LIFE-SAVING APPLIANCES

Contents of LSA Plan:

The Lifesaving Appliances (LSA) Plan is an essential document onboard vessel, providing detailed information on the location, type, and maintenance schedule for all lifesaving equipment. The LSA Plan is part of the vessel's safety equipment and is required under the International Convention for the Safety of Life at Sea (SOLAS). It is crucial for ensuring that all lifesaving equipment is accessible, properly maintained, and ready for use in an emergency.

Contents of the LSA Plan

1. **General Information:**
   - **Ship's name**, IMO number, call sign, and other identifying details.
   - **Date of plan preparation** and any revision dates.
2. **Detailed Inventory of Lifesaving Appliances:**
   - **Lifeboats:** Number, type, capacity, and location.
   - **Liferafts:** Number, type, capacity, location, and details on hydrostatic release mechanisms.
   - **Rescue boats:** Specifications and launching arrangements.
   - **Lifebuoys:** Quantity, locations on the ship, and any additional features like light and smoke signals.
   - **Lifejackets:** Number, type (adult, child), location for regular and emergency use.
   - **Immersion suits and thermal protective aids:** Number, type, and storage locations.
   - **Marine evacuation systems:** Details if applicable.
3. **Location Diagrams:**
   - Clearly marked diagrams or plans showing the exact location of all lifesaving appliances.
   - Routes to reach these appliances from various locations aboard the ship.
4. **Maintenance and Inspection Schedule:**
   - Detailed schedule for regular maintenance and inspections as per manufacturer guidelines and regulatory requirements.
   - Last serviced dates and due dates for next services.
   - Record-keeping formats for ongoing maintenance and inspections.
5. **Usage Instructions:**
   - Instructions for the use of each type of lifesaving appliance.
   - Emergency procedures associated with the deployment and use of lifesaving equipment.
6. **Training Requirements:**
   - Details regarding crew training on the use of lifesaving appliances.
   - Schedule and records of drills and training sessions.
7. **Safety Procedures:**
   - Specific safety procedures for the deployment of lifesaving appliances.
   - Action plans for mustering and evacuation in emergency situations.

Purpose of the LSA Plan

- **Safety Compliance:** Ensures compliance with SOLAS and other maritime safety regulations.
- **Operational Readiness:** Assists in maintaining operational readiness of all lifesaving appliances for emergency situations.
- **Crew Training and Drills:** Facilitates effective training and regular drills for crew members to be familiar with the use of lifesaving equipment.

- **Inspection and Survey Readiness:** Keeps the vessel prepared for inspections and surveys by maritime safety authorities.

Lifebuoys:

Lifebuoys, also known as life rings or life belts, are critical safety devices designed to be thrown to a person in the water to provide buoyancy and prevent drowning. They are a standard and mandatory piece of safety equipment on all seagoing vessels, including cargo ships, passenger ships, and offshore installations. Lifebuoys must meet specific specifications and requirements set by international maritime safety regulations, notably those stipulated by the International Maritime Organization (IMO) and outlined in the Safety of Life at Sea (SOLAS) Convention. Here are the key specifications and buoyancy requirements for lifebuoys:

Lifebuoy Specifications

1. **Material and Construction:**
   - Lifebuoys are typically made from buoyant materials such as polyurethane foam or other materials that do not absorb water. They are covered with a durable, weather-resistant synthetic or canvas fabric to withstand harsh marine environments.
2. **Size and Weight:**
   - The outer diameter of a standard lifebuoy typically ranges from 720 to 800 mm (approximately 28 to 31.5 inches), and the inner diameter is usually about 400 to 500 mm (15.7 to 19.7 inches).
   - The weight of a lifebuoy is generally at least 2.5 kg (5.5 lbs) to ensure it can support additional equipment such as a light or smoke signal.
3. **Color and Markings:**
   - Lifebuoys are required to be orange or similarly high-visibility color. They must also have retro-reflective tape that enhances visibility during search and rescue operations at night or in poor visibility conditions.
   - They should be marked with the ship's name and port of registry for identification purposes.
4. **Attachments:**
   - Lifebuoys must be fitted with a grab line (a rope that circles around the lifebuoy) with a minimum length of 4 times the outside diameter of the lifebuoy.
   - Some lifebuoys are also equipped with self-activating smoke signals and self-igniting lights to facilitate location during rescue operations, particularly in adverse conditions.

Lifebuoy Buoyancy

1. **Buoyancy Level:**
   - The minimum buoyancy requirement for a standard lifebuoy is 14.5 kg (32 lbs). This ensures that the lifebuoy can support an adult person in the water until rescue can be effected.
   - The buoyancy is provided by the material used in the lifebuoy's construction, which is designed to remain stable and afloat in choppy water conditions.
2. **Performance in Water:**
   - The lifebuoy must be capable of supporting a specified amount of iron weights (typically around 14.5 kg) for at least 24 hours without sinking in fresh water.
   - It should be capable of quick deployment and easy grabbing, able to perform efficiently in different sea conditions, including being thrown into the sea from a height (up to 30 meters specified in some regulations) without sustaining damage.

