



EcoStream

Oily water cleaning system



EcoStream oily water cleaning system.

Towards cleaner oceans

Bilge water generated onboard ships is a major environmental concern for the shipping industry. Regardless of its source, bilge water must be treated to reduce the oil content to levels that meet international regulations for release into the environment. This is critical to keeping the world's oceans and their vast marine ecosystems healthy and productive.

The impact of ship propulsion on the marine environment can be minimized and heavy fines avoided if efficient bilge water treatment is carried out onboard. The need for waste disposal ashore can also be reduced. Over the years, the cost for waste disposal has continued to climb as local authorities enforce stricter laws for the land-based companies that process this waste.

Application

Cleaning bilge water poses distinct challenges. Not only does the composition and flow of bilge water change, making continuous and efficient treatment difficult, but treatment onboard presents another set of constraints.

Treatment methods must meet individual ship requirements and demands for safety, reliability, compactness, automation, low maintenance and the ability to withstand rough weather conditions.

Centrifugal separation has proven to be a reliable, efficient and flexible method for continuous removal of oil and other contaminants suspended in the bilge water onboard ships and at land-based power plants.

EcoStream: Reliable, efficient, continuous

The Alfa Laval EcoStream solution is a reliable single-stage centrifugal separation system for highly efficient treatment of large bilge water volumes at sea as well as ashore. The compact modular system generally cleans bilge water to less than five parts per million (ppm) oil in water.

Based on a standardized concept, EcoStream is a complete stand-alone system that is easy to install for any new or existing installation. Continuous, fully automatic operation – even when subjected to oil shock and rough weather conditions – reduces the need for large bilge water holding tanks. This increases payload capacity.

EcoStream significantly reduces operating costs compared to conventional

bilge water systems thanks to minimized volumes of waste that require disposal.

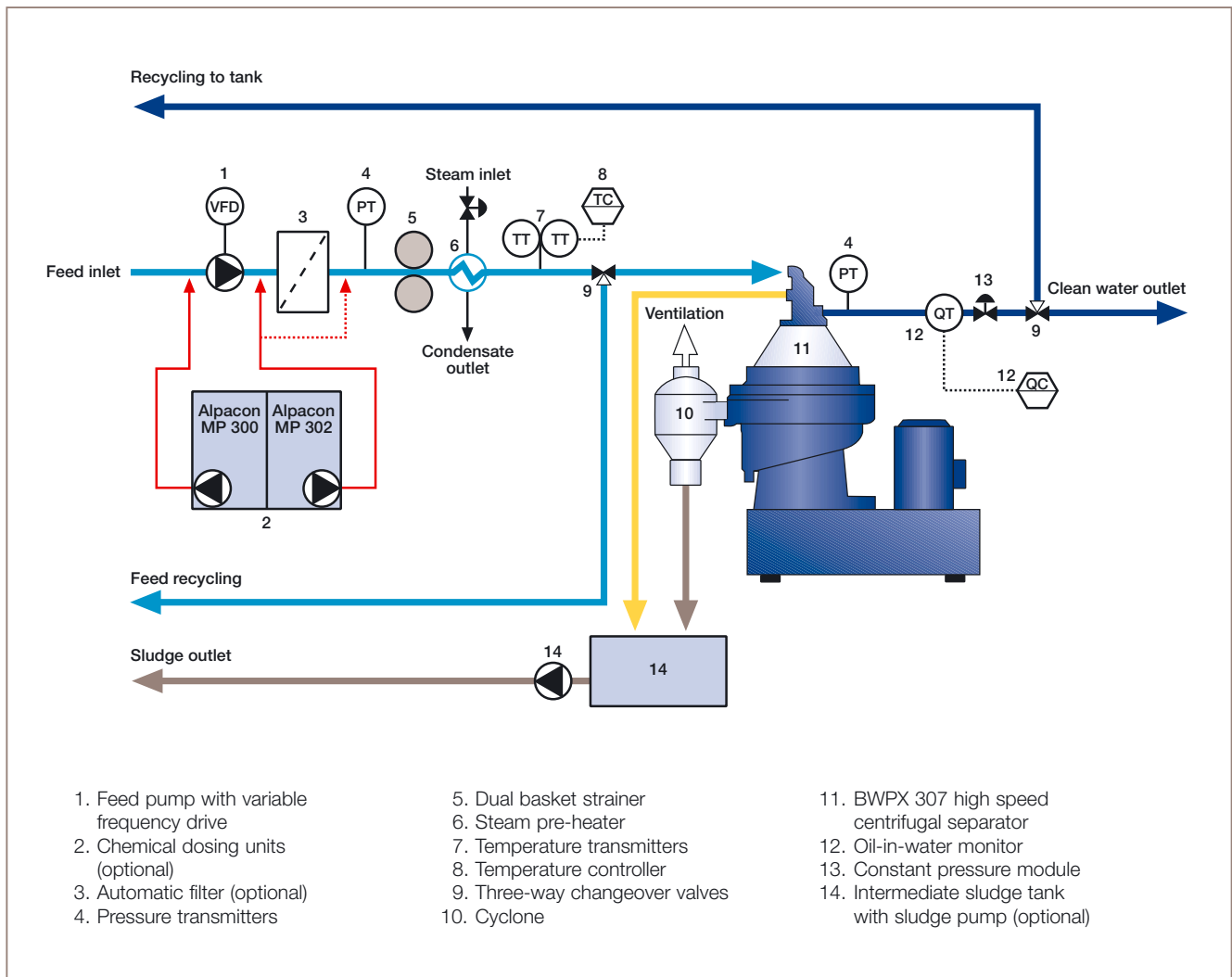
EcoStream complies with the Marine Environment Protection Committee Resolution, MEPC.107(49), of the International Maritime Organization (IMO).

