

A Pocket Guide

Major Accidents On Ships

Preventions

&

Safety Measures

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No seafarer wants to get hurt or suffer injuries while working on ships. We all know it's a hostile working environment a sea and no matter how many precautions we take, accidents are bound to happen.

In the last couple of years, a series of regulations has been introduced and implemented to ensure safety and security of seafarers working on ships. However, human error is one such factor that has been a major contributor to fatal accidents around the world.

There are a few types of life threatening accidents which repeatedly take place on board ships in spite of following all safety procedures, most of them because of human error.

As seafarers, it is therefore important that you are aware of these fatal accidents and take extra precautions to get rid of all those causes from your working and living environment.

This pocket guide is an effort to enhance personal safety of seafarers by minimizing the effects of the most common accidents that occur on ships.

Let's take a look at some of the major accidents of ships.

Chapter 1: Man Overboard

Man overboard situation is one of the most common and dangerous situations wherein a person falls into water while working on board or as a result of an accident.

Though seafarers are trained to deal with such situations, bad weather and heavy sea can spoil the rescue operation. Areas with extreme water temperatures can also cause hypothermia or other dangerous health issues, including death. Many people have lost their lives in past in man overboard accidents.



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Man overboard drills are carried out on ships to deal with such situations and to ensure that the ship's crew are able to quickly and safely launch the rescue boat/ man overboard recovery system to recover a person from the water. Following things should be noted during the drill:

- The recovery crew should be aware of the effects of hydrostatic squeeze and how it will affect a casualty suffering from hypothermia.
- The crew will launch and man the rescue boat. The rescue boat will be readied and swung out to a side specified by the attending surveyor and launched into the water in a safe and controlled manner.
- Rescue boat stores must be adequate and properly checked
- Rescue boat should be launched in safe manner and the crew should be suitably dressed. Rescue boat should be in serviceable condition
- Proper search and rescue procedures should be carried out for missing crew member
- On completion of the drill the rescue boat must be recovered to the vessel and readied for immediate use

- First aid requirements should be readily available.

The initial and early sighting of the crew gone overboard play a vital role in increasing the percentage of saving his/her life.

Important actions to be taken when a man overboard is sighted are:

- The first and foremost thing is **Never** to lose the sight of the fallen person and inform others onboard by shouting “Man overboard” along with the side of the ship i.e. port of starboard side, until someone informs the bridge and raises an alarm.
- As soon as the bridge officer knows the situation, raise the ‘man overboard alarm’ and hoist signal flag “O” to inform all the ship staff and other ships in the vicinity.
- Throw a lifebuoy with a smoke float, light (and SART if available) near to the fallen person.
- It is to be kept in mind not to throw more than one life buoy as it will distract the fallen crew who is already in panic
- Ship’s engine must be slowed down and ship should be turned towards the fallen crew for recovery manoeuvre.

- Engine to be on stand-by all the time.
- Care must be taken to manoeuvre the ship carefully as not to hit the crew in water.
- Keep ready the rescue boat and muster the rescue team to take actions as soon as possible.
- Rescue the man overboard and put the person in thermal protective aid (TPA) to avoid extra body heat loss.
- Start the first aid as required.
- Always try to succeed in the first attempt as even a little delay can lead to fatal situation.

Chapter 2: Enclosed Space Accidents



Enclosed space accidents are also very common on board ships. Such accidents occur mainly when the ship's crew enters a confined/enclosed space, which is not properly gas-freed and has several pockets of toxic/flammable gases.

In spite of knowing the fact that several lives are lost each year, seafarers still neglect the enclosed space entry procedures, risking their and other crewmembers' lives.

Procedure for Entering an Enclosed Space

The following are the points that need to be followed before entering an enclosed space.

- Risk assessment to be carried out by a competent officer, as enclosed or confined space entry is deficient in oxygen, making it a potential life hazard.
- A list of jobs to be done should be made for the ease of assessment for e.g. if welding is to be carried out or some pipe replacement is to be done. This helps in carrying out the work quickly and easily.
- Risk assessment that needs to be carried out must include what work to be done, rescue operation to be followed etc.
- Potential hazards are to be identified such as presence of toxic gases.
- Opening and securing has to be done and precaution should be taken to check if the opening of enclosed space is pressurized or not.
- All fire hazard possibilities should be minimized if hot work is to be carried out. Emptying the fuel tank or chemical tank nearby the hot work place can do this.

- The confined space has to be well ventilated before entering.
- The space has to be checked for oxygen content and other gas content with the help of oxygen analyzer and gas detector.
- The oxygen content should read 20% by volume. Percentage less than that is not acceptable and more time for ventilation should be given in such circumstances.
- Enough lighting and illumination should be present in the enclosed space before entering.
- A proper permit to work has to be filled out and checklist to be checked so as to prevent any accident which can endanger life.
- Permit to work is to be valid only for a certain time period. If time period expires, a new permit is to be issued and checklist is to be filled out again.
- Permit to work has to be checked and permitted by the master of the ship in order to work in confined space.
- Duty officer has to be informed before entering the enclosed space.

