



# Alfa Laval Aalborg Micro

## Waste heat recovery boiler for marine auxiliary engines

The Alfa Laval Aalborg Micro is a uniquely compact boiler/economizer designed for waste heat recovery from a vessel's auxiliary engines. Easy to install, operate and maintain, it reduces the use of the oil-fired boiler by reclaiming heat that otherwise would be lost through the exhaust gas.

Besides having minimal footprint, height and weight, the Aalborg Micro offers a fast return on investment. This makes it an ideal retrofit solution for improving energy efficiency and lowering vessel fuel costs.

### Application

Only a portion of the fuel energy released by marine engines actually goes to propulsion. A large amount of it escapes as heat, and it makes sense to reclaim as much of this energy as possible. This is true not only for main engines, but for auxiliary engines as well.

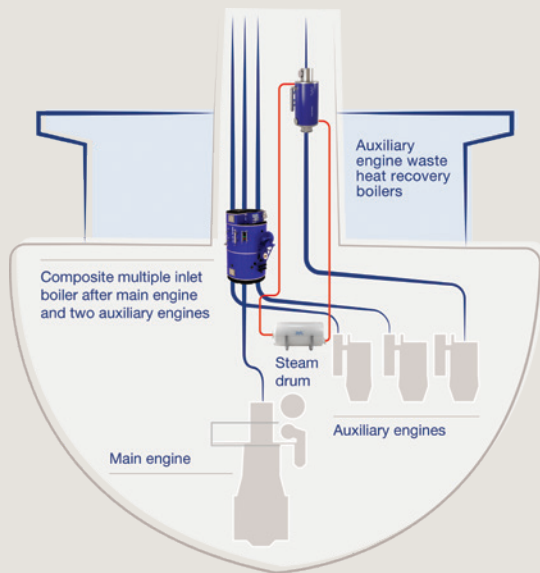
Steam produced with the Aalborg Micro can support or fulfill steam needs in port, but it can also serve other functions. For vessels whose long-stroke main engines produce cooler exhaust, it can provide a needed steam boost during a voyage. If there is no steam shortage while sailing, the additional steam produced with the Aalborg Micro can be used to generate electricity, for example by means of Organic Rankine Cycle (ORC) technology.

### Benefits

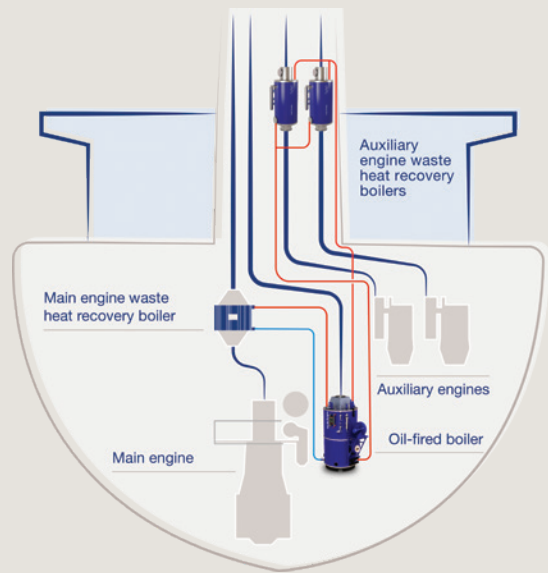
- Extremely compact, plug-and-play design for easy retrofit
- Short payback time\*
- Reduced wear and maintenance on the oil-fired boiler
- Short start-up time (2 minutes)
- Low media volume and inertia that contribute to high uptime
- Positive influence on the vessel's carbon footprint

\* *Payback time for a typical vessel may be less than 1.5 years at a fuel cost of around USD 600 per tonne.*





Steam plant optimization through waste heat recovery from auxiliary engines



Full redundancy for existing steam plant

### Working principle

The Aalborg Micro is installed after the vessel's auxiliary engines (or small main engines). When the exhaust gas passes over the Aalborg Micro heating surface, the waste heat energy in the gas is absorbed for the production of hot water or steam.

The Aalborg Micro is not designed with its own steam space. It is used in connection with one or more oil-fired boilers, which act as the steam/water space. Forced-circulation pumps provide the Aalborg Micro with water at saturation temperature from the oil-fired boiler(s).

In the Aalborg Micro, heat from the engine exhaust gas is transferred to the water side by convection. The generated steam/water mixture is then discharged into the steam space of the oil-fired boiler(s), where the heavier water particles separate from the steam.

### Design

Built for lasting performance, the Aalborg Micro has a durable construction where the coaxial tubes of the heating surface are arranged within a vertical cylindrical shell plate. The heating surface is designed for easy maintenance, with an integrated soot blower that supports the daily cleaning of the coiled fin tubes. In operation, a control damper forces the exhaust gas flow from the engine to pass between the tube coils.

### Technical data

Capacity	500 kW up to 5 MW
Weight (incl. insulation)	400–3900 kg
Diameter (incl. insulation)	950–1870 mm
Height (incl. insulation)	1700–2800 mm
Connections	Welded
Insulation	150 mm
Media inlet/outlet header	DN100
Exhaust inlet/outlet header	DN450 to DN1000
Maximum inlet temperature	535°C
Minimum outlet temperature	130°C
Pressure loss	<4500 Pa
Maximum pressure	39 bar(g)

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