GREASE IS THE WORD

Optimising the wastewater treatment process with effective grease separation

ACO Marine
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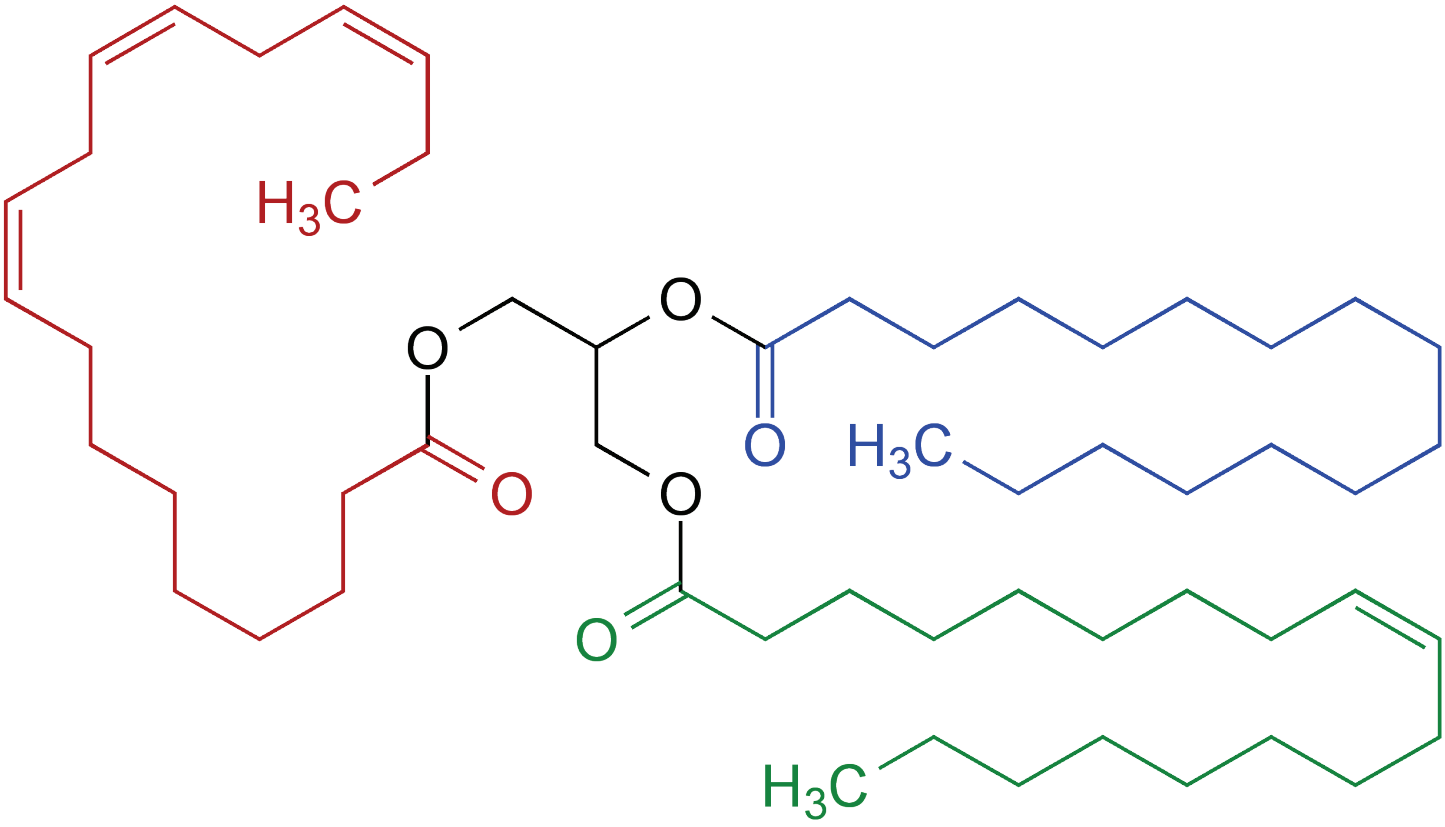
EXECUTIVE SUMMARY

With advancements made in membrane-based wastewater treatment systems, galley water should be free of waste solids (sludge) fats, oils and greases (FOGs) before it enters the treatment process otherwise biological overloading and system blockages can occur.

