SEA SAFETY AND NAVIGATION

A Handbook for fishers

NETFISH-MPEDA
(Ministry of Commerce & Industry, Govt. of India)

Life jacket distribution by NETFISH at Munambam

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(Ministry of Commerce & Industry, Govt. of India)
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PREFACE

The purpose of this handbook is to enhance the knowledge of fishers on sea safety and to familiarize important measures for ensuring safe fishing. The target groups encompass boat owners, skippers, crew and government officials. This guide also highlights the sea safety issues and indicate various practical measures to be taken for safe navigation and fishing. This booklet describes different lifesaving equipments, marine communication devices, navigational tools, lights and signals etc. Guidelines for fishermen to ensure safety at sea while fishing are also mentioned. Fishermen must be trained on sea safety and navigational rules. Proper awareness on important lifesaving equipment, communication devices and distress signals will persuade them to keep suitable lifesaving equipments and communication devices onboard fishing vessels. No fishermen shall loose his life due to absence of lifesaving tools onboard. "Safety first" must be the Mantra than anything while going for fishing. All necessary steps to be taken by authorities concerned to ensure that fishermen are educated properly on Sea safety and Navigational rules before starting their fishing trips. This guide will help in this regard.

-NETFISH–

BACKGROUND

Commercial fishing at sea is among the most dangerous vocations around the globe. Many of the fishers lose their life every year owing to accidents at sea, besides suffering damages to their crafts and gears. Much of the disasters, particularly human loss, could have been avoided with usage of appropriate safety / communication devices and following the prescribed sea safety regulations. The adoption of safety measures at sea is found to be low in India, which points to gross negligence of safety of fisher folk at sea. Fishermen are found to be carried with either inadequate or without any life saving equipment onboard fishing vessels. In many occasions overconfidence tend fishermen to go for fishing without any of the life saving devices onboard, even lifejacket and life buoys which are the most important and mandatory items as per MFR act in India. The natural calamities such as Ockhi, Gaja etc., which rocked Indian states in the recent years show the very importance of lifesaving equipments and communication devices onboard to save the life of fishermen. In this regard, coordinated action among policymakers, implementing agencies and fisherfolk is highly required to translate policies to action. Awareness generation and mandatory trainings are essential to improve fisherfolk safety, while community support is vital for the success of policy enforcement as well.

COMMON ACCIDENTS ENCOUNTERED AT SEA

Capsize of fishing boats- due to poor stability, heavy load on deck and rough seas; happens suddenly without warning and fishermen get least time to use safety equipment.

Collisions- mostly occur during night time due to lack of lightings, navigational lights and proper watch out.

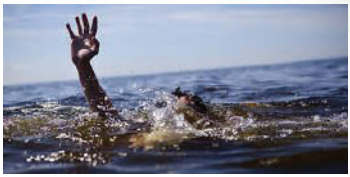
Engine failure- due to bad engine installation and maintenance or lack of fuel; fishermen are not skilled in repairing the engine and hence this will leave them helpless and stranded at sea.

Onboard injuries- occur while handling of hooks, nets onboard; head injuries by over hanging materials during the movement of boat at sea.

Falling overboard- due to slippery deck, use of alcohol, narcotics etc., besides the movement of boats in choppy seas.

Fire onboard- due to bad engine installation, short circuit, bad installation of cooking stove, irresponsible handling of fire elements etc.

Loss of way or disorientation- commonly happens with those boats which do not carry compass, nautical chart, GPS etc.



Running aground- due to unfamiliar fishing grounds or adverse weather the vessel may run into underwater rocks, reefs and banks.

Hull cracks- due to use of poor quality boat building materials, bad construction, bad boat maintenance, overload of catch, aging of boat and stresses on boat by the pounding of water waves.