Arrangement of Lifebuoys Onboard

The arrangement of lifebuoys onboard is governed by strict regulations to ensure they are readily available in an emergency. These regulations specify not only how many lifebuoys must be present but also how they should be distributed around the ship. Here's an overview of typical arrangements:

1. **Number and Location:**
   - The International Convention for the Safety of Life at Sea (SOLAS) requires all ships to carry a minimum number of lifebuoys depending on the ship's length. For instance, ships of 151 meters in length and over must carry at least 8 lifebuoys, while smaller ships will carry fewer.
   - Lifebuoys must be distributed evenly on both sides of the ship to ensure they can be accessed and deployed quickly from either side in an emergency.
2. **Accessibility:**
   - Lifebuoys are positioned to be readily accessible in locations such as the bridge wings, stern, and other strategic points around the vessel, especially near the crew's living and working areas.
   - They must be stored in such a way that they can be rapidly deployed without having to move any obstacles or unlock storage containers.
3. **Additional Equipment:**
   - At least half of the onboard lifebuoys are equipped with self-igniting lights to aid visibility at night or in poor weather conditions.
   - Two of the lifebuoys must be fitted with buoyant lifelines.
   - SOLAS also mandates that at least two lifebuoys on the ship are equipped with smoke signals for marking location in distress situations at sea.

Is MOB Marker a Lifebuoy?

Man Overboard (MOB) Markers are not considered lifebuoys but serve a complementary purpose in man-overboard situations. They are used to mark the position where a person has fallen overboard. Here's more on MOB markers:

1. **Purpose and Function:**
   - The primary function of an MOB marker is to provide a visible indication of the location where a person has fallen into the water. MOB markers are typically fitted with flashing lights, smoke signals, or both to increase visibility and aid in rescue operations.
   - They are designed to float upright in the water and may deploy a flag or light to increase visibility. Some advanced MOB markers also include a radar reflector to enhance detection by radar.
2. **Deployment and Use:**
   - MOB markers are typically thrown into the sea immediately after a man-overboard incident occurs to mark the spot as accurately as possible. They help rescuers focus their efforts in a specific area, increasing the chances of a successful recovery.
3. **Difference from Lifebuoys:**
   - Unlike lifebuoys, MOB markers do not provide buoyancy aid to a person in the water. Instead, they are purely for marking purposes and to assist in the location and recovery operation.
   - Lifebuoys are intended to be thrown to a person in the water to provide something to hold onto, helping them stay afloat until rescued.

Types of Lifeboats

1. **Open Lifeboats:**
   - **Description:** Traditional lifeboats that are open on top, with no roof or covering. They are equipped with manual oars and sails but may also have a motor.
   - **Use:** Less common nowadays due to their vulnerability to harsh weather and sea conditions. Still found on older vessels.

2. **Closed Lifeboats:**
   - **Description:** Fully enclosed lifeboats designed to protect occupants from harsh weather, high seas, and cold water. They are self-righting, can survive rough seas, and are generally motorized.
   - **Use:** Most common on modern ocean-going vessels due to their enhanced safety features.
3. **Freefall Lifeboats:**
   - **Description:** Specially designed for rapid deployment, these lifeboats can be launched by free-falling into the water from a ramp positioned on the stern of the vessel.
   - **Use:** Often used on oil rigs, tankers, and cargo ships where quick evacuation is necessary.
4. **Inflatable Lifeboats:**
   - **Description:** These are not rigid and can be stored in a compact state. They are inflated automatically when deployed.
   - **Use:** Common on commercial vessels, including passenger ships, as secondary or supplementary lifeboats due to their ease of storage and deployment.
5. **Partially Enclosed Lifeboats:**
   - **Description:** A hybrid between open and closed lifeboats, offering protection from the elements with partial enclosures.
   - **Use:** Found on ships where full enclosure isn't deemed necessary but some protection is beneficial.

Lifeboat Requirements

Lifeboats are a critical part of shipboard safety equipment, and their requirements are strictly regulated under international conventions like SOLAS (Safety of Life at Sea), which is administered by the International Maritime Organization (IMO). Here are the key requirements that lifeboats must meet:

1. **Capacity and Number:**
   - The number and capacity of lifeboats must be sufficient to accommodate at least 100% of the people on board the ship. Often, ships are equipped with more than one lifeboat for redundancy.
2. **Construction:**
   - Lifeboats must be constructed to be watertight and capable of maintaining buoyancy when fully loaded with passengers and equipment, even if damaged. They should be unsinkable even when flooded and right themselves if capsized.
3. **Equipment:**
   - Each lifeboat must be equipped with sufficient supplies as per SOLAS requirements, including drinking water, food rations, first aid kits, and means for making distress signals. Tools and spare parts for the engine and other critical components are also required.
4. **Propulsion:**
   - Motorized lifeboats must have engines that are capable of operating even after the boat has been immersed in water. Oars or paddles are also required.
5. **Launch and Recovery Systems:**
   - Lifeboats must have launching and recovery arrangements that allow for safe, efficient, and rapid deployment and retrieval. These systems must be capable of being operated even when the ship is listing or heeled.
6. **Survival Features:**
   - Lifeboats should have thermal protective aids, a canopy for shelter, and insulated floors to protect occupants from cold water and weather conditions.
7. **Communication and Navigation:**
   - Equipped with portable VHF radiotelephones, navigational aids, compasses, and, in some cases, GPS devices to assist in navigation and rescue operations.
8. **Regular Maintenance:**

