FRAMO CARGO PUMPING SYSTEM

Set a sustainable course for Aframax tankers

FRAMO
an Alfa Laval brand

TOGETHER FOR
SUSTAINABLE
SHIPPING

Think outside

The Framo hydraulically driven submerged cargo pumping system is the future solution for Aframax tankers. It offers substantial fuel savings during cargo discharge and cargo heating, leading to reduced operational costs and emissions. The elimination of the pump room not only achieves a 2% increased cargo carrying volume but also enhances the overall safety level. Furthermore, the Framo system allows for simplified cargo piping, resulting in approximately 60% savings in pipes and valves.

the pump room

Made to perform

The Framo cargo pump is of a robust construction made to efficiently empty any cargo tank containing the heaviest and most viscous crude oils. The hydraulic driveline is designed for safe and reliable pumping and final stripping. The pump can operate at full capacity to the very end of your discharge operation without risk of cavitation or any build-up of heat.

Maximize profits

Fuel savings and environmental footprint

The Framo cargo pumping system can save up to 80%, or 40 metric tons, of fuel per cargo discharge compared to conventional steam-driven pump room solutions. Additionally, by utilizing Framo deck-mounted cargo heaters, an additional fuel saving of up to 60 tons can be achieved during a 20-day voyage. This results in estimated fuel savings of up to 100 tons in just one voyage, corresponding to more than 300 tons of CO_2. These significant savings contribute to improving the vessel's fuel economy and reducing its environmental footprint.