Benefits for designers of ships and power plants

- **Compact, modular, easy-to-install system** saves time, space and money.
- **Continuous, single-stage operation** requires less holding tank volume and provides more space for payload.
- **Easy integration** with existing communications systems onboard.

Benefits for owners and operators

- **Reduced operating costs** thanks to low maintenance, automated control, minimal waste disposal and an absence of filter elements that require replacement.
- **Reliable, always-available system.** Operates continuously, regardless of variations in feed, oil shocks and rough weather conditions.
- **Easy to operate.** Automated control and monitoring system integrates with existing Alfa Laval systems, providing a single user-friendly interface.
- **Safe operation.** A key-locked switch can be set in manual/locked position to ensure that only the individual responsible for environmental compliance may authorize overboard discharge.



Schematic diagram of EcoStream cleaning system.

Bilge water

Bilge water can be a mixture of water, fuel oil, lube oil, hydraulic oil, detergents, oil additives, chemicals, catalytic fines, soot and other substances. This mixture is normally collected in a bilge water settling tank and maintained at an elevated temperature.

The marine sector uses large amounts of chemicals for cleaning, service and maintenance activities in the engine room and many of these products are surfactant-based. As such, these chemicals contribute to emulsion formation in a ship's bilge water system. An emulsion is a mixture of oil and water, where small oil droplets are dispersed in the continuous water phase.

Separation efficiency can be compromised by the formation of stable emulsions. This becomes challenging when an emulsion is stabilized by surfactants, water-soluble polymers or colloidal particles. Centrifugal treatment of bilge water using the EcoStream system effectively handles separation.

System description

The EcoStream bilge water treatment system comprises four main functions:

- Forwarding/pumping
- Oily water pre-treatment
- Centrifugal separation
- Process control and monitoring

Oily water is pumped from the settling tank to the pre-treatment stage by a positive displacement pump with variable frequency drive, providing a feed range from 1500 to 2000 litres per hour.

In the pre-treatment stage the bilge water is fed through a dual basket strainer that traps large particles from the fluid. The fluid then passes through a heat exchanger, which raises the temperature of the fluid to the required level for optimal separation efficiency, generally between 60°C to 95°C.

If the formation of a stable emulsion is expected and this temperature range does not enable adequate separation efficiency for the given capacity, an optional chemical dosing unit can be installed.

A three-way changeover valve is located after the heat exchanger in the pre-treatment stage. The purpose of this valve is to direct the fluid to the separation stage when all process conditions, such as feed temperature, pressure and separator speed match pre-set values. If any condition is not met, the valve will re-circulate the fluid to the bilge water settling tank.

When all process conditions are fulfilled the fluid is directed to the separation stage. Fluid then enters a high-speed centrifugal separator that is designed for continuous, high-efficiency separation of large volumes of bilge water. Oil and emulsion separated from the bilge water are continuously discharged and directed to a sludge or waste-oil collecting tank. Solid material is discharged intermittently through the self-cleaning mechanism of the centrifuge.

Treated water is also continuously discharged. An oil-in-water monitor measures the oil content in the treated bilge water in full compliance with IMO Resolution MEPC.107(49). When the oil content is below a pre-set value (15 ppm or lower), the treated water can be directed either to a holding tank for discharge overboard at the ship operator's convenience, or pumped directly overboard. If the oil content is above the pre-set value, the water is re-circulated to the bilge water settling tank.