- Lifeboats must be regularly maintained and serviced according to the manufacturer's guidelines and maritime safety regulations. This includes regular drills for the crew on how to deploy and operate the lifeboat in an emergency.

Food and Water Requirements in Lifeboats

Lifeboats are equipped with emergency provisions to sustain occupants during prolonged survival situations at sea. These requirements are specified in **SOLAS Chapter III Regulation 34** and the **LSA Code**.

Emergency Food Requirements

1. **Ration Quantity**:
   - Each lifeboat must carry at least **10,000 kJ (kilojoules)** of emergency food rations per person onboard.
   - Typically packed as compact, high-calorie, non-perishable bars.
2. **Storage**:
   - Food must be stored in waterproof, airtight packaging to prevent spoilage from seawater or humidity.
3. **Shelf Life**:
   - Emergency rations must have a long shelf life (typically **5 years**) and be clearly marked with expiration dates.

Emergency Water Requirements

1. **Water Quantity**:
   - Each lifeboat must carry at least **3 liters of water per person**.
   - Water is usually stored in sealed containers or flexible pouches.
2. **Desalination Equipment**:
   - If practical, lifeboats should also be equipped with a **desalting apparatus** or **solar stills** for additional water production.
3. **Shelf Life**:
   - Packaged water must have a long shelf life, typically **5 years**, and be resistant to contamination.

Additional Requirements

1. **Markings**:
   - All food and water provisions must be clearly labeled with usage instructions and expiration dates.
2. **Accessibility**:
   - Provisions must be easily accessible and properly secured within the lifeboat to prevent damage during rough seas.
3. **Inspection and Replacement**:
   - Emergency provisions must be inspected during periodic lifeboat checks, and expired items must be replaced.

Lifeboat Weekly Checks and Frequency of Moving from Stowed Position

Weekly Lifeboat Checks (SOLAS Chapter III Regulation 20.6.3)

Lifeboats must be inspected weekly to ensure they are ready for immediate use. The following checks should be performed:

1. **General Condition**:
   - Inspect the lifeboat's exterior and interior for damage, corrosion, or leaks.
2. **Launching Equipment**:
   - Verify that davits, winches, and falls are in good working condition.

- Ensure that the securing arrangements and lashing are in place but can be quickly released.

3. **Release Mechanism**:
   - Check the on-load release mechanism to ensure it is properly engaged and functional.
4. **Provision Inventory**:
   - Confirm the presence and condition of all required emergency provisions, including rations, water, and signaling devices.
5. **Steering and Propulsion**:
   - Verify the functionality of the lifeboat's steering system and propulsion (if applicable, such as engines or oars).
6. **Communications Equipment**:
   - Test the lifeboat's communication devices, such as the VHF radio or emergency signaling equipment.
7. **Buoyancy Equipment**:
   - Inspect the buoyancy units or chambers for any signs of wear or damage.
8. **Lighting and Battery**:
   - Ensure the lifeboat's emergency lights and battery-operated equipment are functioning correctly.

Frequency of Moving Lifeboats from Stowed Position

1. **Every Three Months**:
   - As per **SOLAS Chapter III Regulation 20.7**, each lifeboat must be lowered and maneuvered in the water at least **once every three months** during drills.
2. **Free-Fall Lifeboats**:
   - For free-fall lifeboats, the crew must perform a simulated launch quarterly and a full free-fall launch **annually**, unless exempted by flag state.
3. **Testing in Actual Conditions**:
   - Lifeboats must be moved to the embarkation position weekly and launched at regular intervals to ensure readiness.

Lifebuoy with Lifeline (LTA) Requirements

A **lifebuoy with lifeline**, also known as an **LTA (Lifebuoy Throwing Apparatus)**, is a critical life-saving appliance used for man-overboard situations. Its specifications and requirements are outlined in **SOLAS Chapter III** and the **LSA Code**.

LTA Requirements

1. **Length of Lifeline**:
   - The lifeline attached to the lifebuoy must be **not less than 30 meters** in length.
   - This ensures the lifeline can be effectively used in rescue operations, even in high freeboard vessels.
2. **Diameter of Lifeline**:
   - The lifeline should have a diameter of **8 mm to 11 mm**.
   - It must be buoyant, easy to handle, and made of durable material to withstand exposure to seawater and UV radiation.
3. **Material**:
   - The lifeline must be made from **floating, non-kinking material** that is strong and resistant to deterioration caused by seawater or weather.
4. **Strength**:
   - The lifeline must have a **minimum breaking strength of 5 kN** (approximately 500 kg) to ensure reliability during rescue operations.
5. **Placement**:
   - Lifebuoys with lifelines must be readily accessible on both sides of the ship and distributed near the working deck or embarkation points.

