19 feb 2021

19 February 2021

1. Describe the procedure for using the local, emergency steering position, should the bridge control system become inoperative. (10)

jan 2024

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2. Describe the procedure for using the local, emergency steering position, should the bridge control system become inoperative. (10)

The procedure for using the local, emergency steering position in case of bridge control system failure will vary depending on the specific vessel design. However, here's a general outline of the steps involved:

1. Establish the Situation:

- **Confirm Bridge Control System Failure:** Verify that the primary steering control system on the bridge is indeed inoperable. This may involve checking alarms, indicators, and attempting basic maneuvering commands from the bridge.
- **Assess Steering Capabilities:** Briefly check if any alternative steering systems like autopilot are functional (if available and deemed safe as a temporary measure).

2. Notify Key Personnel:

- **Inform Master and Chief Engineer:** Immediately report the bridge control system failure to the Master of the vessel and the Chief Engineer. This facilitates coordinated action and ensures essential personnel are aware of the situation.
- **Alert Engine Room:** Communicate the situation to the engine room to ensure they are prepared to adjust engine output as needed during emergency steering with the local position.

3. Navigate to Local Steering Position:

- **Consult Emergency Procedures:** Refer to the ship's Emergency Response Procedures manual or placards for specific instructions on accessing and operating the local emergency steering position.
- **Proceed to Local Position:** Following the designated route, carefully navigate crew members to the local emergency steering position, which may be located in a steering gear room or other designated compartment onboard.

4. Prepare and Engage Local Steering:

- **Secure Local Gear:** Ensure the local steering gear is properly secured and prepared for operation according to the ship's instructions. This may involve removing locking pins or disengaging clutches from alternative steering arrangements.
- **Engage Local Steering:** Following the vessel's specific procedures, engage the local steering gear to establish manual control over the rudder.
- **Communicate with Engine Room:** Maintain clear communication with the engine room to coordinate steering commands with engine output adjustments for effective maneuvering.

5. Navigate with Local Steering:

- **Maintain Course:** Utilize the local emergency steering to maintain course and steer the vessel as needed under the direction of the Master.
- **Limited Maneuverability:** Be aware of reduced maneuverability with local steering compared to the primary bridge control system. Exercise caution during navigation and maneuvering operations.
- **Reduce Speed:** It may be prudent to reduce speed to enhance control of the vessel while operating with the local emergency steering system.

6. Rectify Bridge Control System Fault:

- **Technical Evaluation:** While navigating with the local steering system, efforts should be initiated to troubleshoot and rectify the bridge control system fault as soon as possible. This may involve the Chief Engineer and qualified crew members investigating the cause of the failure.
- **Repair or Isolate Fault:** If possible, isolate or repair the bridge control system fault to restore primary steering control from the bridge.

7. Transition Back to Bridge Control (if Repaired):

- **Verify System Functionality:** Once the bridge control system is repaired, thoroughly test its functionality before transitioning back from local emergency steering.
- **Resume Bridge Control:** Following successful testing and confirmation of normal operation, carefully transition steering control back to the bridge.

Important Notes:

- This is a general guideline, and the specific procedures may vary depending on the vessel type, emergency steering system design, and the ship's Safety Management System (SMS).

10 sept 2021

10 September 2021

4. The UMS monitoring and control system of a ship has recently started to give false alarms and incorrect data printouts.

(a) State, with reasons, the possible causes. (5)

(b) State, with reasons, the action that should be taken to ensure continued safe operation of the vessel. (5)

UMS Malfunction: Causes and Safe Operation Measures

(a) Possible Causes of False Alarms and Incorrect Data:

Several factors can contribute to false alarms and incorrect data printouts from a ship's UMS (Unified Machinery Space) monitoring and control system:

- **Sensor Faults:** Malfunctioning sensors that provide data to the UMS can generate inaccurate readings, leading to false alarms and incorrect printouts. Sensor drift, calibration issues, or physical damage to sensors can all contribute to this problem.
- **Communication Issues:** Errors in data transmission between sensors and the UMS can corrupt data, resulting in misleading information displayed on screens and printed incorrectly on reports. Faulty cables, connectors, or interference within the communication network can be potential causes.

- **Software Bugs:** Software bugs or glitches within the UMS itself can lead to misinterpretation of sensor data, triggering false alarms and generating inaccurate printouts. Outdated software or issues with the specific software version being used are possibilities.
- **Hardware Malfunctions:** Hardware failures within the UMS processing unit or other electronic components can cause data processing errors, resulting in false alarms and incorrect printouts. Component degradation or internal circuit board issues can be concerns here.
- **External Interference:** In rare cases, strong electromagnetic interference from external sources can disrupt the operation of the UMS, leading to erratic sensor readings and consequently false alarms and incorrect data printouts.

