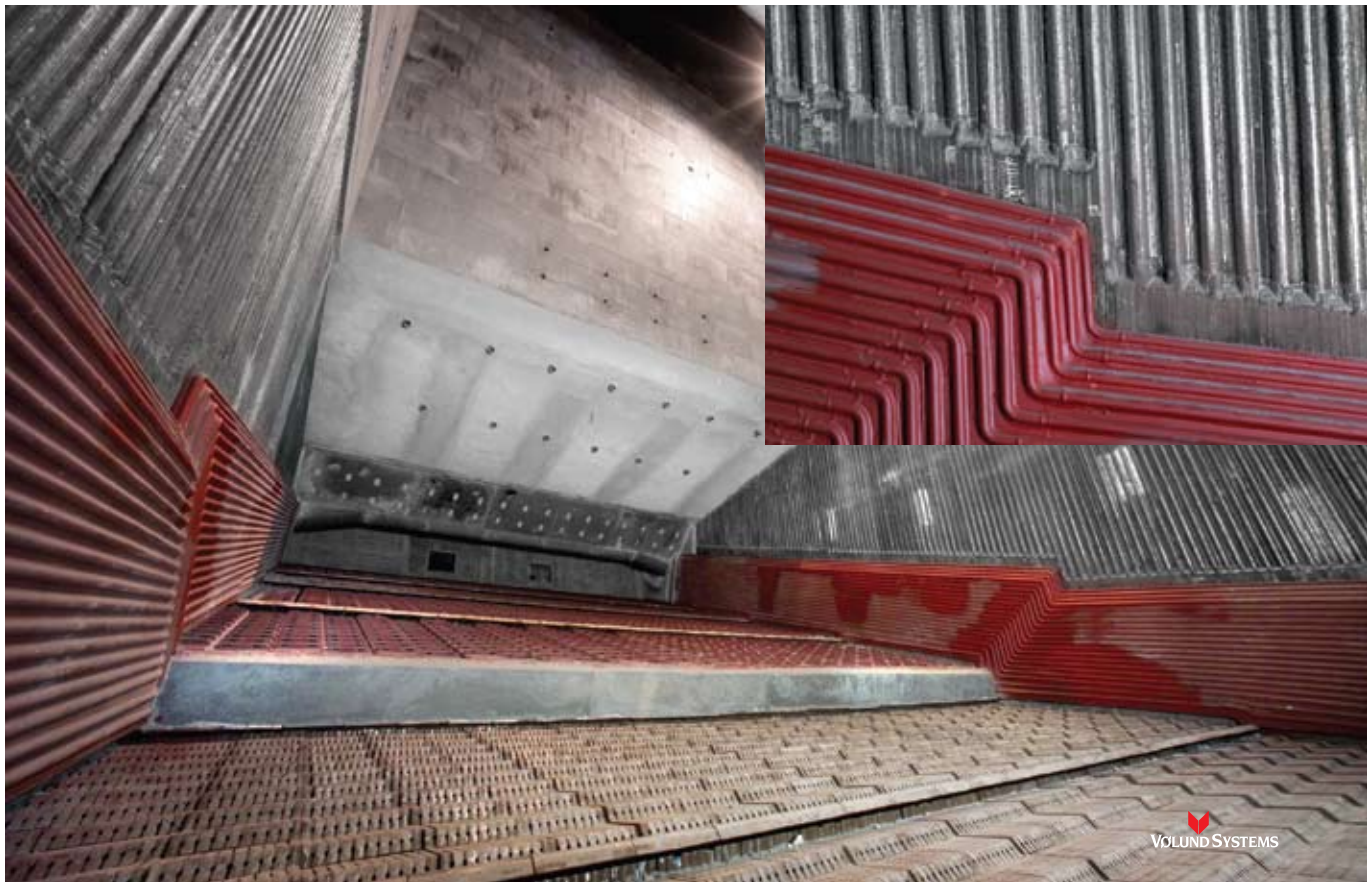


## Plant equipment and components

# Water-cooled wear zone



VØLUND SYSTEMS

*Furnace room with water-cooled wear zone in the waste-to-energy plant Gärstad, Linköping, Sweden. The plant has a capacity of 26 t/h.*

## A revolutionary, efficient and economical method for improving operational accessibility and productivity for waste fired power plants.

The wear zone constitutes a considerable area and is a significant element in the furnace. The wear zone works as a seal and expansion option towards the boiler. It is a wear-resistant, slag-resistant wall with large heat absorption in the furnace's most heavily used zone.