6. **Visibility**:
    - The lifebuoy and lifeline should be of high-visibility color (e.g., orange) and equipped with reflective tape for use at night or in poor visibility.

Lifeboat Launching Procedure

Davit-Launched Lifeboats:

1. **Preparation**: Check that the lifeboat is seaworthy, with all equipment onboard. Ensure that the release gear is set to "secure" and that the boat is properly connected to the davits.
2. **Boarding**: Crew members and passengers board the lifeboat and secure themselves in their seats.
3. **Lowering**: The lifeboat is lowered into the water using the davit system. This is typically done under power, using a motor to control the descent.
4. **Maneuvering Away**: Once afloat, the lifeboat is maneuvered away from the ship using its onboard motor.

Free-Fall Lifeboats:

1. **Preparation**: Similar to davit-launched boats, check that the lifeboat is ready and all equipment is present. The boat is secured in its launching cradle.
2. **Boarding**: Crew members and passengers board the lifeboat and secure themselves in their seats, facing backward (the direction of travel during free fall).
3. **Release**: When commanded, the securing pin is pulled (either manually or automatically), allowing the lifeboat to free-fall into the water from the stern of the ship.
4. **Maneuvering Away**: The impact with the water can be severe; once stable, the lifeboat is maneuvered away from the ship.

Safety Considerations:

- During drills and actual emergencies, the importance of calm, orderly conduct cannot be overstated. Panic can result in injuries or mishaps during the launching process.
- Regular maintenance checks are crucial to ensure that all launching mechanisms and safety equipment are in optimal condition.

Recovering a lifeboat in heavy weather:

Recovering a lifeboat in heavy weather is a challenging and potentially hazardous operation. It requires careful planning, coordination, and execution to ensure the safety of both the lifeboat crew and the ship's crew involved in the recovery operation. Here are the steps and considerations involved in recovering a lifeboat during heavy weather conditions:

1. Assess Weather and Sea Conditions

- **Safety First**: Continuously assess the weather and sea conditions to determine if recovery is feasible without jeopardizing the safety of the crew and the vessel. If conditions are too severe, it may be safer to keep the lifeboat in the water until conditions improve.

2. Prepare the Ship and Crew

- **Positioning the Ship**: Maneuver the ship to create a lee, reducing wind and wave impacts in the recovery area. The ship should ideally be positioned with its stern facing the prevailing weather, sheltering the lifeboat from wind and waves.
- **Brief the Crew**: Ensure all crew involved in the operation are briefed on their roles and the procedures to follow. They should be equipped with appropriate personal protective equipment (PPE), such as life jackets and harnesses.

3. Communicate with the Lifeboat

- **Establish Communication**: Maintain constant communication with the lifeboat via radio. The lifeboat crew should be instructed to approach from the leeward side of the ship, taking advantage of the shelter provided by the ship's hull.

4. Approach and Maneuvering

- **Controlled Approach**: The lifeboat should approach the ship slowly and carefully to avoid collision with the ship's hull. This must be coordinated with the ship's movements to ensure synchronization.
- **Use of Guide Lines**: Throw guide lines to the lifeboat from the ship if possible. These lines can help stabilize the lifeboat as it approaches the recovery position.

5. Recovery Operation

- **Engage Lifting Gear**: Once the lifeboat is in position, hook the lifting gear or davit falls to the lifeboat under the supervision of a competent officer. Ensure that the connection is secure before commencing lifting.
- **Lift Steadily**: Begin lifting the lifeboat, ensuring that the motion is steady and controlled. Adjust the lifting speed according to the swell to avoid swinging or jerking motions that could endanger the lifeboat and its crew.
- **Monitoring**: Continuously monitor the operation and be ready to make adjustments based on the sea state or the ship's motion.

6. Secure the Lifeboat

- **Securing on Deck**: Once the lifeboat is onboard, secure it immediately to the cradle or chocks. Ensure that all securing devices are properly engaged to prevent the lifeboat from moving due to ship's motion or residual sea action.
- **Safety Check**: Conduct a thorough check to ensure everyone involved is safe and accounted for, and that the lifeboat is not damaged.

7. Debrief and Report

- **Debrief Crew**: After the operation, debrief all involved crew members to discuss what went well and what could be improved. This can help refine future recovery operations.
- **Documentation**: Document the operation in the ship's log, including any issues encountered and the condition of the lifeboat and crew.

Safety Considerations

- Always prioritize the safety of personnel over the recovery of the lifeboat. If conditions deteriorate, consider delaying the recovery.
- Ensure that all crew members involved are trained and familiar with the specific recovery procedures and safety equipment on your vessel.

