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SAFETY OF SMALL FISHING VESSELS

Consolidated text of the draft Safety recommendations for decked fishing vessels of less than 12 metres in length and undecked fishing vessels

Note by the Secretariat

SUMMARY

Executive summary:	This document provides the consolidated text of the draft Safety recommendations for decked fishing vessels of less than 12 metres in length and undecked fishing vessels incorporating the modifications agreed by SLF 50.
Action to be taken:	Paragraph 3
Related documents:	SLF 50/5/1, SLF 50/5/2, SLF 50/5/3, SLF 50/5/4, SLF 50/WP.3 and SLF 50/19 (section 5)

General

1 The Sub-Committee, at its fiftieth session, having noted that the Working Group on Safety of Small Fishing Vessels had reviewed in detail all chapters of the draft Safety recommendations prepared by the associated correspondence group (SLF 50/5/1, SLF 50/5/2, SLF 50/5/3 and SLF 50/5/4), agreed, in principle, to the proposed modifications to the text of the draft Safety recommendations for decked fishing vessels of less than 12 metres in length and undecked fishing vessels. Subsequently, the Sub-Committee requested the Secretariat to prepare, immediately after the session, a consolidated text of the draft Safety recommendations so that the relevant sub-committees and Member Governments could consider and comment on the aforementioned recommendations, as appropriate.

2 In pursuance of the aforementioned request of the Sub-Committee, the Secretariat has prepared the consolidated text of the draft Safety recommendations for decked fishing vessels of less than 12 metres in length and undecked fishing vessels, incorporating the modifications agreed by SLF 50, as set out in the annex.

Action requested of the Sub-Committee

3 The Sub-Committee is invited to consider the above information and take action as appropriate.

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ANNEX

DRAFT SAFETY RECOMMENDATIONS FOR DECKED FISHING VESSELS OF LESS THAN 12 METRES IN LENGTH AND UNDECKED FISHING VESSELS

CONTENTS

Notes:

Numbered footnotes provide clarification and information to the members of FVS ISCG and the SLF Sub-Committee and will be deleted from the final consolidated text.

Asterisked footnotes (as per the format used in the Voluntary Guidelines) will remain in the consolidated text.

PREAMBLE

These safety recommendations are the result of the continuing co-operation between the Food and Agriculture Organization of the United Nations (FAO), the International Labour Organization (ILO) and the International Maritime Organization (IMO), in relation to the safety of fishing vessels that began with the development of Parts A and B of the Code of Safety for Fishing Vessels and Fishermen between 1968 and 1974 (hereinafter referred to as the Code) for decked fishing vessels of 24 metres in length and over. This was followed by the development of the Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels (hereinafter referred to as the (Voluntary Guidelines) approved by the Maritime Safety Committee (MSC) at its forty-first session in October 1979 and by the FAO in November 1979 for circulation to governments and the ILO Governing Body being informed at its 211th session in November 1979 of the intention to publish this document.

On adopting the Torremolinos Protocol of 1993 relating to the Torremolinos International Convention for the Safety of Fishing Vessels, 1977, the Conference recommended that there would be a need to revise the Code. Consequently, IMO undertook a review and invited the participation of FAO and ILO, it also decided, at the same time, to review the Voluntary Guidelines; that are directed at decked fishing vessels of 12 m in length and over but less than 24 m in length.

Following the completion of the review, of the Code and the Voluntary Guidelines, the revised texts were approved by MSC, at its seventy-ninth session (1 to 10 December 2004). Thereafter, at the Committee on Fisheries at its twenty-sixth session in March 2005, where FAO welcomed the revisions and recommended the early publication by IMO of these documents and later, the Governing Body of the ILO approved the revised texts at its 293rd session in June 2005.

During the process of revising the Code and the Voluntary Guidelines, the fact became evident that there were no guidelines or recommendations for small fishing vessels of less than 12 m in length that were similar to Part B of the Code or the Voluntary Guidelines. As a consequence, MSC, at its seventy-ninth session, agreed to include in the work programme of the Sub-Committee on Stability and Load Lines and on Fishing Vessel Safety (SLF) a new high priority item on "Safety of small fishing vessels". The aim being to develop safety recommendations for decked vessels of less than 12 m in length and undecked vessels of any length, bearing in mind that the majority of fishing fatalities occur aboard such vessels.

The SLF Sub-Committee undertook the development of the safety recommendations in collaboration with FAO and ILO in order to provide guidelines to Competent Authorities for the design, construction, equipment, training of the crew of small fishing vessels as well as operational safety and established a correspondence group that commenced work in 2005 to develop recommendations. In this regard, the importance of addressing the small fishing vessel sector, that includes more than 80% of all fishing vessels, was emphasized by the more than 30 entities agreeing to participate in the work of the correspondence group.

In addition to the IMO competence in relation to safety of life, vessels and equipment at sea, the correspondence group drew heavily on the wide experience of FAO in the design, construction and operation of small fishing vessels, particularly in developing countries where the majority of small fishing vessels operate. It also drew on the competence of ILO regarding conditions of work and service aboard small fishing vessels. The co-operation between FAO and IMO in relation to measures to combat Illegal, Unregulated and Unreported (IUU) fishing was

recognized with particular regard to the adverse impact on the safety of small fishing vessels in many parts of the world.

The FAO/ILO/IMO Code of Safety for Fishermen and Fishing Vessels, 2005, part A, Safety and Health Practice, provides, in Section I, General, and in Section II, Undecked vessels and decked vessels of less than 12 metres in length, and in certain of its Appendices, guidance that concerns the safety and health of fishermen on small vessels. These Safety recommendations should be read in conjunction with the Code, part A. During the preparation of the Safety recommendations, it was however noted that additional operational guidance was needed concerning these vessels. This has been taken into account in the text. It is further recommended that in framing national safety requirements it would be essential to give consideration to local weather and sea conditions and any special operational requirements.

[The remaining paragraphs to be prepared at time of submission to the SLF Sub-Committee and/or the MSC.]

CHAPTER 1 GENERAL PROVISIONS

1.1 Purpose and scope

1.1.1 The purpose of these safety recommendations is to provide information on the design, construction, equipment, training and protection of the crew of small fishing vessels with a view to promoting the safety of the vessel and safety and health of the crew. They are not intended as a substitute for national laws and regulations but may serve as a guide to those concerned with framing such national laws and regulations. Each Competent Authority responsible for the safety of vessels should ensure that the provisions of these safety recommendations are adapted to its specific requirements, having due regard to the size and type of vessels, their intended service and area of operation. Before doing so, Competent Authorities should consult with the vessel owners and fishermen, and their representative organizations, and other relevant stakeholders such as vessel designers, builders, and equipment manufacturers. When adapting the safety recommendations, the Competent Authority should endeavour to ensure a level of safety at least equivalent to the provision or provisions concerned.

1.1.2 Unless otherwise stated, the provisions of these recommendations are intended to apply to new decked vessels of less than 12 m in length (L) and new undecked vessels of any length intended to operate at sea. Nevertheless, even where not otherwise stated, the Competent Authority should as far as reasonable and practical give consideration to the application of these provisions to existing vessels[*].

1.1.3 In these recommendations the use of the word sea includes oceans, rivers, lakes and dams, or any body of water.

1.1.4 The provisions of these recommendations do not apply to vessels used for sport or recreation.

1.2 Definitions

For the purpose of these recommendations, unless expressly provided otherwise, the following definitions apply:

1.2.1 *Amidships*[**] means the mid-length of LOA.

1.2.2 *Approved* means approved by the Competent Authority.

1.2.3 *Baseline* is the horizontal line intersecting at amidships the keel line.

1.2.4 *Bow height* is defined as the vertical distance at the forward perpendicular between the waterline corresponding to the maximum permissible draught and the designed trim and the top of the exposed deck at side.

1.2.5 *Breadth*[**] *(B)* is the maximum breadth of the vessel, measured at maximum beam to the moulded line of the frame in a vessel with a metal shell and to the outer surface of the hull in a vessel with a shell of any other material.

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[*] A vessel of less than 12 m in length (L) could be in excess of 15 m in length overall (LOA). See annex I.

[**] The dimensions are illustrated in annex I.

1.2.6 *Collision bulkhead* is a watertight bulkhead up to the working deck in the fore part of the vessel as approved by the Competent Authority.

1.2.7 *Competent Authority* is the Government of the State whose flag the vessel is entitled to fly. The Competent Authority may delegate certain of its duties to entities authorized by it and that it deems suitably qualified to undertake those duties.

1.2.8 *Crew* means the skipper and all persons employed or engaged in any capacity on board a vessel on the business of that vessel.

1.2.9 *Cubic Numeral (CuNo)*[*] is the result of multiplying LOA x B x D.

1.2.10 *Decked vessel* is a vessel having a fixed watertight deck covering the entire hull above the deepest operating waterline. Where open wells or cockpits are fitted in this deck the vessel is considered a decked vessel if flooding of the well or cockpit will not endanger the vessel.

1.2.11 *Deck erection* is any decked structure on the working deck.

1.2.12 *Deepest operating waterline* is the waterline related to the maximum permissible operating draft.

1.2.13 The *depth (D)*[*] is the moulded depth amidships.

1.2.14 *Design categories*[1]

The categories here indicate sea and wind conditions for which a vessel is assessed by this standard to be suitable, provided the vessel is correctly operated and at a speed appropriate to the prevailing sea state.