KEY COMPONENTS OF SEA SAFETY

The three basic components to ensure safety at sea are:

1. Personal Safety at sea

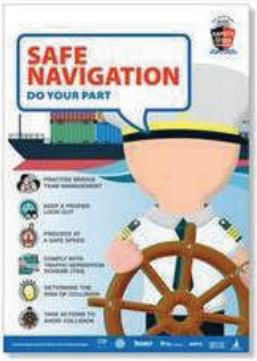
- Wear personal protective equipments
- Be well aware of the surroundings
- Be vigilant
- Think before act
- Do proper reporting

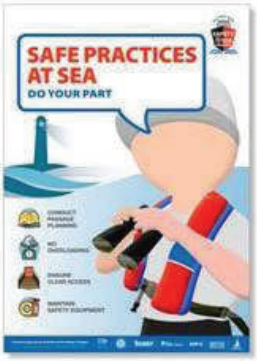
2. Safe Navigation

- Keep proper look out
- Proceed at a safe speed
- Comply traffic rules
- Determine the risk of collision
- Take timely actions to avoid collision

3. Safe Practices at sea

- Do proper planning of the voyage
- Maintain safety equipments
- No overloading
- Ensure clear access





SEA SAFETY EQUIPMENTS NEEDED COMPULSORY ONBOARD

1. Life vests/ Life jackets
2. Life Buoys
3. Distress Alert Transmission System (DATS) / Emergency Position Indicating Radio Beacon (EPIRB)
4. Satellite based Automatic Identification System (AIS) / Vessel Monitoring System (VMS)
5. Very High Frequency (VHF) communication set
6. Global Positioning System (GPS)
7. Navigation lights
8. Fire Extinguisher

I. LIFE SAVING EQUIPMENTS

All the life saving appliances should be properly maintained and periodically serviced based on the recommendations of the manufacturing company.

1. Life Jacket

A life jacket is one among the essential life saving equipments to be carried onboard. It should be constructed with an approved buoyant material in highly visible and bright colour, fitted with a whistle secured by a cord, affixed with retro reflective tapes and fitted with a fixed or flashing light which burns for at least 8 hours.

Proper method of using a life jacket: Life jacket should be worn before you get into water, as it is impossible to wear it while afloat. The tapes of the lifejackets must be tied tight to the body. Before jumping, make sure that the height from water level is not more than 6 meters and there are no obstructions in your way. Then look parallel to the horizon, hold down your lifejacket by one hand and block off your nose and mouth by the other, keep your feet together, and jump-feet first.

Required numbers of Life jackets in a vessel: One life jacket per crew member should be carried onboard and it should be kept in an accessible place.

2. Life Buoys

Life buoy, an essential equipment to be compulsorily carried by all fishing vessels, is used for retrieving a person who falls overboard accidentally or while in

distress at sea. It is thrown to the person quickly to help him board the rescue vessel, by holding on to it. Life buoy is constructed of a buoyant material, in circular shape, with a distinctive visible colour and fitted with grab lines secured at four equidistant points. The inside diameter of a life–buoy shall be 45 cm and outside diameter 76 cm and the weight shall not exceed 6.1 Kg. It shall be capable of floatation in water for at least 24 hours.

Required numbers of Life buoys in a vessel: A minimum of 4 Life Buoys for vessels up to 25 meter length, 6 Life Buoys for vessels of 25 to 45 meters length and 8 Life Buoys for more than 45 meters length should be carried onboard. They should be stored on the port or starboard side of the deckhouse.

3. Life Rafts

A life raft is used, during abandoning of the vessel in distress, to sustain the lives of crew till rescue. The life raft should be capable of withstanding exposure for 30 days afloat in all sea conditions. It should consist of buoyant rescue quoit with minimum 30 meters line (soft throwable buoyant ring attached to line), knife, buoyant bailer, sponges, sea anchors, buoyant paddles, tin-openers, first aid kit, whistle, rocket parachute flares, handheld flares, buoyant smoke signals, waterproof electric torch with one spare set of batteries and one spare bulb in a waterproof container, an efficient radar reflector, daylight signaling mirror, copy of the life-saving signals, set of fishing tackle, food ration packaged in permanently sealed metal containers or vacuum packed with the date of packaging and expiry, water tight receptacles, rust proof graduated drinking vessel, anti-seasickness medicine, thermal protective aids etc.

