



Marine essentials

Equipment and services for marine applications





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New times, new challenges

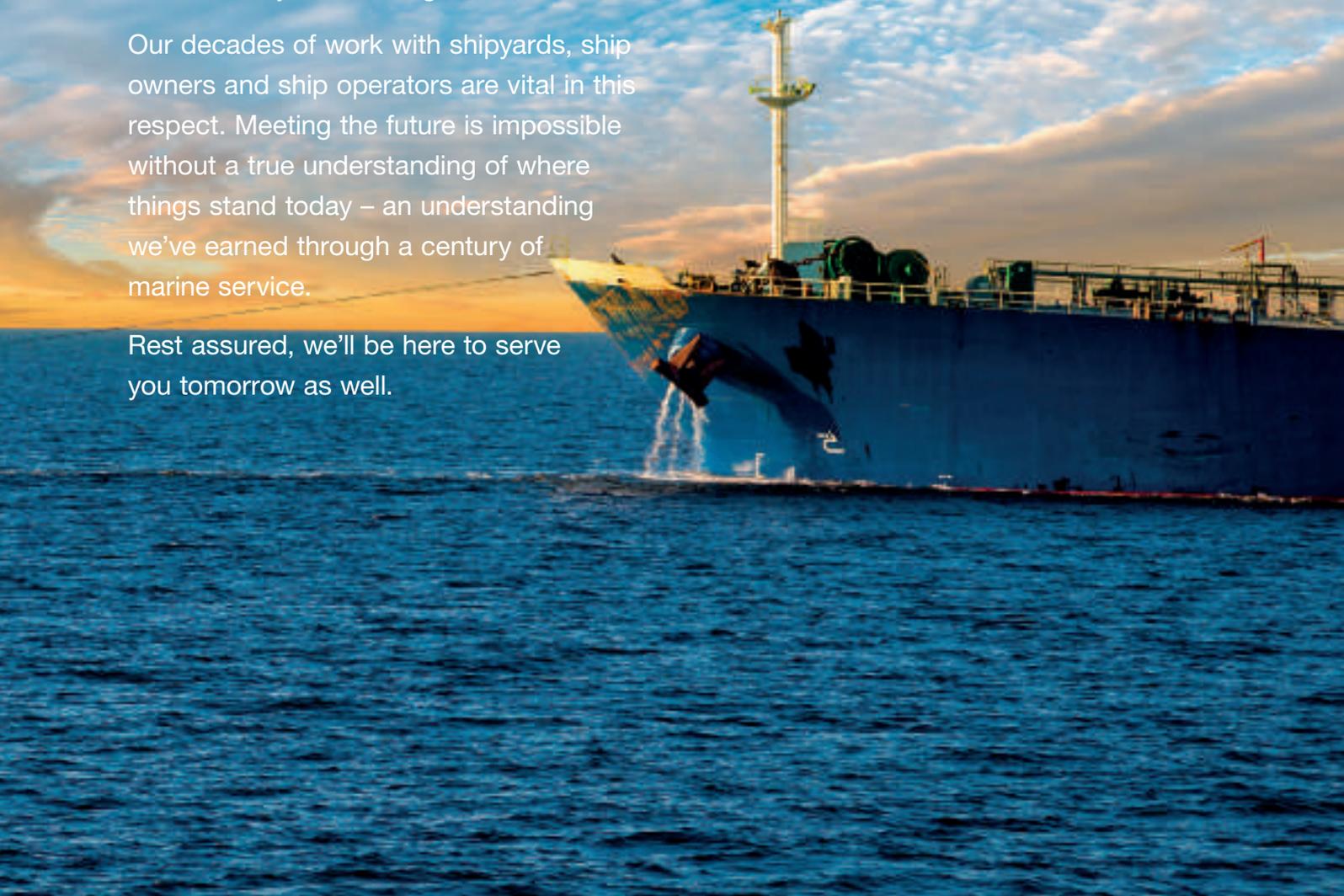
The marine industry is changing with ever-increasing speed, especially when it comes to new demands concerning energy consumption and environmental issues. Whether you build ships or sail them, you need solutions and expertise to stay ahead.

You'll find both at Alfa Laval.

No other supplier offers such a wide range of proven equipment, covering most critical operations on board. Nor will you find greater competence in merging equipment into full applications and innovative solutions to your challenges.

Our decades of work with shipyards, ship owners and ship operators are vital in this respect. Meeting the future is impossible without a true understanding of where things stand today – an understanding we've earned through a century of marine service.

Rest assured, we'll be here to serve you tomorrow as well.



Approaching tomorrow

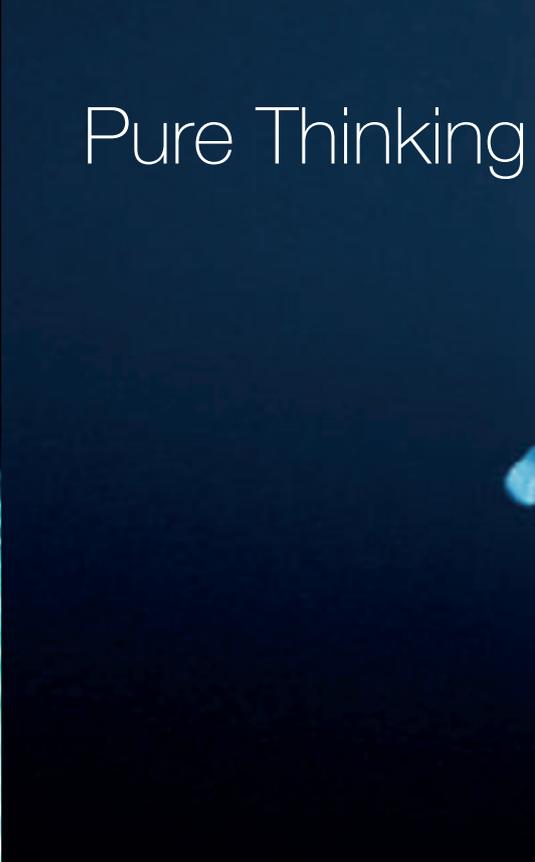
The future is no longer as distant as it once seemed. Nor is it as simple. Alfa Laval's task is to keep you ready for the future, no matter what it brings or how quickly it arrives. It's the reason we channel efforts into three focus areas: Energy Efficiency, Pure Thinking and Extending Performance.

These concepts are introduced briefly on the following pages. Like the problems of economy, the environment and day-to-day operation, they are important in their own right but also interrelated. Together, they create a structured approach to tackling your most pressing concerns.

As tomorrow draws near, our work in these areas is putting solutions into place.

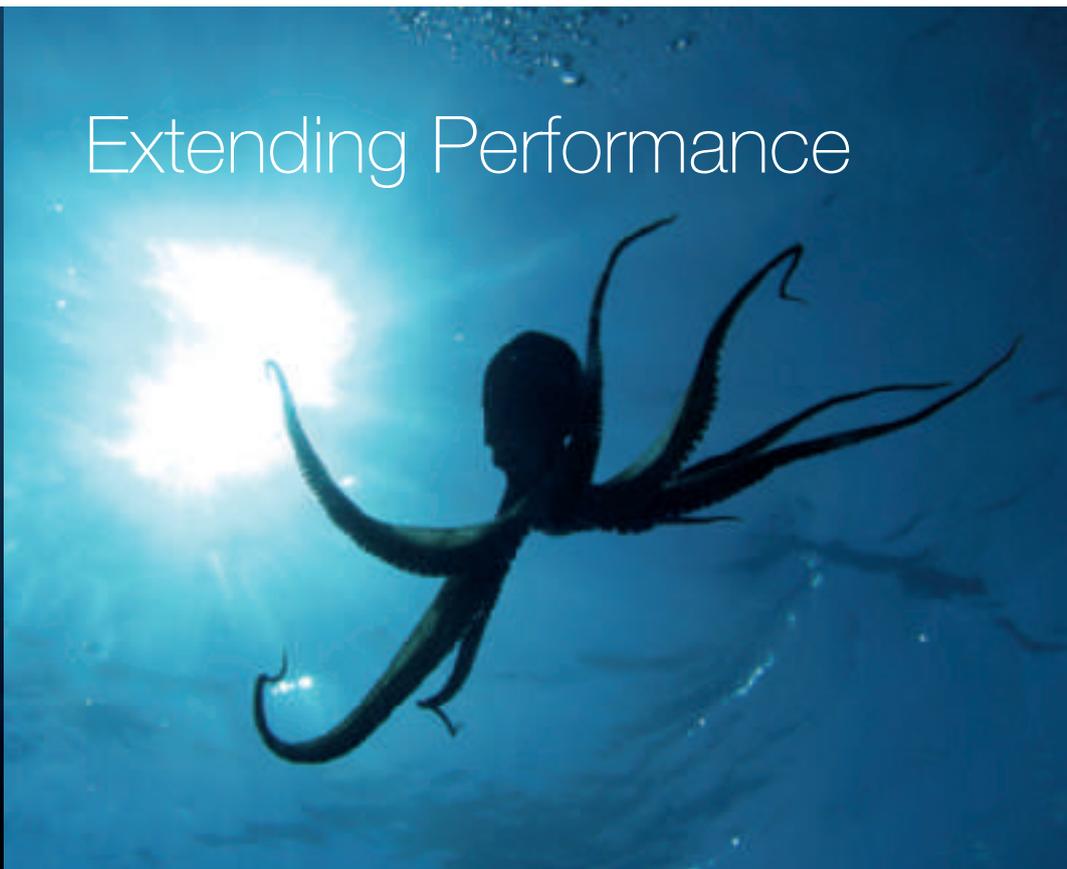


Energy Efficiency



Pure Thinking

today



Energy Efficiency



Dolphins are streamlined for maximum efficiency in water. They can also ride ocean swells and boat wakes, covering twice the distance for the same energy expenditure.



Energy has always been important, but never the critical factor it is today. In a time of high fuel prices and slow steaming, even the heat that was once a surplus is now too valuable to let escape. Wherever energy can be saved or reclaimed, it makes a difference in your fuel consumption and your bottom line.



Savings, compliance, future

Alfa Laval works with key applications to approach energy from every possible angle. Throughout your vessel, we save you money by reducing energy-related operating costs. We support EEDI compliance and minimize the energy impact of new equipment required by other legislation. And we enable the continued use of today's fuel alternatives – while working to develop the choices of the future.

Pure Thinking



***Jellyfish**, the ocean's natural filters, play an important role in stabilizing marine environments. They remove organisms that might otherwise dominate the ecosystem, and are capable of digesting certain pollutants.*



The purity of our oceans and the protection of the ecosystems they contain are the focus of a growing body of environmental legislation. But just as there is a need to reduce the marine industry's environmental impact, there is a need for solutions whose effect on board is minimal.



Concern, commitment, contribution

Alfa Laval has a century-long relationship with the maritime industry. Aware of our own systems' impact, we balance a concern for the environment with our concern for the business of our customers. Our commitment is to workable, sustainable solutions that meet legislative demands while going unnoticed on board. And as we contribute new solutions, we use our growing knowledge to improve our contributions of the past.

Extending Performance

An underwater photograph featuring a silhouette of an octopus on the right side, swimming towards the left. The background is a deep blue ocean with a bright sunburst effect in the upper left quadrant, creating a lens flare and illuminating the water. Bubbles are visible at the top of the frame.

Octopuses have evolved many strategies for making the most of their environment. Clever abilities such as ejecting ink clouds, changing skin colour like chameleons and speedy jet propulsion help them adapt to new challenges.



In the increasingly challenging marine environment, you need to know you can count on your equipment's performance. As slow steaming, new fuels and other factors change the way you operate, Alfa Laval is a constant that can keep you going strong – no matter where or how you sail.



Uptime, availability, optimization

Alfa Laval Parts & Service can extend your performance in many ways. Our quality products, including spare parts that perfectly match the originals, contribute to maximum uptime. And we deliver them through an extensive global organization, whose services are available wherever you sail. Through our extensive service portfolio, we keep you optimized to succeed in a rapidly changing world.



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Solutions are here now

As we look for the answers to tomorrow's challenges, we never lose sight of the needs of today. Alfa Laval has a comprehensive offering, adapted to essential aspects of business at sea. Our equipment, systems 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.

▶ Ballast water treatment	18–19	▶ Scrubber water cleaning	23–24
▶ Bilge water treatment	20	▶ Crankcase gas cleaning	25
▶ Waste fuel recovery	21	▶ Oily water pre-treatment	26
▶ Exhaust gas cleaning	22	▶ The environment and energy – pure synergy	27

OIL TREATMENT

29

We offer treatment solutions for a wide range of oil types, characterized by thorough protection and high energy efficiency. Our modular equipment safeguards your ongoing performance.

▶ Oil cleaning	30–35	▶ Filtration	38
▶ Fuel conditioning	36–37	▶ Pumping	39

COOLING AND HEATING

41

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

▶ Central cooling	42	▶ Cargo heating	45
▶ Gas handling	43	▶ Oil and water heating and cooling	46
▶ Electric heating	44	▶ Filtration	46
▶ Oil and water preheating	44	▶ Cleaning-in-Place	47
▶ Dump condensing and tank cleaning	45		

STEAM AND HEAT GENERATION

49

Our Aalborg boilers and thermal fluid systems have a long history yet remain at the cutting edge. Modular constructions and many options allow energy-optimized solutions for any vessel.