Saved fuel

Discharge: 800 tons of fuel saved yearly

Heating: 1,200 tons of fuel saved yearly

$1,000,000 yearly

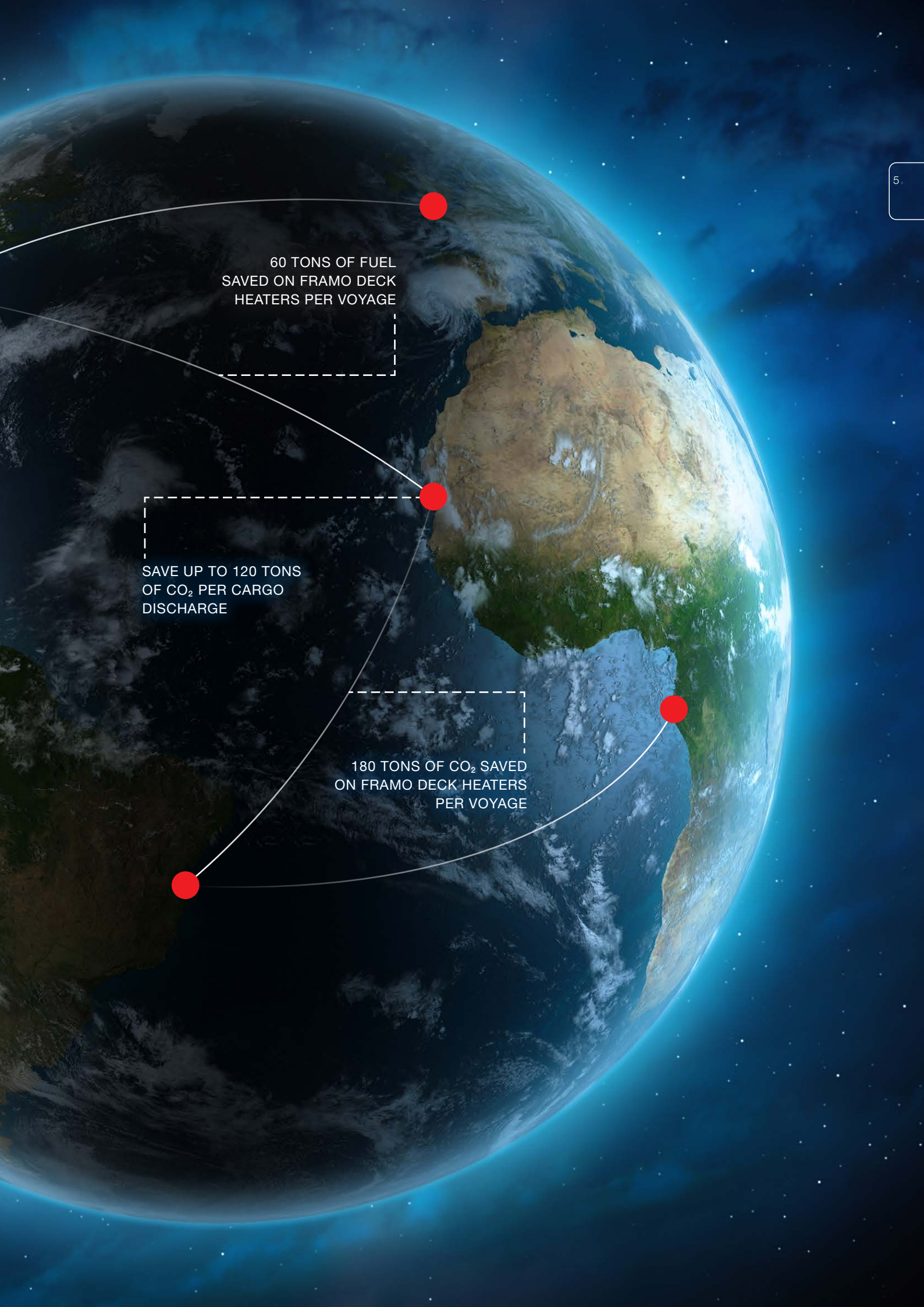
Saved CO_2

Discharge: 2,400 tons of CO_2 saved yearly

Heating: 3,600 tons of CO_2 saved yearly

More than 6,000 tons of CO_2 yearly

EXAMPLE IS FOR 20 VOYAGES IN A YEAR


60 TONS OF FUEL
SAVED ON FRAMO DECK
HEATERS PER VOYAGE
SAVE UP TO 120 TONS
OF CO_2 PER CARGO
DISCHARGE
180 TONS OF CO_2 SAVED
ON FRAMO DECK HEATERS
PER VOYAGE

Well proven technology for

To stay ahead in a competitive industry, Aframax tankers must meet new and changing demands. Higher fuel efficiency, reduced emissions, and shore power are planned or already implemented requirements, limiting the environmental impact of the shipping industry. Propulsion is not the only factor to take into consideration; the cargo discharge system is crucial for its ability to comply with stricter environmental regulations.

Steam drive still makes up the majority of pumping systems in the Aframax crude oil tanker fleet. Installing a Framo submerged pumping system substantially improves fuel efficiency and economy during cargo discharge and cargo heating.

a low emission future

Measures on the horizon

The shipping industry has a strong ambition to reduce fuel consumption and greenhouse gas emissions. Upcoming measures will mandate an improved Energy Efficiency Design Index (EEDI) and regulate CO_2 emissions through a Carbon Intensity Indicator (CII) rating scheme. It is also expected that local authorities, such as the California Air Resources Board (CARB), will implement shore power requirements for all tankers visiting designated ports.

FUTURE-PROOF SOLUTION

Reducing GHG emissions

Regulations on greenhouse gas emissions (GHG) will continue to be tightened to limit the environmental impact of shipping. Framo technology is well-proven to reduce CO_2 emissions by improving energy efficiency in cargo pumping operations, preparing the vessel for future developments such as Carbon Intensity Indicators (CII). This also applies to sensitive port areas where cold ironing or shore power-ready design can be implemented to ensure compliance with local regulations (such as CARB in California). A Framo cargo pumping system offers a future pumping solution that meets all current and anticipated regulations.

Cargo pumping performance

Framo cargo pumping system offers savings and operational advantages:

- Save up to 80% of fuel (40 metric tons) for every cargo discharge, with improved fuel economics.
- Save up to 60 metric tons of fuel per voyage, with a more efficient cargo heating operation.
- Improve ECO profile and prepare for future environmental regulations with existing, well-proven technology.
- Increase cargo carrying volume by 2%, by deleting the cargo pump room.
- Quicker turnaround time in port, with faster discharge operation.

Calculations are based on a comparison at the design discharge rate with an Aframax tanker with a conventional steam-driven pump room system.