(b) Actions to Ensure Safe Operation:

Despite the malfunction, several actions can be taken to ensure the continued safe operation of the vessel:

- **Identify and Isolate the Fault:** The Chief Engineer and qualified crew should attempt to identify the source of the problem. This may involve checking sensor readings directly, reviewing communication logs for errors, and consulting the UMS manual for troubleshooting procedures. If the fault can be isolated to a specific sensor or communication link, it may be possible to temporarily exclude faulty data from certain alarms while investigations continue.
- **Rely on Alternative Monitoring:** While the UMS provides a centralized monitoring system, alternative methods should be used to verify critical engine room parameters. Direct readings from local gauges and instruments should be prioritized to ensure engine performance and safety parameters are within acceptable limits.
- **Maintain Logbook Records:** Increase the frequency of manual entries in the engine room logbook, recording essential parameters like lubricating oil pressure, cooling water temperatures, and RPM based on direct readings from instruments. This provides a backup record of engine performance in case UMS data cannot be fully relied upon.
- **Inform Shore Support and Prepare for Repairs:** The Chief Engineer should notify shore-based technical support about the malfunction. Provide detailed information on the nature of the false alarms and incorrect data observed. Prepare for potential repairs by ordering spare parts or arranging for technical assistance as needed upon arrival at the next port.
- **Reduce Speed or Consider Port Diversion:** If critical engine parameters become uncertain due to unreliable UMS data, consider reducing vessel speed to decrease the load on the machinery. In severe cases, diverting to a port for repairs might be necessary to ensure the safety of the vessel and crew.

3 nov 2020

3 November 2020

3. (a) Explain, with the aid of a sketch, what is meant by the term *Reserve Buoyancy*, stating why it is important. (4)

(b) Explain what is meant by *Free Surface Effect*, stating how this can be minimised. (6)

Buoyancy and Stability: Reserve Buoyancy and Free Surface Effect

(a) Reserve Buoyancy:

Reserve buoyancy refers to the **upward buoyant force** remaining on a vessel after accounting for its weight and the volume of water it displaces at its current loading condition. Here's why it's important:

- **Stability:** Reserve buoyancy contributes to a vessel's **stability**. It acts as a restoring force when a ship heels (tilts) due to wind, waves, or cargo loading. A larger reserve buoyancy provides a greater righting moment, helping the vessel return to an upright position.
- **Safety Margin:** Reserve buoyancy acts as a **safety margin** in case of emergencies like flooding or damage to the hull. If a compartment floods, the remaining air pockets and reserve buoyancy help prevent the vessel from sinking completely.
- **Seaworthiness:** Adequate reserve buoyancy is crucial for maintaining **seaworthiness**. It ensures the vessel can navigate various sea conditions without compromising stability or risking excessive deck immersion.

(b) Free Surface Effect:

The free surface effect refers to the **movement of liquid cargo** within a partially filled tank onboard a ship. Here's how it can be minimized:

- **Sloshing:** The free surface of the liquid can slosh back and forth as the vessel rolls or pitches due to waves. This sloshing motion can significantly affect a ship's stability.
- **Reduced GM (Metacentric Height):** The movement of the free surface effectively acts like a shifting weight within the tank, which can **reduce the vessel's metacentric height (GM)**. GM is a key parameter indicating stability; a lower GM increases the risk of capsizing.

Minimizing the free surface effect involves several strategies:

- **Tank Filling Optimization:** Tanks should be **filled as close to full capacity** as possible to minimize the air gap and free surface movement. This reduces the sloshing effect and maintains a more stable center of gravity.
- **Baffles and Swash Bulkheads:** Installing **baffles** or **swash bulkheads** within tanks can subdivide the liquid cargo, restricting its movement and dampening sloshing. These internal structures create smaller compartments with reduced free surface area.
- **Anti-Rolling Tanks (Stabilizers):** Some vessels, particularly larger ships, may employ **active stabilizer systems** like anti-rolling tanks. These compartments contain water that shifts in opposition to the vessel's rolling motion, counteracting the free surface effect and enhancing stability.

By implementing these measures, the free surface effect and its negative impact on stability can be minimized, ensuring safer operation of the vessel at sea.

Jan 2024

Jan 2024

4. (a) List SIX items of information that should be conveyed to the relieving officer, prior to taking over the engineering watch at sea. (6)

(b) State FOUR criteria which should be taken into account when deciding on the composition of the engineering watch. (4)

Engineering Watch Handover at Sea: Crucial Information and Considerations

(a) Six Key Points for Relieving Officer on Engineering Watch:

Effective communication during watch handover is critical for safe and efficient engine room operations. Here are six key items of information to be conveyed to the relieving officer:

