

March 2024

9. Describe the procedure that should be followed if an outboard motor has been submerged in sea water. (10)

March 2021

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8. Describe the procedure that should be followed if an outboard motor has been submerged in sea water. (10)

Nov 2018

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8. Describe the procedure that should be followed if an outboard motor has been submerged in sea water. (10)

Here's the procedure you should follow if an outboard motor has been submerged in seawater:

Immediate Actions:

1. **Safety First:** Ensure your own safety and the safety of others by turning off the engine (if still running) and disconnecting the battery to prevent electrical hazards.
2. **Retrieve the Engine:** If possible, retrieve the outboard motor from the water as soon as possible. Saltwater exposure can accelerate corrosion.

Prevent Further Damage:

1. **Do Not Start the Engine:** Resist the urge to start the engine. Starting a submerged engine can cause internal damage by forcing saltwater through the system.
2. **Flush with Fresh Water:** As soon as possible, thoroughly flush the outboard motor with clean, fresh water. This will help remove saltwater residue and prevent corrosion. You can use a garden hose with a moderate spray pattern to avoid damaging internal components.

Detailed Cleaning and Inspection:

1. **Drain Fluids:** Drain the engine oil, gear oil, and any other fluids that may have been contaminated with saltwater.
2. **Spark Plugs:** Remove the spark plugs and allow the cylinders to drain any trapped water. You can crank the engine slowly with the spark plugs removed to further expel water.
3. **Air Intake:** Inspect the air intake for any water ingress. Remove any water or debris that may have entered the air filter.
4. **Corrosion Prevention:** Apply a light coating of corrosion inhibitor spray to all metal surfaces after rinsing with fresh water.

Maintenance and Restart:

1. **Professional Inspection:** It's highly recommended to have a qualified outboard mechanic inspect the engine for any internal damage caused by the submersion. They can assess the condition of bearings, seals, and other critical components.
2. **Oil Change:** Replace the engine oil and gear oil with fresh lubricants after the inspection.
3. **Refill Fluids:** Refill any other fluids that were drained during the cleaning process.
4. **Test and Restart:** Only after a thorough inspection and any necessary repairs, attempt to restart the engine. Follow the manufacturer's recommended procedures for starting the engine after submersion.

Additional Considerations:

- **Freshwater vs. Saltwater Submersion:** While these steps provide a general guideline, the specific actions might differ slightly depending on whether the submersion occurred in freshwater or saltwater. Saltwater is more corrosive, so a more meticulous freshwater flush and inspection may be necessary.
- **Severity of Submersion:** The extent of the cleaning and inspection procedure may also depend on the severity of the submersion. A complete submersion for an extended period will likely require a more comprehensive inspection than a brief dunk.
- **Manufacturer's Recommendations:** Always refer to the owner's manual for your specific outboard motor model for any specific instructions or recommendations regarding submersion and recovery procedures.

Following these steps promptly after submersion can help minimize damage to your outboard motor and increase the chances of a successful recovery. However, a professional inspection by a qualified mechanic is highly recommended to ensure the engine's safety and performance after a saltwater submersion.

April 2021

April 2021

8. State the requirements for the stowage of hand portable petrol containers, in small lockers on open deck. (10)

June 2020

June 2020

8. State the requirements for the stowage of hand portable petrol containers, in small lockers on open deck. (10)

Here are the requirements for the stowage of hand portable petrol containers in small lockers on an open deck:

Location and Construction:

- **Lockers:** The containers should be stored in small, dedicated lockers specifically designed for flammable liquids. These lockers should be:

- **Constructed from non-combustible materials:** This could be sheet metal, fiberglass reinforced plastic (GRP), or other approved materials that resist fire and heat.
- **Located away from high-risk areas:** Keep the lockers away from heat sources like engines, exhausts, or electrical equipment. Open flames and welding areas should also be far from these lockers.
- **Clearly marked:** The lockers should be clearly labeled with signage indicating "Flammable Liquids" or "Petrol" to warn of the contents.