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[*] The dimensions are illustrated in annex I.

[1] *Distance categories*[1]

This table is an *aide mémoire* for the members of the correspondence group.

The categories here indicate the distances from safe haven for which a vessel is assessed by the safety recommendation to be suitable, provided the vessel is correctly operated. The competent authority may vary the distance from a safe haven to suit local conditions, practice and experience.

Distance	More than 200 nm	Not more than 200 nm	Not more than 100 nm	Not more than 20 nm	Not more than 5 nm

		Design	Distance
Chapter 1	General provisions		
Chapter 2	Construction, watertight integrity and equipment	X	
Chapter 3	Stability and associated seaworthiness	X	
Chapter 4	Machinery and electrical installations	X	X
Chapter 5	Fire protection, detection and extinction		X
Chapter 6	Protection of the crew		X
Chapter 7	Life-saving appliances	X	X
Chapter 8	Emergency procedures and safety training		X
Chapter 9	Communications	X	X
Chapter 10	Navigational equipment		X
Chapter 11	Crew accommodation		X
Chapter 12	Manning and training		X

.1 **Design category A**

Category of vessels considered suitable to operate in seas with significant wave heights above 4 m and wind speeds in excess of Beaufort Force 8, but excluding abnormal conditions, e.g., hurricanes.

.2 **Design category B**

Category of vessels considered suitable to operate in seas with significant wave heights up to 4 m and winds of Beaufort Force 8 or less.

.3 **Design category C1**

Category of vessels considered suitable to operate in seas with significant wave heights up to 2 m and a typical steady wind force of Beaufort Force 6 or less.

.4 **Design category C2**

Category of vessels considered suitable to operate in seas with significant wave heights up to 1 m and a typical steady wind force of Beaufort Force 5 or less.

.5 **Design category D**

Category of vessels considered suitable to operate in seas with significant wave heights up to and including 0.3 m with occasional waves of 0.5 m height, for example from passing vessels, and a typical steady wind force of Beaufort Force 4 or less.

1.2.15 *Enclosed superstructure* is a superstructure with:

.1 enclosing bulkheads of efficient construction;

.2 access openings, if any, in those bulkheads fitted with permanently attached weathertight doors of a strength equivalent to the unpierced structure which can be operated from each side; and

.3 other openings in sides or ends of the superstructure fitted with efficient weathertight means of closing. A raised quarter-deck is regarded as a superstructure. A bridge or poop should not be regarded as enclosed unless access is provided for the crew to reach machinery and other working spaces inside those superstructures by alternative means which are available at all times when bulkhead openings are closed.

1.2.16 *Existing vessel* is a vessel which is not a new vessel.

1.2.17 *Fishing vessel* (hereto referred as vessel) means any vessel used commercially for catching fish, whales, seals, walrus or other living resources of the sea.

1.2.18 *Forward and after perpendiculars* should be taken at the forward and after ends of the length (L). The forward perpendicular should be coincident with the foreside of the stem on the waterline on which the length is measured.

1.2.19 *Freeboard (f)* is the actual minimum freeboard and, on a decked vessel, is the distance from the underside of the working deck at the side to a water-line, measured perpendicularly to the water-line, plus the minimum thickness of decking. When the working deck is stepped, the lowest line of the deck and the continuation of that line parallel to the upper part of the deck should be taken as the working deck. On an undecked vessel, the freeboard (*f)* is the distance from the gunwale or a down flooding opening, whichever is lower, measured perpendicularly to the waterline. A down flooding opening is an opening in the hull or superstructures which cannot rapidly be closed watertight.

1.2.20 *Height of a superstructure or other erection* is the least vertical distance measured at side from the top of the deck beams of a superstructure or an erection to the top of the working deck beams.

1.2.21 *Keel line*[*] is the line parallel to the slope of keel passing amidships through:

.1 the top of the keel or line of intersection of the inside of shell plating with the keel where a bar keel extends above that line of a vessel with a metal shell; or

.2 the rabbet lower line of the keel of a vessel with a shell of wood or a composite material; or

.3 the intersection of a fair extension of the outside of the shell contour at the bottom with the centreline of a vessel with a shell of material other than wood and metal.

1.2.22 *Least depth*[*] is the depth measured from the keel line to the top of the working deck beam at side. Where the working deck is stepped and the raised part of the deck extends over the point at which the least depth is to be determined, the least depth should be measured to a line of reference extending from the lower part of the deck along a line parallel with the raised part.

1.2.23 *Length (L)*[*] should be taken as 96% of the total length on a waterline at 85% of the least depth, or as the length from the foreside of the stem to the axis of the rudder stock on that waterline, if that length is greater. In vessels designed with rake of keel the waterline on which this length is measured should be parallel to the designed waterline.

1.2.24 *Length overall (LOA)*[*] is the length of the vessel in a straight line parallel to the design waterline, from the foremost part of the stem at the height of the deck or gunwale to the after most part of the stern.

1.2.25 *New vessel* is a vessel the keel of which is laid, or which is at a similar stage of construction, on or after the date of adoption of the present safety recommendations.

1.2.26 *Organization* means the International Maritime Organization.

1.2.27 *Owner* means any person or entity having assumed the responsibility for the operation of the vessel.

[*] The dimensions are illustrated in annex I.

1.2.28 *Protocol* means the Torremolinos Protocol of 1993 relating to the Torremolinos International Convention for the Safety of Fishing Vessels, 1977.

1.2.29 *Skipper* means the person having command of a vessel.

1.2.30 *Steel or other equivalent material* means steel or any material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable fire exposure to the standard fires test (e.g., aluminium alloy with appropriate insulation).

1.2.31 *Superstructure deck* is that complete or partial deck forming the top of a deck erection situated at a height of not less than 1.8 m above the working deck. Where this height is less than 1.8 m, the top of such deck erections should be treated in the same way as the working deck.

1.2.32 *Undecked* vessel is a vessel which is not a decked vessel.

1.2.33 *Watertight* means capable of preventing the passage of water through the structure in any direction under a head of water for which the surrounding structure is designed.

1.2.34 *Weathertight* means that in any sea conditions water will not penetrate into the vessel.

1.2.35 *Working deck* is generally the lowest complete deck above the deepest operating waterline from which fishing is undertaken. In vessels fitted with two or more complete decks, the Competent Authority may accept a lower deck as a working deck provided that that deck is situated above the deepest operating waterline.

1.3 Measurements

In these recommendations measurements are given in the metric system using the following abbreviations:

m	–	metre
cm	–	centimetre
mm	–	millimetre
t	–	tonne (1,000 kg)
kg	–	kilogram
ºC	–	degree Celsius
N	–	Newton
kW	–	Kilowatt

1.4 Maintenance and surveys

1.4.1 The hull, machinery, equipment and radio installations as well as crew accommodation of every vessel should be constructed and installed so as to be capable of being regularly maintained to ensure that they are at all times, in all respects, satisfactory for the vessel's intended service.

1.4.2 Where practicable, before the construction of a vessel, plans of, and information concerning the vessel should be submitted to the Competent Authority, for approval.

1.4.3 The Competent Authority should arrange for appropriate surveys of a vessel during construction and, at regular intervals after completion, to ensure satisfactory condition of the vessel's hull, machinery and equipment, as well as crew accommodation. An appropriate report of the survey should be entered in the record of the vessel.

1.4.4 After any survey has been completed no change should be made in the structural arrangements, machinery, and equipment, as well as crew accommodation, etc., covered by the survey, without the approval of the Competent Authority.

1.4.5 Documentation relating to the safety of the vessel should cease to be valid upon transfer of the vessel to the flag of another State. New safety documentation should only be issued when the Competent Authority is fully satisfied that the vessel is in compliance with the requirements of the relevant provisions.

1.4.6 Hull, machinery and equipment should be maintained to a standard acceptable to the Competent Authority and in accordance with manufacturer's recommendations or those of a recognized organization.

1.5 Equivalents

Where the present provisions require that a particular fitting, material, appliance or apparatus, or type thereof, should be fitted or carried in a vessel, or that any particular provision should be made, the Competent Authority may allow any other fitting, material, appliance or apparatus, or type thereof, to be fitted or carried, or any other provision to be made in that vessel, if it is satisfied by trial thereof or otherwise that such fitting, material, appliance or apparatus, or type thereof, or provision, is at least as effective as that required by the present recommendations.

CHAPTER 2 CONSTRUCTION, WATERTIGHT INTEGRITY AND EQUIPMENT

PART 1 – GENERAL

2.1 Purpose and scope

2.1.1 This chapter should apply to all vessels other than wooden vessels of simple construction such as rafts, dugouts, canoes and vessels of proven historical design.

2.2 Construction, material and structure

2.2.1 Strength and construction of the hull and other structures and vessel's equipment should be sufficient to withstand all foreseeable conditions of the intended service and should be to the satisfaction of the Competent Authority. Recommended construction standards for wooden, GRP, steel and aluminium vessels are provided in annexes II, III, IV and V respectively.

2.2.2 The hull of vessels intended for operation in ice should be strengthened in accordance with the anticipated conditions of navigation and area of operation. Wooden vessels, operating from harbours subject to freezing should have appropriate ice protection sheathing.

2.3 Inlets and discharges

2.3.1 Sea inlets should be fitted with valves which have a positive means of closing from a readily accessible position. The valve should be provided with an indicator, showing whether the valve is open or closed.