However, while this wastewater must be treated according to requirements laid down in IMO MEPC 227(64), which does not allow the discharge of any oils, there are currently no IMO standards for the separation of grease from galley water.

This ACO Marine White Paper considers the need for the introduction of performance standards for grease separators and will look at how operators can optimise the performance of shipboard wastewater treatment with effective grease separation systems.

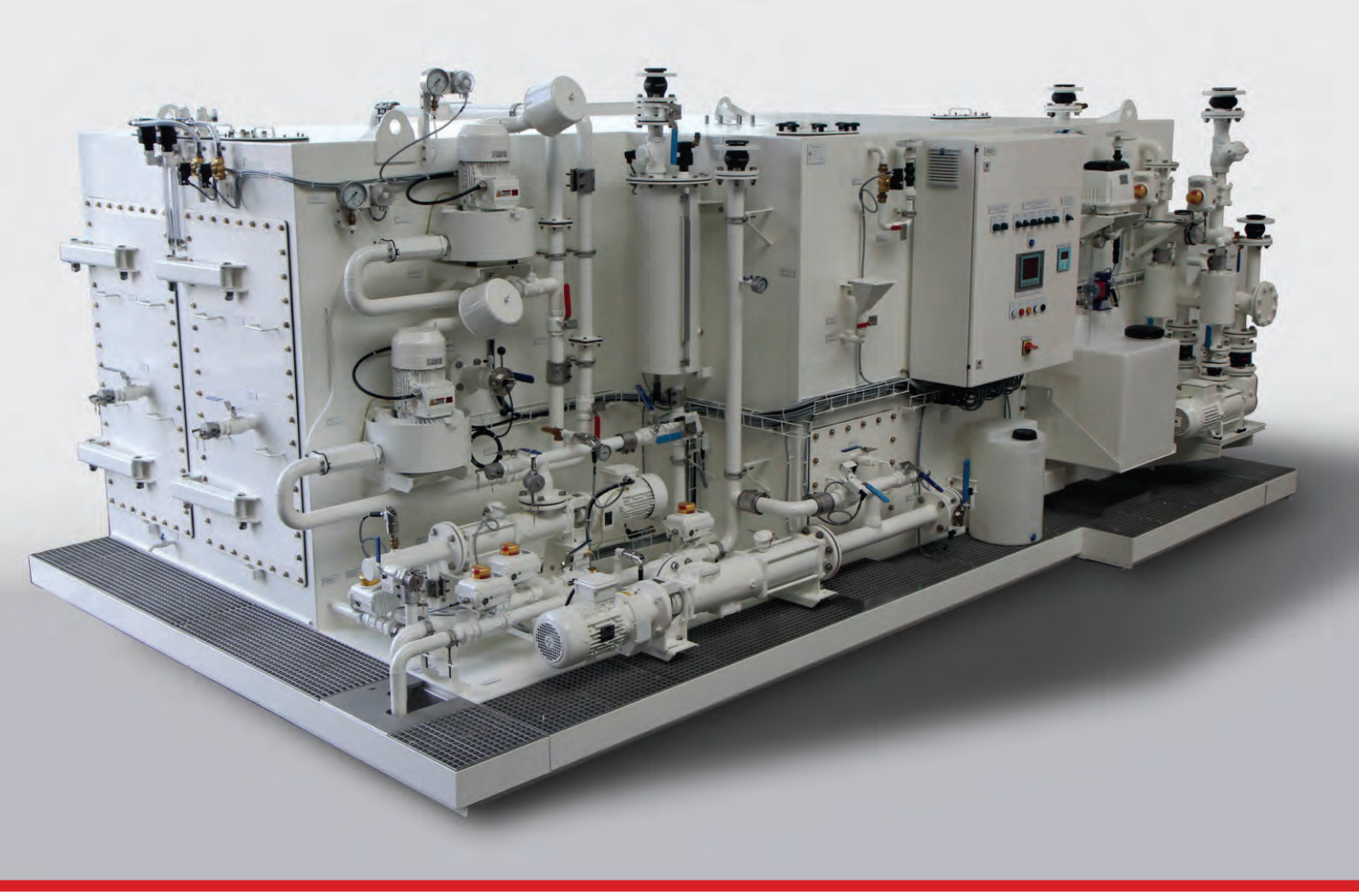


INTRODUCTION

Although there are standards in place for the discharge of treated sewage and bilge water, discussions are taking place to introduce treatment standards for galley water which would, in the long term, prevent oily galley water being discharged directly overboard or bypassing the treatment system.

In the current absence of any performance standards, responsible grease separator manufacturers should as a minimum look to match, or exceed, the land-based regulations for grease separator performance covered in the DIN V4040-2/99 and rated at EN1825, or better the EN1825+, which define the limits for lipoid content of any discharge from the separator.