Ventilation:

- **Natural ventilation:** The lockers must have natural ventilation openings at the top and bottom to allow for air circulation and prevent the buildup of petrol fumes. These openings should be designed to prevent sparks or flames from entering.
- **No forced ventilation:** Avoid using forced ventilation systems within the lockers, as they could ignite any petrol vapors present.

Securing Containers:

- **Means of securing:** The lockers should have a way to secure the petrol containers to prevent them from shifting or tipping over during rough seas. This could involve straps, hooks, or shelves designed to hold the containers in place.

Quantity Limitations:

- **Maximum quantity:** Regulations may limit the total amount of petrol allowed to be stored in such lockers on the open deck. This will depend on the specific regulations of your country or governing body. 50 liters or 13.2 gallons is a common maximum limit, but it's best to check the relevant regulations.

Additional Considerations:

- **Drainage:** The lockers may require a drainage system to channel away any spills or leaks. This drainage should not lead directly overboard but to a designated collection point to prevent environmental contamination.
- **Firefighting Equipment:** Consider having a portable fire extinguisher suitable for fighting petrol fires readily available near the lockers.

By following these requirements, you can ensure the safe storage of hand portable petrol containers on the open deck of a vessel, minimizing the risk of fire hazards and environmental damage. It's important to consult the relevant regulations of your country's maritime authority for the most up-to-date and specific requirements for stowing petrol on board a vessel.

March 2020

8. (a) State THREE dangers arising from the use of LPG open flame appliances. (3)
- (b) Describe the requirements for a *Gas Detector* suitable for a LPG installation. (7)

Dangers of LPG Open Flame Appliances:

(a) Three dangers arising from the use of LPG open flame appliances include:

1. **Carbon Monoxide Poisoning:** LPG combustion produces carbon monoxide (CO), a colorless, odorless gas. Incomplete combustion due to faulty appliances, inadequate ventilation, or blocked flues can lead to CO buildup. CO poisoning can cause headaches, dizziness, nausea, and even death if not detected promptly.
2. **Fire and Explosion:** Leaked LPG gas is highly flammable and can easily ignite from sparks, flames, or pilot lights. In a confined space, a leak can create an explosive gas-air mixture, posing a significant fire and explosion risk.
3. **Burns:** Open flames from LPG appliances can cause severe burns if touched accidentally. This is especially dangerous for young children or people with limited mobility.

Requirements for an LPG Gas Detector:

(b) Here are the key requirements for a Gas Detector suitable for a LPG installation:

- **Gas Detection:** The detector should be specifically designed to detect leaks of Liquefied Petroleum Gas (LPG) commonly used in domestic and recreational applications (propane and butane).
- **Alarm Function:** Upon detecting an LPG leak, the detector should emit a loud and clear audible alarm to warn occupants of the potential danger.
- **Sensor Technology:** Most suitable detectors use electrochemical sensors that are sensitive to LPG gas. These sensors have a longer lifespan and are more reliable than older catalytic bead sensors.
- **Automatic Shut-off (Optional):** Some advanced detectors may have the capability to automatically shut off the LPG supply valve in case of a significant leak, providing an additional layer of safety.
- **Location:** Gas detectors should be installed strategically in areas where LPG appliances are located, typically near the floor level where LPG gas tends to settle due to its heavier-than-air nature.
- **Certification:** Ensure the gas detector meets relevant safety standards and is certified by a recognized testing body.
- **Regular Maintenance:** Follow the manufacturer's instructions for regular maintenance of the gas detector, including testing and cleaning to ensure its proper functionality.

By installing and maintaining suitable LPG gas detectors, occupants can be alerted to potential leaks and take timely action to minimize the risk of fires, explosions, and carbon monoxide poisoning.

Nov 2023

Nov 2023

9. State the safety requirements for small lockers on open deck storing petrol and other highly inflammable liquids in hand portable containers. (10)

Here are the safety requirements for small lockers on open deck storing petrol and other highly flammable liquids in hand portable containers:

Locker Construction and Placement:

- **Non-combustible materials:** The lockers must be constructed from fire-resistant materials like sheet metal, fiberglass reinforced plastic (GRP), or other approved materials that can withstand heat and flames.
- **Away from heat sources:** Position the lockers away from potential ignition sources such as engines, exhausts, electrical equipment, open flames, and welding areas.
- **Clearly marked:** Label the lockers prominently with signage indicating "Flammable Liquids" or "Petrol" to warn of the contents.