▶ Steam and hot water production	50	▶ Thermal fluid system control	55
▶ Steam production	51	▶ Boiler/burner system control	56
▶ Combustion	52–53	▶ Nearly 100 years of marine boiler experience	57
▶ Thermal fluid heating	54		

WASTE HEAT RECOVERY

59

Our Aalborg solutions for recovering waste heat are a smart way to save fuel. They reclaim the surplus energy existing on board – both in main engine exhaust and in other sources as well.

▶ Main heat recovery	60–61
▶ Auxiliary heat recovery	62
▶ Why let even a little go up in smoke?	63

TANK CLEANING AND SAFETY

65

Our dynamic Gunclean Toftejorg equipment cleans your tanks with a fraction of the time and cleaning fluid, while our Aalborg inert gas systems and other solutions keep volatile cargo safe.

▶ Tank cleaning technologies	66–67	▶ Portable cleaning machines	69
▶ Deck-mounted cleaning machines	68	▶ Cleaning optimization software	70
▶ Retractable cleaning machines	69	▶ Inert gas production	71–72
		▶ Gas combustion	73

DESALINATION

75

Proven distillation processes merge with state-of-the-art advances in our freshwater generators. Our revolutionary, AQUA retrofit, supplies quality fresh water with reduced environmental impact.

▶ Seawater desalination	76–78
▶ Drinking water purification	78
▶ Water heating and circulation	79

EXTENDING PERFORMANCE

81

The skilled engineers of our Alfa Laval Parts & Service team specialize in extending performance. With equipment, parts and expertise, they help maximize uptime and minimize lifecycle costs.

▶ Extending performance across the world	82–83	▶ Support services	86
▶ Start-up services	84	▶ Improvement services	87–88
▶ Maintenance services	85	▶ Monitoring services	89

Scrubber water cleaning



Waste heat recovery



Exhaust gas cleaning



Steam generation



Crankcase gas cleaning



Oily waste treatment



Fuel conditioning



Filtration



Oil cleaning



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. Our growing portfolio of equipment – already the marine industry's largest – contributes to virtually all key applications on board.

Thermal fluid heating



Cooling and heating



Desalination



Ballast water treatment



Inert gas production



Gas combustion



Tank cleaning





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 create a sustainable balance, with benefits for both the environment and your bottom line.

Environmental protection



Dual advantages

Alfa Laval's environmental solutions 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 regulating ballast water treatment and airborne emissions.

At the same time, we make sure our solutions fit in on board – not only in their size and construction, but also with regard to their function. You receive equipment that minimizes environmental impact and has a minimal impact on vessel operations.

Lasting value

In addition to long-term assurance, our solutions are designed for long-term economy. Extremely reliable and infrequently serviced, they demand little from the crew. And since their energy-efficient operation is chemical-free, they avoid making you dependent on costly or hazardous consumables.

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

Ballast water treatment

PureBallast 3.0

PureBallast 3.0 is the new generation of leading technology, improved through real-world experience. Handling flows up to 6000 m³/h, it uses up to 60% less energy and is 50% smaller than its predecessors, with a more flexible design for easy installation in a cramped engine room. What remain the same are the type-approved performance and Alfa Laval's full global backing. PureBallast 3.0 employs a unique form of UV treatment, enhanced with advanced oxidation technology (AOT). The UV light eliminates organisms directly or damages their DNA and biological structure, while the AOT creates free radicals that cause irreversible cell membrane damage. The AOT effect has a proven biological impact leading to better treatment performance and lower energy consumption.

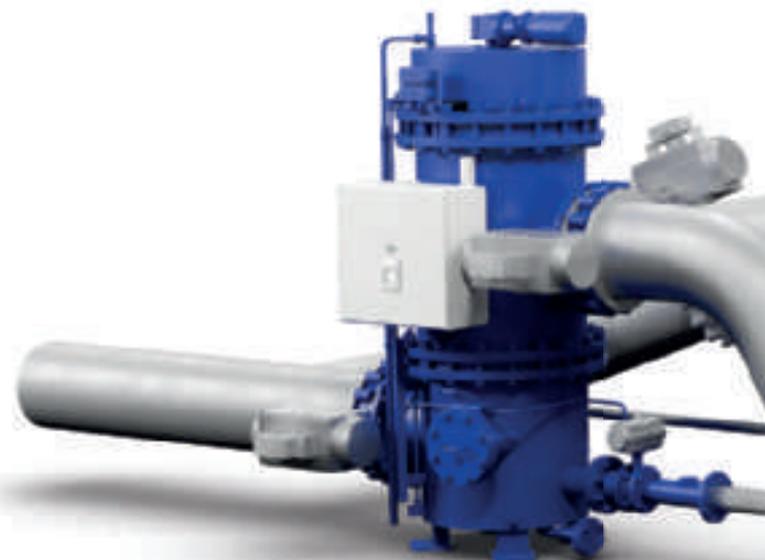
- Leading expertise – innovation built on a firm foundation of knowledge and experience
- Proven technology – hundreds of systems sold and well over a hundred commissioned
- Worldwide support from a strong and committed marine supplier
- High energy efficiency, plus dimming function
- Small footprint
- Fully automated, chemical-free operation
- Easy, flexible installation with few components
- EX version available

Equipment:

- Wallenius AOT reactor(s)
- Filter (50 µm)
- Cleaning-in-Place unit
- Lamp drive cabinet(s)
- Control system
- Flow meter and other auxiliaries

Safe and energy-efficient treatment

Treatment with PureBallast 3.0 is non-toxic, virtually instantaneous and performed in a closed chamber, which means it poses no risk to the crew or the vessel itself. It is also energy efficient, thanks to advanced oxidation technology (AOT), a fully optimized reactor design and an automatic dimming function. When water quality allows, energy consumption is dimmed by up to 50% while retaining type-approved treatment.



PureBallast 3.0

Cleaning-in-Place (CIP) fluid for PureBallast

Alpacon Descalant Offshore fluid is used after each ballasting or deballasting operation. This automated process, which takes around 15 minutes per reactor, has been shown to have a valuable role in maintaining UV lamp performance, as it removes the build-up of calcium chlorides and metal ions that degrade UV transmittance. Alpacon Descalant Offshore is a highly efficient and non-hazardous water-based cleaning agent whose active ingredient is a biological mixture made from renewable materials.

Safe assurance of energy efficiency

Alpacon Descalant Offshore is non-hazardous and non-aggressive, which means it poses no risk to crew health or the ballast water equipment. It contains no solvents and no organic acids. Nonetheless, it is extremely effective in maintaining the UV transmittance of the reactor lamps, producing noticeable effects after each cleaning cycle. Indirectly, this helps to maintain the high energy efficiency of PureBallast 3.0, since UV transmittance determines how much the system's power consumption can be dimmed.



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 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)
- 5 ppm DNV Clean Design Type Approval
- 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
- 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

Immunity to pitch and roll

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.



Waste fuel recovery

PureDry

PureDry is a revolutionary high-speed separator capable of recovering reusable fuel from waste fuel oil, a process that requires separate tanks for waste fuel oil and waste lube oil. It returns up to 2% of the consumed fuel volume to the fuel oil bunker tank, leaving only super-dry solids that can be landed as waste. The separated water, which has an oil content of less than 1000 ppm, is pumped into the bilge water treatment system. PureDry has an unconventional design that comprises only two main moving parts: an outer bowl shell and an insert containing the XCavator, a spiral-shaped device that ejects dry solids without the addition of water.

- Fuel recovery and reuse in accordance with MEPC.1/Circ. 642
- Payback and profit in less than one year
- Up to 2% reduction in consumed fuel volume and related costs
- 99% reduction in waste oil volume – smaller waste oil tanks possible
- No oil losses or additional generated wastes
- Discharge without sensitive hydraulics or displacement water
- Records of all flows kept by EPC 60 control unit – no gaps in Oil Record Book
- Easy operation, with simple Maintenance and Service by Exchange (MSE)



PureDry

Integrated handling of oily waste

PureDry is the first product to take advantage of MARPOL rule MEPC.1/Circ.642, which allows the reuse of the HFO fraction of waste fuel oil as fuel for the diesel engines. This creates a direct savings in fuel costs, while the massive reduction in water content means less waste to store and deposit. Together, PureDry and PureBilge form an integrated waste oil and bilge water handling system that deals with all oily waste streams.

Exhaust gas cleaning

PureSO_x

PureSO_x is a highly effective sulphur removal system. It is the first scrubber system with multiple inlets, and it is also the first to be installed and operated as a main engine (21 MW) hybrid exhaust gas scrubber. PureSO_x ensures compliance with new IMO legislation restricting sulphur emissions, which will begin taking effect in 2015. It scrubs sulphur from the vessel's exhaust gas in an open loop with seawater, or in a closed loop with fresh water. The ability to switch between these two modes gives PureSO_x unique operational flexibility, while its modular construction 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
- Multiple-inlet options to reduce the number of scrubbers on board
- 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
- Includes the PureSO_x H₂O water cleaning unit (see next page)

Continued fuel economy

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 economical HFO rather than switching to expensive low-sulphur MGO.



PureSO_x

Scrubber water cleaning

PureSO_x H₂O

Compact and modular, the PureSO_x H₂O water cleaning unit is an essential part of Alfa Laval's PureSO_x hybrid or freshwater scrubber (see previous page). But it is also available as a standalone product for use in wet scrubbers not designed by Alfa Laval. Proven under real-life operating conditions, PureSO_x H₂O uses centrifugal separation to clean scrubber water in compliance with IMO legislation. The automated unit is easy to operate, and it is available in different sizes to suit a variety of flow rates. All equipment comes installed and tested on a common frame, which is divided into three main blocks to simplify retrofit installations.

- Reliable reduction of solids content in the wash water – generally to well below the required 25 FTU
- Measurement, control and logging of Marpol Annex VI wash water criteria:
 - Acidity (pH)
 - Harmful components of oil (PAH)
 - Particulate matter (turbidity)
- Continuous operation with instant bleed-off and automatic chemical dosing only when necessary
- Flexible, modular design to meet the requirements of most vessels

- Competitive operating costs – low maintenance and waste volumes
- Safe, easy operation with automated control and monitoring
- Password switch for overboard discharge only by authorized personnel

Equipment (delivered as a unit):

- SWPX separator with ancillary equipment
- Scrubber water feed pump
- Chemical dosing pump with retention tanks
- Control cabinet

Reliable compliance

PureSO_x H₂O uses high-speed separation technology, which means continuous and highly reliable operation. It generally reduces the solids content of scrubber water to well below the required 25 FTU – even when subjected to varying engine conditions and rough weather. Dangerous particulate matter is cleaned from the scrubber system, while the waste volumes for disposal are kept to a minimum.



PureSO_x H₂O

PureNO_x

PureNO_x cleans the scrubber water in an Exhaust Gas Recirculation (EGR) process. EGR is one of the solutions under development for compliance with Tier III NO_x reduction demands, which will apply to NO_x Emission Control Areas starting in 2016. EGR has the potential to be the NO_x abatement frontrunner, especially as it reduces fuel consumption when operating at Tier II. PureNO_x is a complete water treatment system using a centrifugal separator to clean the wash water in the wet scrubber, which operates in a closed loop apart from the bleeding off of additional water generated in the combustion process. Developed and undergoing testing in collaboration with MAN Diesel & Turbo, PureNO_x will be commercially available in due time before Tier III legislation comes into force.

- Cleaning of EGR scrubber water for engine protection
- Cleaning of discharge water in compliance with IMO directives (MEPC 57/21 Annex 4)
- Monitoring and logging of wash water in compliance with IMO directives
- Control of pH level in the EGR process

- Compact and simple installation as an integral part of a two-stroke diesel engine
- Possibility to operate at very low engine loads
- Reduction of maintenance costs for the EGR scrubber system
- Significantly reduced waste volumes for onshore disposal

Equipment (delivered as a module):

- SWPX separators with ancillary equipment
- Scrubber water feed pumps
- NaOH dosing pumps
- Scrubber water collecting tank and buffer tanks
- Control cabinet

Protection of engine and environment

An Exhaust Gas Recirculation (EGR) system recirculates up to 40% of the exhaust gas into the charge air chamber. This lowers the combustion temperature, which directly reduces the formation of harmful NO_x emissions. PureNO_x not only prevents soot and compounds derived from the exhaust gas from accumulating in the EGR scrubber and corroding the engine, but also enables the bleed-off of clean water in compliance with IMO criteria.