1. **Overall Plant Status:** Provide a concise overview of the current state of the main engine, auxiliary machinery, boiler (if applicable), and other critical equipment. Highlight any abnormalities or changes since the previous watch.
2. **Running Parameters:** Share vital operating parameters like engine RPM, lubricating oil pressure, cooling water temperatures, boiler operating pressure (if applicable), and fuel consumption rates.
3. **Alarms and Events:** Report any alarms that occurred during the previous watch, explaining their cause and resolution if applicable. Brief the relieving officer on any incidents or equipment issues that require attention.
4. **Planned Maintenance:** Inform the relieving officer about any scheduled maintenance tasks due during their watch. Provide details on the equipment involved, the necessary procedures, and any required preparations.
5. **Fuel Changeover (if applicable):** If a fuel changeover is planned during the watch handover, clearly communicate the procedures to be followed and any precautions necessary.
6. **Communication and Contact Details:** Ensure the relieving officer is aware of established communication protocols within the engine room and any important contact details, such as the bridge or chief engineer's emergency phone number.

(b) Four Criteria for Engineering Watch Team Composition:

The composition of the engineering watch team should be determined considering several important criteria to ensure safe and effective operation of the machinery spaces:

1. **Qualifications and Experience:** The watch team members should possess the necessary qualifications and experience to operate and monitor the specific machinery installed onboard the vessel.
2. **Workload and Complexity:** The complexity of the machinery space and the anticipated workload during the watch should be considered. More personnel might be required during critical operations like port maneuvering or heavy weather conditions.
3. **Fitness for Duty:** The watch team members must be well-rested, alert, and fit to perform their watch duties effectively. Factors like fatigue or illness should be considered when determining watch team composition.
4. **Regulatory Requirements:** International and national maritime regulations often specify minimum safe manning requirements for engine room watch teams based on the vessel's size, type, and power plant configuration.

26 feb 2021

26 February 2021

4. The Marine Accident Investigation Branch (M.A.I.B.) carries out investigations into casualties and accidents involving United Kingdom flagged vessels.

(a) List TWO responsibilities of the M.A.I.B. (2)

(b) State the Statutory requirements for reporting an accident. (4)

(c) List FOUR types of incident that are defined as *reportable accidents*. (4)

Marine Accident Investigation Branch (MAIB) and Accident Reporting

The Marine Accident Investigation Branch (MAIB) plays a vital role in maritime safety within the UK.

(a) Two Responsibilities of the MAIB:

1. **Independent Investigations:** The MAIB conducts independent investigations into accidents at sea involving UK flagged vessels **worldwide**. Their focus is not on assigning blame but on determining the causes and contributing factors to the accident.
2. **Safety Recommendations:** Following investigations, the MAIB publishes reports with safety recommendations aimed at improving maritime safety practices across the industry. These recommendations are directed toward ship operators, regulatory bodies, and equipment manufacturers.

(b) Statutory Requirements for Reporting Accidents:

The statutory requirements for reporting accidents involving UK flagged vessels are outlined in the Merchant Shipping (Accident Reporting and Investigation) Regulations. Here's a breakdown:

- **Legal Obligation:** The master of the ship, or in their absence, the senior surviving officer, has a legal obligation to report the accident to the MAIB.
- **Timeliness:** The report should be made **as soon as reasonably practicable** after the accident occurs.

(c) Four Types of Reportable Accidents:

The following four types of incidents are defined as reportable accidents to the MAIB:

1. **Collisions:** Any collision between a UK flagged vessel and another vessel or stationary object, resulting in personal injury, property damage, or environmental pollution.
2. **Groundings:** An incident where a UK flagged vessel runs aground, resulting in damage to the vessel, pollution, or risk of pollution from the vessel.
3. **Strandings:** A situation where a UK flagged vessel becomes immobilized due to navigational error or equipment failure, and is at risk of damage or pollution.
4. **Machinery Damage:** Damage to the main propulsion machinery or auxiliary machinery onboard a UK flagged vessel, resulting in loss of propulsion, restricted maneuvering capabilities, or near miss situations.

16 nov 2018

16 November 2018

4. (a) State the main purposes of the International Labour Organisation (ILO). (4)

(b) List SIX areas where the MLC Convention applies to workers at sea. (6)

International Labour Organisation (ILO) and the Maritime Labour Convention (MLC)

(a) Main Purposes of the International Labour Organisation (ILO):

The International Labour Organisation (ILO) is a specialized agency of the United Nations dedicated to promoting decent work conditions across the globe. Here are its main purposes:

1. **Setting International Labour Standards:** The ILO develops and maintains a set of international labour standards through conventions and recommendations. These standards address various workplace issues like minimum wages, working hours, occupational safety and health, and social security.
2. **Promoting Decent Work:** The ILO promotes the concept of "decent work" encompassing opportunities for productive and well-rewarded employment in conditions of safety, equity, security, and human dignity.
3. **Technical Cooperation and Assistance:** The ILO provides technical cooperation and assistance to member states (countries) to help them implement international labour standards and improve national labour laws and practices.
4. **Protecting Workers' Rights:** The ILO advocates for the protection of workers' fundamental rights, including freedom of association, the right to collective bargaining, and the elimination of forced labour and child labour.

