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Among all machinery Oily Water Separator (OWS) is given a unique status because of it function and penalties that may imposed because of its irregularities to the ship owner/manager and criminal punishment to seafarer under whose duty Oily water separator comes.As Oily Water Separator is the result of MARPOL 73/78, Annex 1-hip produce water and oil on daily basis because of many factors such as leakage of fresh water pipeline, sea water pipeline, leakage from gland packing / sealing, accidental leakage within engine room, etc.Oily bilge water is the mixture of water, oily fluids, lubricants and grease, cleaning fluids and other wastes that accumulate in the lowest part of a vessel from a variety of sources. The mixture of oil and water is to be separated and dirty oil is to be discharged out of the ship by using equipment such as Oily water separator (OWS). As the name suggest oily water separator is a piece of machinery that separate oil from water,As per maritime regulations, the oil content in the water processed from the OWS must be less than 15 parts per million of oil. Essential requirements for Oily Water separatorAll parts design for the oily water separator is required to be approved by the authority or administration.Approving authority must ensure that the oily water separator pass through the minimum discharge limit of 15 ppm.Additional alarms and sensors must be installed on the equipment where it cant be monitored and maintained at all time.Arrangement must be made so the machine automatically cut off discharge beyond above limit.Any discharge of oily mixture is prohibited in sea unless the ship is in route and is discharged through an oily water separator.Oil record book must be maintained on each discharge on tank to tank basis.ConstructionThe construction of oily water separator is simple with three main parts; separator, filter and control unit with no such moving parts. The whole arrangement is separated into two compartment one for the separator and the other for filter. A separator unit consists of course separator with catch or baffles plates to accumulate small oil particles; with different parts such as test cock, collection chamber, drain, oil heater (electric and steam), riser pipe and separating sheet to assist in this process.OWSThe other compartment with filtering unit then filters and remove these accumulated oils from the separator. The unit consists of two or three stage coalescer filters; where the impurities separated is then later removed manually. On other hand a control unit consists of two separate monitoring and control device. They consists of a mixing pump, test chamber, light source and a controller with inputs from discharge rate, ship speed and oil content.Working Principle of An Oily Water Separator1. Separating UnitFrom the above diagram one can see how simple and easy it is to understand the working of a O.W.S. The whole process of O.W.S starts with pumping bilge water to the first / separator chamber via bilge pump. The baffles plate in the first chamber increase the separating area by providing additional surface to the oil particles to accumulate and form large oil particle. These large and slow oil molecule can now move to the surface quickly.After sufficient amount of large oil molecule collected on the water surface; right hand side valve is opened to remove the accumulated oils on the surface. These oil practice is sent to the waste oil tank / oily bilge tank from the separation stage of the O.W.S. Once the oil is removed the valve shuts automatically.Different specific gravity between oil and water can be further exploited in the first chamber by using laminar or steam line flow; as turbulent flow can cause further emulsification. In separation chamber the oil content in bilge water is only reduced to 100 ppm; so sent to second stage to meet 15 ppm requirement.2. Filtering and Control UnitIn filtration or second stage of oily water separator (O.W.S) the oily mixture is further filtered usingcoalescer mechanism. These filters absorbs the oil molecules following upward in first stage of filtering unit and moving downward during the second stage. The coalescer filter along with subsequent sponge like material having low surface area and lower pressure loss; provide final water content with less than 15 ppm oil.Coalecer FilterEven after filtration the water cant be directly released into the sea. Instead it is passed through O.C.M (Oil Content Monitor) which detect and ensure the oil content is below 15 ppm. If the oil content in the water is more than 15 ppm than it gives an alarm with water output automatically diverted to the bilge tank through a three way valve preventing sea pollution. If everything is within required limit the water is discharged overboard through the same three way valve.Factors Affecting Separation Of Oil From Bilge WaterDensity: A liquid with less density than of other tends to rise up; water have generally more density than that of oil so its easy to separate them if left untouched or at low flow rate.Effective Density Difference: We know that the density of sea water is more that of the fresh water and so; we can increase the rate of rate of separation by using sea water instead of fresh water.Viscosity of Continues Fluid: This law is contradictory to the above statement as it states; a less dense fluid with less viscosity offers better condition for oil to move towards the surface than of a much dense fluid with more viscosity. In other words the rate of rise of oil particles is inversely proportional to viscosity of the fluid. here the viscosity of fresh water is less than that of sea water.Temperature: The temperature of the fluid is an major factor that affects both density and its viscosity. At low temperature there is more viscosity among fluid particles restricting separation; but with increase in temperature the mixture became easy to separate even with the same procedure.Size of Oil particles: Separation of oil from water is directly proportional to the size of oil particles. Thus to assist in formation of large oil particles in Oily Water Separator we use baffles and stream line flow to reduce further emulsification.