PureNO_x

Crankcase gas cleaning

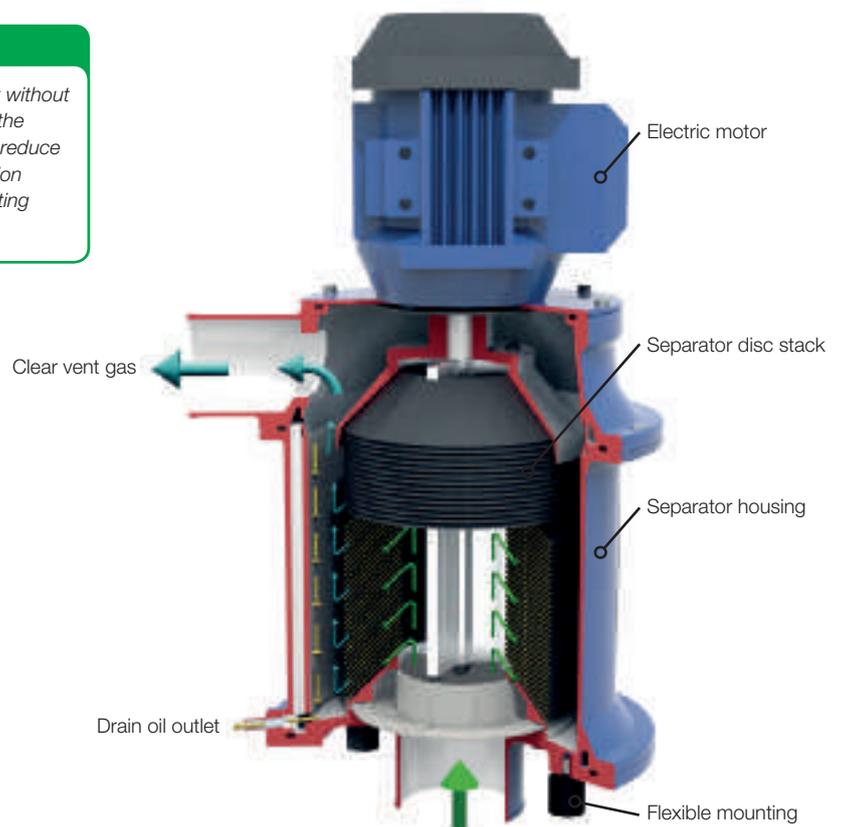
PureVent

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

Oil for recirculation

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.



Oily water pre-treatment

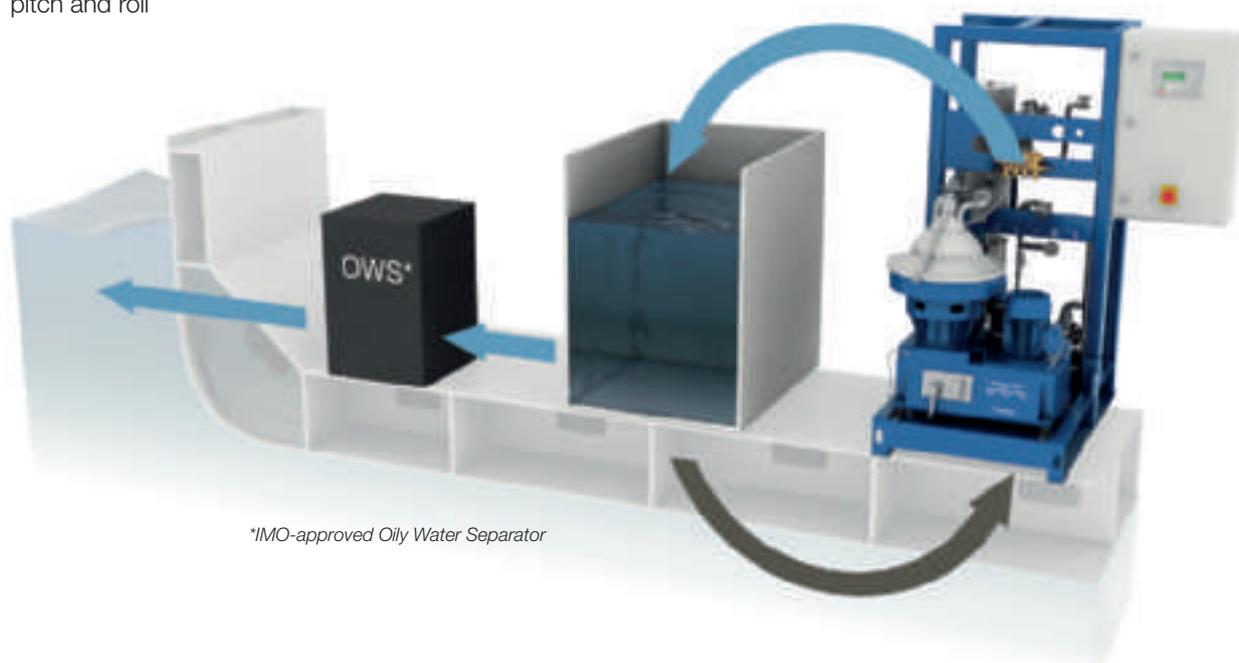
PreBilge

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 60(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.



*IMO-approved Oily Water Separator



The environment and energy – pure synergy

Pure Thinking, the vehicle for Alfa Laval's environmental efforts, began as it sounds – with thinking ahead. Seeing legislation on the way, we formed a strategy for helping the industry meet it. That strategy has led to unique solutions, from PureBallast in 2006 to recent additions like PureSO_x and PureDry.

While these products are usually required rather than chosen, we strive to minimize their impact on board. Energy efficiency is a clear area of focus, in which we continue to improve. PureBallast 3.0 for example, consumes up to 60% less energy than its predecessors.

In fact, some of our products offer substantial energy gains, such as PureDry and PureNO_x. Alone or as part of a larger solution, these products can directly lower fuel consumption.

Throughout this catalogue, green boxes highlight environmental and energy advantages in all product areas. Energy and the environment go hand in hand – a relationship everyone can profit from.



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

Oil treatment



Beyond separation

Alfa Laval separators first opened the door for the fuel oils so common today. That gives us more oil treatment experience than any other marine supplier. Over the years we've reduced the complexity of our equipment, while at the same time increasing its efficiency and protection.

In addition, we've greatly expanded our equipment's scope. What began with a separator is now a full portfolio of solutions, extending from the bunker tank all the way to the engine.

Adaptive technology

Today we adapt to both fuel and engine. Working with the whole fuel line, we can optimize it as a process.

First we adapt separation to oil quality. After separation, we condition the fuel's temperature, pressure and viscosity to match engine specifications and safeguard the changeover between heavy fuel oil and distillates. Now we're adapting to the engine load as well, enabling lower fuel consumption and heightened protection against cat fines.

Just as we welcomed today's fuel, we're paving the way for tomorrow's fuel use.

Oil cleaning

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.



Optimized separator bowl

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)

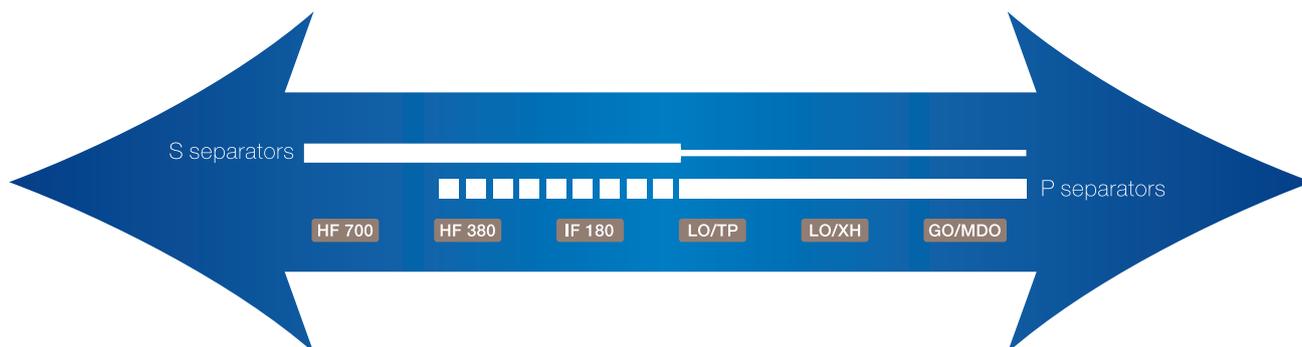
Alfa Laval separation equipment offers the lowest oil losses, lowest power consumption, least maintenance and fewest wear parts on the market. With Alfa Laval, you are thus ensured the lowest LCC and the shortest payback time on your equipment investment.

High efficiency and less sludge

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, low energy consumption and low oil losses. All this 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.



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
- Oil densities up to 1010 kg/m³ (Alcap)
- 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 light marine fuel oils
- Oil densities up to 991 kg/m³
- Viscosities up to 700 cSt/50°C (higher on request)
- Low sludge volumes and oil losses

Waste fuel recovery

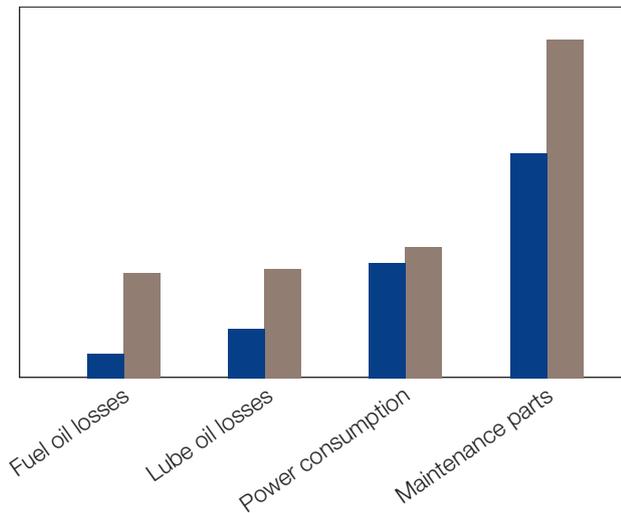
The introduction of MEPC.1/Circ 642 allows the HFO fraction of waste fuel oil to be recovered and reused as fuel for the diesel engines. This makes it advantageous to use Alfa Laval's PureDry (see page 21) after fuel cleaning with the S separator. PureDry returns up to 2% of the consumed fuel oil to the fuel oil bunker tank, which results in tangible fuel cost savings. In the process, it reduces the S separator's already small waste volumes by 99%, creating super-dry solids and sending water with an oil content of less than 1000 ppm to the bilge water treatment system.

Lifecycle cost considerations

Typical lifecycle cost (LCC) over 20 years

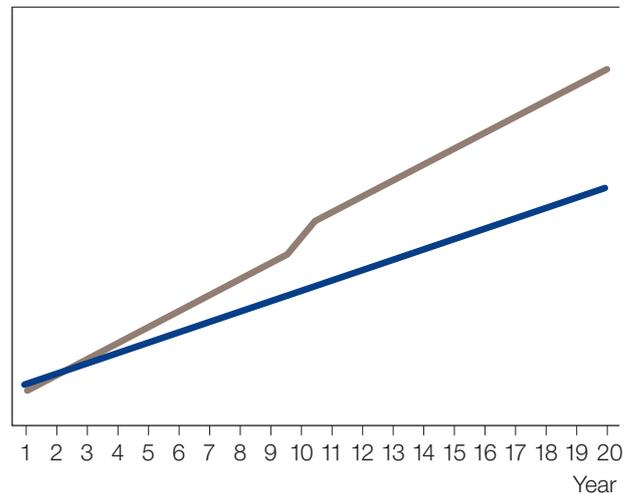
Total cost

■ Alfa Laval ■ Competitor



Accumulated cost over 20 years

Accumulated cost



The graphs above are examples of typical lifecycle cost. As the graphs indicate, the investment cost only represents a small part of the lifecycle cost. Energy-related costs and maintenance costs are far greater, which means that investing in an efficient separator quickly becomes very profitable. To find out how much you could save, please contact your local Alfa Laval representative to make your own LCC calculation.

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 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

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



Cleaning-in-Place (CIP) system for separators

The Cleaning-in-Place (CIP) 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 damage due to disassembly. In particular, it protects against scratches to the bowl discs that can result from manual cleaning with improper tools, which would otherwise quickly cause the discs to become dirty again. The cleaning fluids 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 fluid for both lubricating oil and fuel oil separators
- CIP also reduces workload of crew and avoids possible scratches on bowl discs caused by using the wrong tools at manual cleaning. Scratched bowl discs will cause the discs to become dirtier faster and should therefore be avoided.



CIP type 10M

Cleaning-in-Place (CIP) fluid for separators

Alpacon Multi CIP II is designed for use in the Cleaning-in-Place (CIP) system for separators. It primarily cleans the bowl discs, which maintains separation efficiency and thereby secures the flow of clean oil to the engine. In addition, the fluid maintains the cleanliness of the bowl inlet and outlet. Alpacon Multi CIP II has superior cleaning characteristics and creates no emulsions, which means it does not interfere with the bilge water system. Likewise, it does not lead to corrosion or affect any of the sealing materials used in Alfa Laval separators.

Safe and biodegradable formula

Alfa Laval's high-performance Alpacon chemicals are non-hazardous and readily biodegradable.

Fluids for general use:

- Alpacon Descalant
- Alpacon Degreaser

Fluid specific to heat exchangers:

- Alpacon Multi CIP II (5 l)

Fuel conditioning

Fuel Conditioning Module, FCM

The Fuel Conditioning Module, FCM, 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 and 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



Consistently efficient combustion

The 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.

Handling of multiple fuels

The Fuel Conditioning Module maintains performance when changing between light and heavy fuels. Its embedded ramp function, combined with the Visco-Temp function in the EPC50 B and EPC50 V controllers, prevents temperature shocks to fuel pumps and injectors and optimizes engine performance by keeping stable viscosity.