4. Fire Safety Measures

Fire pump: A vessel should carry hand pumps or power driven pumps with hose connections capable of delivering a jet of water to any part of the vessel through hose and nozzles.

Fire Extinguisher: Portable fire extinguisher of a recognized standard should be carried in the vessel and it should be located at accessible area.

A fire bucket for fire-fighting use should also be carried.

5. First Aid Kit

First Aid Box should be kept essentially in every boat with all first aid equipments and medications to be used in case of emergency. It should contain bandages, band aids, sterile dressings, sterile gauze, adhesive tape, scissors, safety pins, antiseptic cream, liquid antiseptic, tablets etc.

II. COMMUNICATION EQUIPMENTS

In order to disseminate distress message, all boats should carry the emergency communication equipments including the equipments for receiving weather forecast and warnings.

1. VHF Radio

A marine VHF set is a wireless communication device and it is combined of a transmitter and a receiver. It operates only on standard, international frequencies known as channels. The transmission power of VHF set ranges between 1 and 25 watts. It gives a maximum range of up

to 60 nautical miles (111 km) between aerials mounted on tall ships and hills, and 5 nautical miles (9 km) between aerials mounted on small boats at sea level. Communication through VHF system could reach up to 25 nautical miles from the shore.

Benefits of having VHF set in fishing boats:

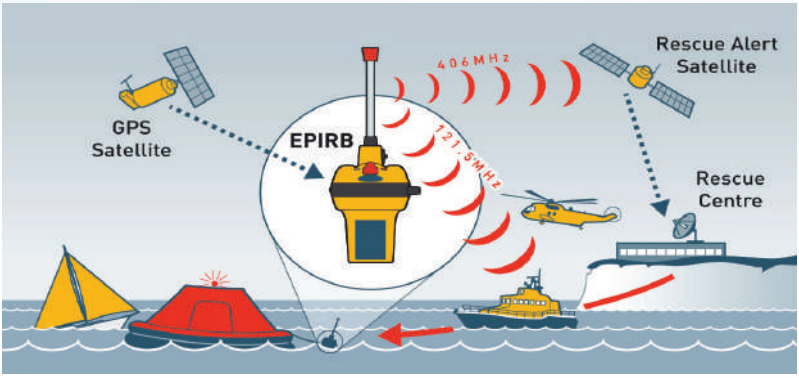
- Any fishermen in distress at sea or with a stranded boat can communicate with other fishermen in nearby boats to get them rescued.
- Fishers can seek emergency help from Coast Guard or Coastal Security Group at the time of distress.
- Fishers can share information of fish availability, sea state etc. with other fishers in nearby boats.
- Fishermen at sea can pass information on any suspicious movement of boats or ships, for swift action against them.
- Help fishers in avoiding conflicts arising over fishing nets at sea.

Operation procedure: By VHF, communication is over a single radio frequency and hence only one of the parties can transmit at a time. To transmit, the user has to press a "PUSH TO TALK" button on the set or microphone which turns the transmitter ON and the receiver OFF. Use Channel 16 (156.8 MHz), the international calling and distress channel, for establishing the call and switch on to other channel soon after for continuation of the talk. Maintain a watch listening on Channel 16 when not using the radio.

2. Satellite EPIRB:

Satellite Emergency Position Indicating Radio Beacon (EPIRB) helps to alert search and rescue services during an emergency at sea, by transmitting distress signal via satellite and earth stations to the nearest rescue co-ordination centre. EPIRBs come in a variety of sizes and shapes and offer a range of different features. EPIRBs must be deployed and activated to perform the primary function of transmitting their location. This can occur on the basis of manual or auto operation. The models with manual deployment modes require a

crew to physically remove the EPIRB from its mounting bracket and flick a switch to confirm transmission activation. EPIRBs fitted with automatic activation modes are generally water activated and will deploy from their bracket to begin auto-transmission. It is essential to register an EPIRB of a vessel with its country of origin, to avoid delay in any search and rescue being launched.