(Schematic diagram) O.W.S of different Construct : OWSOil Water Separator Maintenance ChecklistOily water separator are among the few machinery on board ship which require much less maintenance; thanks to less number of moving parts which are generally the main source of wear and tear. But still it require few maintenance under periodic maintenance on ship; which include changing oil absorbent filters, regular cleaning and monitoring of all units of an O.W.S.Actually an O.W.S is required to be cleaned once the sludge content reach 25% of the separator compartment or the O.W.S reach 75% of its retention capacity. Along with this all associated valves must also be checked and cleaned regularly. Records must be maintained of such events in form of log book for each maintenance, inspection, date time and amount of residue removed with their mode of disposal.Certain checklist are made to assist in these paper work which is also refereed as O.W.S Maintenance / Inspection Checklist which include:Sediments and debris accumulation.Inlet Condition (Possible blockage or debris accumulation at inlet is checked).Condition of Oil absorbing filter.Amount of sediments, sludge and trash in the system.Possible spill or leak in recent past.Structural condition at outlet.Emergency discharge (If any).Recent maintenance (parts)Inspection day (If applicable)Inspector Name (If applicable)Note: The actual document can change from ship to ship but may contain similar / same points.Dismantling Procedure For Cleaning Oily Water Separator Stop the O.W.S Bilge pumpStop the flow of steam to the heating coilsShut main overboard valveOpen vent for both separation and filtration chamber.Now slowly open drain valve of each chamber located at the bottom.Possible oil trapped must be drained to the bildge holding tank.Remove all electric and pipe connections.Open all the nuts and bolts of the top cover of separation chamber.take out the baffle plates and clean them with brush and clean oil.Now open all the nuts and bolts of the top cover for filtration chamber.Take out the coalescer filters and inspect for its condition.Replace the filters if necessary.Keep back the baffle plates in placePut back the new / cleaned filter in its place.Now assemble the whole system.Fill the O.W.S with fresh clean water to check for any leakage.Ready To UseAlso Read: OrWhy not Request your own Topic ! Your oily water separator is an integral part of your vessels bilge water treatment system. Consisting of a separator unit, a filter unit, and an oil level monitoring-and-controlling unit, your separator will work to coalesce, filter, and remove impurities and oil from your bilge water. The result? Youll be able to safely discharge water overboard as long as the oil content is within appropriate limits.That all sounds great, but what happens if your oily water separator malfunctions or turns faulty? At the very least, you could be at risk of breaching International Maritime Organization (IMO) guidelines, which could, in turn, put you at risk for steep fines. Maritime regulations dictate that discharged water must have an oil content of less than 15 ppm. Your oily water separator must be working well in order to help you meet that goal and avoid getting in trouble with your local authorities.If you enjoy avoiding fines and being in charge of a vessel thats running like clockwork, its well worth investing in oily water separator maintenance. One key part of this maintenance is replacing spare parts on time. This can get confusing, but, fortunately, the experts at H2O have your back. Heres what you need to know about spare parts and replacement schedules for your oily water separator. Here are six key oily water separator parts you need to replace on time.The BOSS oily water separator consists of several key components that need to be maintained on a regular basis. Failure to maintain these items may result in the equipment not functioning properly, which can result in a lot of unpleasantness, further damage, costly repairs or even being held at port. Poor maintenance can also result in a very expensive lack of compliance with IMO guidelines.Consider keeping spare replacement parts for each of these six components on hand, so youll be ready to go if anything fails suddenly:1. BOSS Polisher Filter Media: Organoclay, Sand, or CartridgesIf you get to a point where your BOSS separator can no longer maintain the required reading on your oil content monitor, it may be time to evaluate and replace your filtering media. The composition of your waterspecifically, the number of hydrocarbons presentwill influence the expected life of this component.2. Prefiltration Sediment Cartridge and O-RingAre you seeing a high-pressure differential across your pressure gauges? Alternatively, are you experiencing a low flow rate? If so, it may be time to consider changing this filter.3. Brannstrom Bilgmon 488 Measuring Cell (with an Up-to-Date Calibration Certificate)This may just be the most important part of your system, so its one youll definitely want to keep a careful eye on. In order to maintain compliance with IMO regulations, this measuring cell must be within the calibrated period. Verify that your measuring cell is within this date. Since this is so important, know that the experts at H2O are ready to provide you with the date for your measuring cell. A good rule of thumb? This measuring cell is good for five years, after which it must be replaced. This measuring cell is not something that you want to keep a spare on the shelf. However H2O keeps these in stock for quick delivery to the customer when needed.4. Discharge, Recycle, and Fill Solenoid Valves (with Repair Kits and Coils)If you have high-quality valves, youll find that they last a long timebut not forever. Keep these solenoid valves clean, and theyll last for years. Simply replace the O-ring or valve disk on a regular basis, and youll be good to go.5. Process Pump Mechanical Seals and O-RingsAfter years of use, your