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. Suitable for installation on Alfa Laval's FCM or any or other booster system, it provides the needed cooling capacity when using low-viscosity MDO/MGO with diesel engines. Operation of the ACS is fully automatic, and LT cooling water, seawater 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

Safe and controlled changeover

Low-sulphur distillate fuels reduce harmful emissions, but they pose operational difficulties. The Advanced Cooling System removes temperature transition issues through controlled and progressive cooling of the fuel. It protects 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

Alfa Laval offers a wide range of automatic fuel and lubricating oil filters for reliable engine protection and lower lifecycle costs. These have a compact design that enables flexible installation and requires a minimum of space in the engine room. Continuous backflushing prevents the adhesion of retained solids to the filter surface, which ensures long service intervals and reduced maintenance. In addition, it enables the removal of sludge by means of either a diversion chamber or a centrifuge on the backflush line, which yields superior oil conditioning efficiency.

- Low installation, operation and maintenance costs
- Robust disc-type elements with a rigid triple mesh that operate with a low and constant pressure drop
- High filtration efficiency
- No external power source required for lubricating oil filters
- Solutions for trunk piston and crosshead engines in the size range 500–100 000 kW
- Wide range of filtration grades, from 40 μ down to 6 μ nominal

No cartridge disposal

The disc-type filter elements in Alfa Laval's full-flow filters have great advantages over cartridge-type filters. Their robust design 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.



Fuel oil filter (electrically driven)



Lubricating oil filter

Eliminator, CCU

Suitable for lubricating oil treatment for engines burning HFO, MDO, distillate or gas fuels, the Alfa Laval Eliminator, or CCU (Combined Cleaning Unit), is a unique combination of two key technologies in a common housing. A full-flow automatic filter protects the engine by stopping harmful particles, while a high-efficiency disc stack centrifuge on the backflushing line efficiently cleans the lubricating oil.

Protection and prolonged life

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 prolongs the lifetime of the lube oil – in many cases doubling its change interval.



Eliminator, CCU

Pumping

ALP and 3S pumps

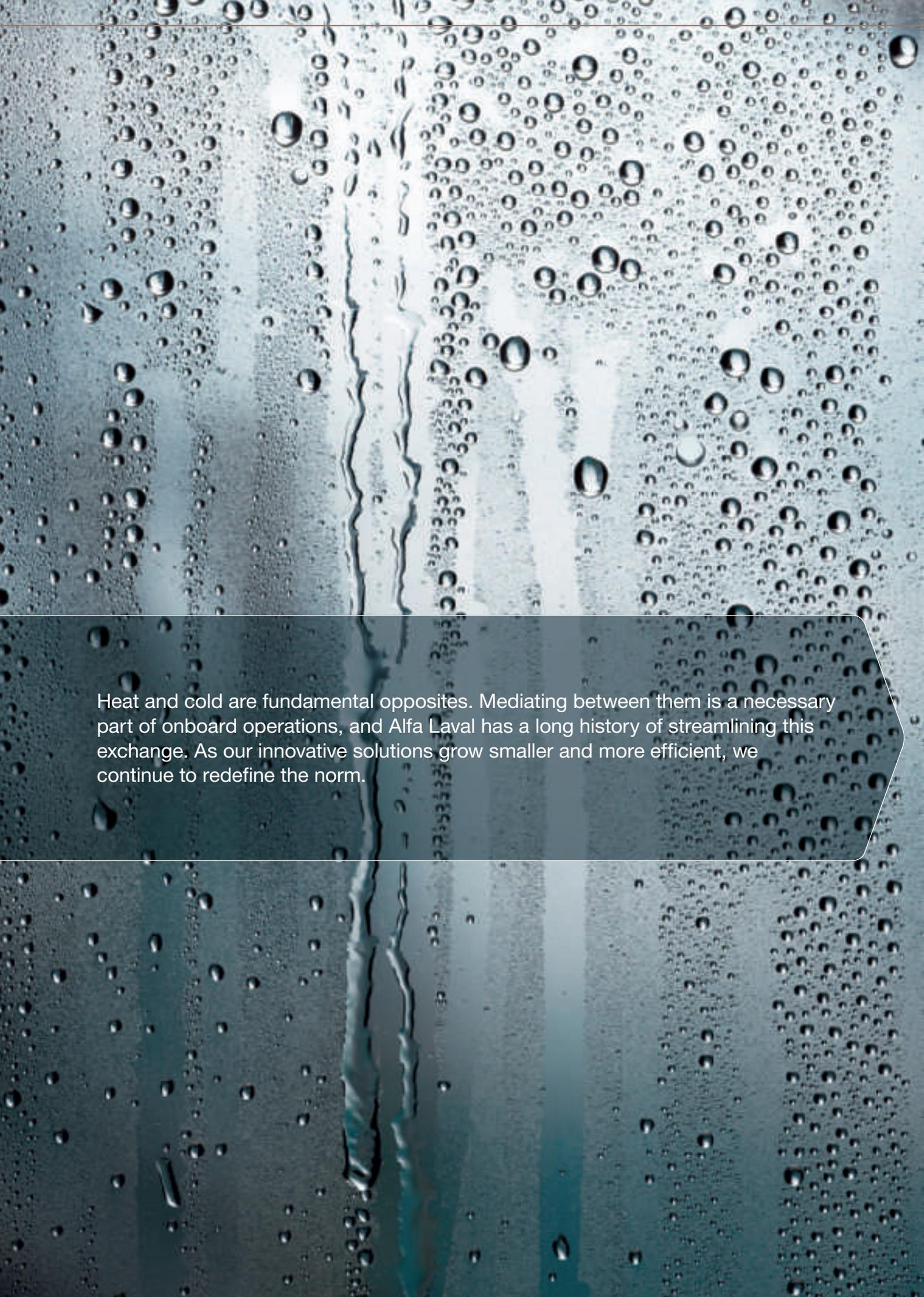
High-quality ALP and 3S three-screw pumps are optimal for use with mineral oils, lubricants and non-abrasive oil-based liquids in marine and industrial applications. ALP three-screw pumps are characterized by a compact design with few components, which reduces pump complexity, spares consumption and handling issues. The 3S series is one of the most comprehensive three-screw pump ranges available, with 29 different pump sizes rated from 5 to 2900 l/min at 1450 rpm. Both ALP and 3S pumps have an innovative construction that ensures a long service life, even in harsh operating conditions.

- Low maintenance and minimized lifecycle cost
- High installation flexibility – a wide range of models, capacities and executions
- High volumetric and energy efficiency
- Pump screws of hardened material for tight tolerances and stable pump capacity over time
- Shaft seals of silicon carbide, with a lubricated and cooled design less vulnerable to dry running
- Efficient seal chamber construction that prevents residue around the ball bearing
- Location of the lifetime-lubricated ball bearing outside the product zone, reducing thermal risk and avoiding exposure to the pumped liquid
- Overflow valve to prevent excessive pressure
 - ALP: Fixed to prevent setting errors
 - 3S: Adjustable to differing opening pressures (3-16 bar)
- Magnetic coupling (no-wear, hermetically sealed) available to comply with SOLAS regulation for leakage-free equipment close to hot surfaces

Applications

- Supply and circulation of fuel, from MGO to HFO
- Transfer of fuel oil
- Hydraulic oil circulation
- Lubricating oil circulation
- Lubricant and coolant pumping
- Feed and transfer pumping for oil burner technology





Heat and cold are fundamental opposites. Mediating between them is a necessary 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.

Cooling and heating



Transferred benefits

Heat exchangers are 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, they maximize cooling capacity and the availability of cheap heat energy.

Innovation inside

Over the years, our R&D has produced major design advances. Our optimized PHE plate patterns, including the brand new pattern of the T35 heat exchanger, are an excellent example. And by fine-tuning tube construction and placement, 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 efficient clip-on constructions like our new ClipGrip™ system. And as time goes on, there will be more advances to come.

Central cooling

Gasketed plate heat exchangers, T35

The T35 series represents the next generation of gasketed plate heat exchangers (PHEs), with innovations on many levels. Like Alfa Laval's other gasketed PHEs, T35 models are ideal for cooling a vessel's prime mover. But their newly developed CurveFlow plates have an improved design with a patented new pattern and distribution area. Less prone to fouling, the new distribution area uses less of the available pressure drop and distributes the flow more evenly across the entire width of the plate. This means even flow and higher turbulence in the main heat transfer area, which greatly improves heat transfer.

Energy-saving efficiency

The new plate design of the T35 series, and especially its patented distribution area, yields a heat exchanger with more effective heat transfer area in relation to its size. This means a smaller investment. Running costs are lower as well, due to a lower pressure drop that reduces pumping costs by up to 20%.

Other T35 advantages include quickly and securely mounted ClipGrip gaskets and an optimized frame design with a swing foot.

- Fewer plates needed due to high thermal efficiency
- Even flow and heat transfer across the plate
- Improved frame with optimized thickness and low weight
- Easy gasket mounting with the ClipGrip system

Applications

- Central cooling
- Lubricating oil cooling
- Scrubber gas application



Gasketed plate heat exchanger, T35

Steam heating and condensing

Gasketed plate heat exchangers, TS-M and AlfaCond

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



AlfaCond 600

Gas handling

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 lifecycle 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

Fusion-bonded plate heat exchangers, AlfaNova M

Gasket-free Alfa Nova M plate heat exchangers (PHEs) feature both plates and brazing of 100% stainless steel. Intended for use as indirect cargo condensers and/or heaters aboard LPG/E carriers, they are also ideal for many other gas system duties as a result of their wide temperature range and copper-free construction. Lighter and smaller than traditional shell-and-tube or welded condensers, AlfaNova M models have a lower condensing pressure and increased condensing capacity, which means tangible energy savings and reduced turnaround time in port.

VOC containment

Volatile organic compounds (VOCs) from tankers are increasingly regarded as a serious environmental problem. AlfaRex and AlfaNova M 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 the environment.

Their innovative stainless steel construction is adapted from the proven AlfaNova series, which combines brazing filler of stainless steel with Alfa Laval's patented fusion technology, AlfaFusion™.

- Ideal cargo condenser for indirect LPG reliquefaction systems
- Fresh water or glycol solution as cooling medium
- Suitability for all LPG media, including ammonia
- Leakage protection – gas cannot enter the seawater loop
- Same low weight and high efficiency as copper-brazed heat exchangers
- Superior temperature range between -196°C and +550°C
- Weight: 400 kg
- Footprint: 0.5 m²



AlfaNova M

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.

- 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



Aalborg EH

MGO use without conversion

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.

Accessories (optional):

- Valves
- Monitoring equipment
- Regulating equipment

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



Aalborg MX

Accessories (optional):

- Valves
- Monitoring equipment
- Regulating equipment

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



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)



Aalborg MP-C

Accessories (optional):

- Valves
- Monitoring equipment
- Regulating equipment

Oil and water heating and cooling

CBM

Virtually maintenance-free, the CBM plate heat exchanger has a compact and cost-effective design that is easy to install or retrofit, even in confined spaces. It comprises corrugated steel plates held together with copper brazing, which ensures optimal heat transfer efficiency and pressure resistance. The CBM covers a large range of applications and can be tailor-made for a particular duty, with various connection standards and connection sizes of 30–100 mm.

- Low-cost investment
- Optimum use of space
- Minimum maintenance – no replacement parts

In addition, there is a preconfigured solution known as HEATPAC CBM, specially designed for the heating of mineral oil prior to separation. HEATPAC CBM is available with two connection sizes, each with 20, 40, 60, 80 or 100 plates and is able to treat duties up to 30 m³/h.

Compatible media:

- Water
- Oil
- Steam
- Thermal oil
- Glycol solution
- Most refrigerants



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:

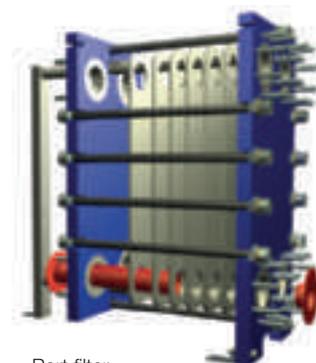
- ALF-S (stainless steel)
- ALF-R (rubber-lined carbon steel)



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: Alloy 254 (for seawater), titanium, Alloy 316L
- Standard mesh size: Ø 1.5–2.2 mm Δ corresponding to open surface of 37%



Cleaning-in-Place

Cleaning-in-Place (CIP) systems for heat exchangers

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 heated, usually biodegradable fluids 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 fluids 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) fluid for heat exchangers

Alfa Laval Cleaning-In-Place (CIP) fluids for heat exchangers are designed to keep your equipment in peak condition without endangering fragile marine ecosystems. All of the fluids are non-hazardous, and many of them are also biodegradable. Most gentle is the general-use line of Alpacon fluids, which contain a unique raw material based on fermented whey.

Safe and natural ingredients

Alfa Laval's high-performance fluids for Cleaning-in-Place 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 ingredients.

Fluids for general use:

- Alpacon Descalant
- Alpacon Degreaser

Fluids specific to heat exchangers:

- AlfaPhos
- AlfaCaus
- AlfaNeutra
- AlfaAdd





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

Steam and heat generation



Skill and scope

Alfa Laval's Aalborg steam and heat generation solutions represent a unique body of knowledge. They stand for nearly 100 years of innovation, from energy-efficient pin-tube elements to composite boilers and low-pressure thermal fluid systems.