Earlier pre-conceived notions that grease traps were sufficient have been proven incorrect. These are traditionally small, in-line entrapment boxes with nothing more than a weir to hold back floating grease and oils. It takes no account of neutrally buoyant substances or more dense solids which can spill over into the discharge side of the unit.



What's more these units require opening, manual emptying and cleaning on a daily basis. As this is a particularly unpleasant task, as well as a potential health hazard, it is often not undertaken frequently enough; or even not carried out at all.

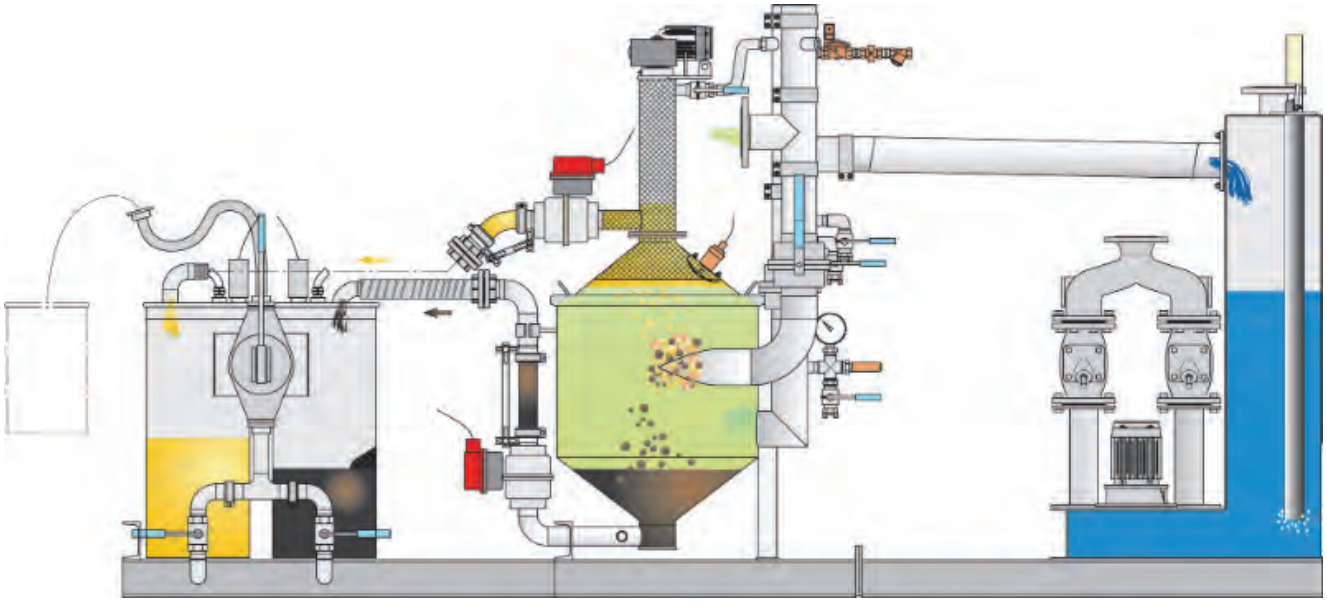
Therefore the only viable solution to ensure reliability of the wastewater treatment system as a whole is to fit fully enclosed self-cleaning grease separation technology in a vessel's machinery space where it can be maintained by ships' engineers in the same manner as all other machinery.