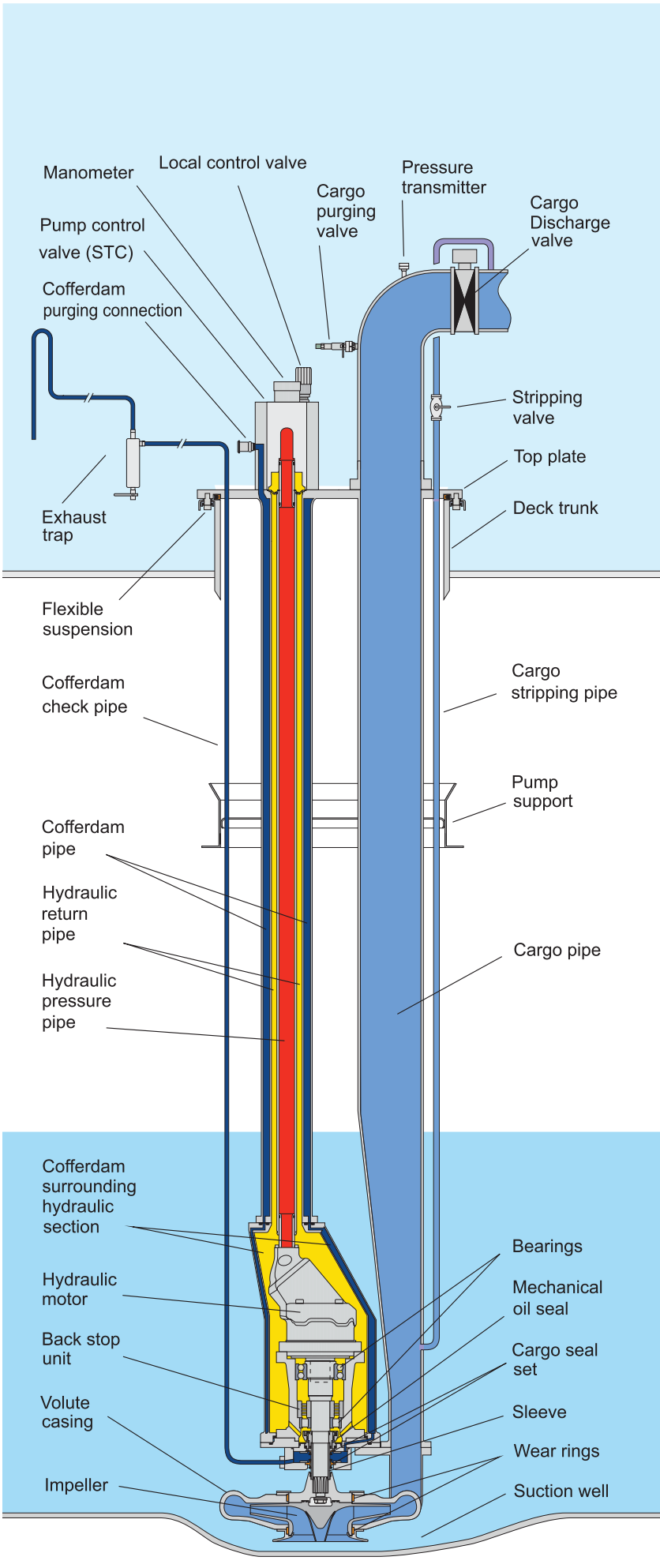
The submerged cargo pump

The Framo cargo pump is a vertical single-stage centrifugal pump powered by a hydraulic motor for safe and efficient operation.

All our cargo pumps are made of stainless steel material and designed with a smooth and easy-to-clean surface with a limited number of flanges which gives a superior ability to pump any liquid.

Design features

- Vertical single stage, single suction impeller, axially balanced
- Robust hydraulic drive with short and stiff drive shaft
- Fail-safe design; lubrication and cooling of pump by the hydraulic driving oil medium
- Pump material is stainless steel
- Concentric hydraulic pipes for maximum safety
- Cofferdam, ventilated to atmosphere, protecting the entire pump
- Mechanical seal against hydraulic oil
- Double lip seal against cargo, only exposed to static pressure
- Anti-rotation brake; loading through pump
- Smooth pump exterior; self-draining and easy to clean



The hydraulic high pressure pipe is located inside the low pressure return oil pipe. The entire hydraulic section is separated from the cargo by a cofferdam ventilated to atmosphere.

Improved profitability

Energy-efficient cargo heating

During a 20-day voyage with heated cargo, Framo deck-mounted cargo heaters can save a total of up to 60 metric tons of fuel. The heaters allow a higher temperature drop at the beginning of the voyage, then raise the cargo temperature before arrival in the discharge port. The Framo system heats and circulates cargo to create a turbulent flow over the heater which improves heating efficiency. This shortens the heating period towards the end of the voyage.

Framo heat exchangers provide flexibility to heat all traded cargoes, such as heavy fuel oils, oil products, and palm oils, as well as chemicals that may be temperature-sensitive, requiring more gentle heating. The heating medium can be saturated steam, hot water, or thermal oil.

