



Together we set the standard

Equipment and services for marine applications







Essential preparations

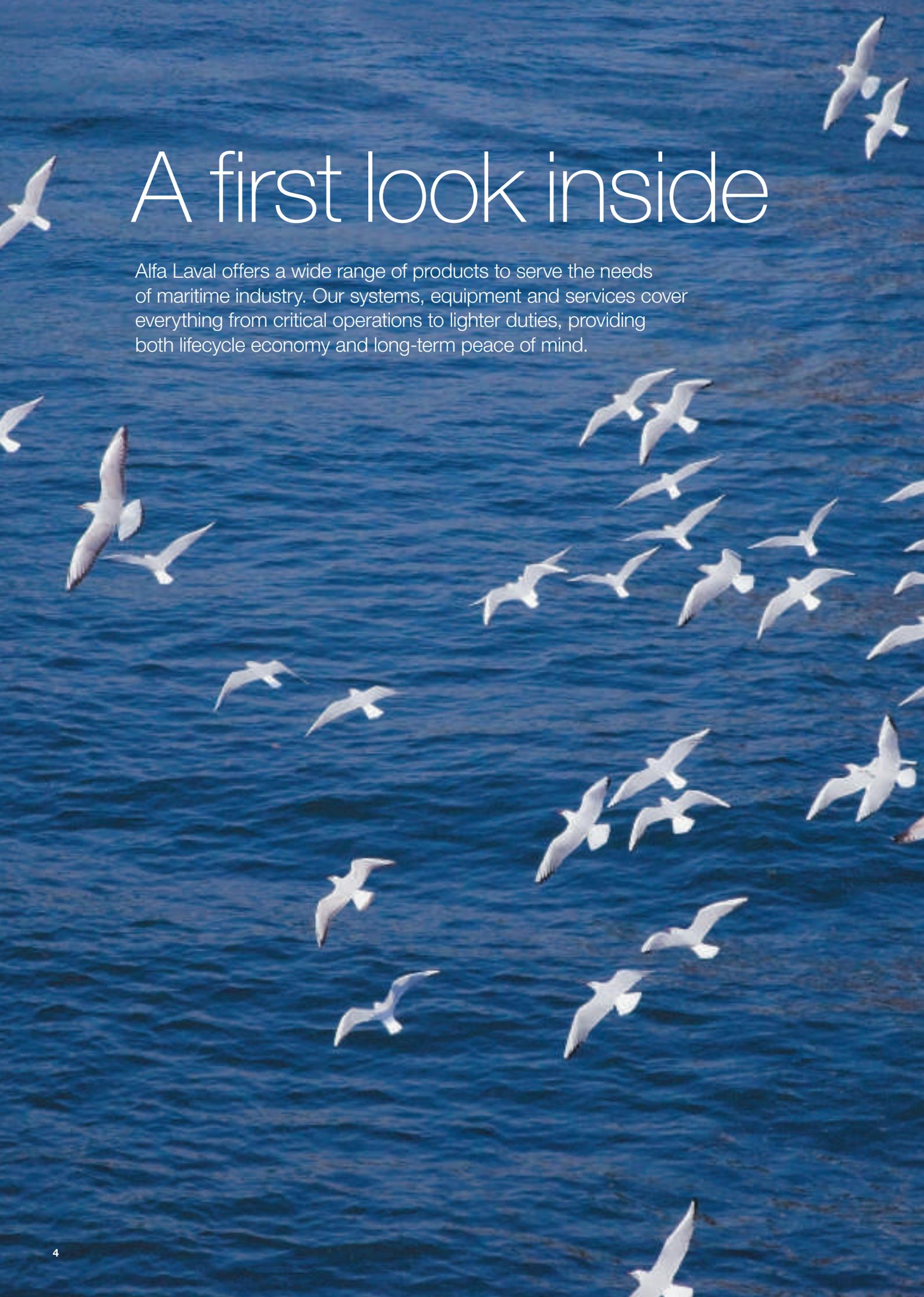
Whether you build ships or sail them, the equipment you choose to have on board plays a vital role in your success.

And no choice is more secure than Alfa Laval.

Through many decades of working with shipyards, ship owners and ship operators, we have come to understand the essentials of life on board. Our solutions address practical as well as operational needs, and we design them to do so in the simplest, most reliable and most cost-efficient way.

The breadth of these solutions is greater than ever, now that Aalborg Industries is a part of Alfa Laval. Looking to the future, our complementary expertise and combined resources will mean even more opportunities to strengthen your marine business and reduce its environmental impact.

Together we set the standard.

A large flock of white seagulls is captured in flight over a deep blue ocean. The birds are scattered across the frame, with some in the foreground and others further away, creating a sense of movement and vastness. The water's surface shows gentle ripples, and the overall scene is bright and clear.

A first look inside

Alfa Laval offers a wide range of products to serve the needs of maritime industry. Our systems, equipment and services cover everything from critical operations to lighter duties, providing both lifecycle economy and long-term peace of mind.

ENVIRONMENTAL PROTECTION

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By reducing cost and hassle as well as environmental impact, our environmental systems meet not only the requirements of current and pending legislation, but also your business needs.

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Our efficient heat exchangers let you take full control – and full advantage – of the thermal energy on board. A complete selection ensures the best possible match of product and function.

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Our Aalborg boilers and thermal fluid systems have a long history yet remain at the cutting edge. Modular constructions and many options enable the perfect heating solution for any vessel.

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Our Aalborg solutions for recovering waste heat let you benefit from the surplus heat energy that already exists on board – in your main engine exhaust, and in other sources as well.

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TANK CLEANING AND SAFETY

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Our dynamic Gunclean Toftejorg equipment cleans your tanks with a fraction of the time and cleaning fluid, while our Aalborg inert gas systems offer optimized solutions for keeping them safe.

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Proven distillation processes merge with state-of-the-art advances in our freshwater generators. Our newest, AQUA, combines a full supply of quality freshwater with reduced environmental impact.

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PEACE OF MIND

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The experts of our Parts & Service team specialize in extending performance. With expertise and support, they help maximize your uptime and minimize lifecycle costs.

▶ Extending performance	64
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ALFA LAVAL ON BOARD

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Alfa Laval, now with the added resources of Aalborg Industries, offers a complete portfolio of leading technologies. Our efficient and reliable solutions handle essential aspects of vessel operation.

Pure Thinking

Alfa Laval's environmental products help customers protect the purity of our oceans. In creating them, we strive to make purity a part of our thinking.

Concern

Having cooperated with maritime industry for nearly a century, we understand both its impact and its needs. We are concerned by the difficulty of protecting the environment, and we recognize our responsibility to bring customers workable solutions.

Commitment

Our concern has inspired a firm commitment to researching and developing sustainable technologies. By avoiding the use of chemicals and other short-term fixes, we ensure that new solutions will not cause additional problems later on.

Contribution

The results of our commitment can be seen on the following pages and in the green boxes found throughout this catalogue. The products and features highlighted have all demonstrated their importance in protecting our marine environment.



Environmental protection

The transport of people and cargo by sea is of crucial importance in today's world, yet it poses a danger to the fragile ecosystems on which our oceans depend. Alfa Laval technologies are helping maritime businesses find a sustainable balance.



Essential balance

Alfa Laval's environmental products are designed to meet both current and pending regulatory demands. This provides security as existing legislation is tightened, as well as compliance with new laws such as those that will regulate ballast water treatment.

At the same time, we make sure that our solutions fit in on board, both physically and functionally. You receive solutions that minimize environmental impact, but which have a minimal impact on vessel operations.

Perpetual economy

In addition to long-term assurance, our solutions are designed for long-term economy. Extremely reliable and infrequently serviced, they offer chemical-free operation and reduced dependency on costly consumables.

Whenever possible, they also recycle the waste that they handle. By maximizing efficiency and minimizing sludge, they reduce your operating costs as well as your onshore deposits.



Ballast water treatment

PureBallast 2.0

Now in its second generation, PureBallast is an easy-to-use ballast water treatment system with full type approval and a proven track record at sea. Using a unique chemical-free technology, it neutralizes the microscopic organisms, eggs, cysts and planktonic larvae that are generally taken in with ballast water. This eliminates the threat of biological invasions when water from one part of the world is released in another. The process is effective, automated and self-contained, as well as harmless to the ballast tanks and crew. And since PureBallast is remarkably compact, it can be installed in cramped engine room conditions or in areas that are otherwise difficult to utilize.

- Proven system – hundreds sold to ship yards and ship owners all over the world
- Materials designed and selected to cope with rough onboard conditions
- Ballast water type approval in accordance with IMO regulations
- Green operation without chemicals, toxic residue or other safety hazards

- No ballasting delays or interference with other ballast water systems
- Easy operation with full automation and remote control
- Flexible, space-saving design based on modular block components
- Ex version available for use in potentially explosive environments
- Capacity: 250–2500 m³/h

Equipment:

- Filter (50 microns)
- Wallenius AOT unit(s)
- Cleaning-in-Place unit
- Control system
- Flow meter

Green advantages

PureBallast breaks down microorganisms and other organic contaminants with the help of ultraviolet (UV) light, the effect of which is boosted by means of an advanced oxidation technology (AOT). In addition to being virtually instantaneous and completely non-toxic, the process occurs within a closed chamber, which means it poses no risk to the crew or the vessel itself.



PureBallast

Bilge water treatment

PureBilge

PureBilge is an efficient and cost-effective bilge water treatment system, designed for continuous use in real-life conditions. By means of high-speed centrifugal separation, it provides fully automatic single-stage operation, even on rough seas or in the presence of difficult emulsions. Besides reducing oil in water content to less than 5 ppm, PureBilge is modular and requires no large holding tanks, which results in a major space savings on board. Moreover, it is designed to work without chemicals and requires little maintenance, especially compared to solutions with filters and static coalescers.

- IMO MEPC 107(49) compliance (≤ 15 ppm oil in water)
- Continuous, automated operation
- Ability to handle varying feed and oil shocks
- Low waste production and lifecycle cost
- Optimized bowl and emulsion-preventing XLrator disc inlet
- Tamper-proof SafetyBox option for performance monitoring
- Compact, plug-and-play design
- Capacity: 2500-5000 l/h

Equipment (delivered as a module):

- BWPX 307 centrifugal separator
- Ancillaries and control cabinet with EPC 60 controller
- Oil-in-water monitor
- Feed pump

Green advantages

PureBilge cleans bilge water with the help of high-speed separation technology, which means it is unaffected by pitch and roll. Highly reliable, the system operates continuously and produces less waste and reject than static solutions such as filters and coalescers. Its already high separation efficiency is enhanced by its XLrator disc inlet, which gently accelerates the bilge water to prevent the creation of further emulsions.



PureBilge

BlueBox data recorder

The BlueBox data recorder is a fully automatic, tamper-proof bilge data recorder with visuALog software, designed especially for the Alfa Laval PureBilge system. Created to prevent unacceptable bilge water discharge and the falsification of Oil Record Books, it keeps a record of oil ppm levels, GPS position, separator operation, overboard valve position and overboard flow

data, as well as a full log of alarms. Tampering with the BlueBox's cover, which encloses the OCM and sampling line, triggers an alarm and sets the overboard valve in recirculation mode.



Sludge and waste treatment

MSPX

Alfa Laval's MSPX sludge and waste treatment system is a highly effective centrifuge system for treating waste oil and sludge from marine and diesel installations. By continuously separating these products into their three basic constituents – water, oil and sludge – it ensures maximum waste recovery and contributes to more cost-effective processing and disposal. The compact, plug-and-play system is easy to fit aboard any vessel, thanks to a flexible design that comprises pumping, heating and separation modules.

- Substantial savings in waste oil and sludge handling costs
- Effective pre-treatment of water prior to discharge into bilge water tank
- Possibility of a smaller holding tank for waste oil and sludge
- Enhanced performance when MP 205 conditioner is injected prior to the feed pump
- Small footprint (complete module approx. 2 m²)
- Capacity: 200–500 l/h, depending on the use of MP205

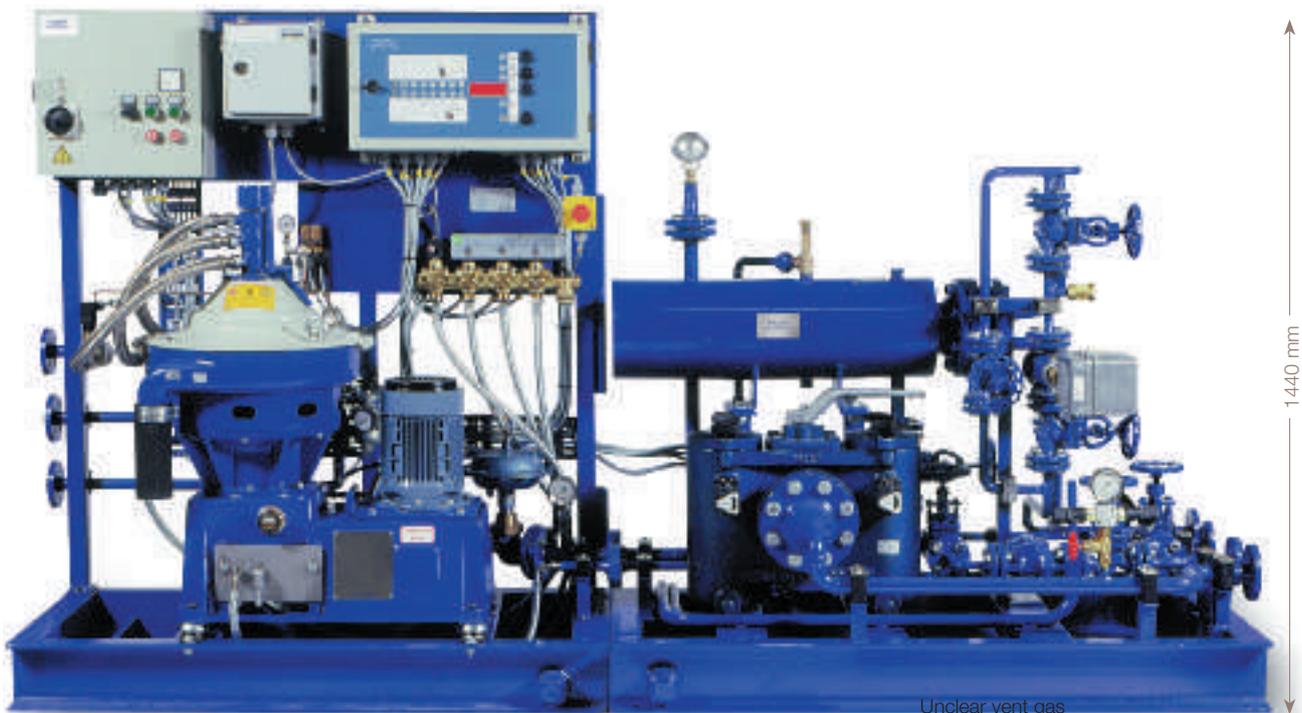
Green advantages

The MSPX system combines economic benefit with environmental peace of mind. It recovers a maximum amount of oil for incineration and similar processes, leaving far less sludge for disposal. Most importantly, however, the MSPX ensures proper bilge water quality. Oil and impurities are removed early on, which enables the bilge water system to operate more effectively.