- Proper signs and “Men at work” sign boards should be provided at required places so that person should not start any equipment, machinery or operation in the confined space, putting life of the people at risk
- The checklist has to be signed by the person involved in entry and also by a competent officer
- One person must always be kept standby to communicate with the person inside the space
- The person may also carry a lifeline with him inside the enclosed space
- The person should carry oxygen analyzer with him inside and it should be on all the time to monitor the oxygen content
- As soon as the level drops, the analyzer should sound the alarm and the space should be evacuated quickly without any delay
- No source of ignition has to be taken inside unless the the master or competent officer is satisfied

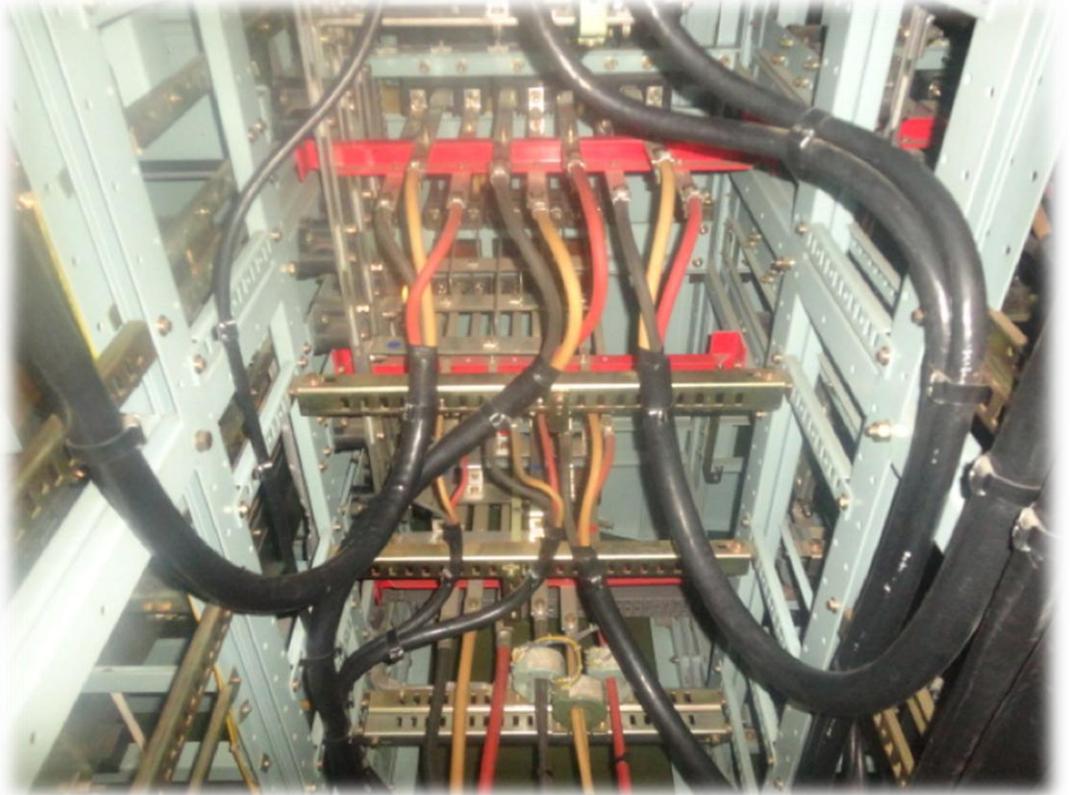
- The number of persons entering should be constrained to the adequate number of persons who are actually needed inside for work
- Rescue equipment are to be present outside the confined space. Rescue equipment includes breathing air apparatus and spare charge bottles
- Means of hoisting an incapacitated person should be available
- After finishing the work, when the person is out of the enclosed space, the after work checklist has to be filled
- The permit to work has to be closed after this

Chapter 3: Electrical Shock Accidents

Just like on land, electrical shocks have also taken several lives on board ships. Unattended electrical connections, exposed wires, and failure in taking basic precautions while handling electrical equipment have led to many unfortunate incidents in the past.

Steps to be taken to minimize the risk of an electrical shock on board:

- Start with the first round of the day; check all electrical motors, wiring, and switches, for abnormal sounds, variation in temperatures, and loose connections
- Ensure that all electrical connections are inside the panel box so that no one can touch them accidentally



- In accommodation area multiple socket plugs shouldn't be used
- Turn off the breaker before starting any work on an electrical system
- Use ply card and notice board as much as possible to inform others about the ongoing work to avoid accidental starts
- Double check the electrical tools such as portable drills for any loose wires before attempting any job.
- Always wear protective clothing, rubber gloves, rubber knee pads and safety shoes to avoid risk of shock
- Use electrically insulated handle tools for working or checking electrical system
- Before working, remove jewelry wrist band and other conductive items
- The resistance of the human body to electric shocks is quite high only when the skin is dry and devoid of any moisture
- Note that the danger of electric shock is much greater for persons working in a hot, humid atmosphere of the ship

- Working near to live equipment should be avoided if at all possible. Tools with insulated handles should be used to minimize risks of electrical shock
- In case of electrical shock accident, the treatment must be rapid if it is to be effective
- The person who has met with an accident must be removed from contact with the circuit by isolating it or using a non-conducting material to drag him away
- Electric shock results in stopping of the heart and every effort must be made to get it going again. Apply any accepted means of artificial respiration to bring about revival
- In the past, fatal shocks have occurred at as low as 60V and thus all circuits must be considered dangerous on board ships

Chapter 4: Explosion in Machinery



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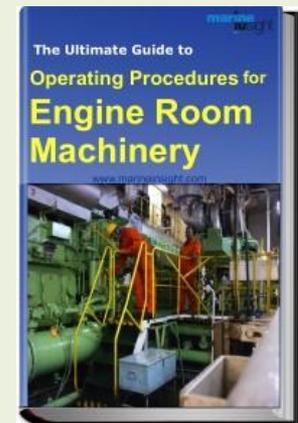
Improperly maintained machinery and systems sometimes leads to major blasts/explosions, destroying the ship's property and killing people working on and around them. Accidents such as compressor blasts, crankcase explosion, boiler blast etc. have caused serious injuries and even death in many cases.