Even more importantly, they stand for thermal expertise. Because we understand the consumers as well as the producers of steam and heat, we can fine-tune the production for the greatest energy efficiency downstream.

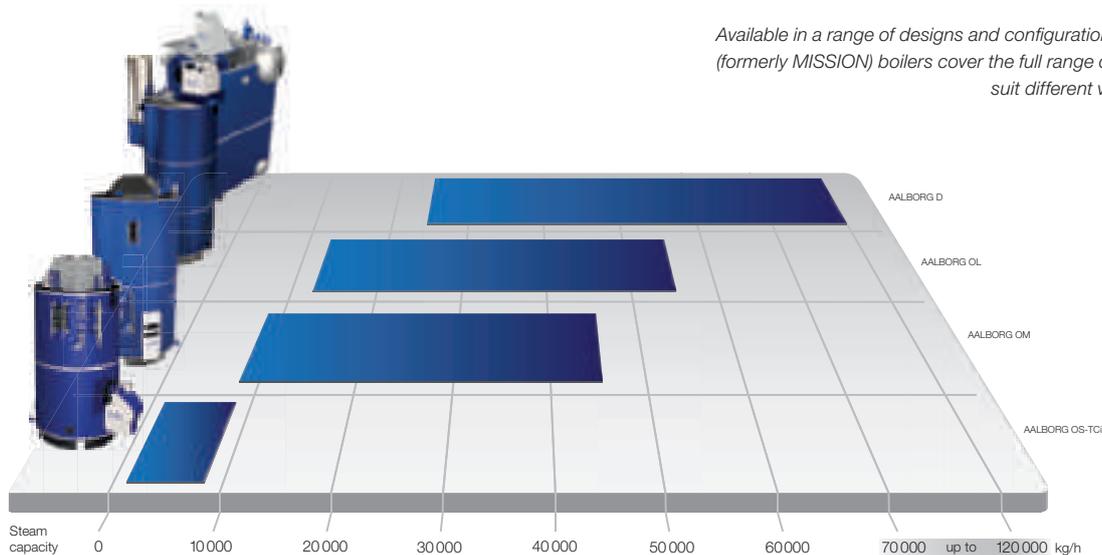
Systematic gains

Advances are still being made. For instance, the low-maintenance Aalborg boiler concept is entering a new generation. Suffixed TCi (Turbo Clean, intelligent), the self-cleaning boilers do away with water washing and the need for effluent disposal.

But the greatest advances come from linking technologies together. Our Energy Management System for thermal fluid, for example, reduces fuel use by prioritizing heat distribution according to the needs of connected consumers. And today we're exploring not only new boiler constructions, but also new ways of combining equipment for even greater effect.

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.



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.



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 downcomers placed outside the membrane walls. Two design pressures are available.



Aalborg OL

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

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.



Aalborg D

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

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)



Aalborg OC-TCi

Optimized efficiency downstream

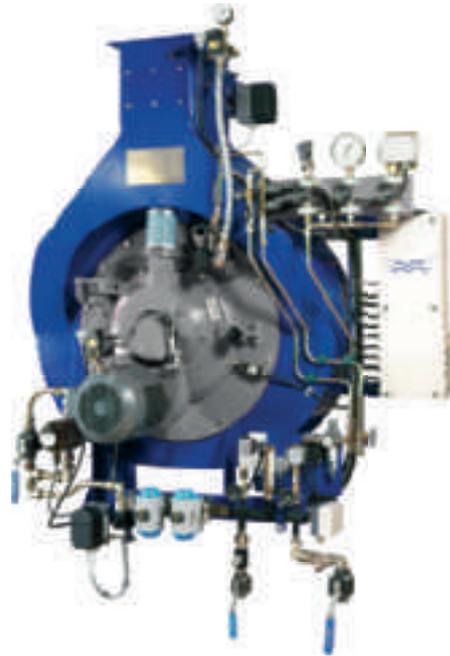
All models in Alfa Laval's range of Aalborg boilers have a basic design that supports the highest possible energy efficiency. However, each boiler is individually constructed to match the specifications of the heat consumers it will serve. By analyzing needs downstream, Alfa Laval can adapt the output temperature and pressure to ensure the highest energy efficiency in the steam line as whole.

Combustion

Aalborg KBE

The compact and lightweight Aalborg 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



Aalborg KBE

Aalborg KBM

The modular Aalborg KBM is a pressure-atomizing burner for residual and distillate fuels, designed for the continuous modulating operation of Aalborg OS-TCi and OC-TCi boilers. Easier to install, access and maintain than traditional monobloc burners, it maintains uniform combustion that improves heat transfer efficiency and reduces the fouling of convection surfaces. The Aalborg KBM has a forced-draught fan assembly, specifically designed to supply the required amount of air at the required pressure. Its unique air damper provides highly accurate control of airflow and minimizes draught loss during boiler shutdown, which means increased boiler uptime, reduced maintenance costs and optimal combustion efficiency.



Aalborg KBM

Aalborg KBO-E

The Aalborg 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



Aalborg KBO-E

Aalborg KBSD/KBSA

The Aalborg 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



Aalborg KBSD



Aalborg KBSA

Thermal fluid heating

Aalborg TFO (oil/gas-fired)

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.

- Mineral oils or hot water can be used as the heat transfer medium
- 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



Aalborg TFO

Aalborg EX (waste heat recovery)

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



Aalborg EX

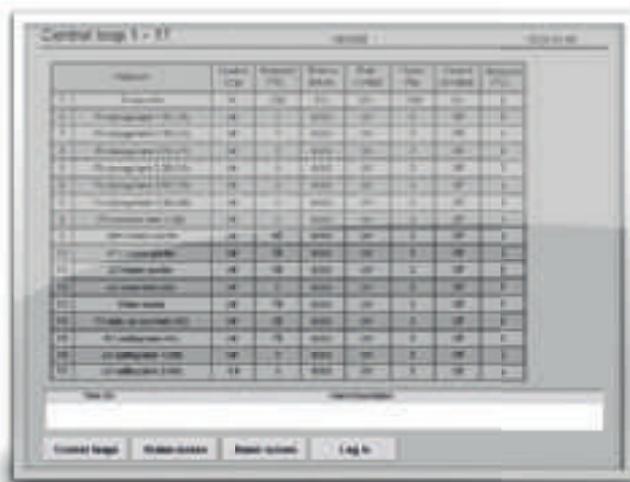
Energy recovery and adaptive distribution

A complete thermal fluid heating system from Alfa Laval offers two ways to reduce fuel consumption and emissions. The Aalborg EX exhaust gas economizer recovers waste heat that would otherwise escape with the exhaust gas, using it to warm the thermal fluid. Once in circulation, the heat energy can be efficiently distributed by the Aalborg Energy Management System (see next page), which adapts the heat flow to the actual needs of the heat consumers. This means the oil-fired boiler can be used less often.

Thermal fluid system control

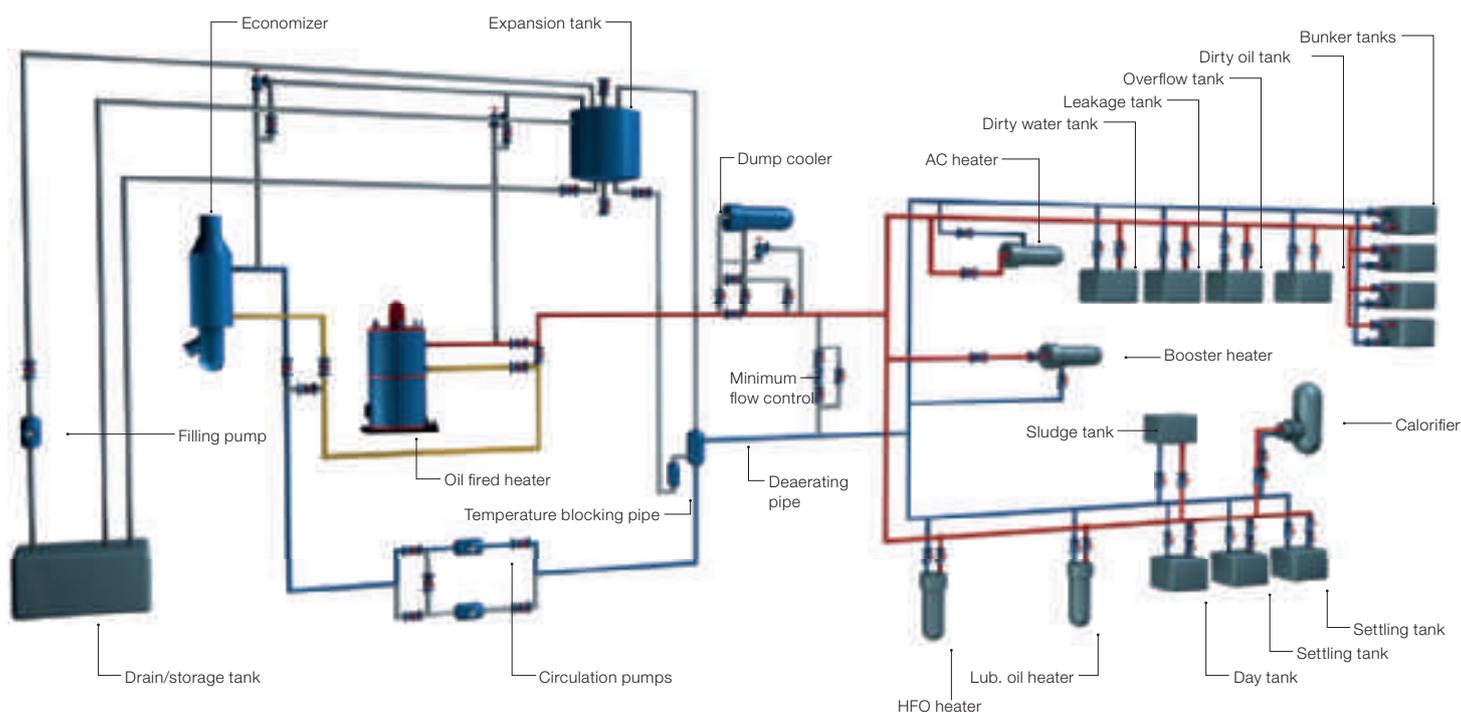
Aalborg EMS

The Aalborg 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 touchscreen, from which the desired temperature and warmup 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.



Aalborg EMS

Typical flow diagram of thermal fluid heating installation with heat consumers



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.



Aalborg Control

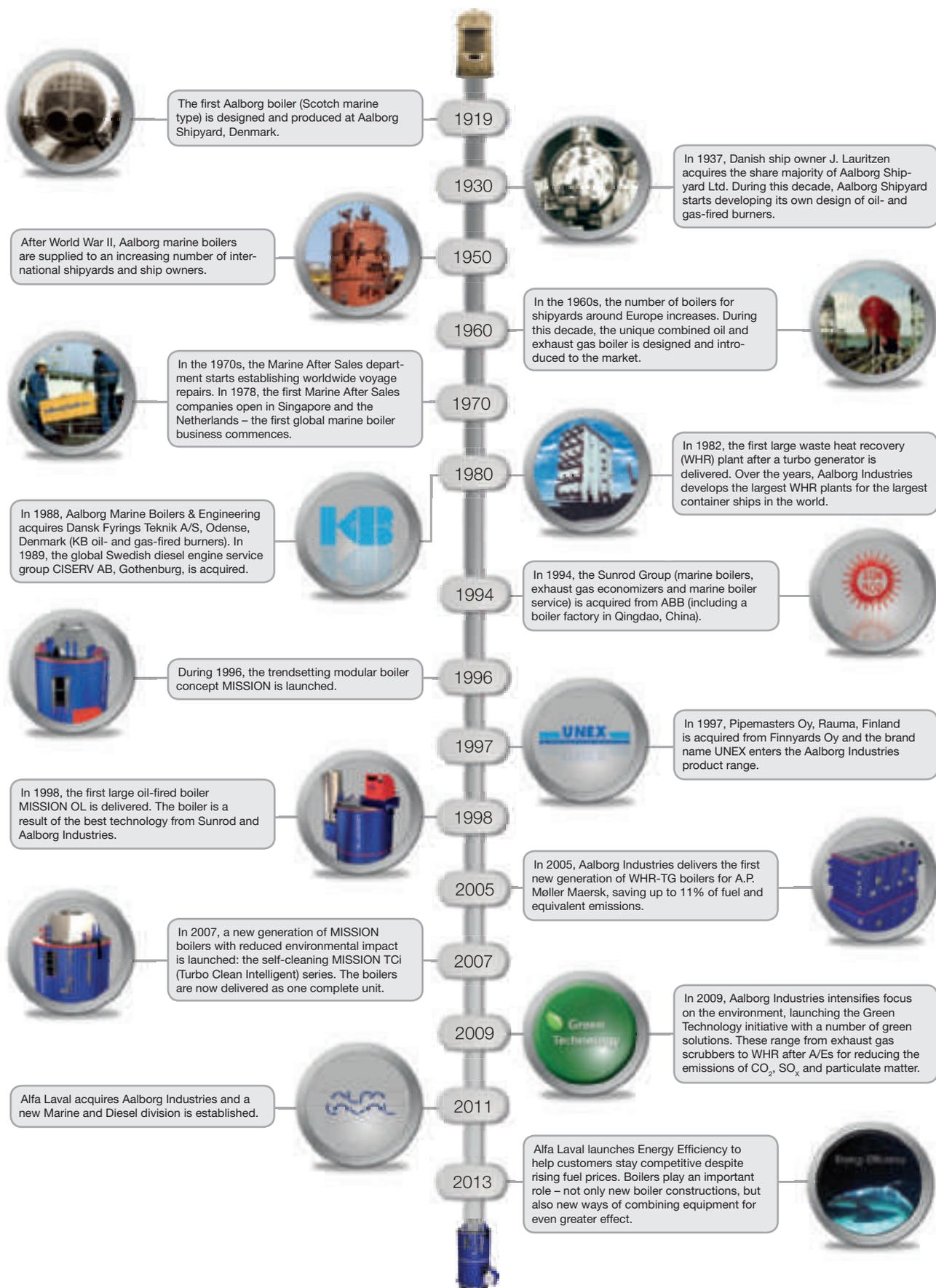
Aalborg Control Touch

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.