pump may begin to leak. Itll be worth your time to establish a routine of checking that the seals and O-rings are functional. Replace them as needed for optimal function.6. Circuit Board FusesJust in case one of your fuses blows, its always a good idea to keep a handful of these circuit board fuses in stock. This may happen if a valve or motor gets shorted or stuck.H2O is here to help you extend the life of your oily water separator.Your oily water separator relies on a finely tuned system of filters, polishing media, cartridges, and cells that all need to be in good working order for you to achieve a bilge water oil content that allows for safe discharge overboard.Managing spare parts and replacement schedules can be a lot to keep track of. If you need assistance clearing up confusion or taking care of maintenance, H2O is a great source for reliable, relevant, and timely information.We can also help you find and purchase the water treatment system parts you need to help you keep your vessel running smoothly. Call our friendly, knowledgeable team today for more information about maintaining your oily water separator and the key spare parts you need to make that happen! One of the most significant concerns for a seafarer or shipowner is the risk of oil pollution accidents. Onboard a merchant vessel, the daily operations generate a mixture of oil and water, which must be properly separated before discharging the treated water overboard. This process is critical in preventing oil pollution, and compliance with international regulations is mandatory.To address this, the Oily Water Separator (OWS) is used on ships. This essential equipment is designed to separate oil from bilge water, ensuring that only clean water, with oil content below 15 parts per million (ppm), is discharged into the sea. The regulations governing this process are covered under MARPOL ANNEX I, and it is now a requirement for all ships to have an oil discharge monitoring and control system.For a ship engineer, understanding the OWS is crucial, as it is one of the most inspected pieces of machinery by Port State Control (PSC) officers and surveyors. Throughout a career, engineers may encounter numerous makes and models of OWS, making it imperative to understand their working, maintenance, and regulatory compliance.Function of the Oily Water SeparatorAs its name suggests, the Oily Water Separator is designed to separate oil from water in the bilges of a ships engine room, cargo holds, and other oil-contaminated areas. According to maritime regulations, the oil content in water processed by the OWS must not exceed 15 ppm before being discharged overboard. MarineX Your Gateway to the World of the Maritime Industry. MarineX is an AI-driven knowledge platform designed for passionate maritime enthusiasts, professionals, leaders, and industry insiders. No spam. Unsubscribe anytime. MARPOL Regulations Governing Oily Water DischargeUnder Annex I of MARPOL, Regulation 4 outlines the conditions under which oil mixtures can be discharged:The ship must be en route discharge is only allowed when the vessel is moving.Processing through the OWS the oily mixture must pass through the OWS, which meets the regulatory standards set in Regulation 14 of Annex I.Oil content limit the discharge must not exceed 15 ppm of oil content.Exclusion of cargo areas oily mixtures originating from cargo pump-room bilges on oil tankers are prohibited from discharge.Segregation from cargo residues in oil tankers, the oily water mixture must not be mixed with oil cargo residues.Ships operating in Antarctic waters are strictly prohibited from discharging any oily mixtures.Key Requirements for Oily Water Separator (OWS)According to MEPC 107(49), the OWS must comply with several important standards:The Oil Content Monitor (OCM) must be tamper-proof and certified by an authorised organisation.The OCM should sound an alarm and record data if the oil content exceeds 15 ppm or if freshwater is used for cleaning.The OWS must achieve the regulatory discharge limit of 15 ppm.Sensors and alarms must be placed in locations that cannot be easily accessed or tampered with.Only trained officers, under the direct supervision of the Chief Engineer, are authorized to operate the OWS. When not in use, the system must be locked to prevent unauthorized access.Sailing without a functional OWS is illegal, and ships must carry appropriate spares for maintenance.Construction and Working of Oily Water Separator (OWS)The OWS is typically composed of three main components:1. Separator UnitThe first stage of the OWS includes a separator unit with catch plates housed in a coarse separating compartment and an oil collection chamber. Due to the lower density of oil compared to water, oil rises to the top and is collected in the oil chamber. The remaining mixture settles in a fine settling compartment, where further separation occurs.The water discharged from this unit still contains around 100 ppm of oil. A control valve (either pneumatic or electronic) directs the separated oil to the sludge tank. Heaters are often incorporated to facilitate the separation process, especially in colder environments.2. Filter UnitThe second stage is the filter unit, which processes the discharge from the separator unit. This stage involves:A filtration stage that removes particulates.A coalescer stage, where small oil droplets combine into larger droplets, making it easier for them to separate from the water.A collection chamber, where oil rises to the top for removal.The water leaving the filter unit must contain less than 15 ppm of oil. If the oil content exceeds this limit, the filters must be cleaned or replaced. A freshwater inlet is provided to flush the filters before and after operation.3. Oil Content Monitor and Control UnitThe final stage is the Oil Content Monitor (OCM) and Control Unit, which continuously monitors the oil content in the discharge. If the oil content exceeds 15 ppm, the OCM triggers an alarm and shuts off the overboard discharge by activating a three-way solenoid valve.This valve has two outlets one leading overboard and the