Ventilation:

- **Natural ventilation:** The lockers need to have natural ventilation openings at both the top and bottom to allow air circulation and prevent flammable vapor build-up. These openings should be designed with spark arrestors or mesh to prevent sparks or flames from entering.
- **No forced ventilation:** Avoid using forced ventilation systems inside the lockers. Electric fans or other forced ventilation could ignite any present petrol vapors.

Securing Containers:

- **Securing mechanism:** The lockers should have a way to secure the petrol containers to prevent them from shifting or tipping over during rough seas. This could involve straps, hooks, shelves, or other means designed to hold the containers firmly in place.

Quantity Limitations:

- **Maximum quantity:** Regulations may limit the total amount of petrol allowed for storage in such lockers on the open deck. The specific limit will depend on the governing body or country's regulations. A common maximum is 50 liters (13.2 gallons), but it's crucial to consult the relevant regulations for your situation.

Additional Considerations:

- **Drainage:** The lockers may require a drainage system to channel away any spills or leaks. This drainage should not lead directly overboard but to a designated collection point to prevent environmental contamination.
- **Firefighting Equipment:** Consider having a portable fire extinguisher suitable for petrol fires readily available near the lockers for quick response in case of emergencies.

Other Safety Measures:

- **Electrical Safety:** Ensure no electrical wiring or components are present within the lockers to eliminate any potential ignition sources.
- **No Smoking:** Clearly display "No Smoking" signs around the lockers to prevent any smoking activity near the flammable materials.
- **Maintenance:** Regularly inspect the lockers, ventilation openings, and securing mechanisms for proper functionality and any signs of damage.

By adhering to these safety requirements, you can significantly reduce the risk of fires, explosions, and environmental hazards associated with storing flammable liquids in small lockers on open decks. It's important to remember that regulations can vary, so consult the relevant maritime authority in your area for the most up-to-date and specific requirements for your location.

June 2023

June 2023

8. With reference to the storage of volatile fuels, describe the construction and placement requirements of the storage tanks for aviation fuel, including tank ventilation.

(10)

Aviation Fuel Storage Tanks: Construction, Placement, and Ventilation

Aviation fuel is a highly flammable liquid, and its storage requires strict regulations to ensure safety. Here's a breakdown of the key points regarding construction, placement, and ventilation of aviation fuel storage tanks:

Construction:

- **Material:** Tanks are typically constructed from high-quality, welded steel to ensure strength and minimize leakage. In some cases, fiberglass-reinforced plastic (FRP) may be used for specific applications.
- **Double-walled Design (Preferred):** Double-walled tanks are the preferred option as they provide an extra layer of protection. The inner tank holds the fuel, while the outer wall acts as a secondary containment in case of a leak from the inner tank. The space between the walls is monitored for leaks using leak detection systems.
- **Venting:** Storage tanks require proper venting to allow for:
 - **Pressure relief:** Vents release pressure buildup within the tank due to temperature changes or filling operations.
 - **Fuel vapor displacement:** Vents allow air to enter the tank as fuel is withdrawn, preventing a vacuum and potential tank collapse.
- **Fire Protection:** Tanks may be equipped with fire protection systems such as firewalls, fireproofing materials, and foam suppression systems for added safety.
- **Capacity:** Aviation fuel storage tanks come in various sizes, depending on the airport's needs and refueling requirements.

Placement:

- **Distance from Buildings and Aircraft:** Regulations dictate minimum distances between fuel storage tanks and buildings, aircraft parking areas, and other potential ignition sources. These distances ensure that any fire or explosion incident is contained and minimizes damage to surrounding structures and equipment.
- **Bundling:** Aboveground tanks are often placed within a bund (containment area) designed to hold the entire volume of the tank in case of a leak or rupture. This bund may be constructed from concrete or masonry walls.
- **Drainage:** The banded area should have a proper drainage system to prevent rainwater accumulation and potential contamination of the surrounding soil or water table.
- **Security:** Fuel storage facilities should have security measures like fences, access control systems, and CCTV monitoring to deter unauthorized access and potential theft.