Equipment (delivered as modules):

- MSPX 303 separator
- Feed pump
- Heater
- EPC41 control unit
- Chemical dosing unit MP 205 (optional)

MSPX 303



Crankcase gas cleaning

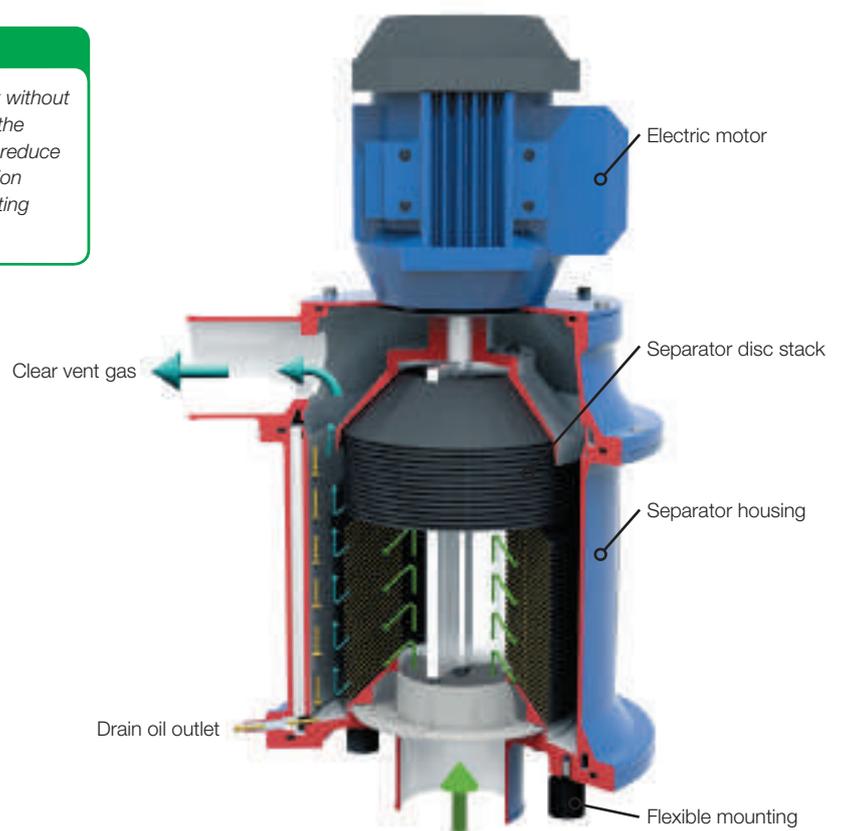
PureVent

PureVent is a compact separator patented by Alfa Laval and developed in cooperation with Wärtsilä. By using centrifugal separation to remove oil and particles from crankcase gas, it offers an opportunity to further reduce engine emissions. Crankcase gas enters at the bottom of the separator and passes into the disc stack, where centrifugal force presses the oil and soot out between the discs. The virtually oil-free air can then be released into the atmosphere, while the oil that collects on the inside of the PureVent housing is recirculated as lubrication or drained off for incineration or deposit.

- Suitable for crankcase gas and other oily mist emissions
- 98–99.9% separation efficiency at 40–150 m³/h
- Provides stable pressure in the engine crankcase, whereas filters can clog and change the pressure drop
- Only 30 l in size
- Major service every 16 000 hours or five years, whichever comes first

Green advantages

PureVent eliminates oil mist and protects the environment without negatively affecting engine performance. In fact, it allows the recirculation of collected oil as lubrication, which helps to reduce your overall oil consumption. By using centrifugal separation instead of filters, it returns virtually oil-free air without creating paper waste for disposal.



Exhaust gas cleaning

PureSO_x

PureSO_x is a highly effective sulphur-removal system, and the first installed and operated as a main engine (21 MW) exhaust gas scrubber. It ensures compliance with new IMO legislation restricting sulphur emissions, which will begin taking effect in 2015. Sulphur is scrubbed from the vessel's exhaust gas in an open loop with seawater or a closed loop with fresh water. The ability to switch between these two modes gives PureSO_x unique operational flexibility, while its modular construction – which includes options for multiple inlets – ensures a compact and energy-efficient scrubber installation.

- Sulphur removal in accordance with IMO MEPC 58 and 59 (in effect 2015 for ECA, 2020 worldwide)
- Sulphur removal rate >98% (exceeds IMO requirements)
- Particulate matter (PM) trapping up to 80%
- Ability to operate in low-alkalinity waters in freshwater mode
- Only minimal sludge generation in freshwater mode
- One solution for main engine, auxiliary engine and boiler exhaust
- Multiple-inlet options to reduce the number of scrubbers on board
- Upgradable design for compliance with future legislation
- Well-proven technology tested at MAN Diesel & Turbo's facilities
- Short payback time (1-2 years) thanks to fuel cost savings
- Operating power consumption: approximately 1.5% of engine power



PureSO_x

Green advantages

PureSO_x is a win-win solution that benefits ship owners and ship operators as well as the environment. By effectively removing the sulphur content from vessel exhaust, it prevents the creation of harmful compounds in the air. At the same time, it allows ship owners and ship operators to continue using economic HFO rather than switching to expensive low-sulphur MGO.

Oily water pre-treatment

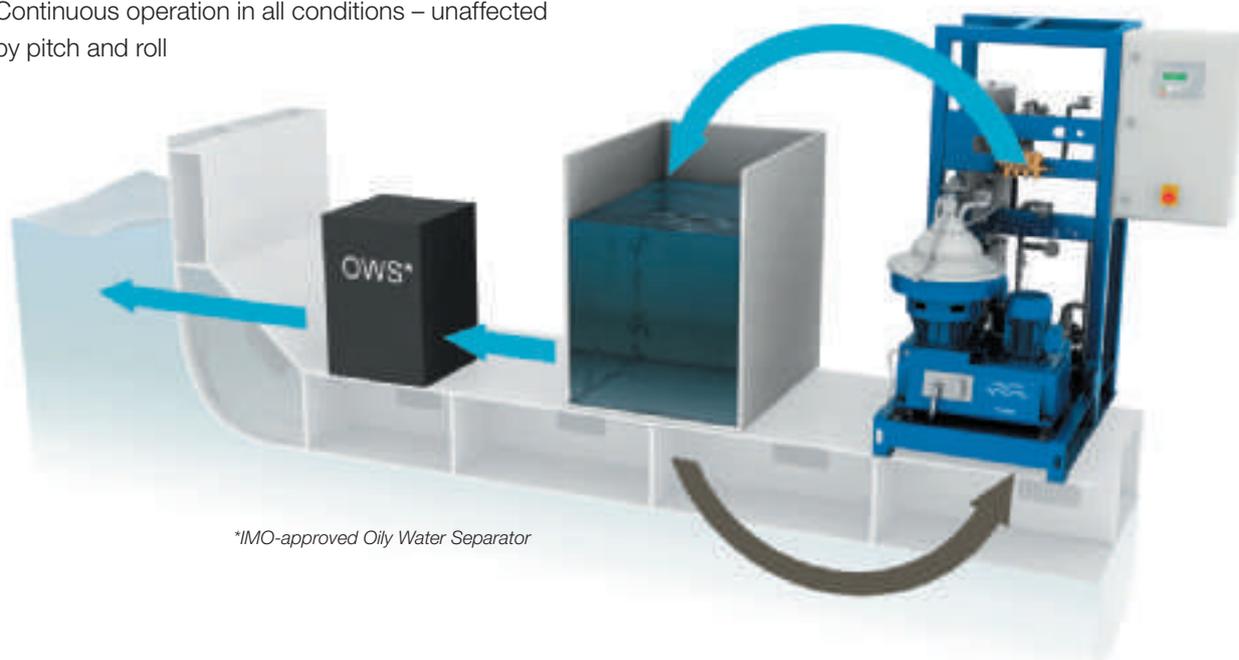
PreBilge

When switching bilge water treatment technologies is not an option, PreBilge offers a uniquely simple way to resolve performance issues. Acting as a complement to the existing treatment system, it uses centrifugal separation to provide a clean bilge water feed that the existing system can handle in all conditions. PreBilge is installed as a continuous pre-treatment loop extending from the bilge water tank, which it maintains in much the same way that a lube oil separator maintains the lube oil tank. Since the oil monitoring and overboard discharge are handled by the existing treatment system, no type approval or adjustment to the vessel's IOPP certificate are necessary.

- Compact module with a 1.5 m² footprint
- Flexible placement (no proximity to bilge water tank needed)
- Removal of heavy oils, particles and emulsions that are difficult for other systems
- Separation performance equivalent to a settling area of 3000 m²
- No filters or other consumables
- Continuous operation in all conditions – unaffected by pitch and roll

Green advantages

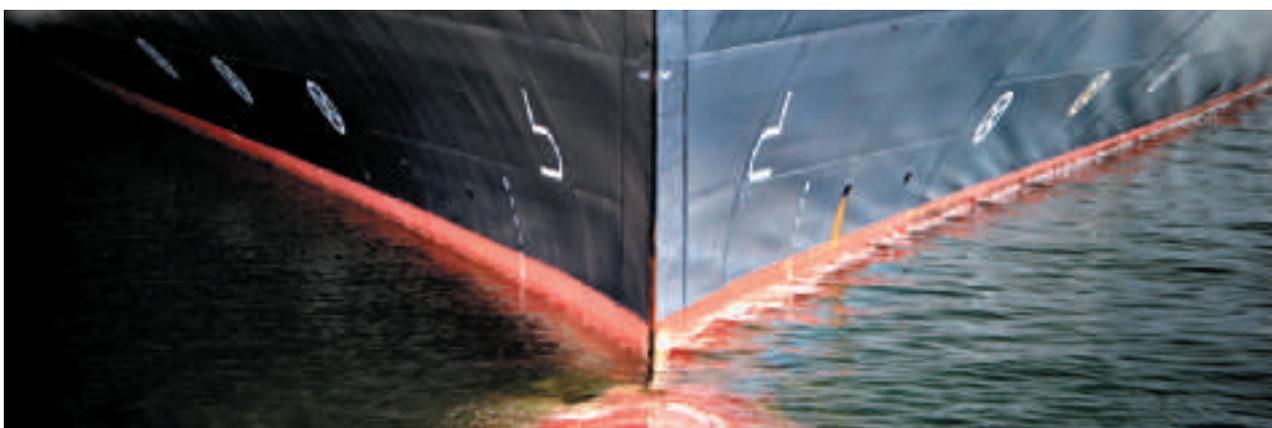
Many vessels possess bilge water treatment systems that are type approved according to IMO resolution MEPC 660(33) or MEPC 107(49), but which fail to do their job in real-life conditions at sea. PreBilge ensures that these systems reliably provide IMO-compliant bilge water treatment – without adding filters that produce more costly waste.





Oil treatment

Alfa Laval helps you make the most of the potential in your oils. Whether maximizing the amount of energy-rich fuel you extract or extending the lifetime of your lubricant, our oil treatment solutions bring you long-term economy while protecting your engine and other sensitive equipment.



Easy access to value

Alfa Laval was founded on a simple idea: the extraction of value from complex media. This was the idea behind our first marine separator, which opened the door for the fuels in use today.

Having built centrifugal separators for over a century, we offer more experience today than any other supplier. Over the years, we've enhanced our equipment's performance and increased its lifetime, while at the same time reducing its complexity.

Features like CentriShoot and CentriLock, our unique discharge system and bowl-locking mechanism, are examples of how we've not only increased efficiency, but also decreased wear and tear.

A complete chain

What began with a separator is now a complete portfolio of solutions leading from bunker tank to main engine, built with modular thinking and plug-and-play principles.

And just as we paved the way for today's fuels, we're paving the way for tomorrow's fuel use. The advanced automation of our fuel conditioning systems, which adapt fuel temperature, pressure and viscosity to engine specifications, is perfecting the changeover between heavy fuel oil and the distillate fuels that are increasingly common.



Separation

S and P Flex range

Alfa Laval's S and P Flex separation systems are the result of continuous technical development and innovative design solutions. They combine the high efficiency, low sludge output and low operating cost of Alfa Laval self-cleaning centrifugal separators with a truly flexible scope of supply, producing a market-leading solution with many benefits.

Key benefits

■ Optimal performance and highest efficiency

A fine-tuned bowl design ensures optimal performance and the best possible separation efficiency.

S separators also feature unique Alcap technology for continuous monitoring of the cleaned oil.

■ High reliability

Advances in internal design, as well as other technical features created with Alfa Laval expertise, increase system reliability and your peace of mind.

■ Easy installation

The small physical size of the separators, combined with the flexible delivery options of the S and P Flex range, simplifies positioning and installation in the engine room.

■ Easy operation and service

The EPC 60 controller, which is a part of all deliveries, is designed for intuitive menu navigation and "one-button" starts and stops. Its modular construction enables faster troubleshooting and I/O board replacement.

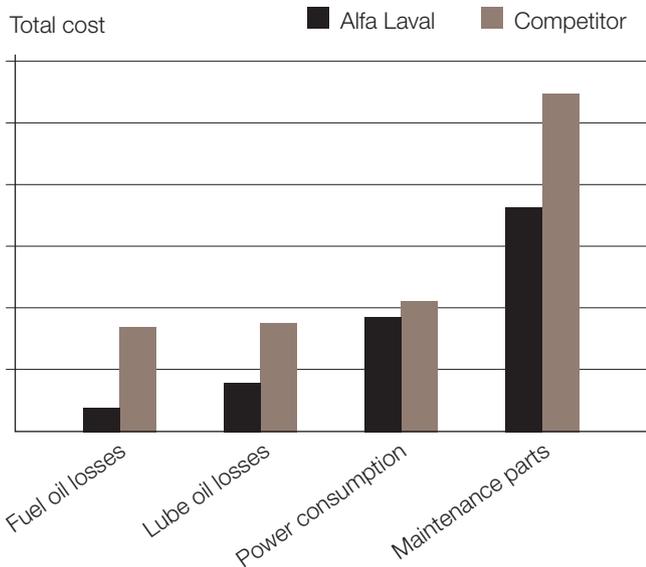
■ Lowest lifecycle cost (LCC)

Alfa Laval separation equipment offers the lowest oil losses, lowest power consumption, least maintenance and fewest wear parts on the market. With Alfa Laval, you are thus ensured the lowest LCC and the shortest payback time on your equipment investment.



Optimized separator bowl

Typical lifecycle cost (LLC) over 20 years



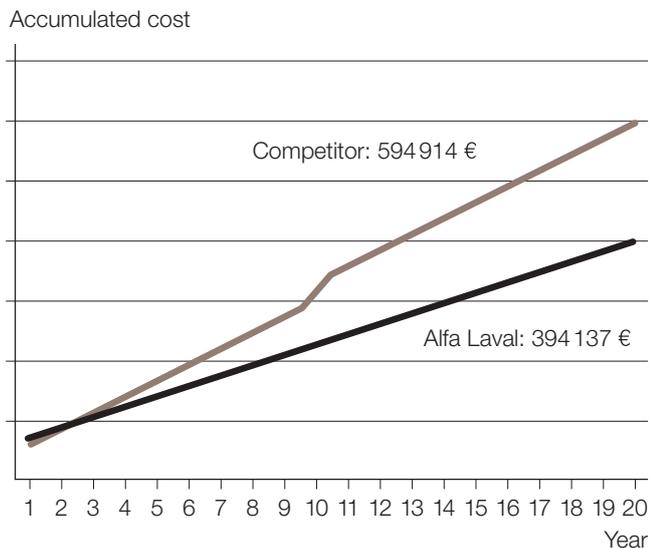
Green advantages

Alfa Laval's S and P separators have optimized bowls and other design features that lead to exceptional efficiency. No matter which model you choose, you can count on low water consumption, energy consumption and oil losses, which means less sludge to dispose of and a reduced burden on the environment.