other to the sludge tank. When the OCM detects high oil content, the discharge is redirected to the sludge tank. A freshwater flushing system is provided to clean the OCM unit. Already have an account? Sign in. Oily Water Separators The oily water separator (OWS) is a critical piece of equipment found in the engine rooms of ships, designed to separate oil from water mixtures before discharge into the sea. This function is not only essential for compliance with environmental regulations but also for the operational efficiency of marine vessels. The separation process is governed by principles of physics and engineering, and understanding its operation can significantly enhance the management of oily waste on board.An oily water separator operates primarily by utilizinggravityandcoalescenceto separate oil from water. The device is essential for treating bilge waterwater that accumulates in the lowest part of a ships hull, often mixed with oil and other pollutants. According to MARPOL Annex I regulations, ships must ensure that the oil content in discharged water does not exceed15 parts per million (ppm). Failure to comply can result in severe penalties and environmental damage.Construction and Working PrincipleAn oily water separator typically consists of several key components, each playing a specific role in the separation process:Separator Unit: This is the core component where the initial separation occurs. It includes:Coarse Separation Compartment: Here, the oily water mixture enters and undergoes gravity separation. Oil, being less dense than water, rises to the top.Fine Separation Compartment: After coarse separation, the remaining mixture flows into this compartment, where coalescing plates or filters further separate smaller oil droplets from water.Filter Unit: This unit is responsible for removing any remaining impurities after the initial separation. It typically includes:Coalescing Filters: These filters promote the merging of small oil droplets into larger ones, enhancing separation efficiency.Final Filtration Stage: This stage ensures that any residual solid pollutants or oil droplets are removed from the water before discharge.Control Unit: This component monitors and controls the operation of the OWS. Key features include:Oil Content Monitor (OCM): Continuously measures the oil concentration in the effluent. If levels exceed 15 ppm, it triggers alarms and redirects flow back to a holding tank.Control Valves: These valves manage the flow of separated oil and treated water, ensuring compliance with discharge regulations.Heating Coils: Some OWS units are equipped with heating coils to reduce the viscosity of oil and facilitate better separation by promoting smoother flow.Oil Skimmer: An optional but useful component that removes the oil layer from the surface of separated water, ensuring that only clean water is discharged.Operational ConsiderationsThe operation of an oily water separator involves several stages, each critical for effective separation:Initial Pumping: The oily bilge water is pumped into the separator unit through an inlet valve. The system is usually filled with clean seawater to aid in separation.Coarse Separation: In the coarse separation compartment, due to gravity, lighter oil rises to form a layer above the denser water. Heating coils may be activated to assist in reducing oil viscosity, allowing for more efficient separation.Oil Collection: As oil accumulates at the top, sensors detect its level and trigger a control valve that allows separated oil to drain into a designated sludge tank or dirty oil holding tank.Fine Separation: The remaining mixture flows into the fine separation compartment, where it passes through coalescing plates or filters. Here, smaller oil droplets merge into larger ones due to coalescence, further enhancing separation.Final Filtration: After passing through coalescing filters, almost oil-free water moves on to a final filtration stage where any remaining impurities are removed.Discharge Monitoring: The treated water exits through a discharge line equipped with an Oil Content Monitor (OCM). If the monitored ppm level is below 15 ppm, it can be discharged overboard; if not, it is redirected back to a holding tank.The separated oil is collected in an oil collection chamber and is periodically discharged into an oily waste tank or sludge tank, while the treated water exits the separator for potential discharge overboard.Case Studies and ExamplesCase Study: MV Prestige IncidentOne notable example highlighting the importance of effective oily water separation occurred with the MV Prestige in 2002. The ship sank off the coast of Spain after suffering a hull breach, leading to a significant oil spill that caused extensive environmental damage. Investigations revealed that inadequate oily water separation practices contributed to this disaster, emphasizing how critical proper operation and maintenance of OWS systems are for preventing such incidents.Technological AdvancesRecent advancements have introduced new technologies aimed at improving oily water separation efficiency. For instance, some systems now utilizesupercavitation techniques, which involve creating bubbles in a liquid to enhance separation processes. Research indicates that these methods can significantly reduce operational costs and improve compliance with environmental standards by achieving lower ppm levels more effectively than traditional methods.Maintenance and TroubleshootingRegular maintenance of oily water separators is essential for ensuring their effective operation. Common issues include:Clogged Filters: Over time, coalescing filters can become clogged with particulates, reducing efficiency. Regular cleaning or replacement is necessary.Sensor Malfunctions: The accuracy of OCMs is vital; faulty sensors can lead to incorrect readings and potential environmental violations.Pump Issues: The type and condition of pumps used can significantly impact performance. Using pumps that generate excessive turbulence can lead to poor separation.A proactive maintenance schedule should include routine inspections, cleaning