Tank Ventilation:

- **Types of Vents:** Two main types of vents are commonly used:
 - **Vacuum and Pressure Relief Vents:** These vents automatically open to release pressure or allow air intake as needed to maintain atmospheric pressure within the tank. They are typically set to open and close at specific pressure levels.
 - **Flame Arrestors:** These are installed on vents to prevent flames from entering the tank in case of an external fire. Flame arrestors use a specially designed element that extinguishes flames while allowing air to pass through.
- **Vent Location:** Vents are typically located on the highest point of the tank to allow for proper air exchange and prevent fuel accumulation within the vent system.
- **Vent Discharge:** Vent discharge should be directed away from potential ignition sources and personnel working areas to minimize the risk of vapor inhalation or fires.

Additional Considerations:

- **Regulations:** Storage tank construction, placement, and ventilation must comply with relevant national and international regulations (e.g., NFPA 30, API 653). These regulations specify detailed requirements for materials, capacities, fire protection, and other safety aspects.
- **Inspections and Maintenance:** Regular inspections and maintenance of tanks, vents, and associated equipment are crucial to ensure their integrity, functionality, and compliance with regulations. Leak detection systems, pressure relief valves, and flame arrestors require periodic checks to ensure proper operation.

By adhering to these construction, placement, and ventilation requirements, aviation fuel storage facilities can minimize the risk of fires, spills, and environmental damage, ensuring safe and efficient storage of this vital fuel for aircraft operations.

June 2021

June 2021

8. Describe the safety requirements for the electrical installation in a large locker on deck, designated for the carriage of petrol, or vehicles with fuel in their tanks.

(10)

Here are the safety requirements for the electrical installation in a large locker on deck, designated for the carriage of petrol or vehicles with fuel in their tanks:

General Principles:

- **Minimize Electrical Equipment:** The fundamental principle is to minimize the use of electrical equipment within the locker altogether. Petrol vapors are highly flammable, and even a small spark can ignite them, leading to a fire or explosion.
- **Explosion-proof Equipment (if necessary):** If essential electrical equipment must be present (e.g., lighting), it needs to be certified as explosion-proof for hazardous environments containing flammable liquids and vapors. Explosion-proof equipment is specifically designed to prevent sparks or hot surfaces that could ignite flammable atmospheres.

Specific Requirements:

- **Wiring:** If electrical wiring is present, it must be:
 - **Marine-grade cables:** Use only marine-grade cables designed to withstand the harsh marine environment, including moisture, salt spray, and vibration.
 - **Enclosed and protected:** All wiring should be enclosed in sealed conduits or trunking to protect it from physical damage and prevent any potential sparks from igniting vapors.
- **Lighting:** If lighting is required:
 - **Explosion-proof fixtures:** Use only explosion-proof lighting fixtures specifically certified for use in flammable atmospheres. These fixtures are sealed to prevent sparks and hot surfaces.
 - **Low voltage:** Consider low voltage lighting systems (e.g., 12V DC) to further minimize the risk of sparking.
- **Switches and controls:** Any switches or control panels for lighting or other electrical equipment should be located outside the locker in a safe, non-hazardous area.
- **Grounding:** All electrical equipment and metallic components within the locker should be properly grounded to prevent static electricity buildup, which could also be an ignition source.

Additional Considerations:

- **Inspection and Maintenance:** Regularly inspect the electrical installation for any signs of damage, corrosion, or loose connections. Ensure explosion-proof equipment certifications are valid and up-to-date.
- **Alternative Lighting:** Consider alternative lighting options outside the locker, such as deck lights or spotlights, to minimize the need for electrical lighting within the flammable storage area.
- **Ventilation:** Proper ventilation is crucial to remove any potential petrol vapors that could accumulate within the locker. Refer to regulations regarding ventilation requirements for flammable liquid storage lockers.

By following these safety requirements and minimizing the use of electrical equipment, the risk of fire or explosion in a locker designated for petrol or vehicles with fuel tanks can be significantly reduced. It's important to consult the relevant maritime authority or classification society for the most up-to-date and specific requirements for your location and the size and type of your vessel.