GREASE SEPARATOR DESIGN

To meet the requirements of onboard operation, grease separators should be totally enclosed to avoid any possibility of odours into the compartment and fully flooded to remove any free surface effect caused by the movement of the vessel.

Failure to do so can result in a re-mixing of the grease/oil into an emulsion, which is more difficult to separate.

Use of self-cleaning systems that allow continued availability should be considered to ensure zero down-time of the plant and continuous treatment when installed on deep sea vessels. These self-cleaning systems remove the requirement for regular operator intervention and ensure optimum performance.



The shape of separators should be such to encourage efficient separation whilst at the same time having 'clean' internal surfaces that do not allow build-up of solids behind frames or in corners. The most effective design is a cylindrical concept with cones mounted top and bottom, like the system pictured. This affords more effective channelling of FOGs and solids to the discharge points.

Automated operation is usually effected by internal sensors which should automatically open discharge valves to allow FOGs and sludge to be discharged into the disposal system. If units are under a small hydrostatic pressure this can be achieved without the requirement for any discharge pump(s) and any manufacturer offering equipment should take into consideration the vessel configuration and the waste management procedures onboard to ensure suitable solutions are offered.

Options for effluent handling vary depending on customer requirements for pumping of grease and/or sludge to ship tanks and all scenarios should be catered for. A typical system, pictured below, incorporates a 'treated water' lift station for installations where a grey water holding tank is not located below the grease separator. This has to be pumped vertically/horizontally to the ship's wastewater holding tanks.

For larger passenger vessels where ship tanks are available for grease and sludge holding, solids-handling transfer pumps should be used in place of the local collecting tanks/barrels as the quantities involved will be too great for manual handling.

GREASE SEPARATOR SIZING

In the interests of reducing costs and minimising space requirements, grease separator sizing is often not carried out correctly. Consideration should not only be given to the number of persons onboard but also to sporadic loading, detergent content, water temperature, operational periods of the galley, density of the galley water as well as hydraulic load per meal. It is therefore vitally important that, when developing solutions for galley water treatment, the operational profile of the vessel is fully understood.

CONCLUSION

Of the entire 'hotel' wastewater generated onboard ships (toilets, sanitary, laundry and galley), galley water is the most difficult to manage and treat effectively.

Yet it is often the one most overlooked. Fats, oils and greases are the single biggest contributing factor to wastewater treatment system failure, regardless of the treatment technology used. Early provision in the ship design for the correct grease separation technology will ensure reliable operation, and lowest risk, to the wastewater treatment system as a whole and ensure a vessel's legislative compliance.

ACO Marine has probably the largest share of the cruiseship market for the grease separation technologies with operators including all the major brands. In addition Lipator and Lipatomat grease separation systems have been installed for galley water management on many of the major ferry and offshore building shipyards, super and megayachts as well as into the navies of the UK, Netherlands, France, Russia, Egypt and others.

SUMMARY

The fats, oils and greases found in galley wastewater are the single biggest contributing factor to wastewater treatment failure and the one of the most difficult wastewater streams to manage and treat effectively.

In the absence of any performance standards for grease separation systems, ACO Marine advises ship operators to carefully consider the design and size of a grease separation system in order to optimise the wastewater treatment process.

ACO Marine has now introduced a new composite grease separator as part of its Lipator and Lipatomat product range.

Manufactured from high-density polyethylene (PE) composite, the new PE-Lipator (manual) and PE-Lipatomat (automatic) separators have been designed to meet market demand for more cost-effective, lighter units capable of delivering the same performance benefits as the stainless steel models.