The water-cooled wear zone has been developed to

reduce uncooled refractory lining in waste-to-energy boilers. The disadvantage of uncooled refractory lining is that large amounts of slag build up which interrupts the operation of the system. Especially on the lowest part of the furnace's side walls, slag deposit build-up can hinder waste flow and thereby significantly influence the combustion process. In the worst case, this can result in operational stoppages.





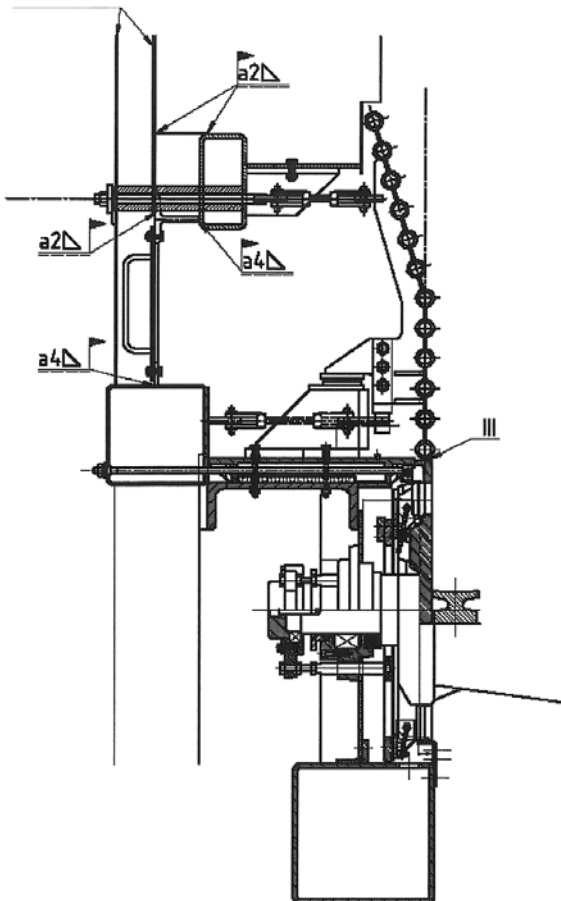
Slag deposits over the grate

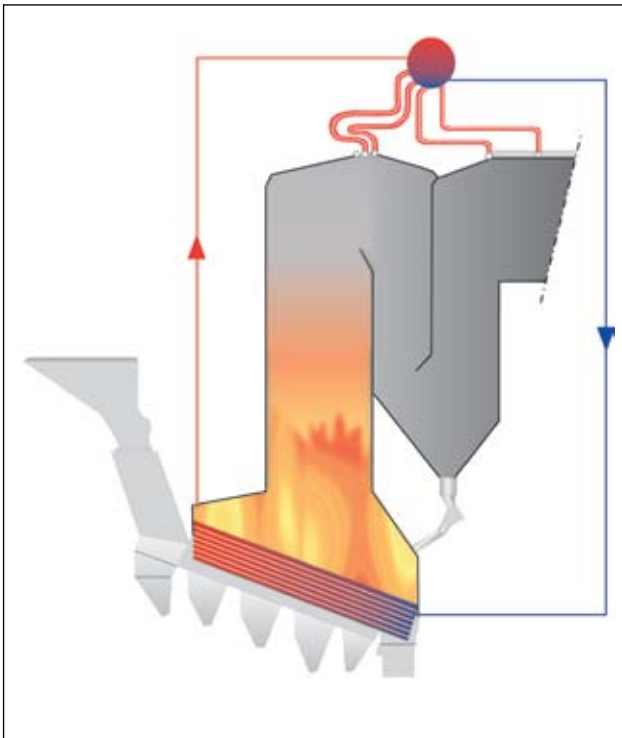
#### Typical problems in old plants:

- Reduced capacity due to increased heating value.
- Increased build-up of slag deposits which means reduced waste capacity, reduced energy production and in the worst case operational stoppages.
- Increased furnace temperature which wears the refractory lining, affects boiler control and results in corrosion.
- Increased wear of refractory lining in the furnace and increased requirement for slag removal will increase the maintenance costs.