Aalborg Control Touch

Nearly 100 years of marine boiler experience





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.

Waste heat recovery



Valuable returns

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

Alfa Laval's Aalborg waste heat recovery systems deliver documented fuel savings and CO₂ reductions of up to 12%. Our extensive experience lets us design and install systems that maximize energy gains without any compromise in onboard safety.

Further opportunities

As well as working with main engine exhaust, Alfa Laval is expanding the Aalborg portfolio by focusing on previously neglected sources of waste heat. Today, recovered heat from the auxiliary engines can meet steam requirements during port stays, and in some cases even at sea.

Using overlooked heat sources, for example to superheat steam, is a way not only of accommodating energy needs, but also of preparing for emission regulations. Besides cutting costs, the reduced fuel consumption helps limit the generation of CO₂.

Main heat recovery

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.



Aalborg XW-TG

- 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)
- Dividing wall system for connecting several exhaust gas sources

Reliable energy returns

Waste heat recovery increases main diesel engine efficiency by reclaiming around half of the energy otherwise lost in the exhaust. Maximizing the energy returns requires high operational reliability, however, which the Aalborg XW-TG ensures by a number of means. The gills of the economizer's heating surface, for example, are spaced in a way that minimizes soot-build up. In addition, they are cleaned on-load by a highly efficient, electrically operated sootblowing system using steam or compressed air.

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.



Aalborg XW

- 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

Aalborg XS-2V and XS-7V

Constructed with smoke tubes, the Aalborg XS (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-7V has no steam space and is designed for forced circulation and operation with an oil-fired boiler.



Aalborg XS-7V

Aalborg XS-2V

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

Options:

- With (XS-2V) or without (XS-7V) own steam space
- Integrated silencer

Auxiliary heat recovery

Aalborg XS-TC7A

Constructed with smoke tubes, the Aalborg XS-TC7A is a compact and efficient exhaust gas economizer for installation after the auxiliary engines. When used in combination with a waste heat recovery system installed after the main engine, it significantly reduces the oil consumption of the oil-fired boiler under most load conditions. Since the operation of the auxiliary engines is not continuous, the economizer has been developed for varying loads. It features a specialized convection section, optimized to augment heat transfer through increased turbulence at the exhaust gas boundary layer. This allows increased steam production while reducing the economizer's weight in comparison to other waste heat recovery systems.

- Design pressure: 10 bar(g)
- Capacity according to ship's specification
- Ability to support steam demand during port stays
- Potential positive influence on Energy Efficiency Design Index (EEDI)

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 or 24 bar(g)
- Capacity according to ship's specification

Options:

- With or without own steam space
- Resistance to dry running (within certain parameters) for continuous operation even when performing maintenance



Aalborg XS-TC7A

Untapped energy potential

Exhaust gas from the auxiliary engines has been an overlooked energy source. But because the cooler exhaust of long-stroke main diesel engines can be insufficient to support steam needs, it is becoming more attractive. Auxiliary engine exhaust gas can fulfil steam requirements during port stays or even en route. At today's high fuel prices, the Aalborg XS-TC7A exhaust gas economizer has a typical payback time of 1–1.5 years.



Aalborg XW Superheater

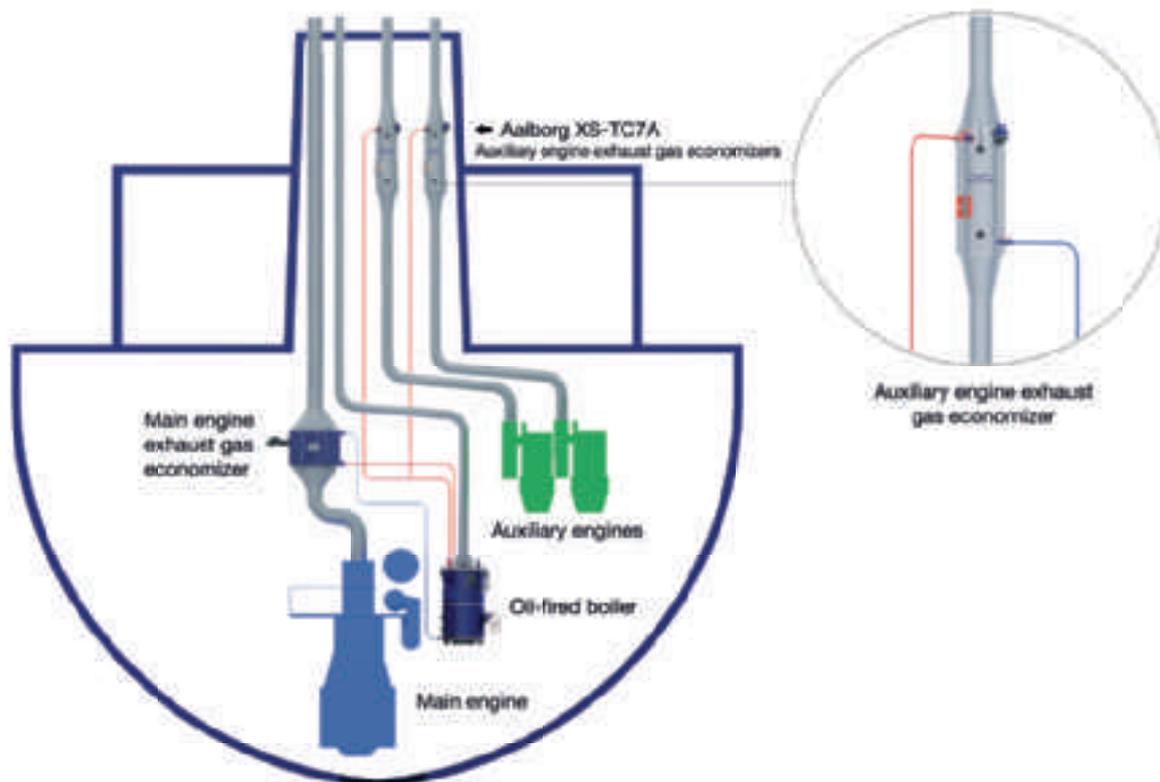
Rapid payback in fuel savings

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.

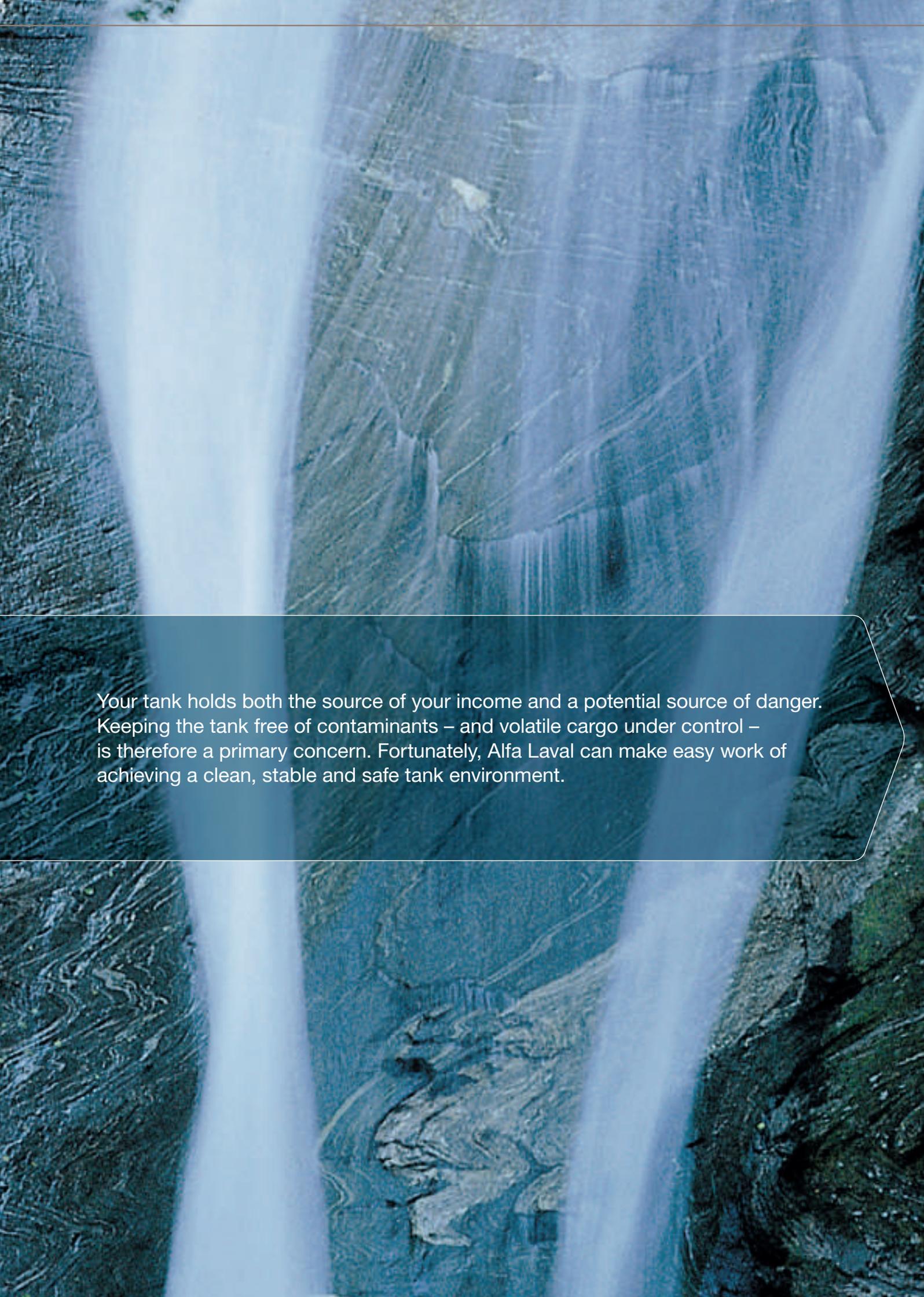
Why let even a little go up in smoke?

At today's fuel prices, producing steam with the heat energy from exhaust gas makes sense wherever possible. With a full selection of exhaust gas economizers, Alfa Laval offers complete waste heat recovery systems for the main engine exhaust as well as auxiliary engine exhaust.

Once seen as a bonus, auxiliary waste heat recovery does more than meet steam needs in port. Today, with long-stroke main engines producing cooler exhaust, it also gives you an energy supplement en route – which keeps the oil-fired boiler from being needed.

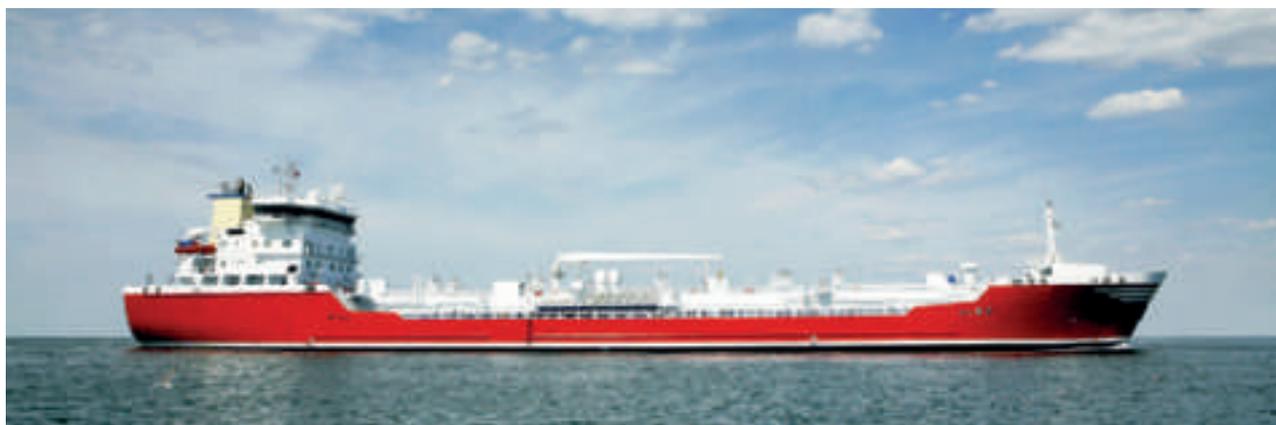


Aalborg XS-TC7A exhaust gas economizers are one good option for making your fuel go further. The fuel savings from their installation can be as high as 10–15%. And that can mean a return on investment of less than two years.