Precautions of Lowering a freefall lifeboat:

Lowering a freefall lifeboat (FFLB) for drills or actual emergency use involves specific precautions to ensure the safety of personnel and the effectiveness of the lifeboat. These precautions are outlined in the SOLAS (Safety of Life at Sea) training manuals, which provide guidelines on the procedures and safety measures to be followed. Here's a comprehensive list of precautions to consider when lowering a freefall lifeboat:

1. Inspection and Maintenance

- **Pre-Operation Check**: Conduct a thorough inspection of the lifeboat, launching appliances, and release mechanisms before any operation. Ensure that no parts are worn or damaged.
- **Maintenance Records**: Regularly update and review maintenance records to ensure that all components have been maintained according to the manufacturer's recommendations and SOLAS requirements.

2. Training and Familiarization

- **Crew Training**: Ensure that all crew members are properly trained and familiar with the operation of the freefall lifeboat, including understanding all launching procedures and safety measures.
- **Drill Regularity**: Conduct regular drills to keep crew proficiency high. SOLAS requires that freefall lifeboat drills be conducted at least once every three months.

3. Safety Gear

- **Personal Protective Equipment**: Ensure that all personnel involved in the launching process are wearing appropriate safety gear, including life jackets, helmets, and suitable protective clothing.
- **Secure Inside the Lifeboat**: All personnel inside the lifeboat should be securely seated and strapped in before release to prevent injuries during the freefall and water entry.

4. Communication

- **Clear Communication**: Maintain clear and effective communication between the lifeboat crew and the ship's bridge or launching control station. Use reliable communication devices to ensure all commands and signals are clearly understood.
- **Launch Authorization**: Ensure that the launch is authorized by the ship's master or officer in charge, and only proceed with launching when clear instructions are given.

5. Operational Checks

- **Release Mechanism Test**: Regularly test the release mechanism to ensure it functions correctly and smoothly without any hitches.
- **Securing Devices**: Check that the lifeboat's securing and release devices are correctly set up and fully functional, preventing premature or accidental release.

6. Weather and Sea Conditions

- **Assess Conditions**: Evaluate weather and sea conditions to determine if it's safe to conduct a launching drill. Avoid launching in adverse weather conditions unless it is an actual emergency.
- **Stabilization**: If the drill or launch must be performed in less than ideal conditions, take all necessary measures to stabilize the ship and lifeboat during the launching process.

7. Post-Launch Procedures

- **Recovery Plan**: Have a clear plan and procedure for recovering the lifeboat after the drill or in the aftermath of an emergency.
- **Inspection After Recovery**: After the lifeboat is recovered, conduct another thorough inspection to check for any damage incurred during the launch and address any issues immediately.

8. Documentation

- **Log Entries**: Record all drills and actual launches in the ship's official log, noting any issues encountered and the condition of the lifeboat post-launch.

Extended Service Liferafts

Extended service liferafts are a type of liferaft that allows longer intervals between required servicing. These liferafts are subject to specific design, inspection, and operational conditions.

Features of Extended Service Liferafts

1. **Longer Servicing Intervals**:
   - Can be serviced every **30 months** instead of the standard **12 months**, reducing operational downtime and costs.
2. **Special Requirements**:
   - Must be equipped with **self-inspection kits** to allow the crew to carry out intermediate inspections between servicing.
3. **Deployment Readiness**:
   - Designed to ensure operational reliability over extended periods, even in harsh maritime environments.
4. **Regulatory Compliance**:
   - Must meet IMO and SOLAS standards for liferaft performance and safety.
5. **Operational Areas**:
   - Primarily intended for use on ships operating in regions where frequent liferaft servicing facilities are unavailable.

Maintenance Considerations

- Self-inspection by trained crew is mandatory during the extended interval.
- Liferafts must still undergo full servicing at approved stations within the specified timeframe.

Difference Between Dry Ship Lifeboats and Tanker Lifeboats

Aspect	Dry Ship Lifeboats	Tanker Lifeboats
Design	Conventional lifeboats designed for general use.	Fire-protected lifeboats to withstand tanker hazards.
Fire Protection	Not required.	Equipped with **fire-resistant outer shells** and water spray systems.
Compressed Air Supply	Typically absent or minimal.	Fitted with compressed air bottles for a **minimum of 10 minutes** breathable air supply in a toxic or smoke-filled environment.
Sprinkler System	Not standard.	Fitted to spray water over the lifeboat for fire protection.
Heat Resistance	Limited protection against high temperatures.	Can withstand exposure to **flames for at least 8 minutes** as per SOLAS requirements.
Suitability	Suitable for general cargo and passenger ships.	Specifically designed for oil, chemical, or gas tankers.
Escape from Hazardous Areas	Not equipped for chemical or toxic gas exposure.	Designed to enable safe evacuation from hazardous atmospheres, such as fires or gas clouds.

Requirement for Davits

Davits are the mechanical systems used to launch and recover lifeboats and rescue boats. **SOLAS Chapter III** and the **LSA Code** specify the requirements for davits to ensure effective and safe evacuation.