Though there is no particular way to stop such fatal machinery accidents, mentioned below are some important points that should be followed as preventive measures:

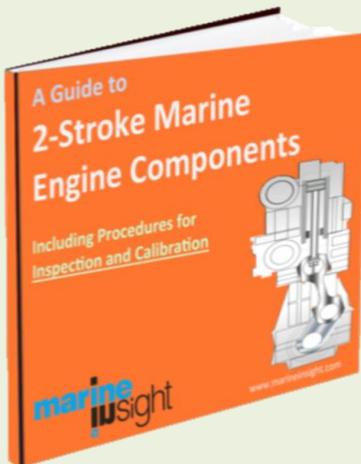
- 1. Understand Starting / Stopping Procedures of Machinery :** Every ship is different and so are its machinery systems. Though the basic type of machinery systems remains the same for all ships, the operating and maintenance procedures would differ according to the manufacturer of the machine and the ship type. It is imperative for a ship's engineer to understand the starting and stopping procedures of his machinery extremely well before doing everything else. This can be done by using the operating manual of each machinery system and asking questions to fellow engine room colleagues/seniors.

Know more about engine room machinery in

 **The Ultimate Guide to Operating Procedures for Engine Room Machinery**



- 2. Read The Machinery Manual Thoroughly:** As an seafarer, you must know your machinery manual like the “back of your hand”. It’s the knowledge base on which you will be able to build the foundation of your maintenance schedules and troubleshooting techniques. Without knowing the construction/design of your system and understanding how it works, you will be shooting “arrows in dark” while dealing with an emergency situation.
- 3. Learn From The Machinery Records:** Every engine room machinery has a history which should be studied thoroughly by officers. This history will tell you about the all the things that the machinery has gone through in the past including major accidents, problems, and overhauling operations.



Know more about marine engine components in

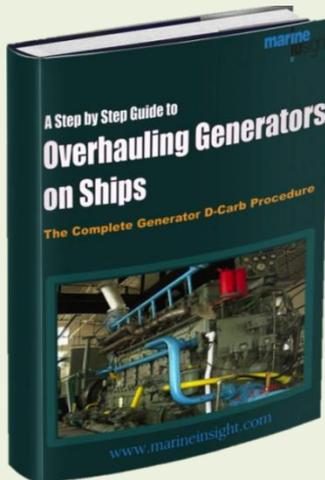
➔ A Guide to 2-Stroke Marine Engine Components



- 4. Find out Details on All Major Maintenances :** Past maintenance reports helps engineers to understand the main problems that the machinery has faced and what are the issues that have been experienced frequently. The maintenance reports would also include all important comments and tips that needs to be considered while handling that particular machinery system.
- 5. Keep a Track of Running Hours:** Depending on the running hours of the machinery, the ship's engineer will plan and perform the next maintenance procedure. Keeping a track of the running hours is extremely important to prevent any kind of sudden failure or breakdown of machinery.
- 6. Check If There is any Alteration Done in the Used Parts by Referring Past Records:** Ship's machinery systems are constantly going through regular maintenance procedures which often involves major repair works. During such procedures some of the machinery parts are to be altered to perform repair jobs. For e.g. whenever any major repair is done on the crank shaft pin of the marine engine (through grinding), the dimensions of the adjoining parts like the shell bearings are also altered.
- 7. Know All Important Tests:** All important engine room machinery and systems have some kind of tests attached to them for their smooth operations. As a seafarer, it is important to understand these tests and learn how are they performed and what are the procedures involved to send the required sample to shore.

Tests such as boiler water tests, generator lube oil test etc. require engineers to know about their contents, chemicals involved and common impurities found. Learn the purpose and procedures of these tests to ensure smooth running of your machinery.

- 8. Find Out Past 3 months Log Book Parameters:** Log book is one such reference on board that marine engineers have to refer every single day. Apart from this, they must take out time to go through the log book parameters of their machinery, especially from the past three months, in order to understand common problems or any major changes that have taken place in their usual operations.



Know more about Overhauling Generators on Ships in

A Step By Step Guide to Overhauling Generators on Ships



Apart from the general steps mentioned above, ship personnel must also know precautionary steps that are to be taken to prevent such machinery explosions and accidents on board ships.

Additional Reading:

[Crankcase Explosion](#)

[How to Prevent Crankcase Explosion](#)

[How to Prevent Starting Airline Explosion](#)

Chapter 5: Mooring Operation Accident

Yet another most common reason for serious injuries and deaths on board ships, mooring operations is considered an extremely dangerous task, which needs proper skills and knowledge.

Several officers and crewmembers lose their lives every year because of accidents related to mooring operations.



Mentioned below are ten points that must be considered while handing mooring operation on ships:

- 1. Don't Allow Any Extra Crew Member on the Deck:** Ensure that no extra personnel are present at the mooring station except those who are involved in the operation. Anyone who is not assisting in the mooring operation must be asked to leave the mooring station for his/her and other's safety.
- 2. Consider Weather Condition:** Before planning the mooring operation, consider the weather condition by taking factors such as wind and current.

The ship's master and responsible officer must have the details of current and future weather data before commencing the mooring operation.

- 3. Have knowledge of Snap Back Zone and Rope Bight:** All personnel involved with the mooring operation should be aware of the snap back zones and rope bight.
- 4. Check All the Mooring Equipment:** Check all the equipment (mooring winch, drums, windlass etc.) involved in the mooring operation for any kind of problem. Proper routine maintenance is the key to ensure smooth running of mooring equipment and systems. Don't forget to check the load sensors of mooring winches.