3. SART (radar SART or AIS SART):

Search and Rescue Transponder (SART) is a self-contained, waterproof transponder for emergency use at sea. These devices may be either a radar-SART or a GPS-based AIS-SART. The radar-SART is used to locate a survival craft or distressed vessel by creating a series of dots on a rescuing ship's radar display. The receiver of SART detects signals from X-band radars (9.2–9.5 GHz) and immediately the SART transmits twelve pulses on the same frequency which will be reflected as a series of twelve dots (with a gap of 0.6 miles between them) on the screen of the radar. The twelve dots will become short arcs when the rescue vessel approaches the SART, and the arcs increase in size if the vessel gets closer. If the rescue vessel is very close, the SART will be activated permanently by the side lobes of the radar antenna and the signal of the SART will then be visible as twelve complete circles on the radar screen.

An AIS SART sends updated position reports to the rescue vessel. It derives position and time synchronization from a built in GPS. Once per minute, the position is sent as a series of eight identical position report messages. A ship equipped with AIS can receive AIS SART distress signals more than 5 miles away whereas an aircraft can receive it up to 20 to 40 nautical miles.

All vessels up to 500 Gross tonnages must carry at least one SART and those Vessels having >500 tons must carry at least two SARTs.

4. Distress Alert Transmitter (DAT):

DAT is used to transmit a short message containing position and type of emergency to a central location through satellite for rescue operation. In case of emergency, the user has to switch on the DAT unit and select a message (e.g. fire in boat / boat sinking/ medical help / other emergency) by pressing the corresponding switch provided on the system. The message combined with position of the boat will be transmitted to the rescue centre. The DAT repeats the message every minute for first five minutes and then every five minutes till it is switched off manually or until the battery life gets over.

III. NAVIGATIONAL EQUIPMENT

1. Magnetic compass:

It is the most basic of all navigational tools, an essential one in coastal navigation to steer in the proper direction following a course. The needle in the compass will show the North direction.

2. Global Positioning System GPS:

GPS is a satellite based navigational device which provides the fastest and most accurate method to navigate, measure speed, and determine location. The GPS uses a network of satellites. The

GPS receiver collects and processes signals from the GPS satellites that are in view and then uses that information to determine and display the location, speed, time etc. The GPS receiver does not transmit any information back to the satellites.

Using a GPS receiver, it is easy to determine our exact location as well as to navigate to a specific location. The Potential Fishing Zones can be very easily identified using GPS, which enables the fish catch with less effort thereby saving fuel as well. Thus GPS not only makes sailing safer, but also more efficient.

Basic guidelines for using a GPS receiver: To provide reliable navigational information, including the position, a GPS receiver needs to receive good signals from at least four satellites. GPS receivers require an unobstructed view of the sky; so ensure to use it in an open area.

The most common coordinate systems used in GPS navigation are 'Degrees/Minutes/Seconds'. This is the standard way of listing latitude and longitude. For example: the coordinates 9° 56' 20" N & 76° 16' 13" E indicates that the north/south position is 9 degrees, 56 minutes and 20 seconds north of the Equator and the east/west position at 76 degrees, 16 minutes and 13 seconds east of the Prime Meridian.

- For plotting a route entering waypoints, first press the MARK button or on some units, press and hold the ENTER button and add the details.
- To identify a particular waypoint target use the FIND or GOTO button. Then switch to the Compass screen where the GPS receiver will give you a bearing and estimate the distance and time of travel.
- The track recording feature of the GPS enables to automatically set track points as you go. In addition to this, tracking also allows you to record time and distance traveled.