General Requirements for Davits

1. **Type of Davits**:
   - **Gravity Davits**: Most common, allowing lifeboats to be launched by gravity without external power.
   - **Free-Fall Davits**: For rapid deployment of free-fall lifeboats.
   - **Pivot Davits**: Used on smaller vessels or restricted spaces.
2. **Launching Requirements**:
   - Must allow the lifeboat to be launched safely **within 5 minutes** under adverse conditions, including a list of **20°** and a trim of **10°**.
3. **Self-Lowering Mechanism**:
   - Davits should be operable by one person and must not rely on power systems to lower the lifeboat.
4. **Capacity**:
   - Designed to handle the fully loaded weight of the lifeboat, including passengers, provisions, and equipment.
5. **Secondary Means of Operation**:
   - Manual backup systems must be available to operate the davit in case of power failure.

Maintenance and Testing Requirements

1. **Load Testing**:

- Davits must undergo periodic load tests at **1.1 times the maximum working load** to ensure structural integrity.

2. **Inspection**:
   - Regular inspections for corrosion, wear, and proper functioning of mechanical components.
3. **Operational Testing**:
   - Conduct drills to test the davit's operation and ensure crew familiarity.

Types of Davit Launch Systems

Davits are the mechanical arms used to lower the lifeboats into the water. Several types of davit systems are employed depending on the ship's design and the lifeboats used.

1. **Gravity Davits:**
   - **Function:** Utilize gravity to lower the lifeboat into the water, with mechanisms to brake and control the descent.
   - **Common Use:** Widely used because of their simplicity and reliability.
2. **Hydraulic Davits:**
   - **Function:** Use hydraulic systems to lower lifeboats, offering smoother, more controlled operations, especially beneficial in rough conditions.
   - **Common Use:** Preferred on larger vessels where heavier lifeboats necessitate a more robust system.
3. **Freefall Davits:**
   - **Function:** Specifically designed for freefall lifeboats, these davits securely hold the lifeboat on a ramp positioned above the waterline and allow it to slide off and enter the water without any hoisting.
   - **Common Use:** Essential for rapid deployment in emergency situations, typically on tankers and bulk carriers.
4. **Single Pivot Gravity Davits:**
   - **Function:** These allow the lifeboat to pivot out over the water before it is lowered, using gravity to assist the deployment process.
   - **Common Use:** Useful in situations where space constraints prevent the use of standard gravity davits.
5. **Telescopic Davits:**
   - **Function:** These davits extend outwards and lower the lifeboat into the water, ideal for ships with limited deck space.
   - **Common Use:** Often found on cruise ships and passenger ferries.

Lifeboat Requirements for Passenger and Cargo Ships

Lifeboat requirements are outlined in **SOLAS Chapter III** and the **LSA Code** to ensure the safety of passengers and crew during emergencies. These requirements vary for **passenger ships** and **cargo ships** based on their design and operation.

Lifeboat Requirements for Passenger Ships

1. **Number of Lifeboats**:
   - Passenger ships must carry sufficient lifeboats to accommodate **100% of the total number of persons onboard**.
   - At least **50% of the total capacity** should be on each side of the ship.
2. **Type of Lifeboats**:
   - **Totally Enclosed Lifeboats** are required to protect passengers and crew from weather and sea conditions.
   - **Rescue Boats**: At least one rescue boat must be carried, which may be lifeboat-compatible.
3. **Lifeboat Launching**:
   - Lifeboats must be capable of being launched when the ship is at a list of **up to 20°** and a trim of **10°**.

4. **Additional Considerations**:
    - Lifeboats must include provisions, signaling devices, and equipment as outlined in the LSA Code.
    - Lifeboats should be **partially or fully enclosed** to provide protection and stability in adverse conditions.

Lifeboat Requirements for Cargo Ships

1. **Number of Lifeboats**:
    - Cargo ships must carry lifeboats on both sides of the vessel, with a capacity to accommodate **all persons onboard**.
2. **Type of Lifeboats**:
    - **Free-Fall Lifeboats**: Often used on cargo ships to ensure rapid evacuation in emergencies.
    - Alternatively, **conventional lifeboats with davits** can be used.
3. **Launch Capability**:
    - Lifeboats must be launchable at a ship's list of **20°** and a trim of **10°**.
4. **Rescue Boats**:
    - At least one rescue boat must be available, which may double as a lifeboat if compliant.
5. **Provisions and Equipment**:
    - Lifeboats must include emergency provisions, first aid supplies, and survival equipment.

Amendment of the LSA Code

The **Life-Saving Appliances (LSA) Code** is a set of standards adopted by the International Maritime Organization (**IMO**) to ensure the design, construction, and performance of life-saving equipment on ships. Amendments to the LSA Code are periodically made to improve safety and align with technological advancements.