- 5. Check the Tail of Mooring Line:** If the mooring wire line is provided with tail (short lengths of synthetic fiber rope which are placed in series with the vessel's winch-mounted wires to decrease mooring line stiffness and thus to reduce peak line loads and fatigue due to vessel motions) ensure same size and material of tails are used for all lines in the same service (breast, spring and head lines). Different tail size and material would lead to uneven load in the mooring line.
- 6. Tend One Line at a Time:** Only one line should be tended at a time during mooring operation. If this is not done, it may increase the load in the other tended lines. If two lines are tended together it may lead to overloading and breakage. Follow the orders of the master or responsible ship officer properly to avoid any kind of mishap.
- 7. Keep a Check on the Mooring Line Load:** Ensure that the allowable breaking load in any of the mooring lines does not increase 55% of its Maximum Breaking Load (MBL). This is to prevent the line from breaking.
- 8. Keep a Continuous Check:** Load on the mooring lines must be checked continuously even after the mooring operation is over. If there is any change in the ship's ballast condition, the lines must be slacked or tightened accordingly. The condition of the rope material should also be checked to foresee unfortunate accidents.

- 9. Avoid Mixed Mooring:** Mixed mooring is extremely dangerous. Generally, mooring lines of the same size and material should be used for all leads, if this is not possible due to the available equipment, all lines in the same service, i.e. breast lines, spring lines, head lines and stern lines should be of the same size and material. The use of mixed moorings comprising full length synthetic ropes used in conjunction with wire should be avoided. If a synthetic rope and a wire are used in the same service the wire will carry almost the entire load while the synthetic rope carries practically none.

- 10. Arrange Mooring Lines Symmetrical:** All mooring line must be arranged as symmetrical as possible with the breast line. The breast line should be perpendicular to the longitudinal centerline of the ship and the spring line should be parallel to the longitudinal center line.

Additional Reading:

[Avoiding Death Traps On Ships](#)

Chapter 6: Falling from height



On board ships, seafarers are often required to work at heights wearing safety harnesses and other important equipment. However, in spite of taking all the necessary precautions, several crew members have lost their lives or suffered permanent injuries as a result of falling/slipping from heights, failure of safety devices, falling inside cargo hold during inspection and also due to sheer negligence.

While working aloft or at a height, a number of precautionary measures need to be taken and bosun chairs, stage boards or scaffolding should be prepared.

Summarized below are some basic checks prior to working aloft. These procedures are only indicative, not exhaustive in nature and one must always be guided by practices of good seamanship.

- A proper pre-meeting should be held before commencing the work
- The personnel should be clearly instructed of work scope, procedure and precautions to be taken
- Personnel who are carrying out the work should be physically fit
- Personnel carrying out the work must wear all appropriate clothing
- Personnel carrying out the work should be provided with adequate personal protective equipment
- Condition and strength of safety harnesses, lifelines, safety belts should be properly checked

- Equipment to be used must be correctly and properly rigged and measures must be taken to prevent damage by chafing
- Bosun chairs, stage boards, scaffoldings & ladders should be checked for good condition
- Condition and strength of ropes and lifelines must also be checked
- All anti-falling measures for tools must be taken into consideration
- Rolling period and wind speed must be taken into consideration to find out if the work can be carried out safely or not
- Traffic under the working site must be prohibited
- Personnel should be notified of working in vicinity of radar scanner, aerials and funnel & whistle
- Warning notices must be posted at proper places to avoid accident by use of such equipment during working

- Watchman must be posted where working crew is insufficient to take appropriate measures to prevent accidents
- If portable ladders are used, it must be checked if they have been set correctly at suitable places.

Fatal accidents do not occur only while working aloft. Several lives have been lost when seafarers have slipped/tripped and fallen from heights.

Mentioned below are important measures that must be taken to prevent slips/trips/falls:

- Ensure adequate lightings are fixed at all places on ships where chances of slips and trips are high.
- All hazards/obstructions must be identified clearly and marked.
- Non-slip surfaces should be in place and properly maintained .
- Personnel must use appropriate footwear.

- Working areas on board ships must follow good housekeeping by clearing oil, rubbish and equipment at the end of work
- All working areas must be provided with good access controls such as guardrails, wires etc.
- Personnel must wear all safety equipment and also use harness/nets etc. while working at places where chances of falls are high
- Adequate first aid facilities must be kept ready

Chapter 7: Lifeboat Testing Accident

It is said that lifeboats take more lives than they save. Lifeboat testing during drills is an important routine on board ships. However, several seafarers have lost their lives while performing such tests. Though new regulations have been introduced in order to ensure utmost safety while handling lifeboats, accidents involving severe injuries and deaths still occur as a result of lifeboats.



A study published by the International Maritime Organization (IMO) and the Maritime Safety Committee stated that the following categories cover the overwhelming majority of lifeboat accidents that involved the injury or death of a crew person:

- The failure of the on--load release mechanism
- The accidental usage of the on--load release mechanism
- The insufficient maintenance of lifeboats, launch equipment and davits
- Failures in communication
- Lack of familiarity with lifeboats and the associated equipment
- Unsafe practices during lifeboat inspections and drills
- Other design faults

Though all the above causes of accidents on lifeboats can easily be prevented, the question that still remains is – How?

Maritime organizations have come up with several methods through which they can increase the safety of lifeboat operation and cut down on the potential accidents because of lifeboats.

A safety circular has been made to bring the issues to attention of any and all relevant parties, such as industry organizations and ship crew--members.