2.3.2 Discharges passing through the hull should be fitted with an automatic non-return valve with a positive means of closing it from a readily accessible position. The valve should be provided with an indicator, showing whether the valve is open or closed.

2.3.3 The Competent Authority may accept alternative arrangements, providing that the following requirements are complied with:

.1 hull penetrations with openings less than 100 mm above the deepest waterline or below the floor on undecked vessels should be fitted with means of closing;

.2 discharges between 100 mm above and 350 mm above the deepest waterline may be fitted with a non-return valve, without a means of closing. In case of wet exhaust systems the valve may be of a flap type, see annex XVI;

.3 discharges more than 350 mm above the deepest waterline need not be fitted with a valve.

2.3.4 Inlet and discharge valves not accessible in an emergency should be fitted with remote means of operation such as by extended spindle or wire pull device.

2.3.5 Fittings attached to the hull, all valves and all pipes between the shell and the valves should be of cast steel, bronze or other ductile material. The Competent Authority may approve the use of other materials for pipes of non-steel vessels.

2.3.6 Any penetration prone to be damaged by fishing gear, equipment or crew should be suitably protected.

2.3.7 Where sea inlet piping systems comprise flexible hose, such hoses should be of an approved type and the connections should be fitted with double, corrosion-resistant hose clips at both ends.

2.3.8 When operating experience justifies departure from 2.3.1 to 2.3.7, the Competent Authority may allow alternatives.

PART 2 – UNDECKED VESSELS

2.4 Drainage of partial decks

2.4.1 Any partial deck either inboard or outboard should be adequately drained.

2.5 Securing of heavy items

2.5.1 All heavy items of equipment should be securely fastened in position to prevent movement when the vessel is at sea.

2.6 Anchor and mooring equipment

2.6.1 Anchor and mooring equipment designed for quick and safe operation should be to the satisfaction of the Competent Authority. A recommended practice for anchor and mooring equipment is provided in annex VI.

PART 3 – DECKED VESSELS

2.7 Construction

2.7.1 Bulkheads, closing devices and closures of openings in these bulkheads, as well as methods for their testing, should be in accordance with the requirements of the Competent Authority. Vessels constructed of material other than wood should be fitted with a collision bulkhead unless the Competent Authority deems that this requirement is impracticable, and at least with transverse watertight bulkheads bounding the main machinery space. Such bulkheads should be extended up to the working deck. In vessels constructed of wood such bulkheads, which as far as practicable should be watertight, should also be fitted.

2.7.2 Pipes piercing the collision bulkhead should be fitted with suitable valves operable from above the working deck and the valves should be secured at the collision bulkhead inside the forepeak. No door, manhole, ventilation duct or any other opening should be fitted in the collision bulkhead below the working deck.

2.7.3 The forepeak should not be used for carrying fuel oil, except where specially approved by the Competent Authority.

2.8 Hull integrity

2.8.1 External openings should be capable of being closed so as to prevent water from entering the vessel. Deck openings which may be open during fishing operations should normally be arranged near to the vessel's centreline. However, the Competent Authority may approve different arrangements if satisfied that the safety of the vessel will not be impaired.

2.9 Weathertight doors

2.9.1 All access openings in bulkheads of enclosed superstructures and other outer structures through which water could enter and endanger the vessel, should be fitted with doors permanently attached to the bulkhead, framed and stiffened so that the whole structure is of equivalent strength to the unpierced structure, and weathertight when closed.

2.9.2 The height above deck of sills in those doorways, in companionways, erections and machinery casings which give direct access to parts of the deck exposed to the weather and sea should be at least 380 mm.

2.9.3 Where operating experience has shown justification and on approval of the Competent Authority, the height above deck of sills in the doorways specified in 2.9.2, may be reduced to not less than 150 mm. In vessels of design category D the height may be further reduced to 50 mm.

2.10 Hatchways

2.10.1 The height above deck of hatchway coamings on exposed parts of the working deck should be at least 300 mm.

2.10.2 Where operating experience has shown justification and on approval of the Competent Authority the height of hatchway coamings, except those which give direct access to machinery spaces, may be reduced from the height as specified in 2.10.1 or the coamings may be omitted entirely, provided that efficient watertight hatch covers other than wood are fitted. Such hatchways should be kept as small as practicable. On vessels of design categories A, B, C1 and C2 the covers should be permanently attached by hinges or equivalent means and be capable of being rapidly closed or battened down.

2.10.3 The hatchway covers should have the same strength as the deck. As guidance on structural strength reference should be made to annex VII. On vessels of design categories A, B, C1 and C2 covers should be fitted with clamping devices and gaskets or other equivalent arrangements sufficient to ensure weathertightness to the satisfaction of the Competent Authority.

2.11 Machinery space openings

2.11.1 External access machinery space openings should be of sufficient strength and fitted with doors complying with 2.9 or hatch covers complying with 2.10.

2.12 Other deck openings

2.12.1 Where it is essential for fishing operations, flush deck covers may be fitted, provided these are capable of being closed watertight and such devices, on vessels of design categories A, B, C1 and C2, should be permanently attached to the adjacent structure. Having regard to the

size and disposition of the openings and the design of the closing devices, metal-to-metal closures may be fitted if the Competent Authority is satisfied that they are effectively watertight.

2.13 Ventilators

2.13.1 The coamings of ventilators should be as high as practicable. On the working deck the height above deck of coamings of ventilators other than machinery space ventilators should be not less than 450 mm. When the height of such ventilators may interfere with the fishing operation of the vessel their coaming heights may be reduced to the satisfaction of the Competent Authority. The height above deck of machinery space ventilator openings should be to the satisfaction of the Competent Authority.

2.13.2 Coamings of ventilators should be of equivalent strength to the adjacent structure and capable of being closed weathertight by devices permanently attached to the ventilator or adjacent structure. Ventilators should be arranged as close to the vessel's centreline as possible and, where practicable, should extend through the top of a deck erection or companion-way.

2.14 Air pipes

2.14.1 Where air pipes to tanks and void spaces below deck extend above the working or superstructure decks, the exposed parts of the pipes should be of strength equivalent to the adjacent structures and fitted with appropriate protection and protected from damage by fishing or lifting gear. Openings of pipes should be provided with means of closing, permanently attached to the pipe or adjacent structure, except that where the Competent Authority is satisfied that they are protected against water trapped on deck, these means of closing may be omitted.

2.14.2 The height of air pipes above deck to the point where water may have access below should be at least 450 mm on the working deck. When the height of such air pipes may interfere with the fishing operation of the vessel their heights may be reduced to the satisfaction of the Competent Authority, provided that they are fitted with a non return arrangement at the air pipe goose neck.

2.14.3 Provision should be made to prevent a vacuum forming in the pipe or tank.

2.14.4 Exposed air pipes, in excess of 25 mm in diameter, serving fuel oil, and other oil tanks should be fitted with anti-flame net protection or other equivalent devices.

2.15 Sounding devices

2.15.1 Sounding devices, to the satisfaction of the Competent Authority, should be fitted: to the bilges of those compartments which are not readily accessible at all times during the voyage; and to all tanks.

2.15.2 Where sounding pipes are fitted, their upper ends should be extended to a readily accessible position and, where practicable, above the working deck. Their openings should be provided with permanently attached means of closing.

2.15.3 Sounding arrangements on fuel service tanks should be such that in the event of the tanks being overfilled, spillage through the means of sounding cannot occur.

2.15.4 Fuel tank sounding pipe openings should not be located in crew accommodation.

2.16 Windows and skylights for decked vessels of design categories A and B

2.16.1 Skylights leading to spaces below the working deck should be of substantial construction and capable of being closed and secured weathertight from the inside, and with provision for adequate means of closing in the event of damage to the inserts. Skylights leading to machinery spaces should be avoided as far as practicable.

2.16.2 Toughened safety glass or suitable permanently transparent material of equivalent strength should be fitted in all wheelhouse windows exposed to the weather. The means of securing windows and the width of the bearing surfaces should be adequate, having regard to the window material used. Openings leading to spaces below deck from a wheelhouse whose windows are not provided with the protection required by 2.16.3 should be fitted with a weathertight closing appliance.

2.16.3 A suitable number of storm shutters should be provided where there is no other method of preventing water from entering the vessel through a broken window.

2.16.4 The Competent Authority may accept windows without storm shutters if satisfied that the safety of the vessel will not be impaired.

2.17 Freeing ports [and scuppers][2]

2.17.1 Care should always be taken to ensure the quick release of water trapped on deck. If freeing ports are fitted with locking devices, the opening mechanism should always be easily accessible.

2.17.2 When the main deck is prepared for carrying deck load by dividing it with pound boards, or any division capable of trapping water, there should be slots between them of suitable size to allow easy flow of water to freeing ports.

2.17.3 The size, number and location of freeing ports should be sufficient to drain water overboard from exposed decks. Guidance on the dimensions of freeing ports is found in annex VIII.

2.18 Anchor and mooring equipment

2.18.1 Anchor and mooring equipment designed for quick and safe operation should be to the satisfaction of the Competent Authority. A recommended practice for anchor and mooring equipment is provided in annex VI.

2.19 Working spaces within an enclosed superstructure

2.19.1 Working spaces within an enclosed superstructure should be arranged to the satisfaction of the Competent Authority, taking into account where practicable:

.1 efficient drainage;

.2 openings necessary for fishing operations;

[2] A paragraph on scuppers is to be developed.

.3 means of escape;

.4 stowage of catch;

.5 headroom; and

.6 ventilation.