(b) Six Areas Where the MLC Convention Applies to Workers at Sea:

The Maritime Labour Convention (MLC), adopted by the ILO, establishes minimum working standards for seafarers worldwide. Here are six key areas where the MLC applies to seafarers:

1. **Minimum Requirements for Seafarers to Work on a Ship:** The MLC defines the minimum competency standards, medical fitness requirements, and certification needs for seafarers to work onboard vessels.
2. **Conditions of Employment:** The MLC sets out regulations concerning seafarers' employment contracts, wages, working hours, paid leave, repatriation in case of termination of employment, and dispute settlement mechanisms.
3. **Accommodation, Recreational Facilities, Food and Catering:** The MLC establishes minimum standards for seafarers' accommodation onboard ships, including size, amenities, and sanitation requirements. It also addresses recreational facilities, food quality, and catering services.
4. **Occupational Safety and Health Protection:** The MLC focuses on protecting seafarers' health and safety at work. It covers areas like accident prevention, safe work practices, medical care onboard, and protection against occupational hazards.
5. **Welfare:** The MLC recognizes the specific challenges of seafaring and emphasizes the importance of seafarers' welfare. It promotes access to communication facilities, recreational activities, and religious observances while at sea.
6. **Social Security Protection:** The MLC encourages member states to ensure seafarers have access to adequate social security protection covering unemployment, sickness, injury, disability, old age, and maternity leave.

3 November 2020

4. With reference to the regulations regarding watchkeeping procedures:

   (a) state the off-duty time to which a watchkeeper is legally entitled:

      (i) in any twenty-four hour period; (3)

      (ii) accumulatively over the period of one week; (1)

   (b) list SIX circumstances under which it may be necessary to increase the watchkeeping manning of the machinery spaces. (6)

Watchkeeping Regulations and Manning Levels

(a) Watchkeeper's Off-Duty Time:

Regulations regarding watchkeeping procedures are outlined in the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). Here's the breakdown of off-duty time entitlement:

(i) In Any Twenty-Four Hour Period:

The STCW **does not specify a minimum** off-duty time entitlement within a **single 24-hour period**. However, it mandates sufficient rest to ensure the watchkeeper is fit for duty and capable of maintaining safe watchkeeping standards. In practice, most watchkeeping schedules allocate at least **8 hours** of rest within a 24-hour period.

(ii) Accumulatively Over One Week:

The STCW requires seafarers to be provided with **at least 72 hours** of rest **over a seven-day period**. This rest can be distributed unevenly throughout the week, as long as the minimum of 72 hours is met.

(b) Circumstances for Increased Watchkeeping Manning:

The STCW and national regulations may recommend increasing watchkeeping manning in the machinery spaces under several circumstances:

1. **Navigating Through Areas of High Traffic or Restricted Visibility:** When sailing through areas with dense traffic or restricted visibility due to fog, heavy weather, or nighttime conditions, additional personnel might be required on watch to assist with monitoring and safe navigation.
2. **Maneuvering in Busy Ports or Confined Waters:** During maneuvering in crowded ports or confined waterways, increased watchkeeping manpower can be beneficial for safe operations, particularly for monitoring equipment and communicating effectively with the bridge.
3. **Carrying Out Maintenance or Repairs:** If maintenance or repairs need to be performed on machinery while the vessel is underway, additional personnel might be required on watch to maintain safe operation of the remaining machinery and ensure personnel safety during maintenance activities.
4. **Heavy Weather Conditions:** During periods of heavy weather with high seas or strong winds, additional watchkeepers can be essential to monitor equipment performance, compensate for increased machinery loads, and take prompt action if necessary.

5. **Emergencies or Abnormal Situations:** In case of emergencies like fire, machinery failure, or pollution events, additional manpower in the engine room can be critical for effective response, damage control, and safe operation of the vessel.
6. **Operating with Reduced or Limited Crew:** If the vessel is operating with a reduced or limited crew due to illness, injury, or other reasons, increasing watchkeeping manning might be necessary to ensure safe and efficient operation of the machinery spaces.

Note: The specific requirements for watchkeeping manning levels may vary depending on the size and type of vessel, the complexity of the machinery installation, and the specific conditions of the voyage.