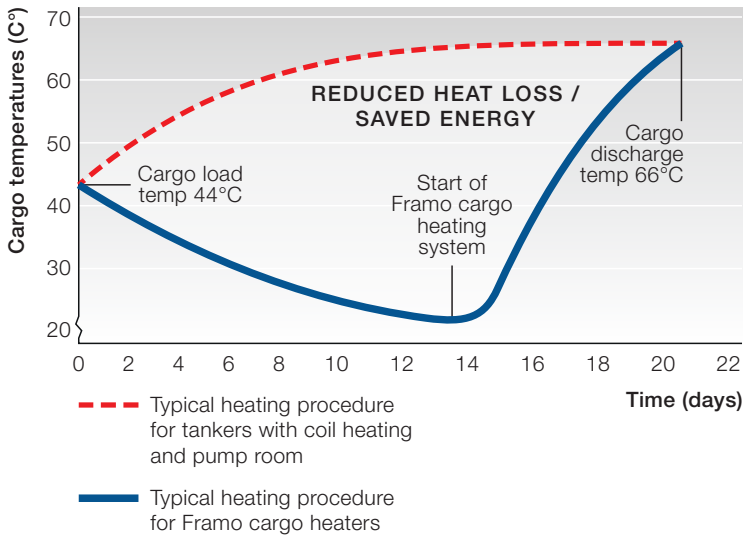
Designed for efficient discharge

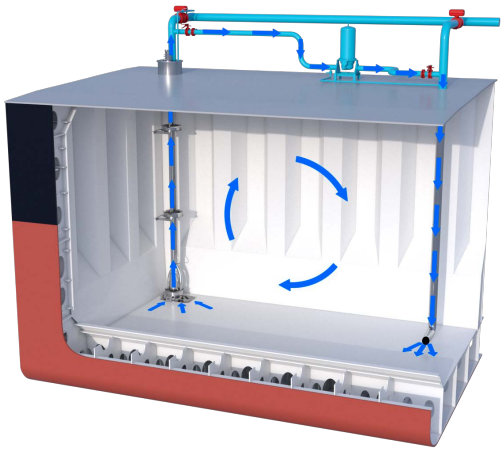
The submerged cargo pump takes suction directly from the bottom of the cargo tank. The design eliminates the need for long suction lines and submerged cargo valves inside the tanks. As a result, full discharge capacity can be maintained from the start to the very end of the discharge operation without any risk of cavitation. With one pump in each tank, complete cargo segregation is achieved, eliminating the risk of contamination between cargo tanks.

Enabling more storage space

With the cargo pumps submerged inside the cargo tanks, and ballast pumps inside double-side ballast tanks, there is no need for a pump room. Eliminating the pump room can add up to 2,000 m³ of valuable storage volume to the vessel.

Recommended heating procedure for tankers with Framo submerged cargo pumps





24/7 support

With over half a century of experience in marine cargo pumping, Framo service engineers are well trained to render efficient and smooth service in challenging marine environments. Our experienced team is always at your disposal, we provide 24/7 worldwide service and cost-free troubleshooting.

Fuel savings and environmental footprint

The Framo cargo pumping system can save up to 80%, or 40 metric tons of fuel per cargo discharge, compared to conventional steam-driven pump room solutions. With Framo deck-mounted cargo heaters, an additional 60 tons of fuel can be saved on a 20-day voyage.

Removing the pump room, increased cargo volume

By eliminating the pump room, a 2% increase in cargo carrying volume can be achieved, as well as an increase in the overall safety level, as the pump room represents a hazardous area.

Reduced number of boilers

Only one boiler is needed since the steam-driven turbines can be removed. A 30-ton boiler is sufficient for cargo heating and tank cleaning.

Simplified piping maintenance

With cargo piping running on deck, where it is easier to inspect and maintain, there is 60% savings in piping and valves. The simplified cargo piping system is much easier to drain and strip.

Increased cargo flexibility

Efficient cargo switches are made possible by the built-in stripping device – as little as 60 litres of cargo remaining in the tank.

Fewer ballast voyages

Facilitating an efficient and easier switch between different grades of cargoes increases opportunities for triangulation, with less time in ballast.

Unified power system

No separate power system is required when hydraulic power is used for running deck machinery and the emergency portable cargo pump.

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