protocols, and prompt repairs to any identified issues.Regulatory ComplianceCompliance with international maritime regulations regarding oily water discharge is non-negotiable for ship operators. MARPOL regulations require that all vessels are equipped with effective oily water separators and that crew members are trained in their operation and maintenance. Regular audits and inspections by port state control authorities ensure adherence to these standards.The oily water separator plays a pivotal role in maritime operations by safeguarding marine environments from pollution while ensuring compliance with stringent regulations. Understanding its construction, working principles, operational requirements, and maintenance needs is essential for maritime professionals tasked with managing waste on board ships.As technology continues to evolve, innovations in oily water separation will likely enhance efficiency and effectiveness further, paving the way for more sustainable maritime practices. By prioritizing proper use and maintenance of OWS systems, ship operators can contribute significantly to protecting marine ecosystems while maintaining operational integrity within their fleets. The Wrtsil Senitec oily water treatment units use optimized emulsion breaking and separation technology that surpasses all existing regulations and guarantees an oil content in the cleaned water of below 5 ppm. In normal operation the actual levels have repeatedly been shown to be as low as 1 ppm, which gives a priceless safety margin to the IMO limit. Any combination of a separator, a coalescer or other means, and also a single unit designed to produce an effluent with oil content not exceeding 15 parts of oil per million parts of water by volume. Note: According to Resolution MEPC.107(49), a sampling point should be provided in a vertical section of the water effluent piping as close as practicable to the 15 ppm bilge separator. Re-circulating facilities should be provided after and adjacent to the overboard outlet of thestopping device to enable the 15 ppm bilge separator system, including the 15 ppm bilge alarm and the automatic stopping device, to be tested with the overboard discharge closed. One of the main causes of oilywater filtering equipment malfunction is the effect of bilge water containing cleaning agents. Detergent-based cleaning fluids can produce chemically stabilised oil emulsions which cannot be separated on board ship by the gravity alone. The best way to improve the performance of oily bilge water separating equipment is to avoid the use of surfactant-based cleaning materials.1. Bilge water inlet2. Oil separation stage3. Emulsion tank4. Chemical dosing pumps5. Control panel6. Oil and solids effluent7. Chemical stage8. Dissolved air inlet9. Inlet to flotation stage10. Overboard11. Backwashing water outlet12. Fresh water inlet (to filter stage)13. Filter stage14. Oil monitor Marpol regulations regarding discharge of oil in sea water are becoming stringent day by day. For this purpose Oily water seperators have become compulsory on all types of ships. OWS is used to treat the oil-water mixture from bilge spaces (read about bilge water here), oil tanks or any compartment in the ship which has accumulated water, before discharging it to the sea. According to one of the annexure of Marpol, water that has to be discharged should contain less than 15 parts per million of oil. OWS is used to attain this.Almost all OWS use gravity system for the separation of water from oil. This method allows the system to bring down the PPM (parts per million) number to 100, which is not enough. For this purpose, all OWS are equipped with a filtration system to bring down the PPM level. The PPM is measured with an instrument which is similar in working to the Salinometer used to check salt ppm.In this article we will learn about the working of such an oily water separator which has two units- A separator unit and a filtrating unit.Construction and working- The separator unitThe Separator unit itself consists of two parts. The first part consists of a coarse separating compartment with an inlet for the oil-water mixture. The oily water mixture enters the compartment through the inlet pipe.Some of the oil molecules due to their lower density will separate and rise to the top of the mixture into an oil collecting compartment.The remaining oil leaves the compartment, from an outlet provided at the bottom of the chamber to the second part which is a fine separating compartment. This compartment has stationary catch plates arrangement fixed at the center of the compartment as shown in the figure. The oil mixture flows slowly between the catch plates. The oil from the mixture will stick to the underside of the catch plates and slowly move outwards to rise at the top of the mixture and gets collected in an oil collecting space.The clean water which has PPM of around 100, flushes out of the compartment through a pipe attached at the center of the compartment. All the oil collecting compartments are provided with heating coils or a steam inlets for heating the oil to facilitate a free flow. The air produced is released through a vent provided at the top of the compartment. The mixture is then passed to the filteration unit.Construction and working - The filtrating unitThe water that comes out of the separating unit generally has a PPM level of 100 or less. To reduce the PPM level, it is passed to the filtrating unit. The filtrating unit also consists of two stages.When the water enters the first stage, solid particles and physical impurities are removed with the help of filter units. These impurities settle at the bottom of the compartment and are removed later. The water then passes through the second stage for complete removal of oil. The second stage uses coalescer inserts to achieve this. Coalescer induces coalescence process between the oil particles. Due to this process the surface tension between the oil molecules in the mixture breaks down which makes them to stick together to form larger molecules. This large oil molecules then rise to the top of the