2.20 Tanks for fish in refrigerated (RSW) or chilled (CSW) sea water

2.20.1 If RSW- or CSW-tanks or similar tank systems are used, such tanks should be provided with a separate permanently fitted arrangement for the filling and emptying of sea water.

2.20.2 If such tanks are to be used also for other purposes, the tanks should be arranged with a bilge system and provided with adequate means to avoid ingress of water from the bilge system into the tanks.

2.21 Drainage of partial decks

2.21.1 Means should be provided for any partial decks either inboard or outboard to be adequately drained.

2.22 Securing of heavy items

2.22.1 Means should be provided to secure all heavy items of equipment in position to prevent movement when the vessel is at sea.

CHAPTER 3 STABILITY AND ASSOCIATED SEAWORTHINESS

3.1 General

3.1.1 This chapter may be applied to vessels other than those of a multi-hull design and outrigger canoes.

3.1.2 Vessels of design categories A and B should be so designed and constructed that the recommendations given in this chapter will be satisfied in the operating conditions referred to in 3.9. Calculations of the righting lever curves should be to the satisfaction of the Competent Authority.*

3.1.3 Wherever practicable, guidance should be provided for an approximate determination of the vessel's stability by means of the rolling period test including values of rolling coefficients particular to the vessel.**

3.2 Stability criteria for decked vessels of design categories A and B

3.2.1 For decked vessels, the following minimum stability criteria should be met unless the Competent Authority is satisfied that operating experience justifies departure there from:

.1 the area under the righting lever curve (GZ curve) should not be less than 0.055 m-rad up to 30° angle of heel and not less than 0.09 m-rad up to 40° or the angle of flooding θ_f if this angle is less than 40°. Additionally, the area under the righting lever curve (GZ curve) between the angles of heel of 30° and 40° or between 30° and θ_f, if this angle is less than 40°, should not be less than 0.03 m-rad. θ_f is the angle of heel at which openings in the hull, superstructures or deckhouses which cannot rapidly be closed watertight commence to immerse. In applying this criterion, small openings through which progressive flooding cannot take place need not be considered as open;

.2 the righting lever GZ should be at least 200 mm at an angle of heel equal to or greater than 30°. The righting lever GZ may be reduced to the satisfaction of the Competent Authority but in no case by more than 2(24-LOA)%, where LOA, in metres, is as defined in 1.2.24;

.3 the maximum righting lever GZ max should occur at an angle of heel preferably exceeding 30° but not less than 25°; and

.4 the initial metacentric height GM_0 should not be less than 350 mm.

3.2.2 Where ballast is provided to ensure compliance with 3.2.1, its nature and arrangement should be to the satisfaction of the Competent Authority. Ballast should be secured in the vessel in such a way that it will not move even if the vessel is inclined to 90°.

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* Refer to the Calculation of stability curves and the Effect of free surfaces of liquids in tanks contained in 3.6 and 3.3 respectively of the Code on Intact Stability adopted by the Organization by resolution A.749(18), as amended and the Code of Practice concerning the Accuracy of Stability Information for Vessels adopted by the Organization by resolution A.267(VIII).

** Refer to An approximate determination of small vessels stability by means of a rolling period tests contained in annex IX.

3.3 Alternative stability criteria for decked vessels of design categories A and B

3.3.1 For decked vessels of design categories A and B for which, by reason of insufficient stability data, 3.2.1 cannot be applied or where the Competent Authority is satisfied that operating experience justifies departure from the stability criteria in 3.2.1, one of the following criteria should be used as the criterion.

3.3.2 *Approximate formula for the minimum metacentric height GM_{min}*

3.3.2.1 For decked vessels for which, by reason of insufficient stability data, 3.2.1 cannot be applied, the following approximate formula for the minimum metacentric height GM_{min}, in metres, for all operating conditions should be used as the criterion.

$$GM_{min} = 0.53 + 2B\left[0.075 - 0.37\left(\frac{f}{B}\right) + 0.82\left(\frac{f}{B}\right)^2 - 0.014\left(\frac{B}{D}\right) - 0.032\left(\frac{l_s}{Lwl}\right)\right]$$

where:

Lwl in metres, is the length of the vessel on the waterline in maximum load condition;

B, *D* and *f*, in metres, are as defined in 1.2.5, 1.2.13 and 1.2.19; and

l_s is the actual length of enclosed superstructure extending from side to side of the vessel, in metres, as defined in 1.2.15.

The formula is applicable for vessels having:

.1 $\frac{f}{B}$ between 0.02 and 0.20;

.2 $\frac{l_s}{Lwl}$ smaller than 0.60;

.3 $\frac{B}{D}$ between 1.75 and 2.15.

For vessels with parameters outside of the above limits the formula should be applied with special care.

3.3.2.2 The above formula is not intended as a replacement for the basic criteria given in 3.2.1, but should be used only if circumstances are such that cross-curves of stability, KM curve and subsequent GZ curves are not and cannot be made available for judging a particular vessel's stability.

3.3.2.3 The calculated value of GM_{min} should be compared with actual GM values of the vessel in all loading conditions. If a rolling test, an inclining experiment based on estimated

displacement, or another approximate method of determining the actual GM is used, a safety margin should be added to the calculated GM_{min}.[**]

3.3.3 *A rolling period test – option 1*[++]

A rolling period test[**] should be conducted when the vessel is loaded according to the operating condition as specified in 3.9.1.1. The stability is deemed satisfactory if the rolling period (T_r), in seconds, is less than the breadth of the vessel (B), in metres.

3.3.4 *A rolling period test – option 2*[+]

A rolling period test[**] should be conducted when the vessel is loaded according to the operating condition as specified in 3.9.1.1. The stability is deemed satisfactory if the rolling period (T_r), in seconds, is less than indicated in the following table:

Maximum rolling periods (T_r) in seconds

D	B(m)														
(m)	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4
0.6	3.2	3.2	3.4												
0.7	3.8	3.5	3.5	3.5											
0.8	4.3	4.0	3.7	3.6	3.6	3.7									
0.9	4.3	4.6	4.3	3.9	3.7	3.7	3.8								
1.0		4.6	4.9	4.5	4.2	4.0	3.8	3.9	4.0						
1.1			4.8	5.1	4.6	4.4	4.2	4.0	4.0	4.1	4.3				
1.2				5.0	5.2	4.8	4.5	4.3	4.2	4.1	4.2	4.3			
1.3					5.1	5.3	5.0	4.7	4.5	4.4	4.2	4.3	4.4		
1.4						5.3	5.5	5.1	4.9	4.7	4.5	4.4	4.4	4.5	4.6
1.5							5.4	5.6	5.3	5.1	4.9	4.7	4.6	4.5	4.6
1.6								5.5	5.7	5.4	5.2	4.9	4.9	4.8	4.7
1.7									5.7	5.9	5.6	5.2	5.2	5.1	5.0
1.8										5.8	6.0	5.5	5.5	5.4	5.2

where:

B and D, in metres, are as defined in 1.2.5, and 1.2.13.

3.3.5 *Required metacentric height GM_r combined with a rolling period test*[+++]

3.3.5.1 The following approximate formula for required metacentric height GM_r, in metres, for all operating conditions should be used:

[**] Refer to An approximate determination of small vessels stability by means of a rolling period tests contained in annex IX.

[++] This method is useful for vessels mainly in European region.

[+] This table is useful for traditionally built vessels in South East Asia region.

[+++] This formula is useful for traditionally built vessels in South East Asia region.

$$GM_r = 0.117B\left(\frac{B}{D} - 2.20\right) + \left[1.773\left(\frac{T}{D}\right)^2 - 2.646\frac{T}{D} + 1.016\right]B$$

where:

B and *D*, in metres, are as defined in 1.2.5 and 1.2.13; and

T is the draught, in metres, from the baseline, which is defined in 1.2.3, to the water line.

3.3.5.2 A rolling period test** should be conducted when the vessel is loaded according to the operating conditions as specified in 3.9.1. The actual metacentric height GM, in metres, at all operating conditions should be calculated as following formula:

$$GM = \left(\frac{0.834B}{T_r}\right)^2$$

where:

B, in metres, is as defined in 1.2.5; and

T_r, in seconds, is the rolling period.

3.3.5.3 The stability is deemed satisfactory when the GM is not less than GM_r.

3.3.6 *Offset load test*

3.3.6.1 An offset load test should be conducted when the vessel is loaded according to the operating conditions as specified in 3.9.1.1. A weight equivalent to 25 x LOA x *B* (kgs) should be distributed along one side of the vessel,

where:

LOA and *B*, in metres, are as defined in 1.2.24 and 1.2.5.

3.3.6.2 The stability is deemed satisfactory when the angle of heel does not exceed 15° and the freeboard to the deck is not less than 75 mm at any point.