Revolutionary design features

EcoStream incorporates the Alfa Laval BWPX 307 high-speed centrifuge and the latest achievements in fluid dynamics technology:

- A patented Alfa Laval disc inlet, Optiflow, gently accelerates the bilge water into the separator bowl with minimal shearing and foaming. This greatly improves the separation efficiency by preventing droplet splitting and further emulsion formation.
- A new disc-stack and bowl design provides the maximum surface area for separation. Specially designed distribution holes and optimized caulk configuration further enhance separation efficiency.



EPC 50 process controller.

These design features, as well as stable, continuous operation, ensure proper handling of oil shocks that generally bring static cleaning systems to a standstill.

EPC 50 process controller

This new generation of the easy-to-operate, computer-based Alfa Laval process controller facilitates advanced fully automated monitoring and control of EcoStream functions by displaying in clear text process parameters, alarms and other data.

The EPC 50 process controller shows the status of the process, system valves and transmitters, activated or deactivated.

A push-button, light-emitting diode (LED) panel indicates the status of motors, cleaned bilge water for discharge overboard and for re-circulation, feed pump, optional chemical dosing unit and automatic cleaning device of the oil-in-water monitor.

The process controller is based on the same hardware used in other Alfa Laval units, making it easy for operators who are already familiar with this equipment.

Options

- Automatic, self-cleaning filter.
- Chemical dosing unit.
- Sludge removal kit (SRK) with intermediate sludge tank, sludge pump and level switches.
- Cleaning-in-place (CIP) unit for the centrifuge.
- Pneumatic cleaning device for the oil-in-water monitor.
- Connection of the process controller via serial bus to an external computer or communications system.
- Steam control valve with safety shut-off function.

Capacity

EcoStream is designed for a throughput capacity ranging from 1500 to 2000 litres per hour.

Operation

- Recommended maintenance intervals:
 - Intermediate service: Every 2000 operating hours (or every three months)
 - Major service: Every 8000 operating hours (or once a year)
- Service spares kits contain all necessary parts for each service.
- The system manual includes detailed information in electronic format or as paper copy for:
 - System description
 - Operating instructions
 - Parameter list
 - Alarms and fault finding
 - Installation instructions
 - System reference, including instrument list
 - Service and spare parts
 - Connection instructions and drawings
- Commissioning and technical services to start up the system and to offer advice about operation and maintenance are available from Alfa Laval offices worldwide.

Technical data

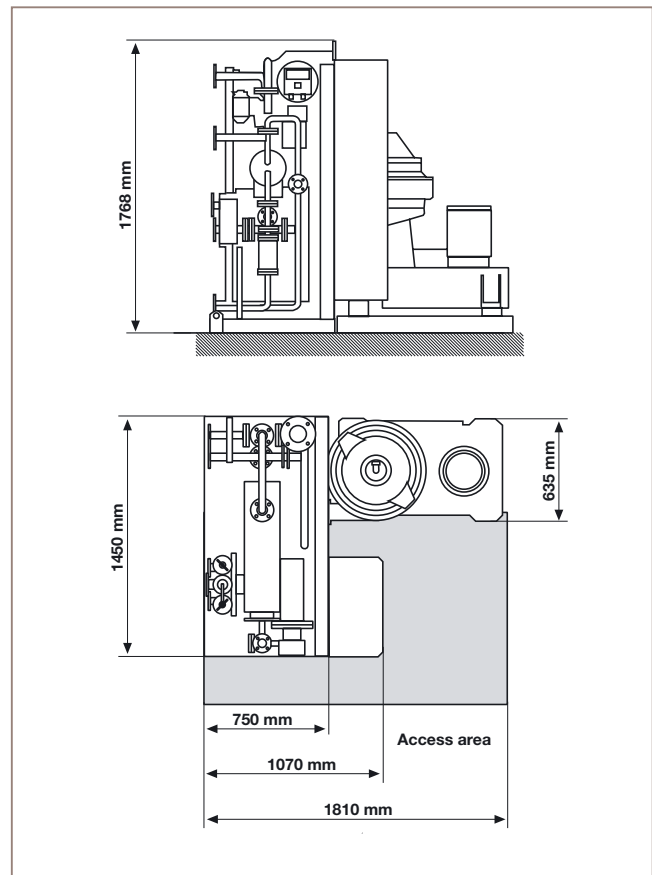
Power and connections

Supply voltage	Three-phase, 220 V up to 690 V	
Frequency	50 or 60 Hz	
Power consumption	12 kW	
Instrument air	DN 12	700–2000 kPa
Operating water	DN 12	300–600 kPa
Steam inlet	DN 25	700 kPa saturated

Net weight

Separator with frame	580 kg
Valve and piping rack	455 kg
Feed pump	150 kg
Control cabinet	325 kg

Dimensions



How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com