3. Radar:

Radar transmits radio waves which reflects off an object within a specific range around the vessel and thus helps to locate/ identify nearby ships/ boats or coastline during the time of darkness or poor visibility.

4. Radar Reflectors:

Radar reflectors reflect the radar signals sent by bigger ships and thus help the larger vessels to spot smaller boats on their radar screens, even from far away. By this, collision can be avoided. It also helps to locate boats during rescue operation. A radar reflector enhances the safety of fishing boats at sea, especially in poor visibility. The reflectors should be big enough and placed above all superstructures on the boat. The higher you can position the radar reflector, the better it is.

5. Echo sounder:

Uses sound waves directed vertically down below the vessel to determine the depth of water, characteristics of bottom surface, presence of fish shoal etc. Echo sounder can help in reducing the danger from running aground. By

using Echo sounder the fish searching time can also be reduced to a certain extent, thereby saving fuel.

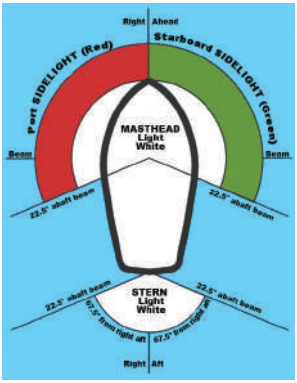
IV. NAVIGATIONAL LIGHTS & SIGNALS

Lights, shapes and flags should be provided to indicate that the vessel is engaged in any specific operation for which such signals are used. Using these lights and signals properly is an important part of safe navigation.

Definitions:

a) "Masthead light"- a white light placed over the fore and aft centerline of the vessel showing an unbroken light over an arc of the horizon of 225° and so fixed as to show the light from right ahead to 22.5° abaft the beam on either side of the vessel.

b "Sidelights"- a green light on the starboard side and a red light on the port side each showing an unbroken light over an arc of the horizon of 112.5° and so fixed as to show the light from right ahead to 22.5° abaft the beam on its respective side. In a vessel of less than 20 metres in length the sidelights may be combined in one lantern carried on the fore and aft centre line of the vessel.

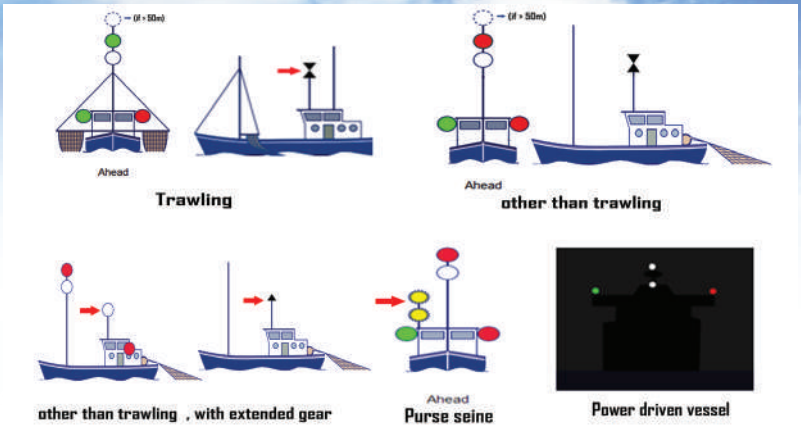


c) "Stern light"- a white light placed as nearly as practicable at the stern showing an unbroken light over an arc of the horizon of 135 degree and so fixed as to show the light 67.5° from right aft on each side of the vessel.

d) "Towing light"- a yellow light having the same characteristics as the "stern light" defined above.

e) "All-round light"- a light showing an unbroken light over an arc of the horizon of 360 degrees.

f) "Flashing light"- a light flashing at regular intervals at a frequency of 120 flashes or more per minute.