Included in that circular are the following instructions:

- Ensure that the on--load release mechanism is in compliance with the various requirements of the LSA Code (specifically paragraphs 4.4.7.6.2.2 – 4.4.7.6.5)
- Make sure that all relevant information regarding the adjustment and maintenance of lifeboats and associated equipment is available on board
- All personnel carrying out inspections and maintenance of the lifeboat and associated equipment must be both fully trained in and familiar with said duties
- The maintenance of lifeboats and associated equipment must be carried out in adherence to the approved practices
- Health and safety requirements apply to drills as they do to “real” procedures
- Lifeboat drills must be conducted in accordance with the SOLAS regulation III/19.3.3

- Any personnel carrying out maintenance or repair must be qualified for the job
- Hanging--off pennants should be used only for maintenance, not during training
- Lifeboat inspection must be regular and thorough
- All equipment must be durable in rough conditions and easily accessible
- All tests for safety and life--saving equipment must be conducted rigorously to guidelines, newly created by the International Maritime Organization

Chapter 8: Hot Work Accidents



Accidents as a result of hot work can occur because of several reasons. One of the most common ones are when hot work is being carried out in enclosed space with flammable gases, when the adjacent tank has flammable material, as a result of flammable gas pockets etc.

It is also seen that seafarers often fail to follow the basic hot work procedures while carrying out such procedures, leading to unfortunate, fatal accidents.

Following procedure to be followed for carrying out hot work maintenance on ships:

- Refer and follow "Hot Work Precautions Matrix" before starting the job
- A work planning meeting to be held and a formal or informal risk assessment to be carried out of the work place
- A responsible officer, who is not directly involved in the hot work, must be designated to ensure that the plan is followed
- The atmosphere of the hot work area should be tested and found to be less than 1% LEL
- Fire fighting equipment must be arranged and kept ready for immediate use
- Fire detectors of the work place must be checked for proper working
- Measures should be taken to prevent scattering sparks, such as spark shelters
- Confirm that no other work such as repairing pipelines, that may cause leak of combustible gas or oil, is being done in the same compartment

- Arrangements for placing required watchmen for monitoring hot work area and adjacent areas should be made.
- Provision must be made for sufficient ventilation and lighting.
- Evacuation routes/passages must be properly designated/secured.
- The condition of tools and equipment must be checked and found satisfactory.
- Personnel involved in work must be provided with appropriate personal protective equipment and danger indications, safety ropes etc. installed at work site as necessary.
- Areas where fire is directly applied must be clearly marked.
- All crew engaged in the hot work should be adequately trained and clearly instructed in precautions to be observed when carrying out hot work.
- Measures must be taken to prevent fire from coming in contact with gas, residual oil, sludge and other dangerous and combustible materials.
- Check there is no dangerous and combustible materials on the other side of the bulkhead, deck head or division on which hot work is to be carried out.

- The section to be worked on should be disconnected or disassembled from related pipelines and valves by cold work and the open ended section must be sealed off.
- The safety in the pipe must be confirmed where applicable.
- The safety of enclosed compartments must be confirmed in accordance with procedures for entry into enclosed spaces where applicable.
- All crew engaged in work within enclosed space must be provided with portable lighting apparatus.
- Gas detection in spaces where there is danger of combustible gas emissions (air pipe tops, areas near manholes, other openings and the like) and in vicinity of the hot work area must be carried out prior work and should continue periodically during work.

Some most safety precautions to follow while doing gas welding/hot work are:

- **Secure Gas Cylinders in Vertical Position:** Compressed gas cylinders must be handled with utmost care and always be secured in vertical position even if they are full or empty. Full and empty cylinders to be segregated and marked clearly.

- **Store in Right Spaces:** Never store oxygen and acetylene cylinder together in one space whenever possible.

Keep them separately in well ventilated spaces. Ensure when not in use, their caps should always be on them.

- **Keep Grease and Oil Away:** Control valves and fittings should be kept free of oil and grease. Never operate cylinder valves and parts with oily and greasy hands.
- **Ensure Flame Arresters Are Properly Fitted:** Ensure non-return valves and flame arresters are fitted in the acetylene and oxygen cylinder lines. One flame arresters is normally fitted in the low pressure side of the regulator near cylinder and other near the torch.
- **Keep Pressure of Oxygen Higher:** When performing gas welding, ensure the pressure of oxygen is always higher than the acetylene to avoid acetylene going back to the oxygen line.
- **Handle Acetylene With Care:** Acetylene should not be used for welding at a pressure exceeding 1 bar of atmosphere gauge as it is liable to explode, even in the absence of air, when under excessive pressure.

- **Rectify Cause of Backfire:** In case of back fire, the first priority should be to close the oxygen valve and then immediately close the acetylene valve. No operation is to be performed until the cause of backfire is rectified.
- **Handle Flashback Carefully:** In case of flashback or explosion of the gas pipes, first action must be to isolate the cylinder valves for both the cylinders.

Further action to be taken as per ship's fire drill procedures.

- **Ensure Proper Connections:** The connections between the hose and blowpipe, and between hoses should be securely fixed with fittings to comply with Regulatory Standard.
- **Keep a Steady Watch:** A regular watch to be kept on the temperature of acetylene cylinder.

If the temperature is elevating, it is to be considered same as flashback or explosion situation for taking action.

- **Prevent Interchange of Hoses:** Manifold hose connections including inlet and outlet connections should be such that the hose cannot be interchanged between fuel gases and oxygen manifolds and headers.