Recent Amendments to the LSA Code *(As of January 2025)*:

- **Resolution MSC.402(96)**:
    - Revised maintenance and testing requirements for life-saving appliances, including lifeboats, rescue boats, and launching appliances.
    - Focused on ensuring uniform standards for servicing intervals, service provider approval, and crew training.
- **Resolution MSC.404(96)**:
    - Updates to performance standards for immersion suits and anti-exposure suits, ensuring better protection against hypothermia in cold-water environments.
- **Resolution MSC.459(101)**:
    - Introduced amendments to the Code for improved **electronic devices** for emergency communication, such as Personal Locator Beacons (PLBs) and modernized Emergency Position Indicating Radio Beacons (EPIRBs).

Common Areas of Amendments:

1. **Lifeboats and Launching Appliances**:
    - Enhancements in on-load release mechanisms to reduce accidents during drills and emergencies.
    - Improved structural integrity standards for lifeboats to withstand harsher conditions.
2. **Life Rafts**:
    - Upgraded stability and survivability standards in rough seas.
    - Enhanced equipment packs with improved signaling devices.
3. **Personal Life-Saving Appliances**:
    - Stricter testing for lifejackets to ensure they meet buoyancy and visibility requirements.
4. **Training Requirements**:
    - Emphasis on practical training for proper use and maintenance of life-saving appliances.

Function of Sea Anchor Tripping Line

A sea anchor, also known as a drift anchor, is a crucial piece of equipment for lifeboats. It is essentially a parachute-like device deployed in the water to stabilize the lifeboat by increasing its drag through the water and reducing the speed of its drift. The sea anchor also helps to keep the lifeboat's bow facing into the waves, which enhances stability and safety in rough seas.

Tripping Line Function:

- **Deployment and Orientation Control:**
  - The tripping line is used to deploy the sea anchor properly and ensure it opens fully once it is in the water. It also helps in controlling the orientation of the sea anchor, making sure it functions effectively to stabilize the lifeboat.
- **Retrieval Assistance:**
  - The tripping line facilitates the retrieval of the sea anchor. By pulling the tripping line, the crew can collapse the sea anchor, making it easier to bring it back aboard the lifeboat.
- **Adjustment of Position:**
  - The line allows for adjustments to the position of the sea anchor relative to the lifeboat, helping to manage the attitude of the lifeboat against the waves and wind more effectively.

Frequency of davit launch Liferaft lowering:

The frequency of lowering davit-launched liferafts as part of routine maintenance and crew training exercises is regulated to ensure that both equipment and crew are always prepared for an emergency. The International Maritime Organization (IMO) and the regulations set forth in the International Convention for the Safety of Life at Sea (SOLAS) specify these requirements. Here's an overview of the frequency and guidelines:

SOLAS Requirements for Lowering Davit-Launched Liferafts

1. **Lowering for Maintenance:**
   - **Routine Maintenance:** SOLAS requires that davit-launched liferafts be lowered by means of their launching appliances at least once every three months. This exercise ensures that the launching mechanisms, including the winch, cables, and davits, are in good working condition.
   - **Operational Testing:** During these quarterly lowerings, the operation of the release mechanism and the winch should be tested to ensure that they function smoothly without any hitches.
2. **Lowering for Crew Training:**
   - **Crew Familiarization:** Beyond maintenance, the lowering of liferafts is also critical for crew training. Crew members should be trained and familiar with the launching procedures. While the full lowering is done quarterly, additional drills that involve crew training on the deployment procedures can be conducted more frequently using simulators or on-deck drills without actual lowering.
   - **Deployment Drills:** SOLAS mandates that every crew member must participate in an abandon ship drill that includes the deployment of a davit-launched liferaft within 24 hours of the ship leaving a port if more than 25% of the crew has not participated in such a drill in the previous month.

Immersion Suit Requirements for Lifeboats

Immersion suits are vital for survival in cold water and are required onboard lifeboats under **SOLAS Chapter III Regulation 32.3** and the **LSA Code**.

Requirements for Immersion Suits in Lifeboats

1. **Number**:
   - One immersion suit must be provided for each person onboard the lifeboat.
2. **Location**:

- Immersion suits must be stored in a way that allows easy access during emergencies, typically in lifeboats or in nearby lockers.

3. **Standards**:
   - Immersion suits must comply with IMO-approved standards for buoyancy, insulation, and durability (e.g., resistance to tearing and oil contamination).
4. **Compatibility**:
   - Immersion suits must be compatible with the lifejackets provided in the lifeboats.
5. **Thermal Protection**:
   - Suits must provide sufficient insulation to delay hypothermia for at least **6 hours** in cold water (0–2°C).
6. **Maintenance**:
   - Regular inspection and maintenance are required to ensure the suits remain in good condition.

Immersion Suit Exemption for Specific Ships

SOLAS allows exemptions from carrying immersion suits on certain ships based on operational conditions and voyage routes.

Exemptions from Immersion Suit Requirements

1. **Warm Climate Areas**:
   - Ships operating **exclusively in warm climates** may be exempted from carrying immersion suits, as the risk of hypothermia is minimal.
   - Flag states define specific temperature thresholds (e.g., water temperatures above 20°C).
2. **Passenger Ships**:
   - Passenger ships are not required to carry immersion suits for passengers, as they typically rely on lifejackets for emergencies.
   - However, immersion suits are required for crew members assigned to emergency duties.
3. **Short Voyages**:
   - Ships on **short international voyages** may be exempted if the voyage does not pose significant survival risks in case of an emergency.