Sources

1. en.wikipedia.org/wiki/United_States_Merchant_Marine

9 nov 2018

9 November 2018

4. (a) List FOUR aspects upon which a new person joining a vessel for the first time would receive instruction. (4)

   (b) Detail SIX ways in which personal action can increase the risk of fire on a vessel. (6)

28 may 2021

28 May 2021

5. (a) List FOUR aspects upon which a new person joining a vessel for the first time would receive instruction. (4)

   (b) Detail SIX ways in which personal action can increase the risk of fire on a vessel. (6)

Onboard Familiarisation and Fire Safety Precautions

(a) Four Aspects of Instruction for New Crew:

Joining a new vessel requires familiarization to ensure efficient work and safety. Here are four key areas where a new crew member would receive instruction:

1. **Vessel Familiarisation:** New crew will be introduced to the general arrangement of the ship, including location of their designated work areas, muster stations, emergency exits, life-saving appliances, and essential machinery spaces.
2. **Life-Saving Appliances and Drills:** Training will be provided on the operation and use of life-saving appliances like lifeboats, life rafts, and personal flotation devices (PFDs). New crew will also participate in mandatory safety drills to practice emergency procedures.

3. **Fire Safety Procedures:** Crew members will receive comprehensive instruction on fire safety procedures, including the use of fire extinguishers, activation of fire alarms, and emergency evacuation routes from accommodation and machinery spaces.
4. **Duties and Responsibilities:** New crew will be briefed on their specific duties and responsibilities onboard, including their role during emergencies, watchkeeping requirements (if applicable), and proper use of relevant equipment and machinery.

(b) Six Ways Personal Actions Can Increase Fire Risk:

Fires onboard vessels pose a serious threat. Here are six ways personal actions can increase fire risk:

1. **Smoking in Unauthorized Areas:** Smoking is strictly prohibited in most areas onboard a vessel. Ignoring designated smoking areas and smoking in accommodation spaces or around flammable materials can easily start a fire.
2. **Improper Use of Electrical Equipment:** Overloading electrical outlets, using damaged electrical cords, or leaving electrical appliances unattended while operating can lead to overheating and electrical fires.
3. **Mishandling of Flammable Liquids:** Careless handling of flammable liquids like paint thinners, cleaning solvents, or fuels can result in spills and vapor accumulation, increasing fire risk. Proper storage and use of flammable liquids are essential.
4. **Improper Waste Disposal:** Accumulation of oily rags, discarded cigarettes, or combustible waste in inappropriate locations can create fire hazards. Proper waste disposal procedures must be followed.
5. **Using Cooking Appliances Unsafely:** Leaving cooking unattended on stoves, using improper cooking methods, or not cleaning ovens regularly can lead to grease fires in galley areas. Following safe cooking practices is critical.
6. **Tampering with Fire Safety Equipment:** Disabling fire alarms, blocking fire doors, or tampering with fire extinguishers can significantly hinder firefighting efforts in the event of a fire.

16 nov 2018

16 November 2018

5. (a) List FOUR examples of materials on board a vessel for which a Material Safety Data Sheet (MSDS) should be supplied. (4)

(b) List SIX items of information that could be obtained from a MSDS. (6)

Material Safety Data Sheets (MSDS) Onboard Vessels

(a) Four Examples of Materials Requiring MSDS:

Vessels carry various materials, and some pose potential safety hazards. Here are four examples where an MSDS should be readily available:

1. **Flammable Liquids:** Fuels like diesel, gasoline, and lubricating oils are essential for ship operation. However, they are flammable and can release hazardous vapors. An MSDS provides information on safe handling, storage, and firefighting procedures for these liquids.
2. **Cleaning Chemicals:** A variety of cleaning chemicals are used for maintenance and sanitation purposes onboard. These chemicals can be corrosive, toxic, or irritating. An MSDS outlines proper personal protective equipment (PPE) requirements and safe handling practices for these chemicals.
3. **Compressed Gases:** Vessels may use compressed gases like oxygen for breathing apparatus, inert gases for fire prevention, or refrigerant gases in air conditioning systems. An MSDS details the hazards

associated with pressurized gases, appropriate handling procedures, and potential health risks in case of leakage.
4. **Paints and Solvents:** Paints and solvents used for maintenance and corrosion protection can be flammable and contain harmful chemicals. An MSDS provides information on proper ventilation requirements during application, safe storage practices, and disposal procedures for paint thinner and used paint cans.

(b) Six Key Details Found in an MSDS:

An MSDS is a vital document for understanding the properties and hazards of various materials onboard. Here are six key pieces of information obtainable from an MSDS:

1. **Material Identification:** The MSDS clearly identifies the material by name and chemical formula and may include trade names or synonyms used for the material.
2. **Hazardous Ingredients:** The MSDS lists the hazardous ingredients present in the material and their respective concentrations. This information helps identify potential health risks associated with exposure.
3. **Physical and Chemical Properties:** The MSDS details physical properties like boiling point, flash point, flammability limits, and chemical properties like acidity or alkalinity of the material.
4. **Health Hazards:** The MSDS describes the potential health hazards associated with exposure to the material, including symptoms of inhalation, skin contact, or ingestion. It may also recommend first aid procedures in case of accidents.
5. **Fire Fighting Measures:** The MSDS provides information on suitable firefighting techniques for the material, including recommended extinguishing agents and precautions to be taken during firefighting operations.
6. **Handling and Storage:** The MSDS outlines safe handling procedures for the material, including the use of appropriate PPE, ventilation requirements, and proper storage conditions to minimize the risk of accidents or spills.