mixture to get collected in the collecting chamber.The collecting chamber is emptied as and when require. The filter units are to be changed generally once a week. The OSW system is fixed with a PPM monitoring device which keeps a continuous check on the discharged waters PPM level. The system raises an alarm, in case the PPM level goes above 15.According to Marpol, this PPM monitoring device is also compulsory on ship along with the OWS.ReferencesIntroduction to Marine Engineering by D.A TaylorImage CreditsVelcon Filtration UnitOily Water SeparatorWhole Unit OWSOIl Water Separator_: Introduction to Marine Engineering_ by D.A Taylor Separator Spares & Equipment, LLC specializes in spare parts, consumables, equipment, and services for coalescing oily water separators, centrifugal oily water separators, and oily content monitors.Bilgewater separators, also known as oily water separators (OWS), are onboard treatment systems designed to remove oil from the vessels bilgewater before discharging it overboard. As regulations become more stringent and enforcement increases, everyone, including owners, designers, builders, and operators of ships, is aware that the oily water separator is a serious design specification, operating consideration, and key personal responsibility. We are committed to keeping your current oily water separator environmentally compliant with USCG and IMO requirements. We are your link to IMO MEPC 107(49) compliance. We provide oily water separator spare parts and accessories for the following brands. Oily water separators (OWS) are critical pollution prevention equipment required on vessels to prevent harmful oil discharges into the marine environment. These systems separate oil from water in bilge wells before the water can be discharged overboard, ensuring compliance with international regulations that limit oil content to 15 parts per million (ppm) or less. This guide explores everything ship operators and crew need to know about oily water separators - from regulatory requirements and operational procedures to maintenance best practices and common compliance challenges.REGULATORY FRAMEWORKMARPOL Annex I RequirementsThe International Convention for the Prevention of Pollution from Ships (MARPOL) Annex I establishes the global requirements for preventing oil pollution from ships. Regulation 14 specifically addresses oil filtering equipment requirements: Ships of 400 gross tonnage and above but less than 10,000 GT must have oil filtering equipment ensuring discharged water contains no more than 15 ppm of oil Ships of 10,000 gross tonnage and above must have additional alarm arrangements and automatic stopping devices when the 15 ppm limit is exceeded The equipment design must be approved by the Administration following IMO specificationsDischarge RestrictionsMARPOL Annex I Regulation 15 sets strict conditions for legal discharge of oily water: The ship must be proceeding en route (not at anchor or alongside) The oily mixture must be processed through an approved oil filtering system Oil content must not exceed 15 ppm The mixture must not originate from cargo pump-room bilges (on tankers) For oil tankers, the mixture cannot be mixed with oil cargo residuesSpecial areas with heightened restrictions include the Mediterranean Sea area and the Red Sea area, among others. No discharges are permitted in the Antarctic area. Always read your SMS and follow your companys environmental department instructions. Although MARPOL does not prohibit OWS usage in special areas, your company may have stricter rules requiring prior approval before using the OWS. Always consult agents, as local regulations may prohibit OWS usage. The more permissions you obtain, the lower your risk of facing imprisonment.OWS SYSTEM COMPONENTS AND OPERATIONOWS systems include critical components engineers must master: bilge tank, feed pump, gravity/coalescer separators, filters, oil content monitor, three-way valve, and control panel for effective oil-water separation.Main ComponentsA typical oily water separator consists of: Bilge holding tank Collects oily water from machinery spaces Feed pump Transfers the oily water to the separator First-stage separation Often gravity-based or coalescer Second-stage polishing Often using filters or membranes Oil content monitor (OCM) Continuously measures oil content Three-way valve Redirects water exceeding 15 ppm back to the bilge tank Control panel Monitors and controls the system operation Oil collection tank Stores separated oil for disposalOperational PrinciplesMost OWS systems utilize one or more of these separation technologies: Gravity separation Uses density differences to separate oil (main weakness: ineffective with emulsified bilge water) Coalescence Forces small oil droplets to combine into larger ones that can be separated Filtration Uses various media to capture oil particles Centrifugal separation Uses centrifugal force to separate components of different densitiesTemperature ConsiderationsFor effective separation, especially with residues from heavy fuel, bilge water should have a temperature of 5055C before being pumped from the bilge water tank. This temperature range optimizes the separation process by reducing viscosity.OPERATIONAL PROCEDURESStrict operational procedures must be followed: secure permissions, verify location, test monitors, continuously monitor discharge, maintain valve control, update records, and avoid prohibited practices for safe OWS operation.Safe operating proceduresPre-operation preparations Obtain permission from both Master and Chief Engineer before operation Ensure the engine room is manned during operation Operate only during daylight hours Fill the separator completely with clean sea water before startingLocation verification Confirm with Officer on Watch (OOW) that the vessel is in an area where discharge is permitted Ensure the vessel is proceeding en route (not at anchor) Verify proper distance from shore or special areasTesting before discharge Test oil content monitor for alarm functionality Verify automatic shutdown system is operational Test communication