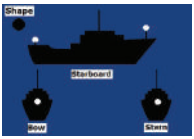


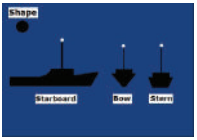
No:	Vessel Category	Mandatory Lights	Mandatory shapes
1	Power driven vessel	Mast Head Light, Second Mast head Light (if >50 m), Side lights, Stern Lights	
2	Fishing Vessel engaged in Trawling	Two all-round lights in a vertical line, the upper being green and the lower white, Side lights & Stern Lights (when making way through water) Mast Head Light (if >50 m)	A shape consisting of two cones with their apexes together in a vertical line one above the other
3	Fishing vessel, engaged in fishing other than trawling	Two all-round lights in a vertical line, the upper being red and the lower white, Side lights & Stern Lights (when making way through water), Mast Head Light (if >50 m)	A shape consisting of two cones with apexes together in a vertical line one above the other

No:	Vessel Category	Mandatory Lights	Mandatory shapes
4	Fishing vessel other than trawler with outlying gear extending more than 150 metres horizontally from the vessel	Two all-round lights in a vertical line, the upper being red and the lower white, Side lights & Stern Lights (when making way through water), Mast Head Light (only if >50 m) An all round white light in the direction of gear	A shape consisting of two cones with apexes together in a vertical line one above the other. A cone apex upwards in the direction of the gear

Additional Signals for fishing for fishing vessels fishing in close proximity	
Trawlers.	
When shooting their nets	Two while lights in a vertical line
When hauling their nets	One white light over one red light in a vertical line
When the net has come fast upon an obstruction	Two red lights in a vertical line
Purse seiners	Two yellow lights in a vertical line flashing alternately every second (may be exhibited only when the vessel is hampered by its fishing gear)

Navigation lights and signals not only tell other vessels where you are, but what you are doing.



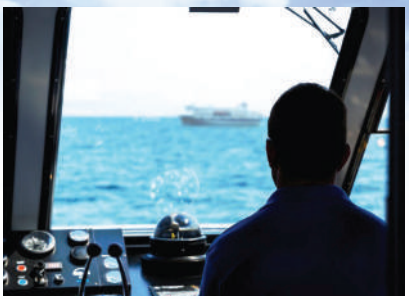


Vessel at anchor:

Rule 30(a) Vessels > 50m but <100 m in length: An all-round white light in the fore part and at or near the stern.

Rule 30(b) Vessels <50 m in length: An all-round white light placed where it may best be seen.

V. RULES OF THE ROAD FOR STEERING & NAVIGATION



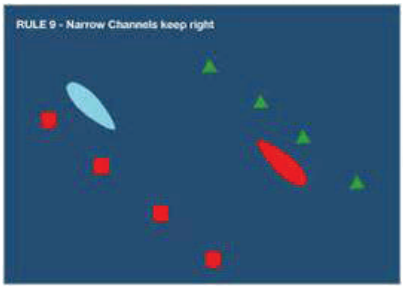
Rule 5 - Keep a close and constant look-out: by sight and hearing. Danger can come from anywhere at sea.

Rule 6 - Be at Safe speed: Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and can be stopped within a distance appropriate to the prevailing circumstances and conditions.

Rule 7 - Determine the risk of collision: All ships must use all available means adapted to prevailing circumstances and conditions to determine the risk of collision. If there is any doubt about the risk of collision, it must be considered that the risk exists.

Rule 8 - Avoiding a collision: Any manoeuvre taken to avoid a collision must, if the circumstances allow, be carried out without hesitation, in good time and in accordance with good maritime practice.

Rule 9 - Narrow channels and fairways:

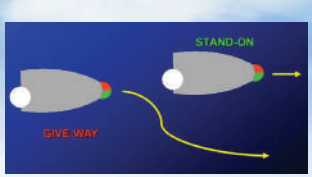


a. A vessel proceeding along a course of a narrow channel or fairway shall keep as near to the outer limit of the channel which lies on her starboard side.