- **Replace Old and Faulty Hoses:** Any hose in which flashback has occurred must be replaced with new one.
- **Handle Hoses Properly:** While performing the job, the hoses should be laid properly and kept out of any moving machinery, sharp corners, high temperature areas etc. Ensure they are not dangled, knitted or tipped over.
- **Use Only Soap Water for Leakages:** Only soap water to be used for detection of leak from hose or regulator arrangement.
- **Never Use Sealing Tape:** Never use sealing tape of metal joining material to prevent leak between metal to metal gas tight joints. With an oxygen cylinder this could result in initiation of a metal- oxygen fire.
- **Never Over Tight Connections:** Never try to over tight any nut of regulator connection or cylinder valve spindle to stop the leak. This can lead to damage.
- **Take Proper Steps for Maintenance:** Only special tools should be used to clean any clogging in the blow pipe. Before performing any maintenance, complete system to be isolated. Never attempt repairs on pressurized oxy-acetylene equipment nor carry out any unauthorized modification on hot work equipment.

- **Use Safe Igniters Only:** Blowpipe should only be ignited with friction igniter or other stable flame generator. Avoid using lighter as sudden flame, else blowpipe can hit the lighter body and explode.
- **Never Use Oxygen:** Oxygen should never be used for ventilation, cooling purpose or for blowing dust off the surface or clothes.
- **Discard Hoses That Had Flashback:** Any length of hose in which a flashback has occurred should be discarded immediately.

Last but not the least, make sure before carrying out any kind of hot work, the hot work checklist and risk assessment forms have been duly filled. Also, do not forget to follow all safety procedures while carrying out such jobs in enclosed spaces.

Chapter 9: Fall from Gangway/ Pilot Ladder



Accidents have occurred on many ships when the ship's gangway or pilot ladders has failed while being used by ship's crew members, pilots or visitors. Gangway failure usually takes place as a result of lack of maintenance and failure of gangway wire rope.

“The Master is obliged to ensure a safe means of access to the vessel at all times”. With regards to this regulation and the advice provided in the “Code of Safe Working Practices for Merchant Seamen”, chapters 6 and 18.

The following points must be applied whenever the gangway is in use:

- The gangway must be properly rigged and deployed.
- It must be safe to use and adjusted as necessary to maintain safe access to the vessel.
- Gangway adequately lit at all times, with a minimum of 20 lux at a height of 1m.
- A lifebuoy with self-activating light and buoyant line must be posted adjacent to the gangway.
- The gangway **MUST NOT** be used at an angle greater than 30° above the horizontal plane unless it is specifically designed for operation at greater angles, normally up to 50°.
- Where necessary a bulwark ladder must be provided, safety fenced to a minimum height of 1m.
- Guard ropes must be kept taut at all times and stanchions must be rigidly secured.
- The gangway must be kept clear of cargo operations and quayside obstructions.

- The gangway must be kept clear of any materials, substances or obstructions likely to cause a person to slip or trip.
- A safety net should be mounted where a person may fall from the gangway, ship's deck or quayside.
- The aim of the safety net is to minimize the risk of injury arising from falling between the ship and the quay or falling on to the quay or deck and as far as reasonably practicable the whole length of the gangway should be covered .
- Safety nets should be securely rigged, with use being made of securing points on the quayside where appropriate.
- In addition to this it should be noted that users of gangways are responsible for risk assessing conditions prior to use, and where necessary consideration should be given to turning and facing the gangway and bulwark ladder whilst ascending or descending.
- A pilot ladder should be capable of covering the whole length from the point of access to the water level. The height from water level should be informed to the bridge by the port control or the pilot himself depending on the height of the pilot vessel.

Here are few points to consider while rigging the pilot ladder:

- The top portion or head of the pilot ladders should be secured at the strongest point of the vessel.
- Pilot ladder should be positioned and secured, so that it is clear of any discharges from the ship, with parallel body length of the ship and as far as practicable within the half way length (midship) of the ship.
- All steps of the pilot ladder should rest firmly against the ship side. In certain ships, where constructional features such as fenders or rubbing band prevent the implementation of above safety features, special arrangements are to be made for safe embarkation and disembarkation.
- Two man ropes not less than 28 mm and made of manila rope or other material which gives firm grip for climbing the ladder, should be rigged along the side of pilot ladder if requested.
- During night, the whole length of the pilot ladder, point access and egress should be well illuminated. A life buoy with self igniting light and a heaving line should be kept ready. Hand hold stanchions and bulwark ladder are to be used if required.

- If the point of access from sea level is more than 9 meters, a combination ladder should be used. A combination ladder is a conjunction of pilot ladder and accommodation ladder. This is a common arrangement found on vessels with high freeboard. The accommodation ladder is rigged in such a way that it leads aft of the vessel and has a slope angle of not more than 55 degrees.

Maintenance of Pilot Ladder:

- Pilot ladders are to be regularly inspected for wear and tear of side ropes, missing wedges and damages on the steps. The steps should never be painted and should be kept clean, free from oil and grease.
- All the steps should be equally spaced between the side ropes and the distance between two steps should be uniform.
- Steps should be always horizontal. Any faulty steps found should be replaced immediately.
- The side ropes are made of manila rope. They should be continuous and free from ties and joints below the first step of pilot ladder. The shackles used to secure the pilot ladder should have equal strength and durability same as that of side ropes used.