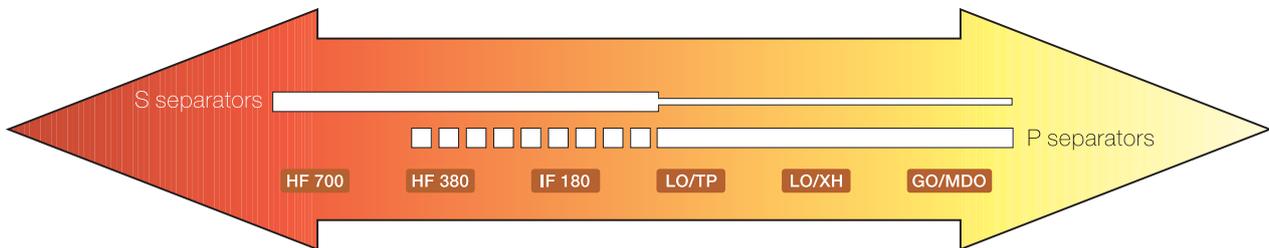
Low-wear mechanical platform

S separators 921-987 and P separators 626/636 are built on a low-wear mechanical platform that features CentriShoot and CentriLock. The CentriShoot discharge system, which greatly reduces sludge volumes, has a fixed discharge slide that flexes gently to expose the discharge ports, thereby eliminating metal-to-metal wear. The CentriLock bowl-locking system uses a lightweight, non-threaded snap ring that prevents wear by allowing easy removal without a sledgehammer.

Accumulated cost over 20 years Payback: < 2 years



The graphs above are examples of typical lifecycle cost. To find out how much you could save, please contact your local Alfa Laval representative to make your own LCC calculation.



S separators



S separators feature Alcap technology, which means they are particularly suitable for cleaning heavy fuel oils and other residual oils of high and varying density. Based on a measurement of water content in the clean oil outlet, they automatically adjust the oil/water interface within the separator bowl.

- Compatibility with all fuel and lubricating oils (Alcap)
- Oil densities up to 1010 kg/m³
- Viscosities up to 700 cSt/50°C (higher on request)
- Minimal sludge volumes and oil losses
- Performance monitoring in full flow via water-in-oil monitor

P separators



P separators are designed to handle uniform oils of consistent and lower densities, such as lubricating and marine diesel oils. Because they utilize purifier technology, in which the separation level is set with a gravity disc, they do not automatically compensate for density fluctuations.

- Compatibility with lubricating, distillate and marine diesel oils
- Oil densities up to 991 kg/m³
- Viscosities up to 600 cSt/50°C (higher on request)
- Low sludge volumes and oil losses

Separation Performance Standard (SPS)

Alfa Laval can supply S separators in accordance with the marine Separation Performance Standard, SPS (CWA 15375), which helps establish a separator's ability to remove hard, abrasive particles from heavy fuel oils. Verified by classification societies, the standard provides a reliable method of evaluating and comparing the separation performance of different fuel oil separators.

Flexible supply



■ Flex system

A separator with ancillaries in the form of optimized block components provides full say over the use of space. This allows for local modularization or do-it-yourself assembly.



■ Flex modules

A compact separator module can be built to a customer-specified configuration from a wide range of skids and machine blocks. Multi-modules and mixed modules are possible for the simultaneous treatment of different types of mineral oils.



MMB 305



MAB 103B



MIB 303

MMB and MAB

Robust, compact and easy to install, the manually operated MMB and MAB separator systems are ideal for applications aboard coastal vessels, work boats, fishing vessels, ferries and yachts. Complete systems for purifying or clarifying mineral oils, they feature simple operation and a large sludge space, which extends the operating period between manual cleanings. The MMB system is also belt driven and features an internal paring disc for discharge of clean oil.

- Easy serviceability
- Proven equipment with low maintenance and spare parts consumption
- Compatibility with lubricating, distillate and diesel oils (MDO)

MIB 303

The low-maintenance MIB 303 operates as a purifier for distillate and marine diesel oil, and as a purifier or clarifier for lubricating oil. An excellent solution for oil cleaning aboard smaller vessels, its compact design allows for plug-and-play installation in very confined spaces. The MIB 303 removes solid impurities and reduces the risk of bacterial growth in the tanks, thereby extending the interval between filter replacements and cutting costs.

- Suitable for oils with a maximum density of 920 kg/m³ at 15°C
- Maximum separation temperature: 70°C
- Capacity:
760 l/h of diesel/gas oil
Max. 460 l/h of lubricating oil

Cleaning-in-Place

Cleaning-in-Place (CIP) system for separators

The Cleaning-in-Place system is a simple and effective way to increase separator performance and lower costs. It hooks up to the separator directly, cleaning the bowl, oil inlets and oil outlets without any dismantling. Not only does this save man-hours, it lowers spare parts consumption since there is no extra wear or damages due to disassembly. The cleaning liquids used with the system are water-based and contain a non-hazardous, organic acid mixture.

- No need for manual cleaning of bowl interior
- Improved separation efficiency due to cleaner bowl
- Same cleaning liquid works with both lubricating oil and fuel oil separators



CIP type 10M

Cleaning-in-Place (CIP) chemicals for separators

Alfa Laval CIP chemicals for separators are designed to keep your equipment in peak condition without endangering fragile marine ecosystems. They make use of Alfa Laval's line of Alpacon chemicals, which contain a unique raw material based on fermented whey. This makes them both non-hazardous and biodegradable.

Chemicals for general use:

- Alpacon Descalant
- Alpacon Degreaser

Separator-specific chemicals:

- Alpacon MultiCip Super (5 l)



Green advantages

Alfa Laval's high-performance Alpacon chemicals contain BIOGEN ACTIVE®, a renewable acid mixture made from fermented whey, fruit acids and water. Non-hazardous and readily biodegradable, they pose no health risks and can be used without protective equipment.

Fuel conditioning

Fuel Conditioning Module, FCM

The Fuel Conditioning Module is a pre-tested, “start-and-forget” system that takes the guesswork out of fuel conditioning. Based on a compact, modular design that can be configured to match any engine or engine room layout, it treats heavy diesel fuel so that it meets the specified requirements for cleanliness, pressure, temperature, viscosity and flow rate. The system is fully automated, with a range of automatic self-cure functions that safeguard operation should a problem occur. But it also offers great flexibility, featuring manual alternatives for all critical functions and effortless operation via remote control.

- Simple, flexible installation
- Pre-installed components, connections and controls
- User-friendly layout with easy access to all components
- Control and monitoring functions combined in a single control panel
- Pressure transmitters for enhanced control capability
- Automatic changeover from DO to HFO mode
- Easy integration and full remote operation

Main equipment (standard version):

- Low-pressure supply pumps
- Automatic oil filter
- Flow and pressure transmitters
- Mixing pipe with deaeration function
- High-pressure circulation pumps
- Oil heaters
- Viscosity transducer
- Control cabinet



Handling multiple fuels

Alfa Laval's fuel conditioning systems maintain performance when changing between light and heavy fuels. Their embedded ramp function, combined with the Visco-Temp function in our EPC50 B and EPC50 V controllers, prevents temperature shocks to fuel pumps and injectors and minimizes engine maintenance costs by keeping viscosity stable.

Green advantages

Alfa Laval's Fuel Conditioning Module ensures that clean fuel of the correct viscosity is circulated under constant pressure and at a high flow rate through the injector pump block. This enables efficient engine operation in accordance with manufacturer specifications, which results in optimal combustion and reduced emissions.

Advanced Cooling System, ACS

The Advanced Cooling System is an effective answer to the operational challenges in fuel changeover caused by the regional introduction of low-sulphur distillate fuels. Added to the Fuel Conditioning Module or another booster system, it provides the high-capacity cooling needed when using low-viscosity MDO/MGO with diesel engines. Operation of the Advanced Cooling System is fully automatic, and LT cooling water, sea-water or chilled water can be used as a cooling medium. When chilled water is not available, a chiller unit from Alfa Laval partner NOVENCO can be incorporated into the system for stepless control of the water temperature – even in the toughest conditions.

- Direct (HFO MGO) and intermediat (HFO MDO MGO) changeover procedures
- Seamless communication between ACS and booster for fast and reliable changeover
- Cutting-edge control of viscosity and temperature variations
- Full process customization via parameters in the operator panel
- Compatibility with all boosters (case-by-case tailoring available)
- Seawater-cooling version available



Advanced Cooling System

Green advantages

Low-sulphur distillate fuels reduce harmful emissions, but they pose operational difficulties. The Advanced Cooling System removes these issues through controlled and progressive cooling. As well as protecting engine fuel pumps from dangerous viscosity drops, it maintains fuel lubricity and thereby optimal combustion.

Viscochief MKII viscosity control system

The Viscochief MKII is a second-generation viscosity control system for use in fuel oil conditioning systems. It determines fuel viscosity by measuring how much the torsional vibration of a pendulum in the fuel is dampened, a method which ensures the most accurate viscosity measurement. Requiring no special attention during normal operation, the Viscochief MKII can be installed with the EPC50 V controller for both local and remote operation.

- Compact design
- Modern control system and sensor technology
- Electronically controlled pendulum vibration
- Possibility to integrate with ship automation systems



Viscochief MKII

Other available equipment:

- Steam and electric heating systems (can be controlled manually if controller electronics are not functioning)
- Steam regulating valve with remote position indication
- HFO/DO changeover valve

Filtration

Automatic full-flow filters

Fully approved by leading engine builders, Alfa Laval's automatic full-flow filters are compact and lightweight, requiring a minimum of space in the engine room. They offer reliable engine protection, with a low and constant pressure drop over the filter and continuous automatic backflushing. Thanks to a diversion chamber and backflushing treatment system, the clean oil used in the backflushing process can be recirculated for lower sludge volumes and greater savings.

- Low installation, operation and maintenance costs
- Full-flow filtering of:
 - Fuel oils for diesel engines
 - Lubricating oils for cross-head and trunk piston diesel engines
- Wide range of models and capacities, including an electrically-driven filter for fuel oil
- No external power source required for lubricating oil filters



Fuel oil filter (electrically driven)



Lubricating oil filter

Green advantages

The disc-type filter elements in Alfa Laval's full-flow filters have great advantages over cartridge-type filters. Their robust construction prolongs the filter lifetime by eliminating the risk of cracking in the filter surface. Most importantly, however, they eliminate the environmental disadvantages associated with filter cartridge disposal.

Eliminator, CCU

Suitable for lubricating oil treatment for engines burning HFO, DO, distillate or gas fuels, the Alfa Laval Eliminator, or CCU (Combined Cleaning Unit), is a unique combination of two key components in a shared housing. A full-flow automatic filter stops abrasive particles, thus protecting the engine, while a high-efficiency disc stack centrifuge on the backflushing phase of the filter efficiently cleans the lubricating oil.



Eliminator, CCU

Green advantages

The Eliminator forms a sealed lube oil circuit, which protects both the oil and the environment. Contaminants are kept from entering the system, while the oil is prevented from spilling or leaking out. In addition, continuous cleaning by the high-efficiency centrifuge gives the oil extra longevity – in some cases doubling its operational life.

Pumping

Three-screw pumps

Three-screw pumps offer high operating efficiency with a wide range of pressure and flow rate options. Thanks to the way that their screw threads seal against each other and against the pump casing, they move liquid at a uniform speed and with little noise or internal leakage. The pumps are simple and virtually maintenance-free, and they come in a standard range suited to nearly all onboard fuel and lubricating oil pumping applications.



- Wide range of models, capacities and options
- Low internal leakage and friction losses
- Low-noise operation with no fluid pulsations
- Outstanding suction capability that prevents harmful and noisy cavitation
- Magnetic coupling available to comply with SOLAS regulation concerning leakage-free equipment close to hot surfaces

Mobile hydraulic oil cleaning

Mobile hydraulic oil cleaning system, emmie

Wheeled from tank to tank and “installation free”, the emmie cleaning system protects against hydraulic system failure by removing water and particles from hydraulic oil. This has the added benefit of extending hydraulic oil life and reducing filter cartridge consumption. The emmie system takes its power from a standard 230V AC wall socket, and it requires only a brief cleaning at regular intervals. It comprises a stainless steel trolley with mounted separator, variable-speed pump, tank and control box, plus an electrical preheater and a set of quick-release hydraulic hoses.

- Removes water and 99% of all particles in the 2–5 μm size range
- Standard delivery features bowl options for both purifier and clarifier modes
- Capacity: 80–120 l/h

Areas of use:

- Bow, stern and azimuth thrusters
- CP propellers
- Deck cranes, winches
- Hoistable decks, ramps, hatch covers
- Steering gear
- Stabilizers
- Hydraulic lifts
- Deep well pumping systems for product/chemical tankers
- Stern tube lubricating oil
- Thermal oil





Cooling and heating

Heat and cold are fundamental opposites. Mediating between them is an essential part of onboard operations, and Alfa Laval has a long history of streamlining this exchange. As our innovative solutions grow smaller and more efficient, we continue to redefine the norm.



Transferring benefits

Heat exchangers are considered a mature technology, yet Alfa Laval is still pushing limits. Having led the shift from yesterday's heat exchangers to today's compact and energy-efficient solutions, we continue to lead with new techniques, such as laser welding and 100% stainless steel brazing in our plate heat exchangers (PHEs).

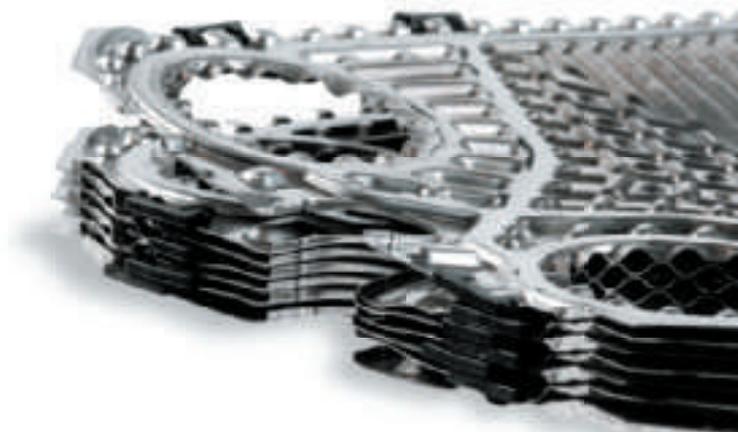
Our innovations, which optimize heat transfer and minimize fouling, do more than reduce the size of the heat exchanger. By minimizing losses in the heat exchange process, they maximize not only cooling capacity, but also the availability of cheap and concentrated heat energy.

The inside story

Over the years, our R&D efforts have accounted for major advances in heat exchanger design. By pressing PHE plates in a single step, for example, we've achieved more stress-resistant plates while using less material. And by fine-tuning tube construction and

configuration, we've increased the durability and flexibility of shell-and-tube models as well.

Similar advances have been made in our gaskets, from specialized elastomers to easy and efficient clip-on constructions. And as time goes on, there will be many more advances to come.



Central cooling

Gasketed plate heat exchangers

Gasketed plate heat exchangers (PHEs) from Alfa Laval are an ideal solution for cooling a vessel's prime mover. The plates are created with an advanced one-step pressing technique, forming thin but strong plates that handle shocks, vibrations and high pressure. The plate design is well suited to central cooling, which means fewer plates are necessary and maximum use is made of the available pressure drop.