between Engine Control Room and bridgeDuring operation Monitor the system continuously Visually check sea surface near discharge for any oil traces Investigate any 15 ppm alarms immediately The Chief Engineer should maintain possession of the overboard valve keyAfter operation Close and re-seal discharge valves Notify Master, OOW and Chief Engineer of completion Update oil record book and seal logProhibited practicesSeveral practices related to oily water separator operation are strictly prohibited and considered major non-conformances: Bypassing the oily water separator Discharging without using the oil content monitor Tampering with the bilge alarm Discharging in prohibited areas or while not en route Discharging water with oil content exceeding 15 ppm Making incorrect entries in the oil record bookMAINTENANCE AND TESTING REQUIREMENTSRegular maintenance and testing are crucial for OWS reliability. Weekly flushing and cleaning, monthly sensor checks and valve tests, quarterly data reviews, annual inspections, and five-year calibrations ensure compliance and optimal performance.Regular maintenance schedule Weekly:Flush the cell with oil-free waterClean the cell using a brush or equivalent tool Monthly:Clean oil sensor electrodePerform internal visual inspection of the overboard pipe (with dated photographs)Test 3-way valve operation (if fitted)Verify seals are properly fittedCheck oil content alarm and automatic shut-off functionalityPerform operational test and confirm effluent discharge from sampling line Quarterly:Check/access electronic stored dataCompare OWS operation timings with Oil Record Book entries Annual:Conduct internal inspection and cleaningClean filter/coalescer elementsChange batteries (if fitted) Five-yearly:Perform shore calibration or sensor change by manufacturer or authorized personnelAccuracy and testingThe IMO regulations require that the accuracy of the bilge alarm must be within 5 ppm. The alarm should be checked for accuracy at the renewal of the International Oil Pollution Prevention (IOPP) Certificate.Clean water is used to calibrate the bilge alarm during testing procedures. The maximum response time between detection of excessive oil content and operation of the automatic stopping device must not exceed 20 seconds.RECORD KEEPING REQUIREMENTSAccurate record keeping is essential for OWS compliance. The Oil Record Book must document all operations with detailed entries, kept onboard for 3 years and signed by the Officer and Master. Seal logs track valve tampering prevention with numbered, durable seals, schematic diagrams, documented seal breaks, replacements, and updated inventories.Oil record book The Oil Record Book Part I is a mandatory document where all OWS operations must be recorded, including collection and disposal of oil residues, condition of oil discharge monitoring and control system, and discharge of bilge water through the OWS. Each entry must include date and time of operation, location of the vessel (coordinates), tank source and quantity, and method of disposal. The Oil Record Book must be kept onboard for at least 3 years after the last entry has been made and must be signed by both the Officer in charge of the operation and the Master.Seal log Many companies implement a seal system to prevent tampering with critical valves. A schematic diagram identifies valves and flanges to be sealed. Seals must be made of strong plastic, individually numbered, and high visibility color. A seal inventory must be maintained. When seals need to be broken, the reason must be recorded. Replacement with new seals must be documented. Updated seal logs must be maintained.CCTV MONITORING REQUIREMENTSMany vessels now install CCTV systems to monitor OWS operations, providing additional oversight. Cameras should monitor the overboard pipe and valve, the oil content monitor, and the entire OWS area. The recording system should be installed on the bridge or chart room, record at specific quality settings, operate continuously, and store data for up to 6 years. Regarding access controls, only the Master should have access to the CCTV equipment and recordings, the Officer on Watch monitors activities and reports suspicious behavior, and the system should be checked daily for proper operation.COMMON CHALLENGES AND SOLUTIONSEmulsification IssuesOne of the main weaknesses of traditional gravity-type bilge water separators is their inability to separate emulsified bilge water. Emulsions are stable mixtures of oil and water that cannot be separated by settling alone. Solutions include using chemical demulsifiers (where permitted), implementing advanced separation technologies, ensuring proper temperature of bilge water before processing, and avoiding mixing detergents with bilge water when possible.Managing Limited Tank CapacityShips often face challenges with limited storage capacity for bilge water and sludge. Best practices involve monitoring tank levels regularly, planning disposal to shore reception facilities well in advance, implementing measures to reduce bilge water generation, properly recording quantities through tank soundings, and estimating pumping quantities based on the OWS capacity and operation time when sounding tables are unavailable.Handling Equipment FailuresIf the OWS or its components fail, proper procedures must be followed: stop operations immediately, record the failure in the Oil Record Book (use appropriate codes), notify the Technical Superintendent, retain bilge water on board until the system can be repaired, if necessary arrange discharge to shore facilities, and document any emergency measures taken.COMMON VIOLATIONS AND ENFORCEMENTTypes of ViolationsThe most common violations related to OWS operations include deliberate bypassing of the OWS system, tampering with the oil content monitor, falsifying Oil Record Book entries, operating the system when not en route, and using chemicals to "trick" oil content monitors.Consequences of Non-ComplianceViolations can result in severe consequences such as criminal prosecutions of crew members and companies, substantial fines (up to $1,000,000 