3.4 Stability criteria for decked vessels of design categories C1, C2 and D

3.4.1 For decked vessels of design categories C1, C2 and D, the stability criteria in 3.2.1 should be used.

3.5 Alternative stability criteria for decked vessels of design categories C1, C2 and D

3.5.1 For decked vessels of design categories C1, C2 and D for which, by reason of insufficient stability data, 3.2.1 cannot be applied or where the Competent Authority is satisfied that

** Refer to An approximate determination of small vessels stability by means of a rolling period tests contained in annex IX.

operating experience justifies departure from the stability criteria in 3.2.1, one of the following criteria should be used as the criterion:

.1 an approximate formula for the minimum metacentric height GM_{min}, as specified in 3.3.2;

.2 a rolling period test, as specified in 3.3.3 or 3.3.4;

.3 required metacentric height combined with a rolling period test*, as specified in 3.3.5 using the following approximate formulae:

$$GM_r = 0.059B\left(\frac{B}{D} - 2.20\right) + \left[2.085\left(\frac{T}{D}\right)^2 - 2.857\frac{T}{D} + 0.990\right]B \text{; and}$$

$$GM = \left(\frac{0.834B}{T_r}\right)^2 \text{; and}$$

.4 an offset load test as specified in 3.3.6.

3.6 Stability criteria for undecked vessels

3.6.1 For undecked vessels of design categories A and B, an inclining test, as specified in 3.11 should normally be carried out to establish the metacentric height GM. The initial metacentric height GM_0 should not be less than 350 mm.

3.6.2 Where the Competent Authority is satisfied that operating experience justifies departure from the requirement in 3.6.1, one of the stability criteria in 3.3 should be used.

3.6.3 For undecked vessel of design categories C1 and C2, one of the stability criteria in 3.5.1.1 to 3.5.1.3 should be used.

3.7 Flooding of fish-holds for vessels of design categories A and B

3.7.1 For decked vessels, the angle of heel at which progressive flooding of fish-holds could occur through hatches which remain open during fishing operations and which cannot rapidly be closed should be at least 20° unless the stability criteria of 3.2.1 can be satisfied with the respective fish-holds partially or completely flooded.

3.8 Particular fishing methods

3.8.1 Vessels engaged in particular fishing methods where additional external forces are imposed on the vessel during fishing operations, should meet the stability criteria of 3.2.1 increased, if necessary, to the satisfaction of the Competent Authority. As an example, guidance for additional stability criteria for beam trawlers is found in annex XII.

3.8.2 Vessels on which equipment for shooting and hauling fishing gear has been installed should not heel more than 10° when the maximum allowable weight is being lifted.

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* This formula is useful for traditionally built vessels in South East Asia region.

3.9 Operating conditions for vessels of design categories A and B

3.9.1 The number and type of operating conditions to be considered should be to the satisfaction of the Competent Authority and should include the following as appropriate:

.1 departure for the fishing grounds with full fuel, stores, ice, fishing gear, etc.;

.2 departure from the fishing grounds with full catch, 30% stores, fuel, etc.;

.3 arrival at home port with full catch and 10% stores, fuel, etc.; and

.4 arrival at home port with 10% stores, fuel, etc. and minimum catch, which should normally be 20% of full catch but may be up to 40% provided the Competent Authority is satisfied that operating patterns justify such a value.

3.9.2 In addition to the specific operating conditions given in 3.9.1 the Competent Authority should also be satisfied that the minimum stability criteria given in 3.2 or 3.6, as appropriate, are met under all other actual operating conditions including those which produce the lowest values of the stability parameters contained in these criteria. The Competent Authority should also be satisfied that those special conditions associated with a change in the vessel's mode or areas of operation which affect the stability considerations of this chapter are taken into account.

3.9.3 Concerning the conditions referred to in 3.9.1, the calculations should include the following:

.1 allowance for the weight of the wet fishing nets and tackle, etc., on deck;

.2 allowance for ice accretion, if anticipated, in accordance with 3.10;

.3 homogeneous distribution of the catch, unless this is inconsistent with practice;

.4 catch on deck, if anticipated, in operating conditions referred to in 3.9.1.2, 3.9.1.3 and 3.9.2; and

.5 allowance for the free surface effect of liquids and, if applicable, catch carried.

3.10 Ice accretion

3.10.1 For vessels operating in areas where ice accretion is likely to occur the following icing allowance should be made in the stability calculations:*

.1 30 kg/m^2 on exposed weather decks and gangways;

.2 7.5 kg/m^2 for the projected lateral area of each side of the vessel above the water-plane; and

* For sea areas where ice accretion may occur and modifications of the icing allowance are suggested, refer to the Guidance relating to ice accretion, contained in recommendation 2 of attachment 3 to the Final Act of the 1993 Conference. Refer also to the Icing consideration and the Recommendation for skippers of vessels on ensuring a vessel's endurance in conditions of ice formation contained in appendix 10 to the annex to Part A of the Code of Safety for Fishermen and Vessels.

.3 the projected lateral area of discontinuous surfaces of rail, spars (except masts) and rigging of vessels having no sails and the projected lateral area of other small objects should be computed by increasing the total projected area of continuous surfaces by 5% and the static moments of this area by 10%.

3.10.2 The height of the centre of gravity of ice accretion should be calculated according to the position of corresponding parts of the decks and gangways and other continuous surfaces on which ice can accumulate.

3.10.3 Vessels intended for operation in areas where ice accretion is known to occur should be:

.1 designed to minimize the accretion of ice; and

.2 equipped with such means for removing ice as the Competent Authority may require.[**]

3.11 Inclining test for decked vessels

3.11.1 Every decked vessel, for which the stability criteria in 3.2.1 are used, should undergo an inclining test upon its completion and the actual displacement and position of the centre of gravity should be determined for the light ship condition.

3.11.2 Where alterations are made to a vessel affecting its light ship condition and the position of the centre of gravity, the vessel should, if the Competent Authority considers this necessary, be re-inclined and the stability information revised.

3.12 Built-in buoyancy for undecked vessels

3.12.1 Every undecked vessel should be fitted with buoyancy compartments, which are filled with solid buoyancy material, accepted by the Competent Authority, distributed so that the vessel will stay afloat and on an even keel in order that bailing is possible, without listing if flooded. This buoyancy should be demonstrated by a calculation and/or by a practical test:

.1 Calculation, using the following formula:

Buoyancy (litres) = Hull (kg) + Equipment (kg) + Motor (kg) + 250M

where:

M = 0.1 LOA *B*; and
LOA and *B*, in metres, are as defined in 1.2.21 and 1.2.5.

For a wooden vessel, the calculations may take into account half the volume of the buoyancy of the wood.

.2 Completing the following practical test:

[**] Refer to 2.4 of appendix 10 to the annex to Part A of the Code of Safety for Fishermen and Vessels on a typical list of equipment and hand tool required for combating ice formation.

The vessel should be loaded with a simulation of the equipment and motor weights plus 250M (as above) kg and then be flooded to the point of submergence. The vessel should then bear a weight of 15 kg on the gunwale amidships on one side of the vessel, without capsizing.

3.12.2 Annex XIII shows a practical buoyancy test, which may be used as an alternative.

3.13 Stability information

3.13.1 Where practicable, suitable stability information, to the satisfaction of the Competent Authority, should be supplied to enable the skipper to assess with ease the stability of the vessel under various operating conditions.*** Such information should include specific instructions to the skipper warning of those operating conditions which could adversely affect either the stability or the trim of the vessel.****

3.13.2 The stability information, referred to in 3.11.1, should be posted on board, readily accessible at all times and inspected at the periodical surveys of the vessel to ensure that it is still valid.

3.13.3 Where alterations are made to a vessel affecting its stability, revised stability calculations should be undertaken to the satisfaction of the Competent Authority. If the Competent Authority requires that the stability information should be revised, the new information should be supplied to the skipper and the superseded information removed.

3.14 Portable fish-hold divisions

3.14.1 The catch should be properly secured against shifting which could cause dangerous trim or heel of the vessel. The scantlings of portable fish-hold divisions, if fitted, should be to the satisfaction of the Competent Authority. The scantlings of portable fish-hold divisions, if fitted, should be in accordance with the recommended practice on portable fish-hold divisions set out in annex X.

3.15 Bow height

3.15.1 The bow height should be sufficient, to the satisfaction of the Competent Authority, to prevent the excessive shipping of water and should be determined taking account of the seasonal weather conditions, and the design category in which the vessel is intended to operate and its mode of operation.

3.16 Maximum permissible operating draught

3.16.1 The maximum permissible operating draught should be to the satisfaction of the Competent Authority and should be such that, in the associated operating condition, the stability criteria of this chapter and the provisions of chapters 2 and 6, as appropriate, are satisfied.

*** Refer to annex XI containing an example of a stability notice. See also the General provisions against capsizing and information for the master, contained in chapter 2 of the Code on Intact Stability, adopted by the Organization by resolution A.749(18), as amended.

**** Refer to the Code of practice concerning the accuracy of stability information for vessels, adopted by the Organization by resolution A.267(VIII).

CHAPTER 4 MACHINERY AND ELECTRICAL INSTALLATIONS

PART 1 – MACHINERY

4.1 General

4.1.1 Machinery and electrical installations should be designed, constructed and installed in accordance with good marine engineering practice. Equipment should be installed, protected and maintained so as not to constitute a danger to persons and the vessel.

4.1.2 Access for persons to machinery spaces should be arranged clear of any moving or heated surfaces and the latter should be sufficiently insulated. Effective guards should protect exposed moving parts such as shafts, drive pulleys and belts. Access ladders should be securely fixed to the vessel's permanent structure and should be of a metal such as steel where practicable.

4.1.3 Layout and installation of machinery spaces and propulsion machinery should be designed for safe and efficient operation.

4.1.4 Lighting should be watertight, where practicable, and designed to facilitate easy inspection and be unaffected by vibration.

4.1.5 Ventilation should be provided either by mechanical fans or natural vents to meet the air requirements of the propulsion machinery and to prevent build-up of fumes and excessive heat.