- Once the pilotage operation is over the pilot ladder should be secured instead of left hanging on the ship's side. The pilot ladders should be stowed in dry and well ventilated space, clear of deck and fitted with cover to prevent the ladder from sunlight, chemical and paint spills.
- It is to note that Pilot ladders are solely used for the purpose of embarkation and disembarkation of the personnel. It should never be used for any other purpose like draught reading or any other maintenance work. Pilot ladders should be well maintained and properly stowed which ensures safe, convenient and unobstructed passage while pilot transfer. More information on pilot ladder construction and specifications can be found in SOLAS chapter V under regulation safety of navigation.

Chapter 10: Fire



Fire of any type and in any part of the ship is of great danger to the ship, cargo and the crew.

Fire can start from an expected or unexpected source and spread rapidly if necessary steps are not taken for smothering.

As we all know, many crew members have lost their lives while fighting or escaping fires on board ships in the past.

The best way to deal with fires on board ships is to prevent them rather than letting them occur. Fire detection and extinguishing at a very early stage is most important as most big fires start small.

In case of fire, following precautions are to be taken:

- Record status of all crew members
- Close fire flaps, doors or other ventilation openings to the area under fire
- Fight the fire with all available means
- Determine the limits of the fire in all directions and keep patrolling these areas throughout the fire
- In case of E/R fire ,close the quick closing valves, stopping fuel pumps and purifier
- If possible, change course, slow down or even stop to reduce wind impact
- Shut ventilation down and close openings, leaving only one fan operating with on the exhaust mode for drawing out smoke

- Stop fuel pumps and purifiers and activate the quick closing valves if fire threatens to spread
- Should a fire become a big one, evacuate and close the machinery space, and apply fixed Carbon Dioxide or other total Flooding systems after confirmation that nobody remains inside the machinery space

In case of fire in a Cargo Hold (Container Vessels / General Cargo Boats)

- Close all Openings including ventilators, and apply carbon dioxide or spray water to extinguish the fire. If tarpaulin, canvas or the like is used for sealing, keep it wet
- Keep dampers and covers for these hatches and ventilators closed until it is confirmed that the fire is completely put out
- Do not enter the cargo hold, unless the fire has been extinguished and confirmed absolutely in safe condition to entry, including applying full ventilating and checking for oxygen and other gases
- Carry out full or partial evacuation of areas or the entire vessel
- If assistance needed from external sources, send notifications as soon as possible

In case of fire in accommodation are:

- Extinguish fire in an early stage using fire Extinguishers, blankets, fire buckets, and others. Consider transferring inflammable articles
- Evacuate the crew and other people right away to safe places except the fire-fighting teams

In case of fire in machinery space:

- For a small, local fire involving oil in e.g. the bilges, extinguish fire at an early stage with sand, foam and carbon dioxide fire extinguishers. Be sure to use spray nozzles if fire hoses are used, and be careful not to spread the fire by the spray
- For a fire of electric equipment including switchboards, shut down the power and use carbon dioxide fire extinguishers

In order to deal with fires on ships, fire drills are carried out to ensure that crew members know their duties during such emergency situations.

The drill helps the ship's crew to understand the basics of fire prevention and also help with the following:

- To prepare the crew in dealing with an emergency situation that may arise because of a fire on board ship
- It makes each and every crew familiar with emergency situation such as a fire on board
- To train the crew in using fire fighting appliances such as SCBA, different types of fire extinguishers, CO2 flooding system, Neil Robertson Stretcher, Inert Gas System, fireman's outfit, life jackets, sprinkler system etc.
- Help the crew to understand the procedure to operate a particular fire fighting system and precautions that are to be taken before operating the equipment. For e.g. there are certain imperative steps that need to be carried out before starting the CO2 fire fighting system for the engine room

- To make the crew acquainted with the location of the emergency escape routes which would be used in case of inaccessibility of a particular zone
- To familiarize the crew with company's fire and safety regulations, important points on personal safety and survival at the sea, recent safety circulars and M notices, and fire fighting appliances and preventive measures on ships

It is extremely important that the fire drill is carried out in as realistic manner as possible in order to make the crew aware of the situations that might arise during fire on ships.

Important points regarding fire drills on ships:

- According to the merchant-shipping act, muster and drills must be according out at regular intervals of time as stated by the company and law
- A fire drill must be conducted within 24 hours of leaving the port if more than 25% of the crew members have not taken part in the drill in the previous month
- A clear fire control plan should be properly displaced in important areas throughout the ship

- Each and every crew member should be provided with clear instructions which he or she would follow during emergency. The duties of each member along with the assigned life boat number must be written on individual cards and made available inside/outside the cabin
- The timing of the emergency drills should be changed in order to change scenarios and allow those crew members to participate who have not attended the previous drill because of duties
- Muster list for the drill should be displayed throughout the ship in locations where the list can be easily accessed. The list should also be displayed at the bridge, engine room, and crew accommodation area
- The location of the muster station should be such that it is readily accessible from the accommodation and work place and is also close to the embarkation station. It should also have sufficient lights provided from emergency source.
- Each area of the ship has a different method of approach to deal with during emergency situations. Training with drills in different situations helps to prepare crew members for all types of situations.

- It is the duty of every ship personnel to get himself acquainted with the location of the emergency muster station upon joining the ship. He should also know his duties which are described in the muster list and learn how to use fire fighting appliances.
- The training manual, which contains instructions and information regarding life saving appliances and methods of survival, should be provided in each crew mess and recreation room.
- The location of the drills should also be changed to give practice to the crew in different conditions and to train them to tackle different types of fire such as machinery space fire, accommodation area fire, store room fire, cargo hold fire etc.
- Every new crew member should be given on board training, which explains use of personal life saving appliances and survival crafts (life boats and life rafts), not later than two weeks after joining the ship
- It is important that each and every crew member performs the drill without making any mistake by memorizing his duties and understanding the important of safety of the ship and the people on board

Further Reading:

[Basics of fire fighting on board ships](#)

[Information on scavenge fire](#)

[Firefighting equipment used on ships](#)

[Types of fire extinguishers used on ships](#)

[Fire in accommodation area](#)

Apart from those mentioned in this guide, there are several other types of accidents that take place on board ships.