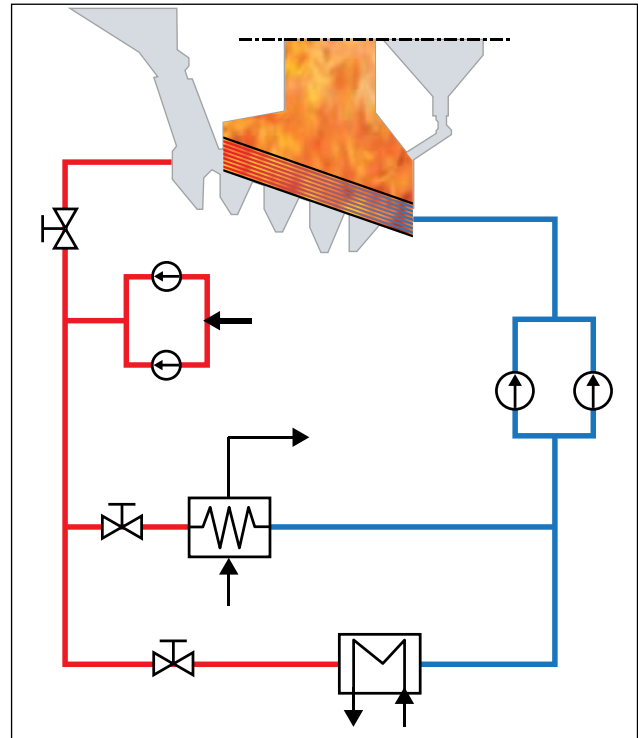
#### Many advantages of the water-cooled wear zone:

- A water-cooled wear zone absorbs approx. 80-100 KW per m<sup>2</sup>. A typical system can receive 1.5-2.8 MW of extra energy - energy which is absorbed as radiant heat.
- There are no slag deposits as the wear zone is relatively cold, 150-300 °C. The system therefore retains its active grate area throughout the operational period.
- Operational stoppages due to slag removal are not required. Heat absorption in the wear zone is 5-10 times higher than in the boiler's two radiation passes.
- Heat absorption in the wear zone reduces the furnace temperature and therefore allows increased heating value and maintains waste capacity.
- The water-cooled wear zone replaces the refractory lining in the system's most heavily used area and experience shows that a water-cooled wear zone has a longer life than refractory lining.
- It is possible to build in a water-cooled wear zone during a standard maintenance stoppage.
- The water-cooled wear zone works actively as an expansion segment between boiler and grate. No jamming of the grate occurs due to the base plate being pressed down over the outer beams of the grate.





A direct connection setup



An external connection setup

### The heat absorption from the wear zone can be used in various ways:

- **Directly connected to the boiler circuit:** The wear zone is connected in natural circulation with the boiler drum and constitutes an integrated part of the boiler. This coupling increases the overall efficiency of the plant. Due to the high operational temperature, the wear zone must be covered with Inconel®.
- **Externally connected:** The heat absorption is used for district heating.
- **Indirectly connected:** The heat absorption is used for air or condensation preheater so that the plant's efficiency is increased. The wear zone is executed in standard black boiler pipe.

**An example:  
Torshavn waste-to-energy plant, Faroe Islands**

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

The waste-to-energy plant in Torshavn is an example of this type of system with a narrow grate. The plant had problems with capacity and operating time and it was often necessary to stop the plant to remove slag from the furnace.

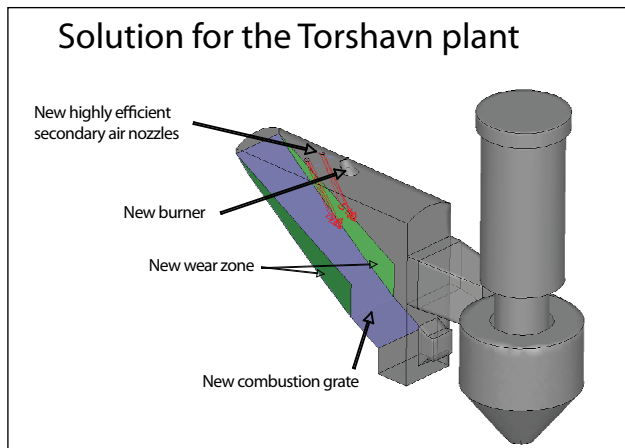
In 2006, Babcock & Wilcox Vølund installed a water-cooled wear zone.

**Improvements after installation of the water-cooled wear zone:**

- An increased accessibility of 100%.
- An overall improvement in working environment without dust at the ash conveyor.
- Downtime for cleaning has been halved from two weeks to one week.



Rebuilt plant in Torshavn. The plant has a capacity of 2 t/h and is shown here after 4000 hours of operation.



The Torshavn plant	Before	After	Units
Combustion capacity	48-50	57-58	tons/day
Heat production	5	6	MW
EBK temperature	1000	950	°C

Babcock & Wilcox Vølund have wide experience with installation of water-cooled wear zones, and solutions are prepared in close collaboration with the client. This ensures an effective solution which gives the best results for each plant. For further information please contact our service department.

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