28 may 2021

28 May 2021

3. (a) State FOUR reasons why an Engine Room Log should be completed. (4)

(b) List SIX typical Engine Room Log entries. (6)

Engine Room Log: Importance and Typical Entries

(a) Four Reasons for Completing an Engine Room Log:

Maintaining a comprehensive Engine Room Log is crucial for safe and efficient ship operation. Here are four key reasons for its completion:

1. **Monitoring Engine Performance:** The Engine Room Log serves as a historical record of machinery performance. Parameters like RPM, lubricating oil pressure, cooling water temperatures, and fuel consumption are logged regularly. This data allows engineers to monitor trends, identify potential problems early, and ensure optimal engine performance.
2. **Maintenance Record Keeping:** The Engine Room Log documents routine maintenance tasks performed onboard, including lubrication schedules, filter replacements, and equipment repairs. This information is essential for preventive maintenance planning and ensures machinery is serviced according to manufacturer recommendations.

3. **Incident Reporting:** The Engine Room Log serves as an official record of any incidents or malfunctions that occur in the machinery spaces. This information may be required during port state control inspections or investigations into accidents at sea.
4. **Future Reference and Knowledge Transfer:** The Engine Room Log provides a valuable record for future reference. New crew members can gain insight into past maintenance history and operating procedures, facilitating knowledge transfer and ensuring continuity of safe engine room operations.

(b) Six Typical Engine Room Log Entries:

The specific entries in an Engine Room Log will vary depending on the vessel and its machinery configuration. However, some typical entries include:

1. **Commencing Engine Watch:** This entry records the time a new watchkeeper assumes duty, noting any parameters like RPM, lubricating oil pressure, and cooling water temperatures at the time of handover.
2. **Routine Equipment Checks:** Regular checks of essential machinery like auxiliary engines, generators, pumps, and steering gear are logged, noting their operating condition and any abnormalities observed.
3. **Maintenance Performed:** Any maintenance tasks performed during the watch are documented in the log, including a brief description of the work completed and any replacement parts used.
4. **Fuel Changeover:** If a fuel changeover is conducted during the watch, the log will record the time, type of fuel being switched to, and any tank switching procedures followed.
5. **Alarms and Events:** The log should record any alarms that occur during the watch, along with the time of the alarm, the identified source, and the actions taken to resolve the issue.
6. **Ending Engine Watch:** Similar to commencing watch procedures, the log will note the time a watchkeeper is relieved, along with the readings of key engine parameters at the time of handover.

28 may 2021

28 May 2021

4. With reference to the International Load Line Convention:

(a) sketch and label a typical load line marking for a vessel certificated to operate in all zones; (5)

(b) define statutory minimum *freeboard*. (2)

(c) explain why there are different load lines for fresh water and sea water. (3)

International Load Line Convention and Load Line Markings

(a) Load Line Markings for All Zones:

A vessel certified to operate in all zones according to the International Load Line Convention will have a specific set of markings on its hull. Here's a breakdown of a typical load line marking:

- **Deck Line:** A horizontal line marked amidships (usually in the middle of the vessel's length) representing the upper surface of the freeboard deck.
- **Load Line Disc:** A circle with a horizontal line passing through its centre, positioned amidships slightly below the deck line. The upper edge of the horizontal line within the disc represents the summer load line (marked with the letter "S").

- **Summer Freeboard:** The vertical distance between the upper edge of the horizontal line within the load line disc and the deck line represents the minimum freeboard required in summer saltwater conditions.
- **Tropical Load Line (T):** A horizontal line marked a specific distance (typically 1/48th of the summer draught) below the summer load line. This line represents the minimum freeboard required in tropical zones.
- **Winter Load Line (W):** A horizontal line marked a specific distance (typically 1/48th of the summer draught) above the summer load line. This line represents the minimum freeboard required in winter zones of the North Atlantic.
- **Fresh Water Load Line (F):** An additional horizontal line (sometimes marked with the letters "FW") may be present on some vessels. This line indicates the minimum freeboard required when operating in fresh water conditions.