Your tank holds both the source of your income and a potential source of danger. Keeping the tank free of contaminants – and volatile cargo under control – is therefore a primary concern. Fortunately, Alfa Laval can make easy work of achieving a clean, stable and safe tank environment.

Tank cleaning and safety



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.

Our nozzle technology has evolved to include the hysteresis clutch of our i40 and i65 series, which prevents false starts and eliminates the leakage risk of a second shaft penetration. Supporting the nozzles is our G-Pass design software, whose 3D simulations surpass shadow diagrams to prevent product build-up and to reduce fluid and energy use.

Safer investments

Alfa Laval has also spent decades optimizing cargo safety under the Aalborg name. Today we provide inert gas through a number of methods, adapted to the combustion-safety requirements of different vessels. Nearly all feature the unique Ultramizing system, which atomizes the fuel oil for soot-free inert gas even at partial loads.

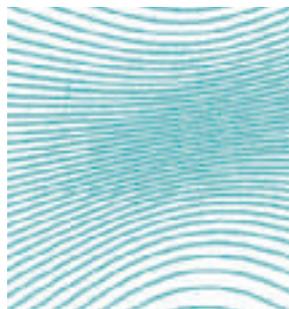
New to our portfolio is the Gas Combustion Unit, which deals with the particular concerns of LNG carriers. And as cargo safety needs grow more specialized, still more solutions will follow.

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.

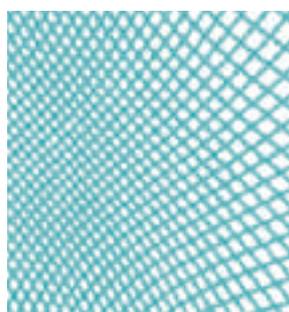


Single nozzle and helical cleaning pattern



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



Fluid-reducing coverage

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.

Jet length

Alfa Laval's optimized nozzle design ensures the longest jet length on the market. This has been shown in official tests of throw length by DNV, in which Alfa Laval nozzles reach up to 35% farther than the second-best alternative. This difference is due to competitor machines dropping more water on the way from the nozzle to the tank wall. With a more effective nozzle design, a smaller nozzle can reach the same distance with the same efficiency as a larger nozzle.

Less energy and slop

The use of smaller nozzles for the same task means less water consumption, which translates into steam and fuel savings when cleaning with hot water. When cleaning for several hours on a vessel with tanks 20 m in length, the savings per tank could be more than EUR 120 per hour, plus savings related to pumping. In addition, there will be less slop water for delivery to onshore facilities.

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

i270 is the next generation of our hard proven 270 FT Mark I machine. Fully programmable and turbine-driven, the Gunclean Toftejorg i270 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 now only available in 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

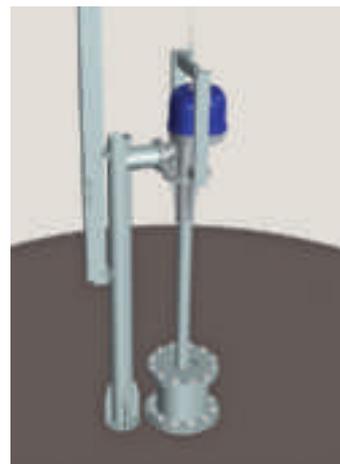
Gunclean Toftejorg i270 – swing arm

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 i270 – 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

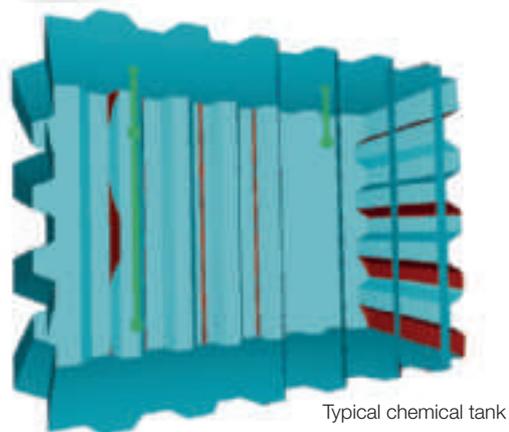
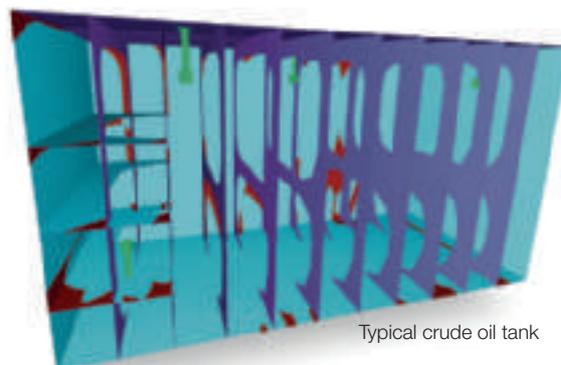
G-Pass

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)

Cleaning with fewer resources

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.



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.

Inert gas production

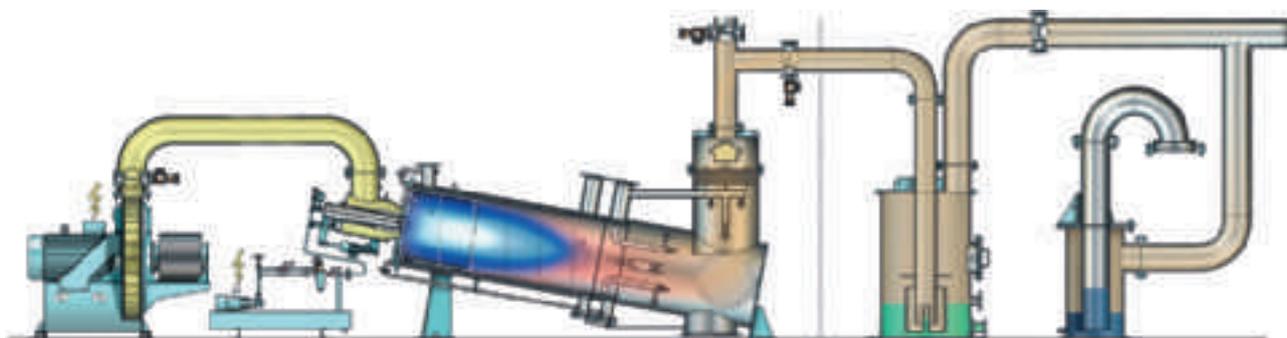
Aalborg inert gas generators

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 carriers
- Product tankers
- LPG carriers



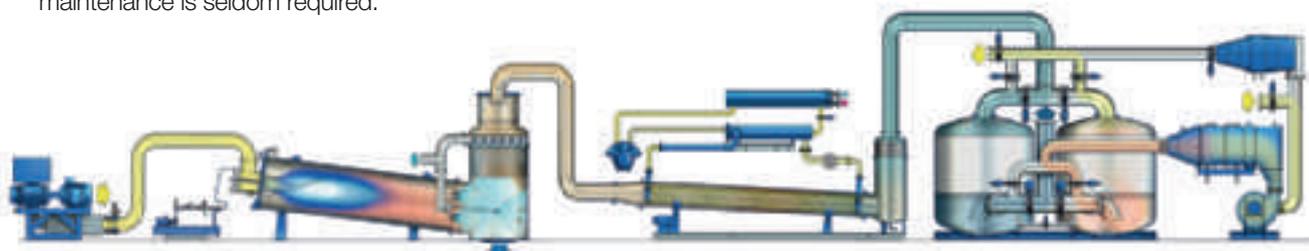
Aalborg FU inert gas generator with accompanying air fans, fuel pumps, deck water seal and P/V breaker

Aalborg dry inert gas generators

The most complex inert gas generators are installed on LNG carriers, where very dry inert gas is required. Aalborg dry inert gas generators from Alfa Laval have integrated controls and consist of four main components: generator, cooler, chiller and dryer unit. The cooler, which has gas contact surfaces of SUS 316 for lifetime service, takes up minimal space due to the low-temperature output of the generator. Using water from the chiller, it stabilizes the heat radiation in all conditions. The dryer unit is redundant and provides additional security. The entire installation is horizontal and allows easy maintenance, although maintenance is seldom required.

Applications:

- LNG
- LPG carriers



Aalborg BUFD dry inert gas generator with accompanying blower, chiller, cooler and dryer

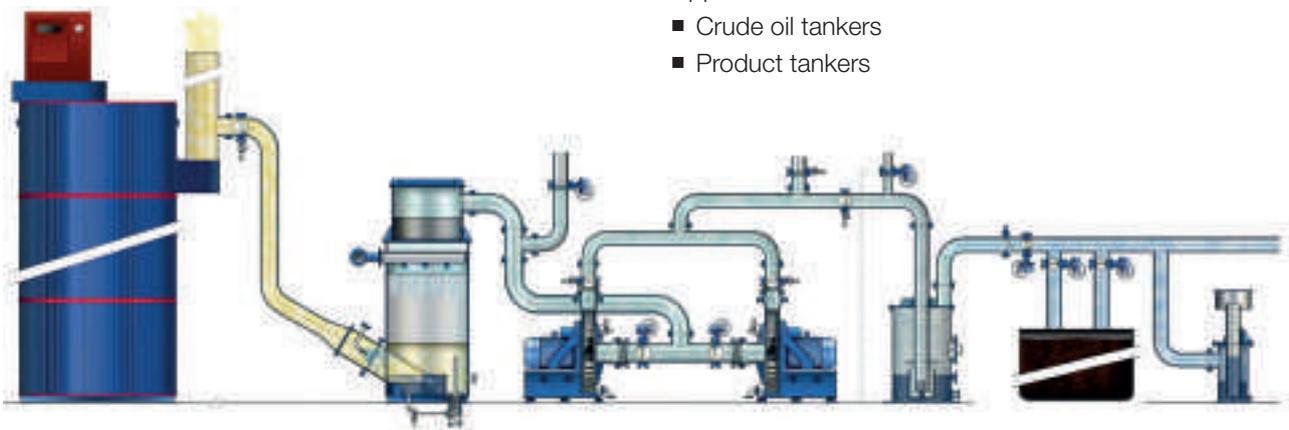
Aalborg inert gas systems (flue gas)

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

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
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

Gas combustion

Gas Combustion Unit

Specifically designed for LNG carriers, the Gas Combustion Unit from Alfa Laval is a convenient and economical means of regulating cargo tank pressure on vessels with dual-fuel diesel electric (DFDE) or low-speed diesel (LSD) engines. It safely disposes of boil-off gas when the gas cannot be used by the vessel's propulsion system, or when it is necessary to prepare the tank for inspection. The unit can also provide backup if the onboard reliquefaction plant should fail. Proven and effective, the Gas Combustion Unit requires little maintenance and has a uniquely compact design with no perforated dome, refractory lining or expansion joints.

- Type-approved disposal of LNG boil-off gas and inert gas
- Fully automated, low-maintenance operation
- Lowest possible operating costs for gas combustion technology
- Four operating modes, including a partial reliquefaction mode
- Streamlined and compact design, integrated into the vessel funnel
- Rotary air damper valve for accurate control of combustion air supply
- Combined motor fans for combustion air and cooling
- Electric rather than oil-fired ignition – eliminates tank, pilot and oil lines

Equipment:

- Combustion chamber
- Gas burner
- Gas valve train
- Fans and electric motors
- Control cabinet
- Power cabinets



Gas Combustion Unit



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 resource and do away with expensive, low-quality bunker water.

Desalination



Fresh advances

Alfa Laval pioneered the compact and cost-efficient production of fresh water. Over 50 years ago, we introduced thermally driven freshwater generators with dual-plate-pack technology. These were not only smaller than shell-and-tube installations, but also far less sensitive to scaling.

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

Energy opportunities

A major advantage of AQUA's three-in-one plate technology is the fact that it cuts seawater requirements in half. This allows smaller pipes and pumps to be used, which means a reduced initial investment, easier installation and lower energy consumption – with lower CO₂ emissions as a result.

But the energy efficiency is hardly limited to AQUA. Where larger volumes of fresh water are needed, our multi-effect plate MEP desalination plant typically consumes just 1.3–3.0 kWh/m³, thanks to an optimized pump configuration and a frequency-controlled motor on the seawater pump.