- Optimized cooling efficiency
- Optimum heat transfer properties
- Easy installation and low operating cost
- Long service intervals and low maintenance costs
- Long-lasting glued or clip-on gaskets that withstand tough applications

Gasketed plate heat exchanger



Other applications for gasketed plate heat exchangers:

- Lubricating oil cooling
- Jacket water cooling
- General oil cooling/heating duties
- General water heating
- Tank cleaning heating
- Cargo heating

Steam heating and condensing

Gasketed plate heat exchangers, TS-M and AlfaCond series

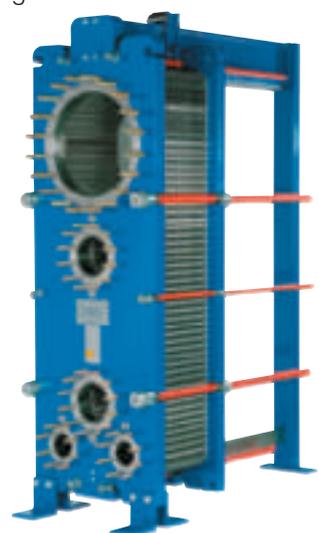
Gasketed plate heat exchangers (PHEs) from Alfa Laval's TS-M and AlfaCond series are specially engineered for steam heating and condensing applications. With their unique plate geometry, strong plate design and heat-resistant gaskets, they withstand the demands of both temperature and pressure. Moreover, their effective heat transfer allows for a reduction in cooling flow rate, which means a lower pump investment and reduced energy cost. They even create a major space savings, since their design is far more compact than the shell-and-tube models previously used in these applications.

- Reduced operating costs
- Ease of maintenance and shorter downtime
- High turbulence, little fouling
- Efficient sub-cooling
- Small footprint
- Extendable design for easy capacity increases
- Stainless steel and titanium models available

Green advantages

AlfaCond can be used on board as a turbine condenser in waste-heat recovery systems. A waste-heat recovery system utilizes the heat of the exhaust fumes to generate additional electricity.

AlfaCond 600



Gas condensation

Welded plate heat exchangers, AlfaRex

Lightweight and up to 80 % smaller than traditional shell-and-tube heat exchangers, gasket-free AlfaRex plate heat exchangers are suitable for duties involving high temperatures, high pressures and aggressive media. AlfaRex models are laser-welded in only two dimensions, which allows them to resist fatigue by contracting and expanding freely along their length. Their close temperature approach creates lower operating costs and significant life cycle savings by minimizing power consumption in condensation duties, where less compression of boil-off gas is needed.

- Temperature range from -50°C to +350°C and pressure capabilities up to 40 bar(g)
- Compatibility with liquids, gases and mixtures of liquids and gases (two-phase flows)
- Low hold-up volume
- Laser welding that reduces the heat-affected zone and stress build-up in the plates

Applications:

- LPG condensation
- Evaporation/condensation of clean fluids
- Refrigeration
- Cargo heating liquid
- General heating/cooling with high pressures or temperatures



AlfaRex

Green advantages

Volatile organic compounds from tankers are increasingly regarded as a serious environmental problem. AlfaRex plate heat exchangers are an ideal solution for condensing volatile organic compounds and keeping them on board, thus minimizing the effect of their transport on nature.

Refrigeration

Semi-welded plate heat exchangers, SWPHEs

Specially developed for refrigeration and air conditioning, semi-welded plate heat exchangers from Alfa Laval are compact, lightweight and corrosion resistant. They combine the flexibility and serviceability of gasketed PHEs with a welded PHE's ability to handle aggressive media. Only a low refrigerant volume is required, and a high turbulent flow helps minimize the risk of freezing. Refrigerant flows in every other welded channel while brine flows in every other gasketed channel, making it possible to change gaskets or to inspect and clean the gasketed channels.

- Capacity range from 35 kW to 10 500 kW
- Ability to handle two-phase flows at temperatures from -45°C to 160°C and pressures up to 25 bar(g)



M110-REF

- Option to assemble piece-by-piece on site
- Vibration resistance due to a short distance between support points
- High heat transfer coefficient for good operational economy

Applications:

- Refrigeration
- Air conditioning
- Evaporation and condensation
- Liquid and oil cooling

Electric heating

Aalborg EH

The Aalborg EH (formerly VESTA EH) is a flow-through electric heater, ideal for heating either oil or water. Primarily used as a booster heater, it has a flexible design that makes it well suited where electric power is the cheapest or only available power source. The standard model is mounted either vertically or horizontally. In addition, there is an Aalborg EH-S (formerly VESTA EH-S) model, which can serve as an alternative to boiler conversion for MGO operation (see “Green advantages”).

- Capacity range from 3 kW to 235 kW
 - Design temperatures up to 160°C and pressures up to 16 bar(g)
 - Construction in carbon steel or stainless steel (AISI 316 or better)
 - Vertical or horizontal mounting
- Accessories (optional):
- Valves
 - Monitoring equipment
 - Regulating equipment



Alfa Laval Aalborg EH

Green advantages

The Aalborg EH-S (formerly VESTA EH-S) model, which is a complete unit with control cabinet, pre-mounted pump, safety valve and non-return valve, can be connected to an auxiliary steam boiler instead of converting it for MGO operation. This allows environmental compliance with EU directive 2005/33/EC.

Oil and water preheating

Aalborg MX

Compact Aalborg MX (formerly VESTA MX) shell-and-tube heat exchangers are most frequently used as oil preheaters for main and auxiliary engines, burners and separators, though their flexible design can be customized to almost any application. Comprised of U-formed tubes with a small diameter, they use either steam or thermal oil as a heating medium. Aalborg MX models are available for use as insert/immersion heat exchangers, as well as for use as outflow suction heaters.

- Capacity range from 10 kW to 2000 kW
 - Design temperatures (shell/tube) up to either 160/204°C or 195/212°C
 - Design pressures (shell/tube) up to 16/16 bar(g) or 32/19 bar(g)
 - Construction in carbon steel (other materials upon request)
 - Baffles and nozzles tailored to individual requirements and acceptable pressure drop
- Accessories (optional):
- Valves
 - Monitoring equipment
 - Regulating equipment



Alfa Laval Aalborg MX

Dump condensing and tank cleaning

Aalborg MD

Constructed from noble materials, Aalborg MD (formerly VESTA MD) shell-and-tube heat exchangers are extremely resistant to seawater and therefore require no sacrificial anodes. This makes them an ideal solution for use as dump condensers, drain coolers, oil coolers or heaters for tank cleaning fluid. Available in designs for either atmospheric or pressurized operation, they feature straight tubes in CuNi and an externally sealed floating tube sheet that compensates for thermal expansion.

- Capacity (condensing): up to 6000 kg/h steam at 3 bar(g)/157°C, subcooled to 90°C with 32°C seawater
- Capacity (tank cleaning): up to 360 m³/h seawater, heated from 5°C to 80°C
- Design temperatures (shell/tube) up to 204°C/100°C
- Design pressures (shell/tube) up to 16/16 bar(g)
- Construction in CuNi 90/10 or CuNi 70/30 alloy, Al/Ni bronze, and carbon steel



Alfa Laval Aalborg MD

Accessories (optional):

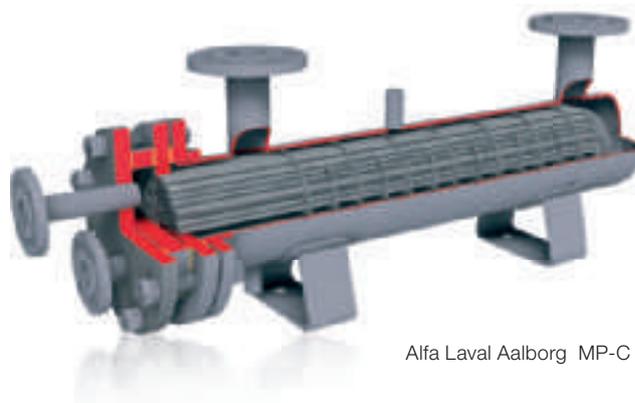
- Valves
- Monitoring equipment
- Regulating equipment

Cargo heating

Aalborg MP-C

Built with over 30 years of cargo heating experience, Aalborg MP-C (formerly VESTA MP-C) shell-and-tube heat exchangers are constructed in 100% stainless steel (AISI 316L) and are thus a perfect choice for heating oil, corrosive or edible cargo. Their heating surfaces are optimized through the use of specially designed baffle plates, which results in a very compact, efficient and cost-effective installation. Horizontal or vertical mounting is possible, and steam, thermal oil or hot water can be used as a heating medium.

- Standard capacity range from 250 kW to 2000 kW (other capacities upon request)
- Design pressures (shell/tube) up to 14/10 bar(g)
- Construction in stainless steel (AISI 316L)



Alfa Laval Aalborg MP-C

Accessories (optional):

- Valves
- Monitoring equipment
- Regulating equipment

Mineral oil preheating

HEATPAC CBM

The HEATPAC CBM is a cost-effective and virtually maintenance-free solution for mineral oil preheating. It consists of corrugated steel plates, mounted to form separate channels through which the oil and heating medium flow in opposite directions. A copper brazing material seals and holds the plates together, ensuring optimal heat transfer efficiency and pressure resistance. Thanks to its compact and lightweight design, the HEATPAC CBM is easy to install or retrofit, even in very confined spaces.

- Low-cost investment
- Optimum use of space
- Minimum maintenance – no replacement parts
- Two types, each with 20, 40, 60, 80 or 100 plates
- Thermal oil, steam or hot water as heating medium
- Capacity: up to 30 m³/h



HEATPAC CBM

Optional equipment:

- Temperature control equipment
- Regulating valve
- Relief valve

Filtration

Automatic self-cleaning filter, ALF

Simple and cost-effective to install, the automatic self-cleaning filter protects a plate heat exchanger by removing debris at the seawater intake. Installed between the seawater pumps and the PHE itself, it provides continuous filtration of the cooling water. Collected debris is automatically removed without disrupting the liquid flow. The filter is easy to service, since the filter basket can be removed without removing the pipes.

- Prevention of PHE clogging
- Continuous, automatic cleaning process
- Short flushing period with flexible regulation of flushing intervals
- Low pressure drop
- Easy service without removing pipes
- Electrical, pneumatic or hydraulic actuators

Available in two models:

- ALF-S (stainless steel)
- ALF-R (rubber-lined carbon steel)



ALF

Port filter

The port filter is a low-cost alternative to the ALF filter. Installed in the seawater inlet port of a plate heat exchanger, it prevents the PHE from clogging with debris that may have passed through the main seawater intake filters/strainers. Removal of the port filter for maintenance is performed from the pressure plate side of the PHE, which means that dismantling of the inlet pipework is avoided.

- Materials: AISI 316L, titanium, 254 SMO
- Standard mesh size: $\text{Ø } 1.5 \Delta 2.33 \text{ mm}$

Port filter



Cleaning-in-Place

Cleaning-in-Place (CIP) systems for PHEs

Alfa Laval Cleaning-in-Place systems are a simple way to keep heat exchangers of all types performing optimally. Connected directly to the heat exchanger ports, they circulate a mixture of heated, usually biodegradable chemicals that effectively dissolve scale, sludge and microorganisms. In this way, the fouling that reduces heat transfer can easily be removed without any need to dismantle the heat exchanger. Not only does this save time on cleaning, it helps to prolong plate and gasket lifetimes.

- Easy operation
- Prolonged gasket life – no damage
- Heating of cleaning chemicals with electricity or steam
- Compatibility with spiral, shell-and-tube, gasketed, welded and brazed heat exchangers
- A range of models and sizes available



Cleaning-in-Place (CIP) chemicals for PHEs

Alfa Laval CIP chemicals for PHEs are designed to keep your equipment in peak condition without endangering fragile marine ecosystems. All of the chemicals are non-hazardous, and many of them are also biodegradable. Most gentle is the general-use line of Alpacon chemicals, which contains a unique raw material based on fermented whey.

Chemicals for general use:

- Alpacon Descalant
- Alpacon Degreaser

PHE-specific chemicals:

- AlfaPhos
- AlfaCaus
- AlfaNeutra
- AlfaAdd



Green advantages

Alfa Laval's high-performance chemicals for CIP systems are non-hazardous, which means that no health risks are posed and no protective equipment is necessary. They are also safe for the environment, as they are based to the greatest possible extent on gentle, natural materials.



Steam and heat generation

Steam and heat have a fundamental role in many onboard processes. Whether by using oil and gas or by economizing heat sources that already exist on board, Alfa Laval finds increasingly efficient ways to generate steam and heat – and to distribute them where they are needed most.



A century of pioneering

Alfa Laval's Aalborg steam and heat generation solutions represent a unique body of thermal expertise. They stand for nearly 100 years of innovation, from pin-tube boiler elements, which increase heating surface and decrease tube length by a factor of eight, to composite boilers and high-temperature, low-pressure thermal fluid systems.

Even more importantly, they stand for exceptional ease and efficiency, from quotation and documentation to installation and ongoing operating performance.



Development for tomorrow

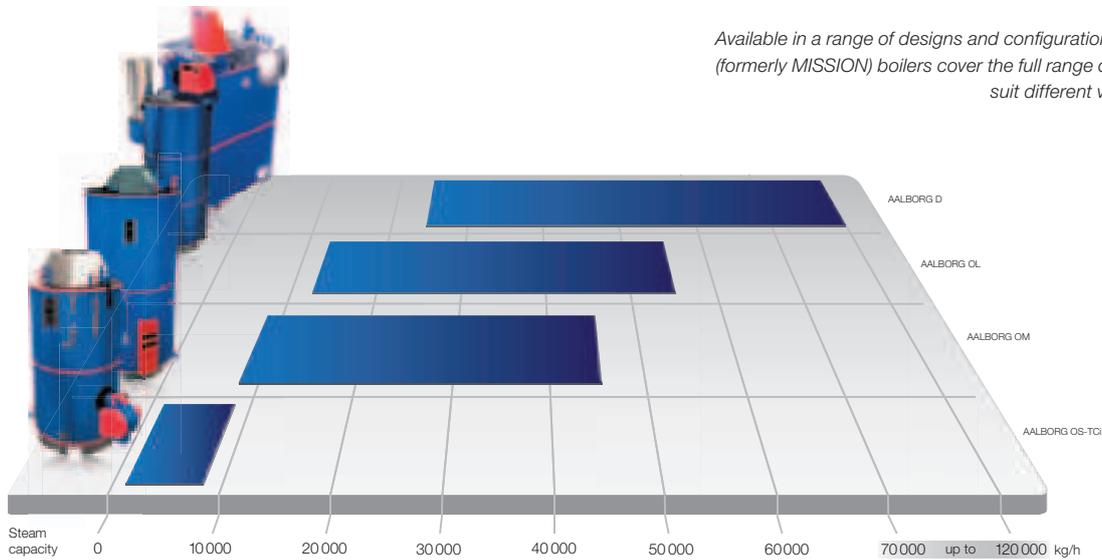
Advances are still being made, especially when it comes to reducing environmental impact. The trendsetting Aalborg boiler concept, with its modular construction and easy maintenance, is now entering a new generation. Suffixed TCi (Turbo Clean, intelligent), the new self-cleaning boilers do away with water washing – and the resulting need for effluent disposal.

Likewise, there are improvements in our thermal fluid systems, such as an Energy Management System that reduces heating and emissions by comparing the available heat with the actual temperature of the vessel's heat consumers.

With solutions like these, the Aalborg name continues to mean progress, both on board and beyond.

Steam and hot water production (oil/gas-fired)

Available in a range of designs and configurations, Alfa Laval's Aalborg (formerly MISSION) boilers cover the full range of capacities needed to suit different vessels and operations.