4.1.6 Floor plates, where fitted, should be non-slip and securely fastened with accessible fasteners.

4.1.7 Piping materials, including plastic piping where allowed by the Competent Authority, should be suitable for their intended purpose; in choosing the material to be used it should be ensured that there would be no failure or degradation of the pipe as a result of any reaction with the fluid.

4.1.8 Tools, spare parts and spare gear required for routine maintenance and simple repairs should be provided for machinery and should be securely stowed in an easily accessible place. Guidance on tools and spare parts is to be found in annex XIV.

4.1.9 Valves, piping and flexible hoses should be of sound and efficient construction and installation. All piping systems should be well supported with pipe clips or mounts and protected against vibration and chafing/wear.

4.1.10 Where pipework is replaced, alignment of the replacement part should be as close as possible to the original.

4.2 Propulsion machinery and stern gear

4.2.1 Propulsion engines and associated stern gear should be of a design, type and rating to suit the design and size of the vessel taking account of the operating conditions and area of operation.

4.2.2 Inboard engines should in general be diesel powered. However in the case of undecked vessels inboard petrol engines may be fitted.

4.2.3 Outboard engines should be securely mounted on a substantial transom. Outboard engines with output more than 15 kW should be surrounded by an overboard drained well, large enough to allow the engine to be tilted entirely above the waterline in parked position. Undecked vessels should have alternative means of propulsion such as oars, paddles or sails.

4.2.4 Flexibly mounted engines should be fitted with short flexible connections of an appropriate type, fitted to associated piping and exhaust systems. Flexible shaft couplings should be suitable for the power to be transmitted and of a type that would not create unacceptable torsional vibrations.

4.2.5 A vessel of design categories A and B fitted with an inboard engine should have adequate means and power for going astern in order to maintain control of the vessel in all foreseeable circumstances.

4.3 Shaft and propeller

4.3.1 The propeller shaft and any intermediate shaft, together with the stern tube, bearings and bushes, should be properly constructed and operate efficiently. Shaft materials, diameter and eventual free span between bearings should be suitable for the power being transmitted and according to manufacturer's requirements. Inboard stern glands should be accessible for adjustment.

4.3.2 As a minimum the shaft diameter should be:

$$d = k * \sqrt[3]{\frac{p}{r}}$$

where:

d = shaft diameter in mm
p = Maximum Continuous Rating in kW
r = propeller revolutions per second
k = 30 for carbon steel
= 23 for AISI 316
= 22 for AISI 431
= 21 for AISI 429
= 18 for CuNi K500.

4.4 Engine starting

4.4.1 All propulsion engines, excepting those engines fitted with hand starting arrangements, should be provided with a secondary means of starting.

4.5 Controls and instruments

4.5.1 The controls should be properly constructed and operate efficiently. Instrumentation system for the propulsion engine should, where practicable, show the following parameters:

.1 RPM;

.2 cooling water temperature; and

.3 lubricating oil pressure.

4.5.2 High water temperature and low lubricating oil pressure alarms should be fitted, where practicable.

4.5.3 Propulsion engines fitted below deck in a machinery space and arranged for remote operation from the wheelhouse or helm position should be provided with an arrangement on or adjacent to the engine to stop it.

4.6 Steering gear

4.6.1 The steering arrangements including the rudder and associated fittings should be of adequate strength and capable of steering the vessel at maximum speed and should be so designed and constructed that they are not damaged at maximum astern speed or by manoeuvring during fishing operations.

4.6.2 All parts of the steering gear should be easily accessible for maintenance. For guidance on steering gear refer to annex XV.

4.6.3 Vessels should be provided with an alternative means of steering which would operate if the main system fails, this may include a steering oar.

4.7 Pumping and piping systems

Fuel oil installations

4.7.1 Tanks for fuel oil should be of sound and efficient construction and safe in operation and should be located remote from heated surfaces and not be situated above hot surfaces and electrical equipment. Tanks and piping should be arranged to minimize in the event of leakage or rupture the possibility that fuel would come into contact with hot surfaces or electrical components. All fuel tanks should be fitted either with a level gauge or able to be sounded manually. Glass contents gauges, where fitted, should have self-closing valves at the base. Metal rods or slotted covers should protect sight glasses. Fixed tanks should be fitted with separate filling and air pipes. On the fuel pipe line there should as close as possible to the tank be mounted a closing valve which is also closable from outside the engine-room. As close as possible to the tank's lowest point there should be a drain valve.

4.7.2 Piping systems should be of sound construction and suitable for the service intended. Flexible connections should be of an appropriate armoured fire-resistant hose with screw fittings, and kept as short as practicable.

4.7.3 Petrol tanks should not be integral with the hull structure. An efficient system should be installed to ensure that petrol does not spill into the hull of the vessel when tanks are being filled. They should not be placed close to any sources of heat nor close to electrical machinery that may cause sparking. Petrol filling systems should be effectively bonded or earthed.

4.7.4 Portable petrol tanks for outboard motors should be secured when in use and arranged in a way that they can be taken ashore for filling.

Cooling water systems

4.7.5 The piping and fittings are to be of sound construction and efficient in operation, the following requirements should be met:

.1 cooling water inlets for main and auxiliary machinery should be kept to a minimum and comply with the requirements of sea inlets, in 2.3;

.2 sea inlet trunks or boxes built into the hull structure should be of such a design that they remain below the waterline at all normal conditions of trim and heel, and should be fitted with arrangements for purging of trapped air;

.3 the sea inlet pipe to the propulsion engine should be fitted with an accessible strainer;

.4 where a common sea main supplying a number of services is installed, each branch pipe should be fitted with an easily accessible isolating valve, with open/closed indication;

.5 where practicable, decked vessels with a single sea water cooling supply to the propulsion engine should be fitted with an additional hose connection with a valve, whereby an emergency supply of cooling water from another pump, that has a sea suction, may be introduced in the event of blockage of the main sea inlet valve;

.6 When modifications are made, particular care should be made in the selection and installation of appropriate materials and comply with the requirements in 4.7.16, 4.1.9 and 4.1.10.

Bilge pumping systems

4.7.6 Decked vessels should have an efficient bilge pumping arrangement fitted, and where practicable, each watertight compartment should have one bilge suction and each suction should be fitted with an easily cleanable filter.

4.7.7 Undecked vessels not fitted with a bilge system should have means of manual bailing such as a bucket, bailer or hand operated bilge pump.

Bilge pumps

4.7.8 All decked vessels should have at least one hand bilge pump. Decked vessels of design categories A and B, fitted with inboard engines, should in addition have at least one power-driven bilge pump fitted.

4.7.9 The power-driven pump may be any pump provided that any sea connection to the pump is isolated from the bilge suction main by a switch cock or interlocked valve system such that sea water cannot drain into the bilge main.

4.7.10 Where a deckwash pump is also utilized for bilge suction purposes, means should be provided to prevent flooding of any compartment from the sea inlet via the bilge main.

4.7.11 Flexible connections and hoses, where fitted, should be soundly constructed and operate efficiently, and should be readily accessible.

4.7.12 Where watertight bulkheads are fitted, means should be provided in the piping system to prevent any leakage via the system from one compartment to another and/or from the sea inlet to a compartment.

4.7.13 Where practicable, an audible and visible bilge level alarm should be fitted to indicate leakage of water into the machinery space. Indication should be at the helm or control position.

Bilge pump installation

Vessel size (LOA)	Total no. of pumps	Number and type of pumps		Min. capacity of power pumps *l*/minute	Minimum total capacity of all pumps *l*/minute
		Hand	Power		
Less than 6 m	1	1	-	-	70
6 m and over	2	1	1	70	140

Exhaust systems

4.7.14 Engine exhaust systems of the dry or water-injected type, which discharge through the hull below the deck at the side or stern, should be provided with means of preventing back flooding into the hull or engine through the exhaust system. This may be by system design, valve or non-return device. See annex XVI.

4.7.15 The exhaust systems should be of sound construction, and hoses of a suitable material, well supported, free from defects, and not in contact with combustible materials.

Materials for valves and associated piping – sea water systems

4.7.16 Valves, pipes and fittings serving as sea inlets and discharges attached directly to the hull of the vessel below the loaded waterline should be of cast steel, bronze, or other equivalent and compatible material. Care should be taken not to use dissimilar metals when joints are required and particularly when lengths of pipe are replaced.

4.7.17 The sea inlet valve should be as close as possible to the hull. Where the sea inlet valve or fitting is connected to the hull by means of a tube or distance piece, the tube or distance piece should be of a material that is compatible with the hull and valve.

Hydraulic systems

4.7.18 The design and installation of hydraulic piping systems should ensure the lowest possible risk of leakages, noise and pipe failure. This requires as few bends as possible. To enable noise reduction expansion pieces should be fitted on supply lines.

4.8 Ventilation of engine-room

4.8.1 Where fitted, the separate engine-room air intake should be of a size capable of meeting the engine manufacturers' requirements, but not less than 7 cm^2/kW; this should be increased to 10 cm^2/kW in tropical climates. The engine-room air intake should be located on the opposite side of the vessel to the engine air intake. The ventilation duct should be provided with means of closing outside the engine-room.

PART 2 – ELECTRICAL INSTALLATIONS

4.9 Main source of electrical supply

4.9.1 When electrical power constitutes the only means of maintaining auxiliary services essential for the propulsion and safety of the vessel, a main source of electrical power should be provided.