in some jurisdictions like California), detention of vessels, additional penalties based on quantity spilled (e.g., up to $1,000 per gallon for spills over 1,000 gallons), increased scrutiny during future port state inspections, and reputational damage to the vessel and operating company.GOOD TO KNOWDetermining QuantitiesWhen you have no sounding tables for the bilge wells and need to enter the quantity of water pumped overboard, you should estimate the quantity based on the OWS capacity and the time it was in operation.Sludge AccumulationThe total quantity of sludge measured by weekly soundings usually increases even if the OWS hasn't been used because oil residues from save-alls and other oily drains gradually build up in the sludge tanks.CONCLUSIONOily water separators represent a critical environmental protection system on board vessels. Proper operation, maintenance, and record-keeping are essential not only for regulatory compliance but also for environmental protection. With increasing scrutiny from port state control authorities and severe penalties for non-compliance, vessel operators must ensure their crews are well-trained and their systems properly maintained.By following the guidelines outlined in this comprehensive guide, vessel operators and crew can ensure they meet all regulatory requirements while protecting the marine environment from harmful oil pollution.15.0K How can we help you today? close Do you want to join Merchant Navy? Are you already in Merchant Navy? Which course are you interested to join? IMUCET/DNS/B.Sc/B.Tech GP Rating ETO GME Book Online Class Offline Class Test Series BMI Calculator Color blindness test Full Information Which department you are sailing in? Ratings Engine Department Deck Department Bosun Fitter Able-Bodied Seaman Ordinary Seaman Oiler/Wiper Steward Chief Cook Trainee Marine Engineer 4th Engineer 3rd Engineer 2nd Engineer Chief Engineer Deck Cadet 3rd Officer 2nd Officer Chief Officer Captain Oil and Water Separators, also called oily water separators, are extremely important in the prevention of oil pollution at sea, as stipulated in line with the MARPOL regulation, Annex I. These Oil and Water Separators prevent ships from discharging oil overboard when pumping out their bilges, oil tanks, or other contaminated spaces.An oily water separator consists of three sub-units, namely:A separator unitFilter unitOCM (Oil Content Monitor) & Control Unit The schematic below shows the inner workings that make up an oil and water separator, with the image after that as another example of an actual separator. In the second image, the separator unit is to the right, the filter unit to the left, and the OCM and Control Unit on the top. The inner workings, and operation, of the separator unit, is as follows:The discharge of the bilge pumps flows directly into the separator unit.This separator unit consists of catch plates which are inside a coarse separating compartment and an oil collecting chamber.Here the oil, having a density which is lower than that of the water, which makes the former rise into the oil collecting compartment and the rest of the non-flowing oil mixture settle down into a fine settling compartment after passing between the catch plates.After a period, more oil will separate and collect in the oil collecting chamber. The oil content of the water which passes through this unit is around 100 parts per million of oil.A control valve, which can either be pneumatic or electronic, releases the separated oil in to the designated oil and water separator sludge tank.A heater may be incorporated in this unit for smooth flow and separation of oil and water.This stage helps in removing some physical impurities to achieve fine filtration in the later stage. The inner workings, and operation, of the filter unit, is as follows:This is a separate unit whose input comes from the discharge of the separator unit.This filter unit consists of three stages the filter stage, coalescer stage, and collecting chamber.The impurities and particles are separated by the filter and are settled at the bottom for removal.In the second stage, a coalescer induces a coalescence process in which oil droplets are joined together to increase the size by breaking down the surface tension between oil droplets in the mixture.These larger oil molecules rise above the mixture in the collecting chamber and are removed when required.The output from this unit should be less than 15 ppm to fulfill the legal discharge criteria in accordance with MARPOL regulation. The inner workings, and operation, of the OCM and Control unit, is as follows:This unit functions together in two parts, monitoring (OCM) and controlling (Controlling unit).The ppm of oil is continuously monitored by the OCM and if the ppm is high it will give alarm and feed data to the control unit.The control unit continuously monitors the output signal of OCM and if alarm arises, it will not allow the oily water to go overboard by means of operating 3-way solenoid valve.There are normally 3 solenoid valves commanded by a control unit. These are located in the first unit oil collecting chamber, second unit oil collecting chamber, and one in the discharge side of the oily water separator which is a 3-way valve.The 3-way valve inlet is from the OWS discharge, where one outlet is to overboard and a second outlet is to the OWS sludge tank.When OCM gives alarm, a 3-way valve discharges oily mixture in the sludge tank. There is legislation and regulations in place to prevent the discharge of oil into the ocean. This is as stipulated by the IMO in their MARPOL regulation Annex I Oil. The fundamental concepts of this regulation are as follows:This annex mainly deals with oil pollution and oil tanker construction.It also stipulates that an accurate oil record book must be kept to monitor all oil that comes on-board the ship, and oil that leaves the ship.Annex I also stipulate that any discharge of water overboard must contain less than 15ppm oil. Content sponsored by 6Sigma

Ship separator. Ship oil separator. Ship oil water separator diagram. Ship oil water separator.