Aalborg OS-TCi

Intended for steam production, the oil-fired Aalborg OS-TCi (formerly MISSION OS-TCi) is supplied as a vertical, pre-assembled boiler unit. This reliable, high-efficiency boiler is constructed with helix tubes and features a user-friendly, integrated pressure-atomizing burner, which is controlled and monitored via an Aalborg Control Touch (formerly MISSION Control Touch) system. The boiler's built-in TCi (Turbo Clean, intelligent) technology makes it self-cleaning to the highest possible degree, and what little maintenance remains is easy and has a low environmental impact.



Alfa Laval Aalborg OS-TCi

- Oil-fired production of steam
- TCi (Turbo Clean, intelligent) technology for improved efficiency and self-cleaning without water washing
- Design pressure: 10 bar(g)
- Capacity: 750–8 000 kg/h

Aalborg OM

Intended for steam or hot water production, the oil- and gas-fired Aalborg OM (formerly MISSION OM) is supplied as a vertical, pre-assembled boiler unit with both smoke tubes and pin tubes. Its furnace consists of membrane walls with a number of large tubes in between, and sufficient circulation is ensured by downcomers placed within these tubes. The optimally designed pin-tube elements, which ensure high performance, are also used to support the top plates of the furnace and boiler. Two design pressures are available.



Alfa Laval Aalborg OM

- Oil- or gas-fired production of steam or hot water
- Design pressure: 11 or 18 bar(g)
- Capacity: 8 000–45 000 kg/h

Aalborg OL

Intended for steam or hot water production, the oil- or gas-fired Aalborg OL (formerly MISSION OL) is supplied as a vertical, two-drum cylindrical boiler. Its furnace, which is built with membrane walls and contains only little refractory material, is shaped to provide optimal combustion conditions. The convection section consists of straight pin tubes with bent pins, which provide a high coefficient of heat transfer and a low pressure loss, and circulation is ensured by down-comers placed outside the membrane walls. Two design pressures are available.

- Oil- or gas-fired production of steam or hot water
- Design pressure: 9 or 18 bar(g)
- Capacity: 12 500–55 000 kg/h



Alfa Laval Aalborg OL

Aalborg D

Intended for steam or hot water production, the oil- and gas-fired Aalborg D (formerly MISSION D) is supplied as a vertical, two-drum boiler with a D-type design. Its furnace is built with membrane walls and contains only little refractory material.

The convection section consists either of bare tubes or of straight pin tubes with bent pins, which provide a high coefficient of heat transfer and a low pressure loss. Circulation is ensured by downcomers placed outside the membrane walls.

- Oil- or gas-fired production of steam or hot water
- Design pressure: 18 bar(g)
- Capacity: 25 000–120 000 kg/h



Alfa Laval Aalborg D

Steam production (composite)

Aalborg OC-TCi

Intended for steam production, the high-performance Aalborg OC-TCi (formerly MISSION OC-TCi) is a space-saving combination boiler fired with both oil and exhaust gas. Pre-assembled and installed vertically, it consists of an oil-fired module with helix tubes and an exhaust-gas-fired module with smoke tubes. The boiler provides effective self-cleaning, thanks to its built-in TCi (Turbo Clean, intelligent) technology and its relatively high gas velocity compared to other composite boilers. Controlled via an Aalborg Control Touch (formerly MISSION Control Touch) system, it can be fitted with a compact silencer to suit any type of diesel engine.

- Combined oil- and exhaust-gas-fired production of steam
- TCi (Turbo Clean, intelligent) technology for improved efficiency and self-cleaning without water washing
- Design pressure: 10 bar(g)
- Capacity: 750–6 500 kg/h (oil-fired section)
400–5 000 kg/h (exhaust-gas-fired section)
400–8 000 kg/h (combined)



Alfa Laval Aalborg OC-TCi

Combustion

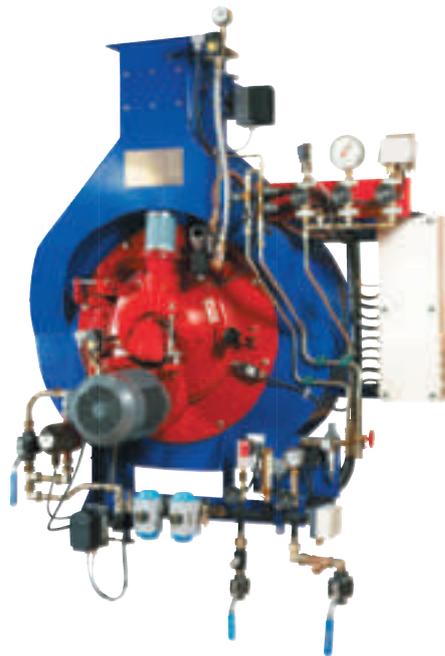
Aalborg KBE

The compact and lightweight Aalborg KBE (formerly KBE) is an optimized burner for HFO/MDO/MGO, based on well-proven rotary cup technology. It operates according to the forced-draught fan location principle, with smaller models featuring a pre-mounted fan and larger models delivered with the fan as a loose component.

The burner's ignition point provides the most dependable ignition possible, while its electronic regulation of air/fuel ratio allows extremely precise combustion control.

A safety device built into the Aalborg KBE prevents the improper adjustment of tertiary air, which might otherwise cause damage to the swirler and cup.

- Max. viscosity at 50°C: 700 cSt
- Max. viscosity at burner inlet: 45 cSt
- Fuel calorific value: 40.2 MJ/kg
- Excess air ratio: 1.15
- Fuel oil delivery pressure: 2.5 bar(g)
- Oil capacity: 150–1 300 kg/h



Alfa Laval Aalborg KBE

Aalborg KBP

The Aalborg KBP (formerly KBP) is a modulating, mono-bloc pressure-jet burner for HFO/MDO/MGO. Designed for and integrated into the Aalborg OS-TCi and Aalborg OC-TCi (formerly MISSION OS-TCi and MISSION OC-TCi) boilers, it provides reliable high performance with the lowest possible emission of CO₂. The burner operates according to the well-proven pressure-atomizing principle, and its inclined design helps optimize combustion. Compact and sturdily constructed from just a few components, it has doors that allow easy access for service and maintenance of the nozzle and burner parts.

- Max. viscosity at 50°C: 700 cSt
- Max. viscosity at nozzle: 16 cSt
- Fuel calorific value: 40.2 MJ/kg
- Excess air ratio: 1.15
- Fuel oil delivery pressure: 30 bar(g)
- Oil capacity: 92–613 kg/h



Alfa Laval Aalborg KBP

Aalborg KBO-E

The Aalborg KBO-E (formerly KBO-E) is a modulating pressure-jet burner for HFO/MDO/MGO with a highly stable flame at all loads. Its robust monobloc construction allows quick, easy and cost-effective installation, since all wiring, piping and testing is completed prior to delivery. The burner also has a hinged design that makes swing-out inspection and maintenance possible, with electrical connections accessed via the top cover.

- Max. viscosity at 50°C: 700 cSt
- Max. viscosity at burner inlet: 15 cSt
- Fuel calorific value: 40.2 MJ/kg
- Excess air ratio: 1.2
- Fuel oil delivery pressure: 30 bar(g)
- Oil capacity: 93–510 kg/h



Alfa Laval Aalborg KBO-E

Aalborg KBSD/KBSA

The Aalborg KBSD/KBSA (formerly KBSD/KBSA) is a steam-atomizing burner for HFO/MDO/MGO. Designed for and delivered pre-mounted on top-fired (KBSD) or side-fired (KBSA) Aalborg (formerly MISSION) boilers from Alfa Laval, it features a dynamic wind box that minimizes pressure loss and stabilizes combustion even at low loads. Rigorously tested to demonstrate performance with all grades of fuel oil, the burner features accessibly arranged mountings that ensure easy installation and maintenance.

- Max. viscosity at 50°C: 700 cSt
- Max. viscosity at burner inlet: 15 cSt
- Fuel calorific value: 40.2 MJ/kg
- Excess air ratio: 1.15
- Fuel oil delivery pressure: 2.5 bar(g)
- Oil capacity: KBSD: 950-4150 kg/h
KBSA: 600-4150 kg/h



Alfa Laval Aalborg KBSD



Alfa Laval Aalborg KBSA

Boiler/burner system control

Aalborg Control

The Aalborg Control (formerly Mission Control) is a computerized burner/boiler control system with a panel and local memory. Located on the burner, it is connected to a PC with SCADA software and can be accessed remotely for historical data and trending curves. An electronic key control system prevents more than one operator from using the control system at any given time.



Alfa Laval Aalborg Control

Aalborg Control Touch

The Aalborg Control Touch (formerly Mission Control Touch) is a computerized burner/boiler control system with a TFT touchscreen and local memory. The system can store historical data and trending curves on a flash memory card for easy access and transfer, and its graphical HMI can be accessed from anywhere on the vessel. Both single-cabinet and multi-cabinet installations are possible.



Alfa Laval Aalborg Control Touch

Aalborg Steam Pilot

Intuitive and exceptionally easy to operate, the Aalborg Steam Pilot (formerly MISSION Steam Pilot) is a computerized burner/boiler control system with all the advantages of a modern touchscreen HMI. Its self-diagnostic functions, which monitor and test all burner operating sequences and visualize burner startup, are a first among systems for burner control. Even so, the system is fully adapted to the marine environment, withstanding temperatures from -20°C to +70°C. Memory and backup are handled via Flash ROM storage, while historical data and trends can easily be saved to and transferred on a USB memory stick.



Alfa Laval Aalborg Steam Pilot

- Redundant Ethernet switch on main circuit board
- CANOpen bus system
- RS-485 MOD bus for communication with IT systems
- Access locally, from the control room or via the Internet

Burner modification

Marine gas oil (MGO) upgrade kits

Alfa Laval's class-approved marine burner upgrade kits enable a safe changeover from HFO to low-sulphur marine gas oil (MGO), which is necessitated by EU directive 2005/33/EC when a vessel is in port or at anchorage. While ensuring technical compliance with fuel requirements, the upgrade kits eliminate the risks associated with running a fuel of lower density, viscosity and flash point than the burner was originally designed for. Both single-line and double-line upgrade kits are available, as well as accompanying inspection services. The double-line kit ensures a rapid change-over between fuels.

- Class approval from all major classification societies
- OEM solutions for Aalborg systems
- OEM-developed software upgrade
- Full system hazop (single and double line)
- Maximum boiler capacity during MGO operation (single and double line)
- Avoidance of contamination through failure positioning of valves
- Improved safety and optimum operational integrity



Green advantages

EU directive 2005/33/EC specifies fuel with a sulphur content of $\leq 0.1\%$ when in port or at anchorage. But the lower flash point, higher calorific value and poorer lubrication characteristics of low-sulphur fuels like MGO create safety hazards on board. Alfa Laval upgrade kits allow environmental targets to be met while safeguarding vessel and crew.

Thermal fluid heating

Aalborg TFO

The Aalborg TFO (formerly MISSION TFO) is an oil- or gas-fired heater for thermal fluid, delivered as part of a complete thermal fluid heating system that includes all necessary components. Available in both vertical and horizontal executions, it has a heavy insulation jacket and is constructed with a double coil of bare tubes, which can be accessed for inspection and cleaning by means of a removable top plate. The Aalborg TFO has a three-pass flue gas configuration that results in high efficiency, as well as a low thermal fluid pressure drop.

- Thermal fluid design temperature: 280°C
- Capacity: 100–20 000 kW

Complete system delivery includes:

- Oil-fired heaters
- Burners
- Economizers
- Control panels
- Circulation pumps
- Valves
- Expansion tanks
- Dump coolers
- Tank cleaning heaters
- Heat exchangers
- Electric heaters (50–3 000 kW)
- Unfired steam boilers
- Spare parts



Alfa Laval Aalborg TFO

Aalborg EX

The Aalborg EX (formerly MISSION EX) is an exhaust gas economizer for heating thermal fluid, delivered as part of a complete thermal fluid heating system that includes all necessary components. Installed vertically and tailored specifically to each application, it secures optimal heat recovery from the engine exhaust gases. Designed with low pressure loss and constructed with coils of bare tubes, it has integrated soot-cleaning nozzles at the exhaust gas inlet and a top-mounted nozzle system for firefighting. If desired, it can also be equipped with integrated inlet and outlet boxes and with integrated exhaust gas bypass dampers.

- Thermal fluid design temperature: 300°C
- Capacity: 100–5 000 kW

Complete system delivery includes:

- Oil-fired heaters
- Burners
- Economizers
- Control panels
- Circulation pumps
- Valves
- Expansion tanks
- Dump coolers
- Tank cleaning heaters
- Heat exchangers
- Electric heaters (50–3 000 kW)
- Unfired steam boilers
- Spare parts

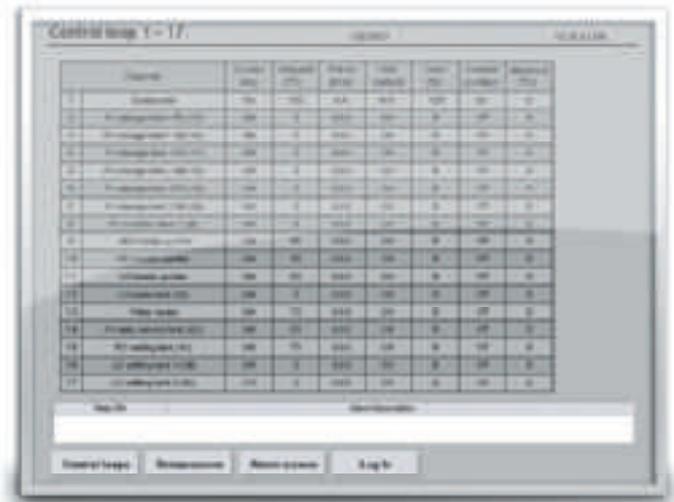


Alfa Laval Aalborg EX

Thermal fluid system control

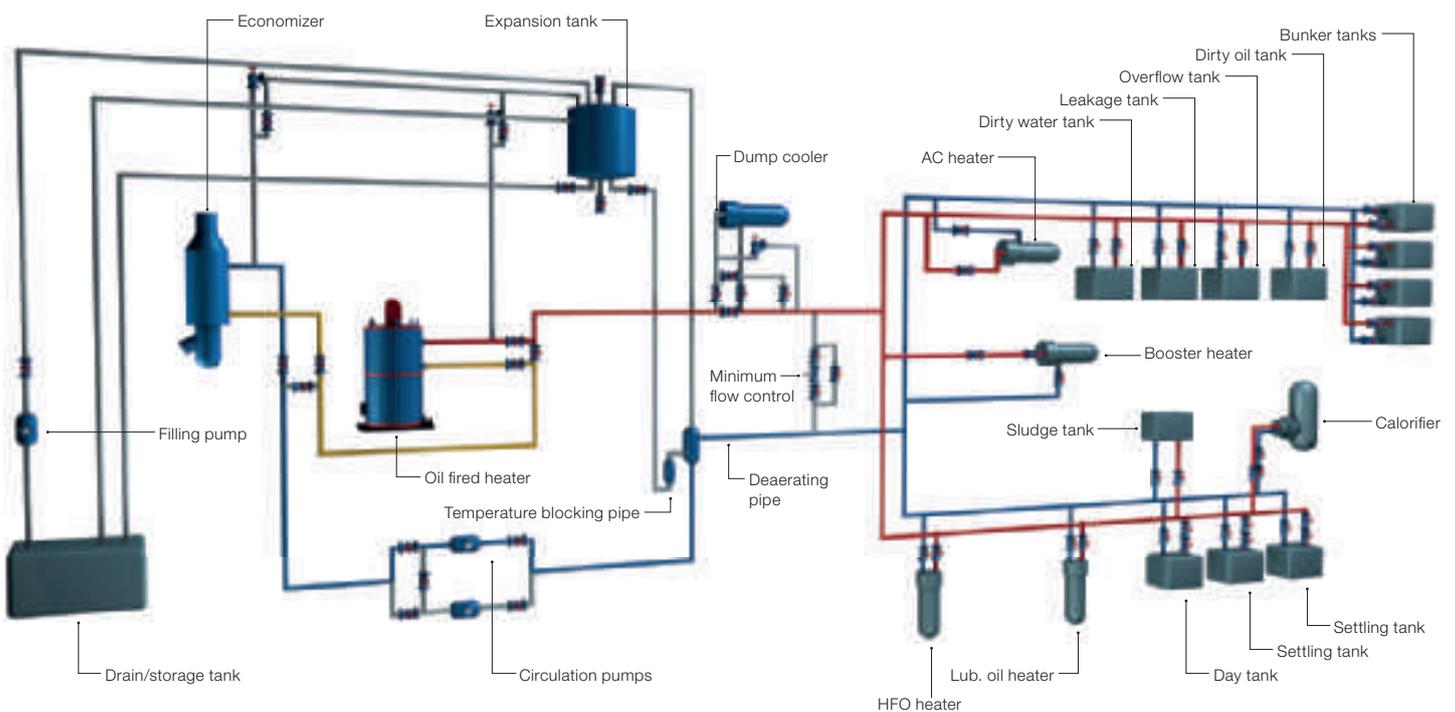
Aalborg EMS

The Energy Management System, or EMS, is a control and monitoring system for the ship's heat consumers. It avoids unnecessary fuel oil consumption and emissions by comparing the available heat with the actual requirements of the heat consumers, all of which are incorporated into the system. This effectively minimizes peak loads and limits supplemental firing of the oil-fired heater. The heat consumers are managed via a touch-screen, from which the desired temperature and warm-up time can be set. If sufficient heat is not available, for example when the vessel is in port, selected consumers are temporarily shut down automatically according to a preferential sequence.