4.9.2 Electricity generating and storage system(s) should have sufficient capacity in normal operating conditions to ensure the correct operation of all safety and navigation equipment including navigation and fishing lights.

4.10 Emergency source of electrical power

4.10.1 All vessels of design categories A and B should be equipped with an emergency accumulator battery bank capable of supplying the emergency lights, radio communication equipment and the navigation lights, for at least three hours. The same recommendation should be applied to vessels of design categories C1, C2 and D authorized to operate more than 20 nautical miles from a safe haven.

4.10.2 The emergency battery should receive constant not selective charging from an electrical generating system having sufficient capacity to reach the minimum requirements for radio transmissions within a period of 10 h. The battery should, where practicable, be located outside the machinery space above deck or as high as possible. It should be so arranged as to ensure functionality in the event of fire or other causes of failure to the main electrical installations.

4.10.3 Where the main engine of a vessel in design categories A, B and C1 has no hand starting ability, one emergency starting battery should be installed with capacity according to the engine manufacturers' requirements and to the satisfaction of the Competent Authority. This battery could be the same battery that supplies other consumers onboard provided it has enough capacity to start the engine; there should be a minimum of two battery banks onboard.

4.11 Precautions against shock, fire and other hazards of electrical origin

4.11.1 The design and installation of electrical systems should be such that the risk of fire and the risk of electrical shock to operating personnel are minimized.

4.11.2 All electrical cables should be at least of a flame-retardant type and should be so installed as not to impair their original flame-retarding properties. The Competent Authority may permit the use of special types of cables when necessary for particular applications, such as radio frequency cables, which do not comply with the foregoing.

4.11.3 Except as permitted by the Competent Authority in exceptional circumstances, all metal sheaths and armour of cables should be electrically continuous and should be earthed.

4.11.4 Where the cables are not metal sheathed or armoured and there might be a risk of fire in case of an electrical fault, special precautions should be taken to the satisfaction of the Competent Authority.

4.11.5 Cable installations:

.1 When selecting cables, particular attention should be given to environmental factors such as temperature and contact with substances, e.g., polystyrene, which degrades PVC insulation.

.2 Cables should not be run below floor plate level or in bilges as the case may be, except where this is necessary for connections to underwater equipment, etc.; such cables should be run through a protective pipe/shield or conduit.

.3 Cables running through fish-holds should be fitted in conduits. Cables should not be secured directly to fuel or oil storage tanks.

.4 Where cables are not run through conduits in machinery spaces, cable trays should fitted and the cables should be secured to the trays with suitable clips.

.5 To the extent practical, all cables from the main switch board to distribution boxes elsewhere should also be carried on cable trays and securely fastened with suitable clips.

4.11.6 All circuits should be clearly identified on switchboards and distribution boards, including service, protective device rating, current carrying capacity and voltage values to the satisfaction of the Competent Authority. Differing voltages should not be included in any one of the distribution boards, unless the Competent Authority is satisfied that the approved arrangement does not pose a risk to operating or maintenance personnel.

4.11.7 All circuits for consumers larger than 5A, except the main supply from the battery to the starter motor and motors for steering gear systems, should be fitted with fuses or circuit breakers to provide protection against overload and short circuit.

4.12 Electrical systems

4.12.1 Guidance on the installation of electrical equipment can be found in annex XVII[*].

4.12.2 Particular attention should be given to protection against water ingress and the effects of vibration.

4.12.3 All circuits should be clearly identified on switchboards and distribution boards, including service, protective device rating, current carrying capacity and voltage values. Differing voltages should not be included in any one distribution board, unless approved by the Competent Authority.

4.12.4 All circuits for consumers larger than 5A, except the main supply from the battery to the starter motor, should be provided with fuses or circuit breakers to provide protection against overload and short circuit.

4.12.5 Piping conveying liquid should not be fitted above or close to switchboards or other electrical equipment. Where such arrangements are unavoidable, provision should be made to prevent leakage damaging the equipment.

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[*] Further guidance can be found in ISO 10133 Small Craft Electrical Equipment Extra-low Voltage DC Installations, ISO 13297 Small Craft Electrical Equipment Alternating Current Installations.

4.12.6 Taking into consideration the design of the system and the working voltage, the Competent Authority may require a system of earth indicator lamps or means of detecting current leakage to be installed.

4.12.7 Batteries should be fitted in enclosed boxes or trays with covers, and provided with sufficient ventilation for the battery to avoid the risk of explosion, remote from sources of ignition. Battery boxes should be sited clear of heat sources and where they are least likely to be flooded. If batteries are sited in accommodation spaces the boxes should be sealed from the accommodation and ventilated to open air.

4.12.8 Each battery or bank of batteries should have a spark proof isolating switch. Systems such as automatic bilge pumps or alarms used when the vessel is unattended should be connected before the cut-off switch.

4.12.9 A means of checking the charge of the battery should be available.

4.12.10 Batteries positioned in the engine compartment should be so arranged as not to short circuit when the compartment is flooded up to the loaded waterline. The batteries should be securely fastened to avoid movement due to the motion of the vessel.

4.12.11 Battery installations of more than 5 kWh, equivalent to 208 Ah at 24 V and 416 Ah at 12 V should be placed in a separate compartment with ventilation to open air. The arrangement should be such the air circulation is not blocked.

4.12.12 Where the main and/or auxiliary engines are fitted with electric motor starters, the batteries connected to the system for starting should be separate from the batteries used for other services. The starter batteries should be capable of starting the engine at least six times without recharging.

DC Systems

4.12.13 Direct current installations should be wired as insulated return systems. The hull should not be used to carry current.

4.12.14 The Competent Authority may approve the following direct current generating and distribution systems providing these are suitable for the intended purpose:

12 V
24 V
32 V
110 V

4.12.15 The two-wire system should be used in steel and aluminium vessels. In GRP and wooden boats where suitable earthing systems are not fitted the single wire system may be used.

AC Systems

4.12.16 The Competent Authority may approve alternating current systems of over 220 V providing that these are suitable for the intended purpose.

4.12.17 Cables for AC systems should be kept separate from DC systems and run in separate trays and conduits, unless approved by the Competent Authority.

4.12.18 Switchgear for AC systems should be fitted in switchboards and panels which are separate from those containing DC systems, unless approved by the Competent Authority. Systems and equipment should be clearly marked.

4.12.19 Switchgear and sockets should be so arranged as to prevent the fitting of low voltage equipment and lamps into high voltage systems.

4.13 Earthing and bonding

4.13.1 Earthing systems should be sound and efficient and such that no danger to the system or vessel can occur. Hull earth plates, where fitted, should be efficiently connected and not painted over.

4.13.2 In steel and aluminium vessels, non-conducting exposed metal parts of electrical equipment that requires to be earthed should be effectively earthed to the hull.

4.13.3 On wood and composite vessels, a continuous ground conductor should be installed to facilitate the grounding of non-conducting exposed metal parts of electronic and communication equipment that are required to be earthed; the conductor should terminate at a point on the main engine or at a copper plate of area not less than 0.2 m^2 fixed to the keel below the light waterline so as to be fully immersed under all conditions of heel. Inside the hull, the earth plate should be connected to a copper bar or rod, of at least 64 mm^2, the length being appropriate to the number of bonding points.

4.13.4 Every earthing conductor should be of copper or other corrosion-resistant material and should be securely installed and protected, where necessary, against damage and against electrolytic corrosion.

4.13.5 Exposed permanently fixed metal parts of electrical machines or equipment which are not intended to be “live”, but which are liable under fault conditions to become “live” should be earthed unless:

.1 they are supplied at a voltage not exceeding 55 V direct current or 55 V, root mean square, between conductors, auto-transformers should not be used for the purpose of achieving this alternative current voltage; or

.2 they are supplied at a voltage not exceeding 250 V by safety isolating transformers supplying one consuming device only; or

.3 they are constructed taking into account the principle of double insulation.

4.13.6 Lightning conductors should be attached directly to the earth plate.

4.13.7 Radar, radio and other navigational equipment that are required to be earthed should have a separate earthing point and the connection should be as short as possible.

4.13.8 Where a flexible non-conducting coupling is fitted between the engine and the propeller shafting the coupling should be bridged by a piece of braided copper conductor.

4.14 Lighting systems

4.14.1 Lighting of normally unattended spaces such as fishrooms and net stores should be controlled from outside the space.

4.14.2 Emergency lighting should be supplied from an accumulator battery. Such emergency lighting should be placed at stairways, exits, machinery spaces, control stations and where survival craft are positioned. An emergency source of power should be made available for a signalling lamp if carried.

4.15 Electric motors

4.15.1 Every electric motor should be provided with a means of starting and stopping so located as to be easily operated by the person controlling the motor.

4.15.2 The circuit supplying the motor should be fitted with short circuit and overload protection. In the case of motors in a steering gear system that are not required to be so protected, an overload alarm should be provided at the helm. However, protection against excess current, if provided should be set at not less than twice the full load current of the motor or circuit and should be arranged to allow the passage of the appropriate starting current.

4.15.3 Fans and pumps driven by electric motors are to be fitted with a remote control. The remote control should be positioned outside the machinery space concerned, for stopping the motors in the event of a fire in the space in which they are located.

4.16 Lightning conductors

4.16.1 Lightning conductors should be fitted on wooden masts. They should be of continuous copper tape or copper rope having a cross section of not less than 75 mm^2 and secured to a copper spike of 12 mm diameter projecting at least 150 mm beyond the top of the mast.