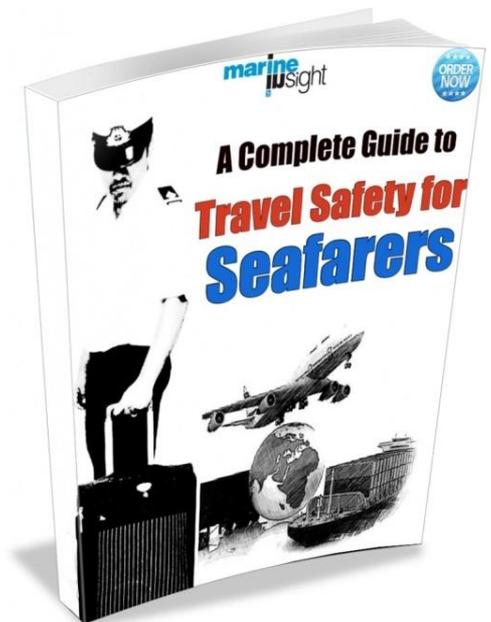
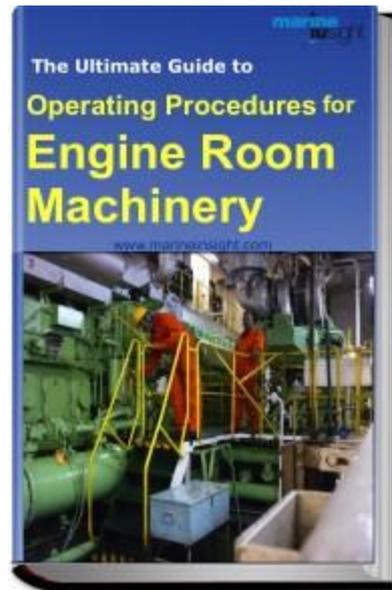
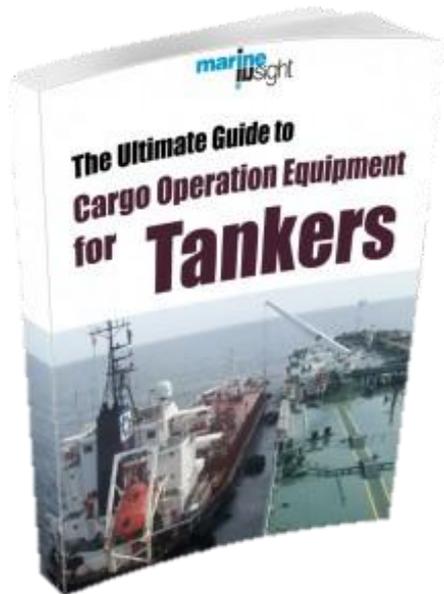
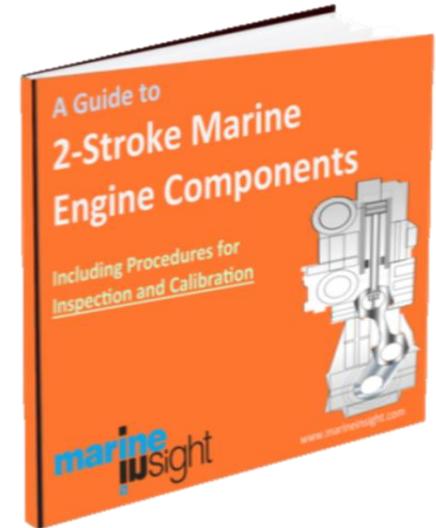
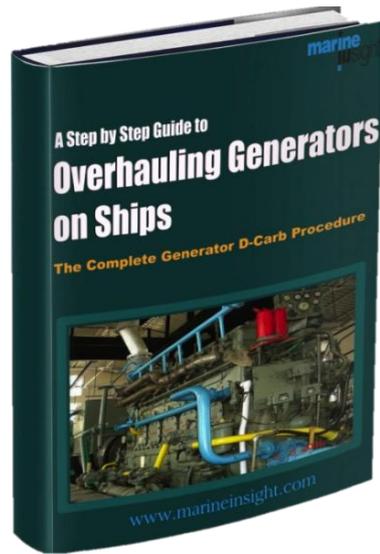
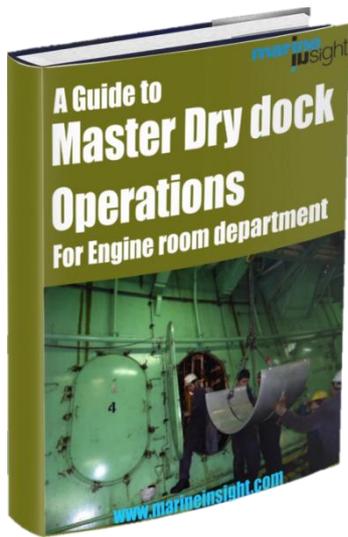
The purpose of this guide is to introduce the prevention and safety measures to deal with accidents related to shipboard operations, so that a safe working environment can be ensured.

The procedures explained here are only indicative, not exhaustive in nature and one must always be guided by practices of good seamanship.

If you have any question, please feel free to contact us at info@marineinsight.com

or ask us at Marine Insight forums – <http://forums.marineinsight.com>

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