Alfa Laval Aalborg EMS

Typical flow diagram of thermal fluid heating installation with heat consumers





Waste heat recovery

Today's modern engine systems are considerably more efficient than their predecessors. Yet much of the energy they produce still goes to heat rather than propulsion. By recapturing this energy and putting it to use, Alfa Laval reduces both fuel consumption and emissions.



From waste to win

The recovery of waste heat is a unique opportunity that benefits operating economy as much as it does the environment. This is why – with 50% of a main engine's fuel energy going to heat flow – using exhaust gas to generate steam at sea is so attractive.

Alfa Laval's Aalborg waste heat recovery systems have delivered documented fuel savings and CO₂ reductions of up to 12%. Our extensive experience lets us design and install systems that maximize economic and environmental gains without compromising safety.

Going further

As well as working with main engine exhaust, Alfa Laval is expanding the Aalborg portfolio by focusing on overall system efficiency and other sources of wasted heat. The latter include auxiliary engines, whose recovered heat can meet steam requirements during port stays and in some cases even on route.

Using overlooked heat sources to superheat steam, for example, not only helps vessels accommodate their power generation needs, but also helps prepare them for forthcoming emission regulations.

As they cut fuel use and thereby costs, they also limit their production of CO₂, NO_x, SO_x and more.



Exhaust gas heat recovery

Aalborg XS-TC7A

Constructed with smoke tubes, the Aalborg XS-TC7A (formerly MISSION XS) is an exhaust gas economizer for main diesel engines. It is available in two models, both of which have a vertical design and a high gas velocity that minimizes fouling. The Aalborg XS-2V has its own steam space and can operate independently from the oil-fired boiler/steam drum. The Aalborg XS-TC7A has no steam space and is designed for forced circulation and operation with an oil-fired boiler. There is also a version of the Aalborg XS-TC7A for use as an exhaust gas economizer after auxiliary engines (see “Green advantages”).

- Design pressure: 10 bar(g)
- Capacity according to ship's specification

Options:

- Model with or without own steam space (XS-2V or XS-7V)
- Integrated silencer
- Division for two engines
- Divided for exhaust gas lines



Alfa Laval Aalborg XS-TC7A

Green advantages

A modified version of the Aalborg XS-7V (formerly MISSION XS-7V) can be installed as an exhaust gas economizer after auxiliary engines. This previously overlooked heat source offers a large amount of energy that can support steam requirements during port stays or even en route. The modified economizer is focused on energy generation and has a typical payback time of 1–1.5 years.

Aalborg XW

Constructed with water tubes and operating with forced circulation, the Aalborg XW (formerly MISSION XW) is intended as an exhaust gas economizer for main diesel engines. Its robust design, however, is suited to numerous applications. The heating surface is made up of double-gilled tubes as standard, with a spacing that minimizes soot build-up. In addition, there is an efficient cleaning system that uses steam or compressed-air sootblowers. The economizer can be used in conjunction with an oil-fired auxiliary boiler or a separate steam drum, in both cases acting as a steam/water separator.

- Design pressure: 18 or 24 bar(g)
- Capacity according to ship's specification

Options:

- Single-gilled or bare tubes (double-gilled as standard)
- Dividing wall system for connecting several exhaust gas sources
- Integrated silencer



Alfa Laval Aalborg XW

Superheating

Aalborg XW-TG

An enhanced version of the Aalborg XW, the Aalborg XW-TG (formerly MISSION XW-TG) has been modified to more efficiently utilize the waste energy from large diesel engines, with reduced fuel consumption and CO₂ emissions as a result. Like the standard version, it is constructed with double-gilled water tubes and operates with forced circulation. However, the Aalborg XW-TG provides superheated steam for power generation by means of a steam-turbine-driven (turbo) generator. Because the heat recovery rates involved demand larger heating surfaces, it also features safety enhancements such as bypass dampers and extended monitoring equipment.

- Design pressure: 6–24 bar(g)
- Capacity according to ship's specification

Options:

- Single- or dual-pressure configurations
- Single-gilled or bare tubes (double-gilled as standard)



Alfa Laval Aalborg XW-TG

Aalborg XW Superheater

The Aalborg XW Superheater (formerly MISSION XW Superheater) is a superheater system for auxiliary boilers. Built in the same manner as the Aalborg XW exhaust gas economizer, with water tubes and forced circulation, it provides fuel savings in the operation of steam-turbine-driven cargo pumps on tankers. This is because running with superheated steam both reduces the outlet temperature of the flue gas from the boilers and increases the thermal efficiency of the turbine. No change in the auxiliary boiler heating surface is necessary. Likewise, no flue gas bypass is required, since the superheater design allows dry running when only saturated steam is needed.

- Design pressure: 18–24 bar(g)
- Capacity according to ship's specification



Alfa Laval Aalborg XW Superheater

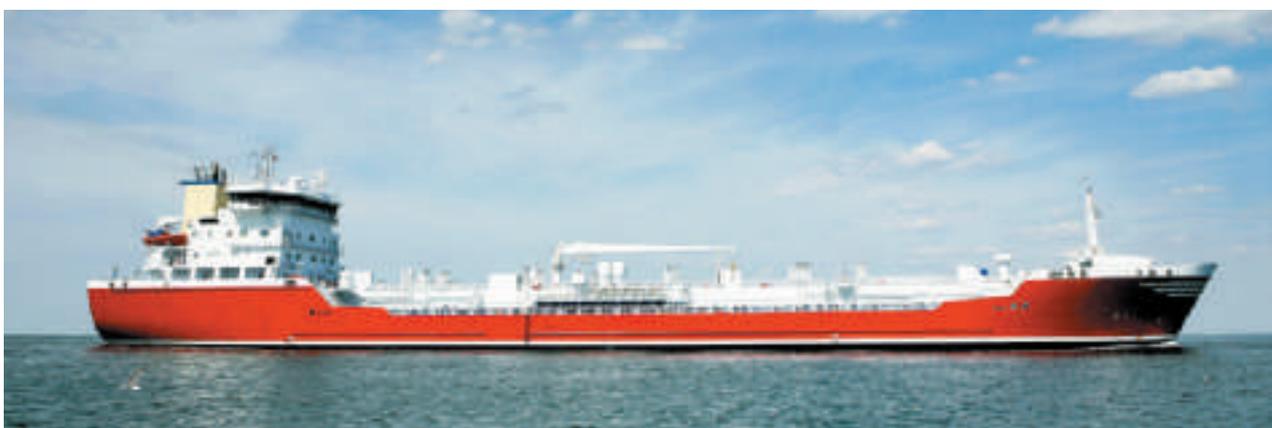
Green advantages

The Aalborg XW Superheater improves the environmental profile of a vessel by greatly increasing the efficiency of the cargo pump turbine. The fuel savings resulting from its installation can be as high as 10–15%, which can mean a return on investment in less than two years.



Tank cleaning and safety

In some situations, the most difficult thing to achieve is nothing at all: a surface without residues and contaminants, for example, or an atmosphere without the slightest explosion risk. Fortunately, Alfa Laval can make easy work of achieving a clean and stable tank environment.



Dynamic improvements

Alfa Laval's automated Gunclean Toftejorg tank cleaning solutions represent over 50 years of optimization. With a helical or criss-cross spray pattern that reaches the whole tank in a fraction of the traditional cleaning time, they eliminate both hassle and expense.

Over the years, our nozzle technology has evolved to include advances like the hysteresis clutch of our i40 and i65 series, which prevents false starts and eliminates the leakage risk of a second shaft penetration. Our G-Pass design software has evolved with it, going beyond the requirements of shadow diagrams to provide 3D simulations that prevent product build-up and reduce fluid and energy use.

Safer investments

For nearly the same amount of time, Alfa Laval has been optimizing inert gas production under the Aalborg name. Generators and systems have been developed with various production methods, designed and configured for the combustion-safety requirements of each type of ship.

Today, nearly all these solutions feature the unique Ultramizing system, which atomizes the fuel oil for soot-free inert gas even at partial loads. This and innovations like it safeguard not only the tank environment, but also the environment as a whole.

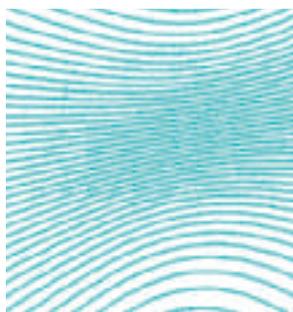


Tank cleaning technologies

Machine types

Single-nozzle

Alfa Laval's programmable single-nozzle tank cleaning machines are a development of the original Gunclean tank cleaning machine, invented in 1965. Since then, the equipment has been modernized and updated to take advantage of technological advances in different applications. Single-nozzle technology uses a helical cleaning pattern that can be adjusted to individual cleaning requirements.

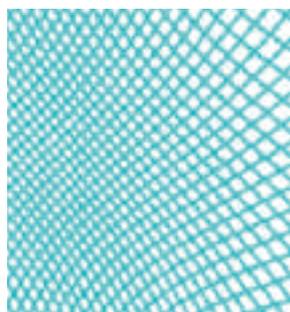


Single nozzle and helical cleaning pattern



Dual-nozzle

Dual-nozzle technology has been known for simplicity and reliability since the introduction of the first Toftejorg dual-nozzle tank cleaning machine in 1953. The nozzles spray cleaning fluids evenly in a characteristic criss-cross pattern, which reaches the entire tank surface to ensure deep cleaning. Alfa Laval's dual-nozzle tank cleaning machines are pre-programmed for 4-10 different cycles, depending on the type of machine.



Dual nozzle and criss-cross cleaning pattern



Green advantages

For vessels with cargoes that do not necessitate hard-impact cleaning, dual-nozzle machines are the right choice. Since the fluid is distributed by two nozzles, the tank surfaces are covered twice as fast. This results in lower fluid consumption and less slop.

The i40 and i65 tank cleaning platforms

Alfa Laval's i40 and i65 tank cleaning platforms are the latest Gunclean Toftejorg developments and represent today's most advanced tank cleaning technology. Available in single-, dual- and multi-nozzle machines, they combine a wear-resistant design with a range of

unique mechanical advances. Chief among these is the patented hysteresis clutch (see below), which provides built-in speed adjustment and prevents slippage during water hammering or sudden pressure surges. Other improvements include an optimized turbine and friction-reducing ceramic balls that enhance lifetime performance.



Hysteresis clutch and turbine

- Topside speed adjustment during operation
- No speed adjustment shaft – reduced risk of seal leakage
- Zero slippage for an uninterrupted cleaning cycle
- Optimized turbine for maximum power transmission
- Durable design and low-wear materials for reduced spare parts consumption

Deck-mounted cleaning machines

Small deck-mounted machines

The machines in Alfa Laval's Gunclean Toftejorg i40 and i65 series are second-generation, high-impact tank cleaning machines. Developed to meet the toughest tank cleaning requirements, they feature a hysteresis clutch with built-in speed adjustment.

- For chemical tankers, product tankers and offshore
- Single-nozzle, dual-nozzle and multi-level versions
- Stainless steel where in contact with cargo
- Slippage-free, with no shaft seal to leak
- Working pressure: 5-12 bar(g)
- Capacity: 5-45 m³/h



Large deck-mounted machines

Fully programmable and turbine-driven, the Gunclean Toftejorg 270 FT Mark I is the most-sold single-nozzle tank cleaning machine for crude oil tankers and bulk carriers. Its four programs range from quick cleaning to high-pitch, heavy-duty cleaning.

- For crude oil tankers, bulk carriers and FPSOs
- Inlet house in galvanized or epoxy-coated steel
- Downpipe in galvanized or stainless steel
- Cleaner head in bronze or stainless steel
- Working pressure: 7-12 bar(g)
- Capacity: 30-110 m³/h



Dual-nozzle machines with internal drive

These dual-nozzle machines are typically submerged aboard crude oil tankers or used as portable equipment. They are also ideal for the small tanks of supply vessels, where their criss-cross spray pattern distributes cleaning media faster and more evenly than manual cleaning.

- For use on all types of tankers
- Fixed and portable versions
- Stainless steel where in contact with cargo
- Many different thread connections and inlet flanges
- Working pressure: 5-12 bar(g)
- Capacity: 7-90 m³/h



Retractable cleaning machines

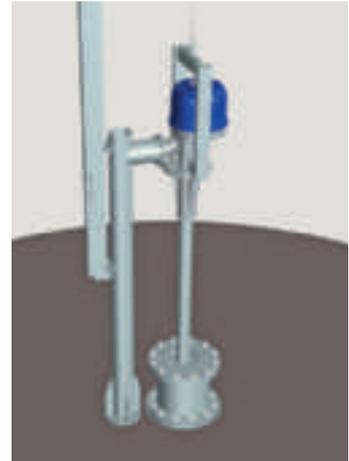
Gunclean Toftejorg 270FT – swing-arm

In order to prevent damage to the cleaner head during cargo operations, the cleaning machine is installed either through the deck or directly inside the hatch cover and hinged on a swivel coupling. Using a convenient hand crank, a single operator can move the unit 90° from its parked position to operational position and back again.



Gunclean Toftejorg 270F – vertical

Using the optional duct pipe, machine support and lifting device with chain block, the cleaning machine is easily installed through a duct in the deck. This helps prevent damage to the cleaner head during cargo operations. This is often a cost-effective means of retrofitting bulk carriers.