Life Raft Questions

HRU (Hydrostatic Release Unit)

1. **Function**:
   - The HRU automatically releases the liferaft when the ship sinks to a depth of **1.5 to 4 meters**, ensuring that the liferaft floats free and deploys.
2. **Activation**:
   - Triggered by water pressure.
   - Once activated, the HRU cuts the securing strap, allowing the liferaft to float to the surface and inflate.
3. **Manual Override**:
   - The HRU can be bypassed manually if the liferaft needs to be deployed while the ship is still afloat.

Painter Line

1. **Function**:
   - The painter line connects the liferaft to the ship and activates the inflation system when pulled.
2. **Length**:
   - Must be long enough to ensure safe deployment, typically **at least 15 meters** or as per the ship's freeboard.
3. **Breaking Strength**:
   - Designed to withstand forces without breaking prematurely, except when separated by the weak link under tension.

Forward Liferaft Criteria

1. **HRU Absence**:
    - Justification for not fitting an HRU on forward liferafts may be due to:
        - **Operational Factors**: In certain cases, forward liferafts are manually deployable for specific roles, such as quick-launch rescue.
        - **Regulatory Approval**: Exemptions may be granted by the flag state if alternative safety measures are implemented.
2. **Forward Liferaft Requirements**:
    - Liferafts on the forward section of the ship must still comply with **SOLAS requirements**, ensuring accessibility, readiness for manual deployment, and proper securing arrangements.

Racking Stress

Racking stress is experienced when a ship's hull is subjected to torsional forces as it navigates through rough seas. This type of stress can twist and distort the hull, affecting the ship's structural integrity.

- **Compensated by:**
    - **Transverse Frames:** These are the primary structural members that help resist racking stresses. Transverse frames extend across the breadth of the ship and provide support against the hull distorting or twisting under stress.
    - **Longitudinal Girders:** These run along the length of the ship and are crucial for providing longitudinal strength, but they also assist in maintaining the hull shape against racking.
    - **Cross Deck Beams:** These beams connect the transverse frames at the deck level and help in distributing the torsional loads more evenly across the ship's structure.
    - **Bulkheads:** Especially watertight bulkheads, these contribute significantly to the torsional rigidity and overall structural integrity of the ship.

Pounding Stress

Pounding stress occurs when the bow of the ship repeatedly slams down into the water as the ship pitches in heavy seas. This type of stress is concentrated at the forward part of the hull and can lead to structural damage over time.

- **Compensated by:**
    - **Longitudinal Strengthening Members (Stringers):** These members run along the length of the hull and help reinforce the ship’s structure where the pounding is most intense, typically at the forward sections of the hull.
    - **Double Bottom Structure:** The double bottom, consisting of two layers of watertight hull surfaces, provides additional strength and cushioning against impacts with the sea surface.
    - **Reinforced Bow Structure:** The bow area, particularly vulnerable to pounding, is often reinforced with thicker plates and additional longitudinal and transverse members to withstand the impacts.

Preparation for SEQ Survey

The SEQ Survey, or Safety Equipment Survey, is part of the regular inspections conducted to ensure that all safety equipment on board a vessel is present, properly maintained, and ready for use. Preparing for this survey involves several key steps:

Checklist for SEQ Survey Preparation:

1. **Life-Saving Appliances:**

- Ensure all lifeboats, liferafts, and rescue boats are in good condition and properly equipped according to SOLAS requirements.
- Check that personal life-saving appliances, such as lifejackets, immersion suits, and lifebuoys, are available in the required quantities and are properly maintained.

2. **Fire Fighting Equipment:**
   - Inspect all firefighting equipment, including fire extinguishers, fire hoses, fire pumps, and fixed firefighting systems, to ensure they are operational.
   - Confirm that fire control plans are up-to-date and accessible.
3. **Navigation and Communication Devices:**
   - Verify that all navigation aids and communication devices are functioning correctly.
   - Ensure that all required charts and publications are updated and onboard.
4. **Alarm Systems and Emergency Instructions:**
   - Test alarm systems, including general alarm and fire detection systems, to ensure they are fully functional.
   - Review and update emergency instructions and muster lists.
5. **Documentation and Certificates:**
   - Gather all relevant certificates and documents, such as the Certificate of Registry, Safety Management Certificate, and previous survey reports.
   - Prepare the Record of Equipment for the Safety Equipment Certificate.
6. **Drills and Crew Training:**
   - Conduct drills prior to the survey to ensure the crew is proficient in emergency procedures.
   - Review training logs to confirm that all required training has been completed and documented.
7. **Physical Inspection and Cleanliness:**
   - Perform a thorough inspection of the vessel for overall cleanliness and orderliness.
   - Check for any obstructions or hazards that could impede access to safety equipment.