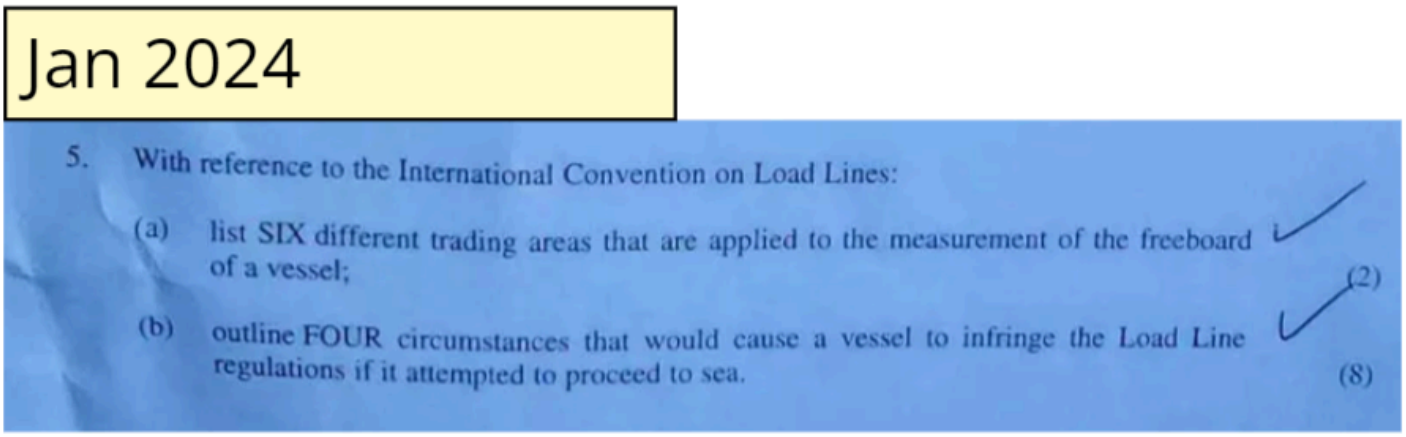
(b) Statutory Minimum Freeboard:

The statutory minimum freeboard is the vertical distance required by regulation between the waterline and the deck line of a vessel. This distance ensures sufficient reserve buoyancy to maintain stability and seaworthiness in various operating conditions, including waves, wind, and cargo loading.

(c) Fresh Water vs. Salt Water Load Lines:

The density of fresh water is slightly less than the density of seawater. Therefore, a vessel displaces a larger volume of fresh water to achieve the same buoyancy compared to saltwater. To account for this difference, a separate fresh water load line (F) might be marked on some vessels. Operating in fresh water with a saltwater load line would submerge the vessel deeper, potentially compromising stability and deck clearance. The fresh water load line ensures adequate freeboard is maintained even in freshwater environments.

Jan 2024



International Load Line Convention and Freeboard Measurement

(a) Six Different Trading Areas for Freeboard Measurement:

The International Load Line Convention defines various trading areas with specific freeboard requirements based on environmental conditions. Here are six different trading areas applied to freeboard measurement:

1. **Summer Zone:** This zone encompasses areas with generally favorable weather conditions, including moderate sea states and temperatures.
2. **Tropical Zone:** This zone covers areas with warmer waters and increased likelihood of tropical cyclones. A reduced freeboard is permitted compared to the summer zone to account for warmer water density.

3. **Winter North Atlantic Zone:** This zone covers the North Atlantic Ocean above a defined latitude limit during winter months, where heavier weather conditions are prevalent. An increased freeboard is required compared to the summer zone for enhanced seaworthiness in rough seas.
4. **Fresh Water Zone:** This area encompasses rivers, lakes, and enclosed bodies of fresh water. A specific freeboard is required for freshwater operation due to the difference in water density compared to saltwater.
5. **Limited Winter Zone:** This zone covers specific areas with seasonal variations in weather conditions. It may have different freeboard requirements depending on the time of year.
6. **Seasonal Tropical Zone:** This zone exists in certain regions with distinct wet and dry seasons impacting weather patterns. Freeboard requirements may vary based on the prevailing season.

(b) Four Circumstances of Infringing Load Line Regulations:

A vessel attempting to proceed to sea would infringe the Load Line regulations under several circumstances:

1. **Submerged Load Line Mark:** If any of the load line markings (like the summer load line "S") are submerged due to excessive cargo loading, the vessel is in violation and cannot safely depart until weight is reduced to meet the minimum freeboard requirement.
2. **Operating Outside Allowed Trading Area:** If a vessel attempts to sail into a trading area (like the winter North Atlantic) for which it is not certified, the freeboard may be insufficient for the expected conditions. This constitutes a violation and requires reassessment of freeboard or avoiding the restricted area.
3. **Damage Affecting Buoyancy:** If the vessel has sustained damage that affects its watertight integrity or reduces its buoyancy (like a hull breach), it would be in violation and unable to sail until repairs are completed and freeboard reassessed.
4. **Unseaworthy Stability:** If the vessel's stability is compromised due to improper cargo loading or exceeding weight limits, even if the load line remains above water, the vessel can be considered unseaworthy and in violation of load line regulations. This necessitates cargo re-stowage or weight reduction to ensure safe operation.