Portable cleaning machines

Rotary jet heads and accessories

Even when a fixed tank cleaning installation is in place, a tank's design may also require portable tank cleaning machines. Internal structures can create areas that are not easily reached by fixed jets, and the nature of the product carried may prevent the use of fixed machines in some areas. If the time and manpower are available on board, portable machines can also be used as a simple and cost-effective stand-alone alternative.

- Construction in stainless steel
- Sizes to accommodate tanks up to 5000 m³
- Various nozzle diameters for optimized impact and flow rate at the desired pressure
- Special cleaner heads and nozzles for longer jet lengths
- Alternative thread and camlock connections upon request



Portable machine and hose saddle



Hose winch with hose and coupling



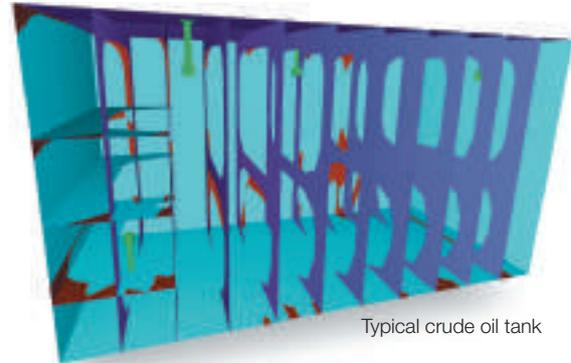
TZ-75P

Cleaning optimization software

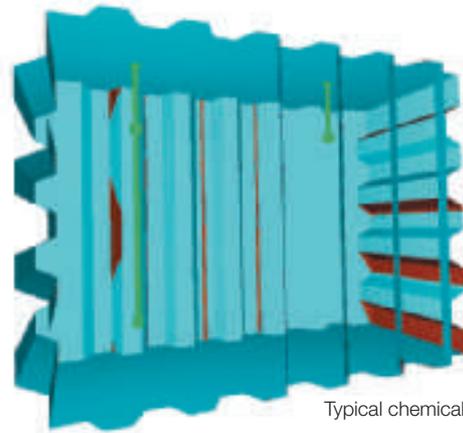
G-Pass

Alfa Laval's G-Pass software is a unique approach to optimizing tank cleaning solutions. It creates a three-dimensional image of your tank and its internal obstructions, which can be rotated to any angle to show the "shadows" that are not directly hit by the tank cleaning jets. G-Pass bases its calculations on the tank's actual construction and can make use of details that are normally disregarded, including faceplates, PMAs, ladders and pump stacks. Its true-to-life results, based on the position, quantity, jet length and jet hit angle of the proposed cleaning machines, can be documented as shadow diagrams in accordance with the International Marine Organization (IMO) and individual or special requirements.

- Presentation of cleaning results as an easily interpreted 3D representation
- Inclusion of internal obstructions, e.g. corrugations and stringer platforms
- Elimination of human error in shadow diagram preparation
- Fully optimized results when used with appropriate definitions of jet length and jet hit angle (DNV and NK definitions recommended)



Typical crude oil tank



Typical chemical tank

G-Pass creates a three-dimensional view of your tank that can be rotated in any direction. All obstructions are present and areas not directly hit by the cleaning jets are clearly shown.

Green advantages

Using 3D to achieve optimal positioning of the tank cleaning machines reduces the need for additional cleaning with portable machines. As a result, there is a reduction in cleaning fluid, fluid heating and slop disposal.

Inert gas production

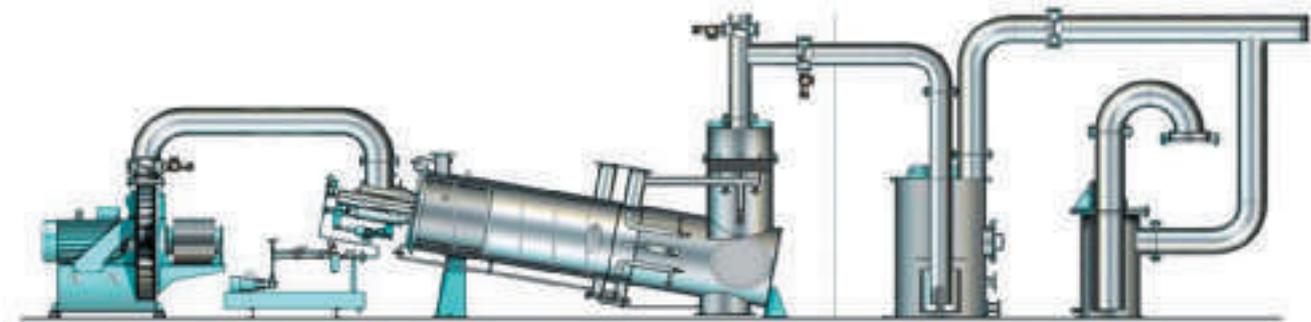
Aalborg inert gas generators

Typically found on chemical tankers and product tankers, Aalborg inert gas generators from Alfa Laval produce inert gas by combusting fuel oil with air in a controlled combustion chamber. Monitored by a specially designed oxygen analyzer and indirectly cooled by seawater, the combustion process is soot-free, thanks to a unique Ultramizing system that ensures complete combustion even in partial-load conditions. In a second stage, after-cooling and sulphur oxide washing are performed directly

in a specially developed spray and cooling system. When the clean inert gas exits the system, it typically has an oxygen content of 2% and a temperature just above that of seawater.

Applications:

- Chemical tankers
- LNG tankers
- Product tankers
- LPG tankers



Aalborg FU inert gas generator with accompanying air fans, fuel pumps, deck water seal and P/V breaker

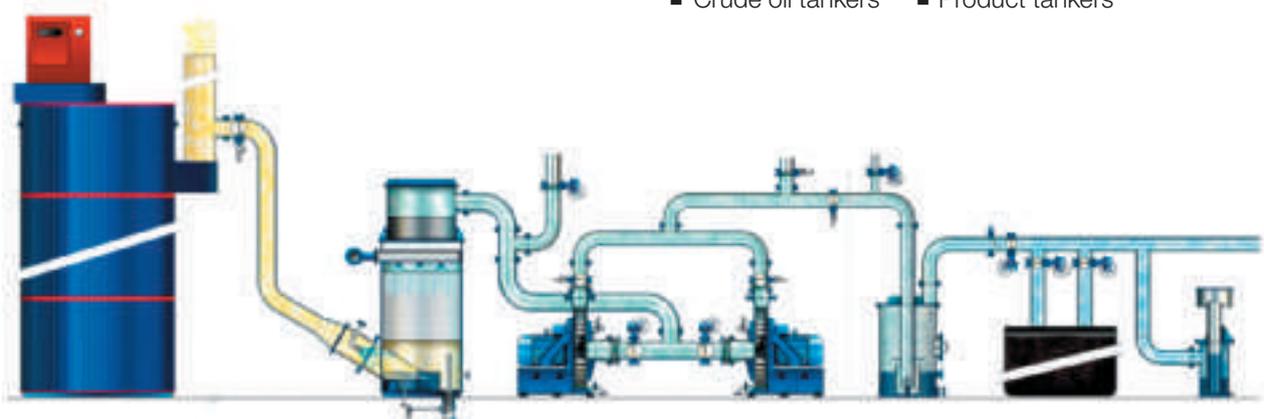
Aalborg inert gas systems (flue gas)

Primarily used on crude oil tankers and product tankers, Aalborg inert gas systems from Alfa Laval are specifically designed to utilize flue gas from oil-fired boilers. The flue gas is extracted from the boilers by fans, after which it is drawn through a scrubber, where the gas is cooled and washed before being delivered to the cargo tanks.

The current systems combine improved particle removal with a compact layout, and they were developed with customer feedback from shipyards, ship owners and ship operators to provide ease of installation and a range of operational advantages.

Applications:

- Crude oil tankers
- Product tankers



Aalborg FIN inert gas system shown with an Aalborg OL (formerly MISSION OL) boiler

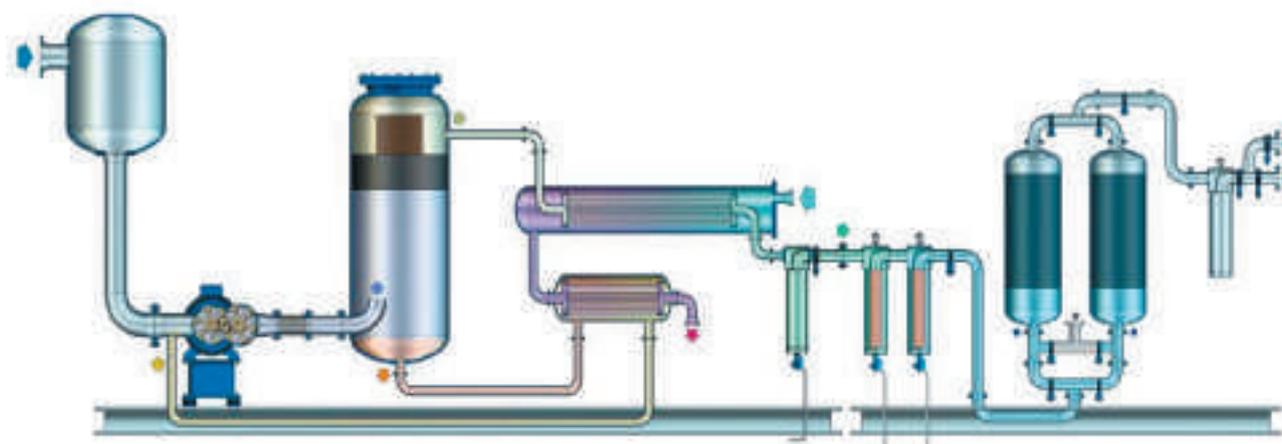
Aalborg nitrogen generators

Frequently installed on LNG carriers, chemical tankers and other vessels where very dry inert gas is required, Aalborg nitrogen generators from Alfa Laval provide high-quality nitrogen that contains only 0.1–5% oxygen. This is produced in one of two ways. In one method, hollow-fibre membranes are used to separate air into nitrogen and oxygen according to the principle of selec-

tive permeation. In the other, a carbon molecular sieve is used to separate the nitrogen from other gases in a two-bed process of pressure swing adsorption. Both solutions can be custom made to fit the engine room or packaged in containers as plug-and-play units for refit.

Applications:

- Crude oil tankers
- Product tankers



Aalborg BUCD/S nitrogen generator with accompanying knock-out drum, compressor, oil separator, coolers and filters

Product overview

Inert gas system type	New product name	Product description
Inert gas generator	Aalborg FU	Saturated inert gas generator, low pressure
	Aalborg BUFD	Dry inert gas generator, low pressure
	Aalborg BUCD/S	Dry inert gas generator, high pressure, low CO ₂
	Aalborg TU	Topping-up saturated inert gas generator
Nitrogen generator	Aalborg MEM	Dry nitrogen generator (membrane)
	Aalborg PSA	Dry nitrogen generator (pressure swing absorption)
Inert gas system	Aalborg FIN	Saturated inert gas system, low pressure, flue gas type
	Aalborg FGIN	Combinert™ – combined inert gas generator and inert gas system (flue gas)
	Aalborg DGIN	Saturated inert gas generator – exhaust gas after-burner

The products and systems shown here are a selection from Alfa Laval's comprehensive Aalborg (formerly SMIT GAS and Aalborg Industries) inert gas offering. Customized solutions are available upon request



Desalination

Water is the most abundant substance at sea, but the salt and impurities seawater contains make it unsuitable for most purposes on board. Alfa Laval's freshwater generators let you take economical advantage of this vast resource and do away with expensive, low-quality bunker water.



Fresh new advances

Alfa Laval has been a pioneer in producing cost-efficient fresh water in a minimal space. Over 50 years ago, we introduced thermally driven freshwater generators with dual-plate-pack technology, which were not only smaller than shell-and-tube installations, but also far less sensitive to scaling.

Today we've taken our multi-effect concept even further, creating a freshwater generator where vacuum distillation occurs within a single plate pack. The revolutionary AQUA, which houses the vacuum in the plate pack itself, contains three-in-one titanium plates on which evaporation, separation and condensation all occur.

Reduced flow and emissions

AQUA's three-in-one plate technology, which eliminates the need for an outer shell, does more than create a smaller freshwater generator. It allows expansion with additional plates, eliminates dry spots and further reduces scaling.

But most importantly, it cuts seawater requirements in half.

Cutting back on seawater use creates savings elsewhere in the chain. With half the seawater flow, smaller pipes and pumps can be used, which means easier installation and a lower initial investment. It also means lower energy consumption – with lower CO₂ emissions as a result.



Seawater desalination

AQUA

The AQUA freshwater generator from Alfa Laval is a major leap forward in freshwater generation technology. Because it utilizes only half as much seawater as other freshwater generators, it requires only half the pump capacity and half the pumping energy. This is achieved through pioneering plate technology, in which the whole distillation process is handled in a single plate pack and with one type of titanium plate. AQUA is easy to install and maintain, and its capacity can often be expanded with the help of additional plates.

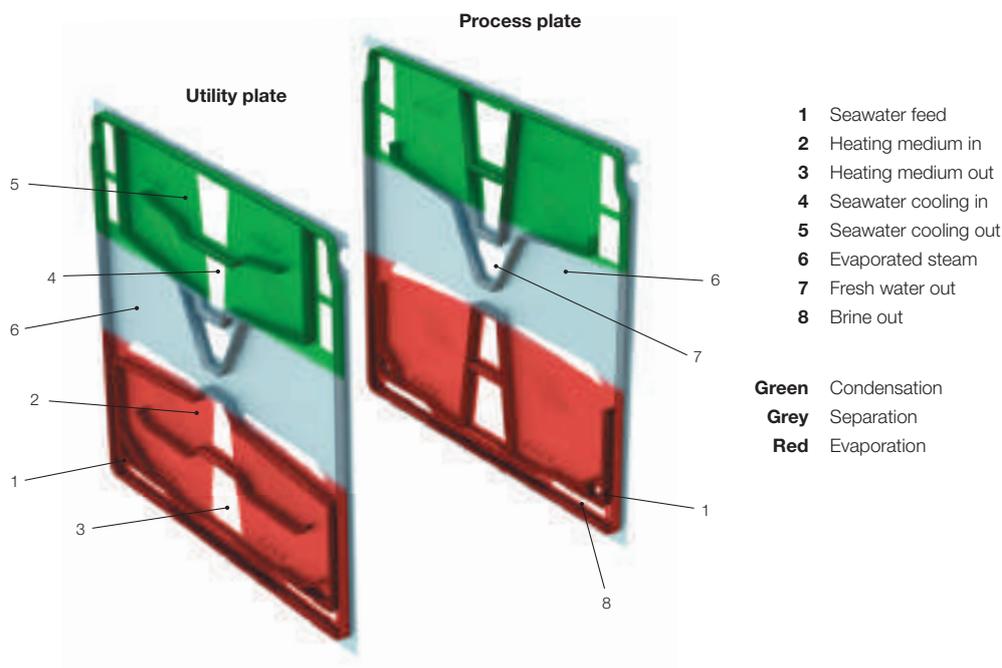
- 3-in-1 plate technology (evaporation, separation, condensation)
- Half the pumping requirements of other freshwater generators
- Smaller pumps and pipework – reduced investment
- Minimum footprint and hold-up volume
- Minimum scaling and less need for cleaning chemicals
- Easy maintenance at long intervals
- Wetted parts in titanium
- Maximum salinity: 2 ppm
- Capacity range: 3.1–60 m³/24 h



AQUA

Green advantages

Because the AQUA freshwater generator uses only half the seawater flow of other freshwater generators, pumping requirements are cut by 50%. This allows smaller seawater pumps to be used, and it means that the pumps consume less fuel. Since the burning of fossil fuel is directly tied to emissions, this in turn reduces the CO₂ output related to the freshwater generator.