Seawater desalination

AQUA

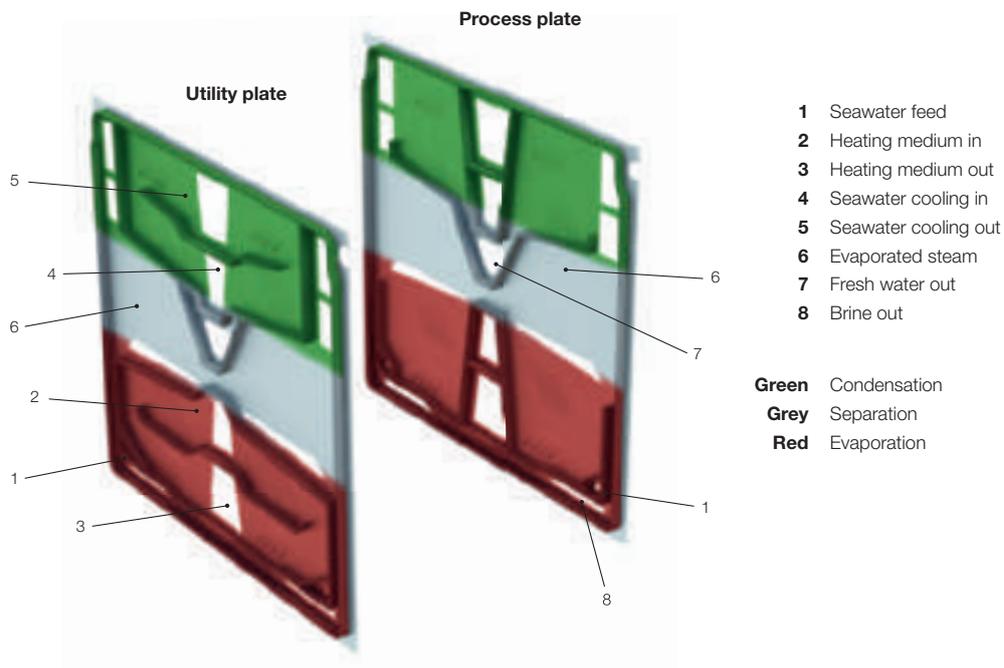
The AQUA freshwater generator from Alfa Laval is a major leap forward in freshwater generation technology. Because it utilizes only half as much seawater as other freshwater generators, it requires only half the pump capacity and half the pumping energy. This is achieved through pioneering plate technology, 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
- Easy maintenance at long intervals
- Maximum salinity: 2 ppm
- Capacity range: 3.1–60 m³/24 h



Less fuel used for pumping

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 electric power. 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 start-up 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

Economical operation

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.

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
- 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.

- 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



AOT 3F

Natural purification

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 of the main engine or other equipment
- Capacity: 7–100 m³/24 h

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

Adding an optional Feed Water Treatment (FWT) system to your freshwater generator produces immediate, automated improvements in water quality. Features of the FWT include:

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

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 HWS



Conditions and requirements change. But the reasons for choosing Alfa Laval from the start remain valid throughout your equipment's lifetime. By putting performance above all, Alfa Laval Parts & Service brings you the benefits of maximum uptime, availability and optimization.

Extending performance



Quality partnership

All equipment needs proper attention to maximize its lifetime value. Alfa Laval Parts & Service can support you wherever you sail, providing solutions that decrease cost of ownership and relevant innovation to keep you ahead.

Whether reconditioning, retrofitting, upgrading or simply fine-tuning, we help you get the most from your existing resources. In every aspect of your dealings with us, you'll experience the same uncompromising quality found in our equipment and parts.

Focused efforts

Our offering is driven by the benefits you seek: uptime, availability and optimization. You want equipment that runs as planned, plus quick access to the tools and advice that can make it happen. As circumstances change, you want your equipment to perform as well as it did on the day you bought it.

All this is ensured 24/7 by our global team of Field Service Engineers, working with a comprehensive network of service and distribution centres. Any time of day, experts are accessible by phone and email. Through start-up, maintenance, support, improvement and monitoring services – all matched to your equipment's life cycle – we put performance in easy reach.

Extending performance



Getting the best economy from your equipment requires getting the most out of existing resources. Alfa Laval has 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 up-time, availability and optimization.

Alfa Laval service centres reflect the breadth of our product portfolio. Some services e.g. boiler and inert gas generator repair, are only available at selected service centres.

across the world



Start-up services

For a long and healthy life cycle

Small errors at the outset can add up to big consequences over time. We help you get every detail of your start-up right with a full range of services – from strategic consultation to hands-on installation.

Skilled engineers are at your service every step of the way, using their knowledge to provide foresight on the challenges you may face and how best to prepare for them. With Alfa Laval on your side during start-up, you can be sure every piece of equipment will live up to expectations and perform like it should over the long haul.

Start-up services include:

- Installation
- Commissioning
- Supervision



Installation

Optimal lifetime performance demands getting off on the right foot. We help you do that with experienced engineers who not only specialize in the equipment to be installed, but can provide insights into how small adjustments will play out over years of operation. Putting installation in their hands means you can rest easy as unwanted surprises are avoided.

Our locally based engineers make no assumptions about your operations, but take the time to get to know your unique circumstances. With installation in their hands, you can count on:

- Quick completion
- Optimal performance
- Experienced specialists who take the lead
- Recommendations for ideal operation and maintenance

Maintenance services

For performance you can count on

A well-crafted maintenance strategy gives you greater uptime, transparent cost control and longer equipment lifespan. In fact, expert maintenance not only improves the performance of your Alfa Laval equipment, but also helps you get more out of all surrounding equipment.

Thanks to tireless R&D, we can offer unique solutions for Cleaning-in-Place that cut man-hours, reconditioning that leaves equipment good as new, and meticulously designed spare parts that improve performance while extending service intervals. For the ultimate in spare parts efficiency, you can even set up an exclusive stock of parts fabricated to your exact specifications and ready to ship the same day you ask for them.



Our maintenance services include:

- Regular and unscheduled service
- Cleaning
- Spare parts & service kits
- Repair and reconditioning
- Exchange and rental equipment

Preventive maintenance

Preventive maintenance is the key to securing uptime while keeping surprises at bay. We can provide you with the training and tools to do it yourself or we can come on board and do it for you. Regular Cleaning-in-Place and the use of quality spare parts keeps wear down and ensures service intervals are optimal.

Using the right tools and methods when disassembling and assembling reduces man-hours and eliminates costly errors. When you base your maintenance on our service kits, you know you have the right parts, the right quality and the right information to perform effective preventive maintenance.

Preventive maintenance gives you:

- Maximum reliability
- Minimized operating costs
- Longer equipment lifetime

PHE re-gasketing

Wipe away years of use with our highly advanced plate heat exchanger (PHE) re-gasketing. At our workshops, we use specially developed tools to inspect and align your gaskets – no matter what brand of PHEs you use.

First, the gasket is removed using liquid nitrogen for a clean separation that maintains the gasket's exact shape. Then a dye is applied that reveals micro-holes. Finally, the gaskets are sealed using a two component oven-cured epoxy glue. Compared to rubber based glues, our epoxy glue lasts years longer. While we are working on your equipment, we can supply you with freshly reconditioned PHEs so you can continue operating as usual.

Alfa Laval PHE re-gasketing ensures:

- Extended PHE lifespan
- Guaranteed performance with a new warranty
- An exceptional seal that lasts for years
- Even small imperfections are found

Support services

For expert assistance anytime, anywhere

Every minute is costly when a problem slows you down. With expert engineers stationed in every part of the world, we can help you quickly solve any issue.

We also help prevent issues from the start, with troubleshooting strategies like regular inspections and service follow-ups. When your vessel is in port, we can conduct a support survey that includes a visual inspection and a review of process parameters and alarm logs, as well as consultation with your own engineers.

Voyage repairs

To provide the most flexible possible solution, our engineers can carry out boiler and inert gas generator repairs during your vessel's normal operation. With our presence around the world, we are able to quickly adjust start dates and team size to fit your schedule. So if the schedule between ports gives you little time for repairs, we can compensate by bringing in additional factory trained specialists to get the job done quicker.

When we have specifications on hand, we can prepare modules on shore to shorten the repair process. While we work on your boiler, we can set up a portable boiler to ensure you maintain steam supply and stick to your schedule. If the repairs cannot be carried out during operation, our repair team can travel with your vessel to complete the job quickly when it reaches port.

Voyage repairs let you:

- Avoid boiler downtime that forces you to use expensive diesel fuel
- Carry out repairs when it suits you best
- Maintain your schedule
- Avoid possible off-hire of vessel

All of our support services have the same goal of maximizing your equipment's availability and uptime. Our support services include:

- Telephone support
- Service follow-up
- Troubleshooting
- Inspection

LNG lifetime extension program

Economic realities have made it attractive to extend LNG vessels' service life. Alfa Laval helps ensure the continued performance of your inert gas generator by inspecting critical components, e.g. the combustion chamber, valves and chiller unit. We then advise you on what parts should be replaced and why. Together, we form a detailed plan to ensure long term performance with no surprise costs.



Improvement services

For an even stronger future

Taking advantage of our upgrades and other improvement services has an immediate impact on your bottom line. Day by day, it becomes more important to make your resources go further, whether due to changing fuel economy or impending regulations. Our improvement services give you smart, cost-effective ways to do just that.

We provide continuous access to the latest innovations – many of which involve little investment. One example is PreBilge, a compact pre-treatment loop that secures the discharge compliance of underperforming bilge water systems. And our Advanced Cooling System gives you cutting-edge control of viscosity and temperature variations to better handle low-sulphur distillate fuels.

With smart retrofits, upgrades, relevant training and expert guidance, we help you secure future success. Our improvement services include:

- New and reconditioned equipment as retrofit
- Performance upgrades
- Improved automation
- Training programs
- Consultancy

Waste heat recovery for auxiliary engines

Reduce your fossil fuel costs and emissions with a waste heat recovery (WHR) retrofit on your auxiliary engines. The Aalborg XS-TC7A is a compact and lightweight economizer that we tailor to your ship and its engine design. Though it has a minimal footprint, it effectively optimizes use of waste heat from the auxiliary engine exhaust gases during voyage and port stays.

The WHR retrofit results in significant reductions in oil consumption, helping you meet budget demands. It is particularly beneficial during slow steaming as, in some



cases, reduced gas flow and temperature mean steam production becomes insufficient for meeting operation requirements. The retrofit can augment steam production to reduce the need to use your oil fired boiler.

Some of the benefits are:

- A short ROI
- Reduced fuel consumption of the oil fired boiler
- Reduced emissions from the oil fired boiler

PureDry retrofit

Take greater control of your fuel costs with a PureDry retrofit. By installing this innovative high speed separator, you can recover super-dry solids from waste fuel oil that can be re-used. The average vessel cuts their fuel costs by about 2%. With bunker fuel oil accounting for nearly 60% of a vessel's operating costs, PureDry can make a major impact on your economy.

The retrofit involves installing two waste oil tanks – one for lube oil and one for fuel oil (many vessels already have this set-up). PureDry features a patented, spiral-shaped device called the XCavator that transports super-dry solids from the fuel oil tank down into a separate container. The recovered fuel is then returned to the fuel oil bunker. The savings typically add up to a return on investment of less than a year.

Pure profit

A large container vessel or cruise ship sailing 52 weeks per year typically burns 1,000 tonnes of fuel per week. With PureDry recovering fuel that would otherwise be treated as waste, it is possible to cut the ship's fuel bill by up to 2%, which amounts to at least USD 500 000 per annum (at bunker prices as of April 2013).



PureDry

FPS service concept

Whether you need inert gas generator (IGG) upgrades or an entirely new boiler, we deliver lifetime service and support to get the most out of your floating production and storage (FPS) vessel. Our services range from life time extension consultation to emergency support from our engineers who are specialized in working with large boiler and IGG systems on offshore vessels. Located around the world, they are always on call to ensure your production keeps hitting its targets.

We can upgrade your boilers to run exclusively on the gas produced on-board the FPS, eliminating the need for external fuel. We can also upgrade the automation of your boiler and IGG so they perform at optimal efficiency.

The Alfa Laval FPS service concept gives you:

- Lifetime service and support
- Cutting edge boiler and IGG automation technology
- Optimized boiler and IGG performance
- Experienced engineers always on-call
- Remote data access for effective support

Monitoring services

For solving problems before they start

Our monitoring solutions let you achieve lower cost of ownership and even greater peace of mind. By tracking certain data, we can identify areas that, with a little adjustment, will deliver concrete results in process performance, equipment lifespan and crew safety.

One way we do this is by monitoring your spare parts consumption. Looking at the numbers, we identify potential issues in maintenance and operational practices and find solutions before they become a real problem. Catching them early means you only need simple fixes, like equipment optimization or a specific training course.



Performance Agreements

Alfa Laval Performance Agreements are individually tailored solutions that can include any of the services in our extensive service portfolio. Based on your specific needs, we put together a unique offering that brings you maximized returns on investments, ensures continuous top performance of your equipment and makes budgeting easy.

When adding up the avoided downtime, minimized need for repairs and reduced operating costs, you will soon discover how profitable a Performance Agreement can be.

Some of the benefits compared to buying single services are:

- Predictability and peace of mind
- Fixed yearly costs
- Access to special services only available in an agreement
- Top level efficiency throughout entire equipment lifecycle



PERFORMANCE
AGREEMENTS





New times, new challenges

The marine industry is changing with ever-increasing speed, especially when it comes to new demands concerning energy consumption and environmental issues. Whether you build ships or sail them, you need solutions and expertise to stay ahead.

You'll find both at Alfa Laval.

No other supplier offers such a wide range of proven equipment, covering most critical operations on board. Nor will you find greater competence in merging equipment into full applications and innovative solutions to your challenges.

Our decades of work with shipyards, ship owners and ship operators are vital in this respect. Meeting the future is impossible without a true understanding of where things stand today – an understanding we've earned through a century of marine service.

Rest assured, we'll be here to serve you tomorrow as well.

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.