9 nov 2018

9 November 2018

3. With reference to the International Convention on Load Lines:

(a) define the terms *freeboard* and *freeboard deck;* (5)

(b) list FIVE items that would be inspected by a surveyor before issuing or endorsing a load line certificate. (5)

International Load Line Convention: Freeboard and Inspections

(a) Freeboard and Freeboard Deck Definitions:

The International Load Line Convention defines two key terms related to a vessel's loading and seaworthiness:

1. **Freeboard:** The freeboard is the vertical distance measured downwards amidships from the upper edge of the deck line to the upper edge of the relevant load line mark (like the summer load line "S"). In simpler terms, it's the distance between the waterline and the deck line as specified by the regulations. A larger freeboard indicates a higher deck relative to the waterline, enhancing seaworthiness in rough seas.

2. **Freeboard Deck:** The freeboard deck is the highest complete deck exposed to weather and sea. It must have permanent means of closing all openings in the weather part thereof. All openings in the sides of the ship below the freeboard deck must be fitted with permanent means of watertight closing to maintain watertight integrity during harsh weather conditions.

(b) Items Inspected by a Surveyor for Load Line Certificate:

Before issuing or endorsing a Load Line Certificate, a qualified surveyor will conduct a thorough inspection of the vessel to ensure compliance with the International Load Line Convention. Here are five key areas a surveyor will focus on:

1. **Load Line Marks:** The surveyor will verify the correct placement, size, and legibility of all load line markings on the vessel's hull as per the assigned freeboard.
2. **Superstructure and Sheer:** The surveyor will measure the extent and arrangements of superstructures on the freeboard deck and along the length of the vessel. These superstructures can affect a vessel's stability and freeboard requirements.
3. **Permeability:** The surveyor will assess the watertight integrity of compartments above the freeboard deck. The percentage of watertight compartments affects a vessel's reserve buoyancy and freeboard assignment.
4. **Doors and Hatches:** The surveyor will examine all weathertight doors and hatches on the freeboard deck and above, ensuring they are operable and can be securely closed to maintain watertight integrity in heavy weather.
5. **Load Line Exemption Certificate (if applicable):** For vessels operating under specific conditions (like short voyages in sheltered waters), a Load Line Exemption Certificate may be granted. The surveyor will verify the validity of such a certificate and ensure the vessel complies with any restrictions mentioned therein.

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4. With reference to the International Load Line Convention (ILLC):

(a) define *weathertight*; (2)

(b) define *watertight*; (2)

(c) state what a surveyor would check when inspecting a weathertight door; (2)

(d) describe what *Freeing Ports* are, explaining why they are important. (4)

Weathertight vs. Watertight and Freeing Ports in ILLC

The International Load Line Convention (ILLC) emphasizes the importance of weathertight and watertight closures to ensure a vessel's seaworthiness. Here's a breakdown of the terms and a vital feature related to these concepts:

(a) Weathertight:

In the context of the ILLC, weathertight refers to the ability of a structure or closure to resist the entry of wind, spray, and rain under normal sea conditions. Weathertight doors and hatches are essential for protecting exposed areas of a vessel from the elements and maintaining habitability for crew members.

(b) Watertight:

Watertight describes a structure or closure that is completely impenetrable to water. Watertight doors and hatches are critical for maintaining the integrity of watertight compartments onboard a vessel. These compartments are designed to remain flooded in case of breach, preventing progressive flooding and potential capsizing.

(c) Surveyor Inspection of a Weathertight Door:

During a Load Line survey, the inspector will carefully examine weathertight doors to ensure they can effectively resist weather elements. Here are some key aspects of a weathertight door inspection:

- **Door Seal Integrity:** The surveyor will check the condition of the door seal for any tears, deformations, or hardening that could compromise its sealing ability.
- **Door Closure Mechanism:** The inspector will verify the smooth operation of hinges and locking mechanisms. They will ensure the door can be closed firmly and secured tightly to prevent water ingress under pressure.
- **Weathertight Threshold:** The surveyor will check the door threshold for any gaps or damages that could allow water to seep in even when the door is closed.

(d) Freeing Ports and Importance:

Freeing ports are openings located in the bulwarks (side walls) of a vessel above the weather deck. They are essential for allowing water to drain from the weather deck while the vessel is underway. Here's why freeing ports are important:

- **Drainage of Deck Water:** When waves wash over the deck, freeing ports allow water to drain overboard and prevent accumulation on deck. This reduces the risk of flooding exposed areas and improves crew safety and working conditions.
- **Stability Enhancement:** Excessive water on deck can affect a vessel's stability. Freeing ports help maintain proper drainage and prevent the vessel from becoming top-heavy due to accumulated water.
- **Prevention of Ice Buildup:** In cold weather conditions, draining water through freeing ports prevents ice buildup on deck. Ice accumulation can increase weight and hamper movement around the deck, posing safety hazards.

By ensuring weathertight integrity of critical compartments and proper drainage through freeing ports, the ILLC promotes seaworthiness and prevents accidents at sea.