Multi-effect desalination plant, MEP

Alfa Laval's multi-effect plate freshwater generator, MEP, is capable of generating large volumes of high-quality fresh water for domestic and technical use. Using waste heat from the engines or low-pressure steam as a heat source, the MEP distills seawater by means of titanium plate heat exchangers that are integrated into the evaporator/condenser chambers. Each MEP is custom-designed for a specific installation using the highest-grade materials, which together with the optimized process design ensure the highest reliability, the least downtime, and the longest and most economical service life.

- Low production cost
- State-of-the-art and user-friendly control technology
- Fast startup and quick response to load changes
- Titanium plates that resist seawater corrosion
- Patented plate design and falling film process for high thermal efficiency
- Unique construction that allows direct access to heating surfaces
- Evaporator vessel of AISI 316L steel
- High distillate purity and salinity of 5-10 ppm
- Capacity range: 200-3000 m³/24 h per unit



Multi-effect desalination plant, MEP

Green advantages

The MEP desalination plant offers the lowest possible consumption of both power and chemicals. The power consumption of the 4-effect MEP-4-750 desalination unit, for example, is less than 2.5 kWh/m³. Moreover, the MEP needs neither a seawater circulation pump nor any anti-foam injection, and its total antiscalant consumption is less than that of traditional MSF units.

VSP-36-C125 freshwater generator

Simple, light and compact, the VSP-36-C125 freshwater generator is designed for start-and-forget operation aboard turbine-propelled ships. It uses vacuum distillation to convert seawater into fresh water, which can then be used for make-up, drinking and domestic purposes. The freshwater generator VSP-36-C125 is available with a combined condenser cooling, ejector water and feed-water system, or with condensate cooling and a separate feed-water system. Both options provide good economy, as only a small flow of condensate is required.

- Low operation and maintenance costs
- Easy-access titanium plates that resist seawater corrosion
- Water for use directly as make-up for steam boilers
- Maximum salinity: 1.5 ppm
- Capacity range: 25–60 m³/24 h



VSP-36-C125

Green advantages

Alfa Laval's freshwater generators offer environmental benefits on several levels. In addition to utilizing waste heat already found on board, they use condensate for cooling, which improves heat recovery and thereby reduces fuel consumption. Only a small quantity of condensate is required for this process.

DPU and JWP freshwater generators

Designed for automatic operation, DPU and JWP freshwater generators from Alfa Laval use vacuum distillation to provide constant fresh water throughout a ship's lifetime. With titanium plates in the heat exchangers and non-ferrous materials throughout, they have a low scaling rate and non-corroding vital parts. Moreover, they require little maintenance and no adjustment once tuned to operating conditions. All models have front cover accessibility, and the two-stage DPU saves energy by using vapour from the first stage as a heating medium for the second.

- Compact, lightweight design
- Utilization of jacket water and hot water or live steam in combination with a hot water loop system
- Utilization of vacuum steam and condensate cooling in turbine-driven ships
- Maximum salinity: 2 ppm
- Capacity range:
 - DPU Series (single and two-stage): 20-75 m³/24 h
 - JWP Series (single stage): 0.5-100 m³/24 h



DPU



JWP

Drinking water purification

AOT 3F

The AOT 3F is a compact water purification system that provides an effective barrier against biological contaminants and pathogens such as Legionella. Its unique sterilization process, which is based on a 100% chemical-free technology, occurs in a closed chamber and generates no toxic residuals. Modular and fully automated, the AOT 3F contains no moving parts and involves no consumables.



AOT 3F

- Log 4 reduction of biological contaminants
- Log 5 reduction of pathogens (including Legionella)
- Compliance with BRL K14010-1/01 regulations on Legionella in drinking water
- IP65/67 protection rating
- Operating temperature: 5–70°C
- Capacity: 3 m³/h standard (15 m³/h available as an option)

Green advantages

The AOT 3F imitates nature's own way of purifying water. It uses a patented advanced oxidation technology (AOT) to generate radicals that break down microorganisms and other organic contaminants. This self-contained process is extremely swift and leaves no toxic residuals.

Water heating and circulation

Hot Water Loop

A complement to freshwater generator systems, the Hot Water Loop provides the correct amount of heating water at the correct temperature – even when the engine is not running. This facilitates the distillation process and makes maximum use of the freshwater generator's capabilities. Reliable and automatic, the Hot Water Loop can even be used for other onboard heating applications, such as the pre-heating of the main engine during periods of standstill. Its compact, modular design requires little space and ensures a simple, low-cost installation.

- Reliable operation due to self-adjusting steam regulation equipment
- Possibility to use in pre-heating the main engine or other equipment
- Capacity: 7–100 m³/24 h

Equipment:

- Stainless steel plate heat exchanger with bed frame and internal piping
- Hot water circulating pump, electric motor and starter
- Thermostatically controlled steam/thermal oil regulating valve
- Instruments and steam trap



Hot Water Loop 35-60

AQUA Hot Water System, HWS

For use with the AQUA freshwater generator, the AQUA HWS allows the production of fresh water with steam from the vessel's steam boiler as an alternative heat source. This means there can be a backup supply of high-quality technical water when the ship's main engine is not in service, for example when the vessel is at anchor. The steam injector system consists of a steam injector and an arrangement of pipes, instruments and internal valves.

Feed Water Treatment, FWT

- pH adjustment filter
- Chlorination
- Dechlorination
- Advanced ultraviolet sterilizer
- Silver-ion water sterilizer



AQUA HWS



Peace of mind

Changing conditions mean changing requirements for capacity, energy efficiency and the use of consumable resources. By providing access to expertise and support, Alfa Laval Parts & Service delivers the benefits of maximum uptime, availability and optimization.



Extending performance

All equipment needs proper attention to maximize its lifetime value. Alfa Laval Parts & Service can support you wherever you sail, helping you increase your equipment's valuable uptime, maintain its service intervals and decrease its total cost of ownership.

Whether handling major overhauls and repairs, retrofitting, upgrading or simply fine-tuning, we see that you get the most out of your existing resources.

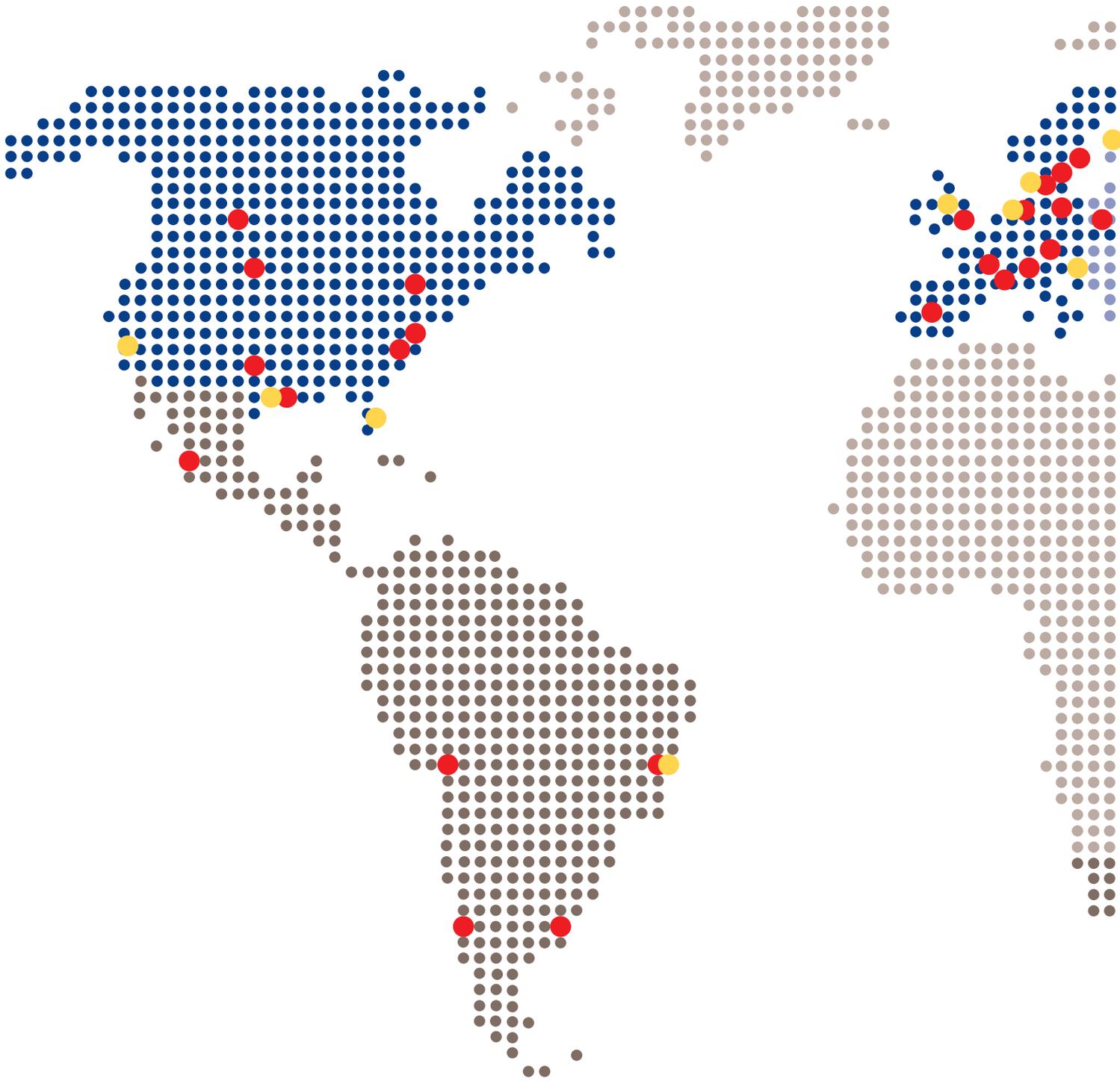
Our focused innovative approach puts us at the forefront of solutions and development. Continuously meeting new challenges, we are dedicated to our search for improvement.

Quality guaranteed

The genuine Alfa Laval parts we deliver also play a role in securing constant uptime and lasting operation. Thoroughly developed and tested for the specific challenges they face, they ensure maximum reliability and keep you running at peak efficiency.

Our parts, service, repairs and support are available 24/7, thanks to service engineers and service centres around the globe and harbour support functions in major ports. With parts, support and a broad range of services covering the whole equipment lifecycle, Alfa Laval Parts & Service is there to help you achieve pure performance.



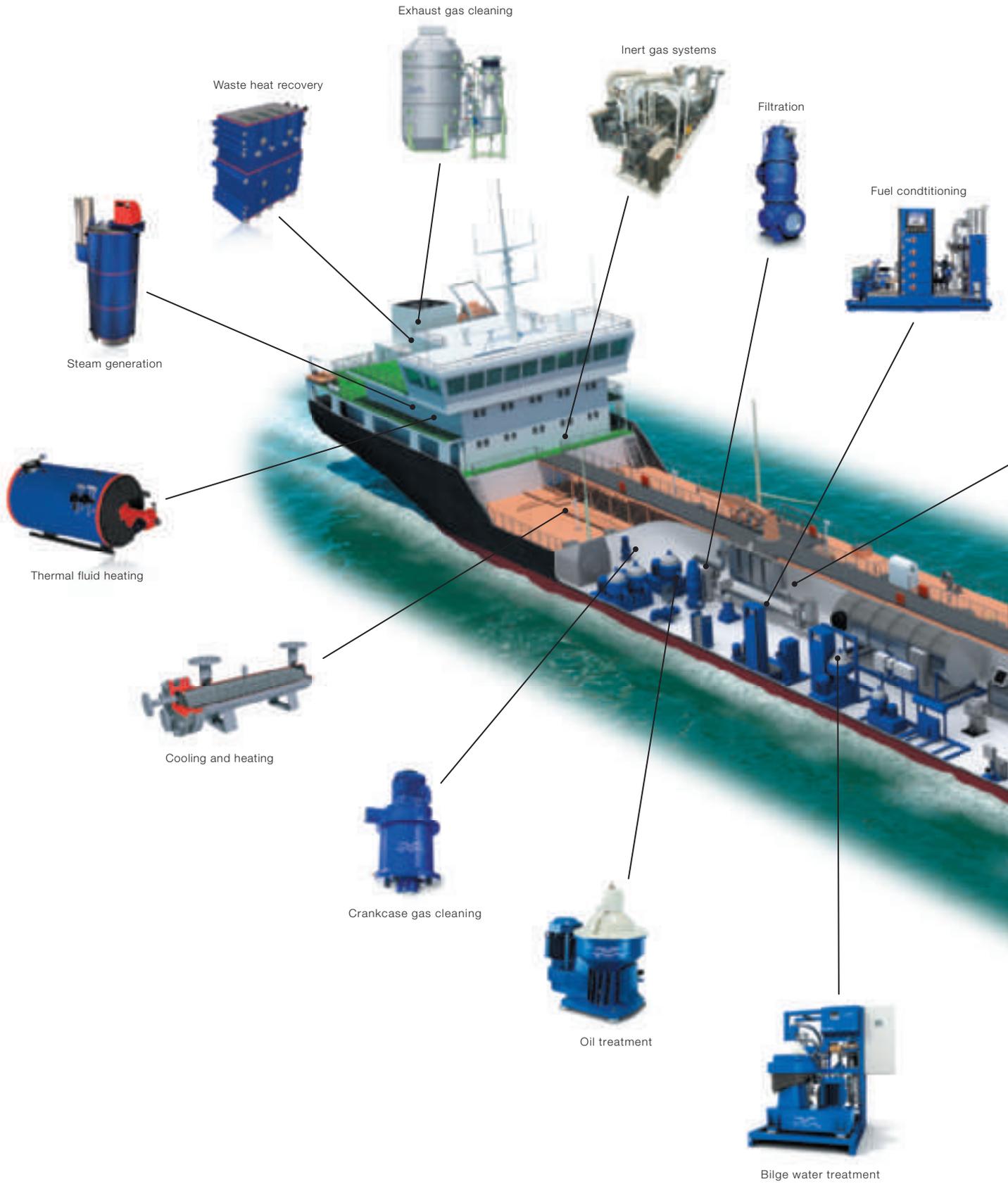


- Alfa Laval
- Alfa Laval Aalborg



Extending performance

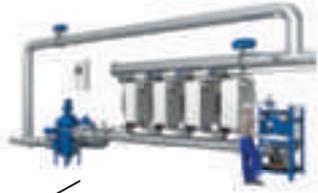
Getting the best economy from your equipment requires getting the most out of existing resources. And with Aalborg Industries now a part of Alfa Laval, we have an extensive global network to help you do just that. With relevant innovations and limitless support, our peace-of-mind experts help you experience maximum uptime, availability and optimization.



Alfa Laval on board

The ease of use, cost efficiency and high reliability that characterize Alfa Laval solutions have made them an essential part of life on most ships worldwide. Now that Aalborg Industries is a part of Alfa Laval, we offer an even more extensive range of equipment that contributes to virtually all key applications on board.

Ballast water treatment



Cooling and heating



Desalination



Tank cleaning

Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineering solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval

Contact details for all countries are continually updated on our web site. Please visit www.alfalaval.com to access the information.