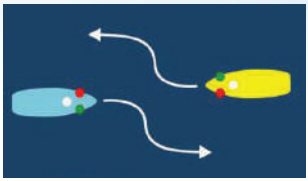
b. A vessel of less than 20m in length or a sailing vessel shall not impede the passage of a vessel which can safely navigate only within a narrow channel or fairway.

c. Vessels engaged in fishing shall not impede the passage of other vessels navigating within a narrow channel or fairway.

Rule 13 ~ Overtaking: The overtaking vessel must keep out of the way of the stand-on vessel.



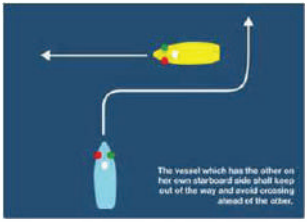
Rule 14 ~ Head-on situations: If two power-driven vessels meet head-on, both must give way by altering their course to starboard so that each shall pass on the port side.

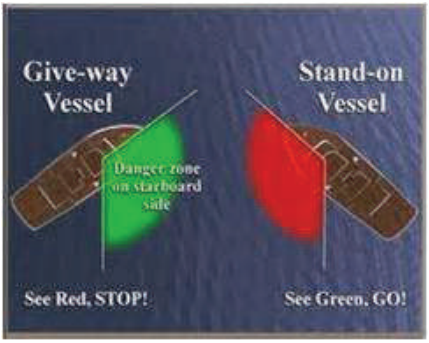


If a power-driven vessel or a sailing vessel meets a vessel engaged in fishing head-on, the power-driven vessel or the sailing vessel must give way. The fishing vessel should maintain its course and speed.

If a vessel engaged in fishing meets a restricted vessel or a vessel not under command head-on, the fishing vessel must give way.

Rule15 ~ Crossing the path of another vessel: A power-driven vessel approaching another power-driven vessel or A vessel engaged in fishing approaching another vessel engaged in fishing on its own starboard side must give way and avoid crossing ahead of the other vessel.





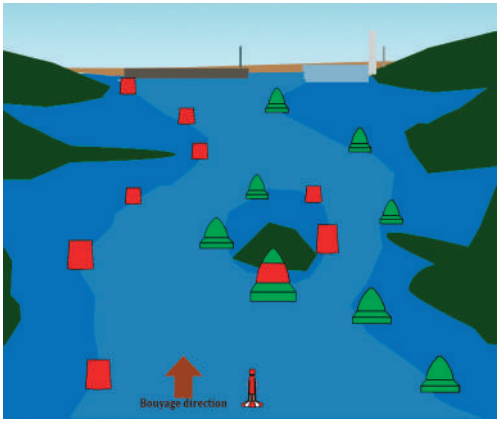
Rule 19 ~ Restricted visibility: If you cannot see other vessels because of fog or bad weather, reduce your speed, give an appropriate sound signal, navigate with extreme care and be prepared to stop.

Order of Priority

1. Vessel not in command
2. Vessel whose ability to manoeuvre is restricted
3. Vessel handicapped by its draught
4. Vessel engaged in fishing
5. Sailing vessel
6. Power-driven vessel underway

BUOYAGE SYSTEM

Buoyage system indicates the edges of safe water channel, in terms of port or starboard. The direction of buoyage is usually in upstream direction, ie: in a harbour, the direction of buoyage will be into the harbour from the sea. A vessel heading in the direction of buoyage and wishing to keep in the main channel should keep port marks to its port (left) side, and starboard marks to its starboard (right) side. The port marks are red in colour and cylindrical in shape. The starboard marks are green in colour and conical in shape.



Lateral marks~ indicate the port and starboard sides of the route to be followed.

Isolated danger mark~ signals the isolated dangers in a restricted area.

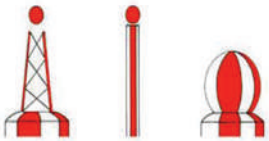
Safe water marks~ show that the waters around them are safe.

Special marks~ show an area or configuration mentioned in nautical documents.

Port mark

Starboard mark

Isolated Danger mark



Safe Water mark

Special Marks

DISTRESS CALLS

When a vessel at sea is in distress, the first step towards rescue is to send messages to other boats or to shore stations through distress call.

Making a MAYDAY call:

- Say loud and clearly "Mayday, Mayday, Mayday. This is vessel (use your boat's name)".
- Repeat three times.
- Provide your exact position if available. Or else provide a magnetic bearing or an estimated distance and direction to an easily identified landmark.
- Describe your boat (type, length, color and other distinctive features).
- Say how many people are on board.
- Give concise information about the nature of your distress (sinking, flooding, fire, medical emergency etc.)

- If your boat is in danger of sinking, indicate how much time you think you have left.
- At the end of the transmission say "Over" and listen for a response.
- Let a minute go by before you repeat the entire process.
- Messages can be given through any communication devices onboard

Responding to a MAYDAY call:

- Write down the message, the name of the boat in distress, its position and the reason for the call.
- If the Coast Guard does not answer within two minutes, call them on Channel 16 and repeat the distress message, stating clearly that you are relaying the message.
- Stand by on Channel 16 and follow the instructions of the Coast Guard.
- Prepare to assist the vessel in distress (if possible)

Other Distress Calls

⇨ Urgency signal "Pan Pan" repeated three times

- Used to announce an urgent message or to request for assistance if a boat or its crew is in danger, but the situation is not life-threatening

⇨ Safety signal "Securité" repeated three times

- Announces important information, such as a warning to other vessels (eg: dangerous debris in the water; intention of large vessel to get under way).

Channel 16

The marine VHF radio frequency (156.8 MHz) primarily intended for distress, urgency and safety priority calls. The frequency can also be used to establish communication before switching on to another working channel. Do not use it for routine calls.

SAFETY GUIDELINES FOR FISHERS

DON'Ts

- Don't use liquors onboard
- Avoid over speed and overconfidence at sea
- Don't carry crew more than the approved capacity of the boat
- Don't use boat in stormy condition
- Don't allow any explosive and hazardous material onboard
- Don't allow overloading
- Don't allow any unauthorized alteration on boat
- Don't allow unauthorized person to get on board
- Don't play with life saving equipments and communication device

DO's

- Carry sufficient life saving equipments onboard
- Conduct proper maintenance of boat and equipments
- Carry essential communication devices onboard
- Keep good look out for other boats and ships while sailing
- Carry the valid registration certificate and fishing license onboard
- Ensure that boat is equipped and crew is trained to handle fire and other accident situations onboard
- Ensure the boat is clean and dry while operating at sea
- Leave information at shore about voyage plan, fishing area and crew members
- Ensure the prescribed standards for Boat design and materials used for boat construction
- Ensure the crew is trained properly on sea safety and navigation
- Follow weather forecasts and warnings carefully
- Conducts proper training and drills on sea safety at sea
- Keep the lifesaving equipments at designated areas onboard.

Conclusion:

Safety at sea is the most important aspect than fishing at sea. Fishermen have to be trained on sea safety and navigation rules to avoid accidents in water. This book is designed for educating fishermen on sea safety and imparting knowledge on the various precautions to be taken while going for fishing. Fishermen must be trained on handling communication devices and safety equipments onboard. Proper awareness on communication and safety devices, and navigation signals and symbols will help fishermen to work without fear at sea.

SEA SAFETY & NAVIGATION TRAININGS BY NETFISH

Kerala South

Karnataka

Maharastra

Gujarat

Kerala North

SEA SAFETY & NAVIGATION TRAININGS BY NETFISH

Tamilnadu South

Tamilnadu North

Andhra Pradesh

Odisha

West Bengal

SEA SAFETY CHECKLIST

Check Engine performance, Oil & Fuel

Check for Tools & Spares

Check Safety Equipments: Life jacket, Lifebuoy

Check Navigation devices

Check Communication Equipments

Check Navigation lights

Check First Aid Box

Check all Documents

Check for enough Food & Water

Check Weather Forecasts

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