4.16.2 In the case of metal hulls, the lower end of the conductor is to be earthed to the hull or in the case of wood or other non-metallic hulls, the lower end of the conductor is to be attached to the earth plate. All sharp bends must be avoided and only bolted or riveted joints should be used.

4.17 Anodes

4.17.1 Where applicable, vessels should be fitted with adequate numbers of zinc or equivalent anodes suitable for the areas to be protected. Anodes fitted in the propeller aperture should be positioned in such a way that they do not disturb the flow of water to the propeller. Anodes should not be painted over and should not be fitted close to earthing plates.

4.18 Equivalency

4.18.1 Electrical installations, which do not comply with the requirements of this part, may be accepted provided that they are unavoidable and that there are justifiable reasons precluding compliance and that the electrical installations are deemed by the Competent Authority to be equivalent to the requirements specified in this part.

CHAPTER 5 FIRE PROTECTION AND FIRE FIGHTING

PART 1 – GENERAL

5.1 Structure

5.1.1 Fire retardant materials should be used in any part of the vessel where the risk of fire is increased due to proximity of heat sources.

5.1.2 Manholes or other openings to fuel oil tanks should not be positioned in the accommodation.

5.2 Maintenance of fire-fighting appliances

5.2.1 Fire-fighting appliances should be maintained in the manner as specified by the manufacturer and to the satisfaction of the Competent Authority.

5.3 Heating installations

5.3.1 Where fitted, electric radiators should be fixed in position and so constructed as to reduce fire risks to a minimum. No such radiator should be fitted with an element so exposed that clothing, curtains, or other similar materials can be set on fire by heat from the element.

5.3.2 Heating stoves, their flues and other similar appliances should be permanently secured and there should be adequate protection against fire.

5.3.3 Heating by means of open fires should be prohibited.

5.4 Storage of gas cylinders

5.4.1 Cylinders, which contain flammable or other dangerous gases, should be stored, suitably secured, on the open deck and in a shelter which is designed to protect them from external heat sources, sun and external impact.

5.4.2 It is recommended that gas detectors are carried on board.

5.4.3 All pipes conveying gas from cylinder to appliances for domestic purposes should be of steel or other material accepted by the Competent Authority.

5.4.4 The Competent Authority may permit alternative arrangement which provide an equivalent measure of safety.

5.5 Requirements for fire-fighting appliances

5.5.1 The performance of fire extinguishers should be to the satisfaction of the Competent Authority.

5.6 Miscellaneous items

5.6.1 The Competent Authority should ensure that materials used as deck coverings and for fittings do not have low spontaneous combustion temperatures, or have explosive qualities when

exposed to abnormal heat sources. This would not exclude the use of wood, GRP or other similar materials.

5.6.2 All reasonable steps should be taken to minimize the emission of harmful vapours in the event of fire.

5.6.3 In the event of a fire in a space containing machinery it should be possible to stop the machinery from a location outside the machinery space.

PART 2 – UNDECKED VESSELS

5.7 Number of fire fighting appliances

5.7.1 Vessels should be provided with fire extinguisher(s), of a type and size approved by the Competent Authority. Such extinguishers should be sited near to the machinery space. The minimum requirements are as follows:

Propulsion	No engine	Outboard	Inboard
Fire Extinguisher	0	0	1 [c)]
Fire Bucket	0 [a)]	1 [b)]	1 [b)]

Notes
a) Not required where other water container (e.g., bailer) is carried
b) Not required where two or more extinguishers are carried
c) The Competent Authority may, after consultation with fishermen exempt the smallest vessels from this requirement

PART 3 – DECKED VESSELS

5.8 Number of fire-fighting appliances

5.8.1 Vessels should carry at least two appropriate fire extinguishers one of which should be located near the machinery space. Where only two fire extinguishers are provided a pail or a bucket coloured red for fire-fighting use should also be carried.

5.8.2 Vessels only fitted with outboard engines may dispense with one fire extinguisher required by 5.8.1.

5.9 Fire-fighting appliances for machinery spaces

5.9.1 Where appropriate a sufficient number of automatic dispersion type fire extinguishers or fire extinguishers deemed appropriate by the Competent Authority should be placed in the machinery spaces, taking into account the volume of the space and arrangement of the machinery.

5.9.2 When the automatic dispersion type fire extinguishers or extinguishing equipment are provided in accordance with 5.9.1, one of the extinguishers required in 5.8.1 is not necessary.

5.10 Ventilation systems

5.10.1 Means should be provided for stopping the ventilators and closing the openings in the ventilation system from a location outside the spaces being served.

CHAPTER 6 PROTECTION OF THE CREW

6.1 General protective measures

6.1.1 The identification of hazards and the consequent measures to assess and manage risk as concerns the construction of and equipment for fishing vessels should be taken in the following order of priority:

.1 elimination of the risk;

.2 control of the risk at the source;

.3 minimization of the risk by such means as the design of safe work systems, the introduction of technical and organizational measures and safe practices and training; and

.4 in so far as the risk remains, provision of the use of personal protective equipment and clothing.

6.1.2 The surfaces of decks and of flooring in working spaces on board, such as machinery spaces, galleys, fish handling and deck equipment operating areas, and deck areas at the foot and head of ladders, should be designed and treated to minimize the possibility of personnel slipping.

6.1.3 Where practicable, an adequate system of lifelines should be provided and it should be complete with the necessary wires, ropes, shackles, eye bolts and cleats.

6.1.4 All vessels should be provided with a means of re-boarding after an accidental fall overboard which should be permanently attached to the vessel. On single-handed vessels the means of re-boarding should be accessible by a person in the water.

6.1.5 Where practicable, on single-handed vessels the Competent Authority should require an arrangement to ensure that if the operator falls overboard the engine will stop. Such an arrangement should not constitute a danger to the operator.

6.2 Deck openings and doors

6.2.1 Hinged and sliding covers of hatchways, manholes, doors and other openings should be prevented from swinging or accidental closing.

6.2.2 Dimensions of access hatches should be of an adequate size for the intended purpose.

6.2.3 Having regard to the operation of the vessel, suitable protection should be provided, where practicable, in positions where there is a danger of personnel falling through deck openings.

6.2.4 Handholds should be provided above the level of the deck over escape openings.

6.2.5 In general external hatches and doors should be closed when the vessel is at sea. All openings occasionally required to be kept open during fishing and which may lead to flooding should be closed immediately if such danger of filling occurs with subsequent loss of buoyancy and stability.

6.2.6 Moving parts of machinery, winches, line and net haulers should be adequately guarded.

6.3 Bulwarks, rails and guards

6.3.1 On decked vessels, efficient bulwarks or guardrails should be fitted on all exposed parts of the working deck and on superstructures and deck erections. On undecked vessels, the height of the gunwales should be sufficient to minimize the risk of persons falling overboard. In every vessel where a fixed bulwark or gunwale is less than 1 m, guardrails should be fitted up to1 m, provided that where this would interfere with the fishing operations of the vessel, alternative arrangements may be accepted by the Competent Authority.

6.3.2 Clearance below the lowest rail should not exceed 230 mm. Other rails should not be more than 250 mm apart, and the distance between stanchions should not be more than 1.5 m. Rails and bulwarks should be free from sharp edges and corners and should be of adequate strength.

6.3.3 Satisfactory means in the form of guard rails or lifelines should be provided for the protection of the crew in getting to and from their quarters, machinery spaces and other working spaces. Storm rails should be fitted on the outside of all deckhouses and casings.

6.3.4 Where equipment is normally incorporated in the structure of a bulwark or rail within the minimum height prescribed for the bulwark, or mounted between stanchions of a guard rail, provision should be made to protect the area when the equipment is not in place.

6.3.5 Where part of a bulwark or guard rail has to be removed for the purpose of the fishing operation, protection for the crew should be provided at the opening.

6.4 Stairways and ladders

6.4.1 For the safety of the crew, stairways and ladders should be of adequate size and strength with handrails and anti-slip treads to the satisfaction of the Competent Authority.

6.5 Safe access

6.5.1 Means should be provided, wherever necessary and to the extent practicable, to ensure sufficiently safe and convenient access to the vessel where facilities are not provided in the port. Such means should be of safe construction and adequate strength, be well illuminated and where practicable have anti-skid surfaces.

6.6 Cooking facilities

6.6.1 Cooking facilities should be provided with guard rails and hand rails.

6.6.2 Cooking stoves should be fitted with guards to retain cooking utensils.

6.7 Deck machinery, tackle and lifting gear

6.7.1 All powered winches and hauling equipment for fishing gear should be fitted with emergency stop safety devices. The emergency stop should be provided at the winch and at the remote station as well as in the wheelhouse.

6.7.2 Controls of winches, line and net hauling equipment, should be so placed that winch operators have ample room for their unimpeded operation and have as unobstructed a view as possible of the working area. Control handles should be provided, where necessary, with a suitable locking device in the stop/neutral position, to prevent accidental movements or displacement or unauthorized use.

6.7.3 Guidance on the safe operation of winches, line haulers and lifting gear is given in annex XXV.

6.8 Lighting in working spaces and areas

6.8.1 All passageways, working spaces and working areas on board the vessel should be well lit. The quality and intensity of the lighting should be sufficient to ensure that the work can be carried out with full regard to health and safety.

6.8.2 The amount of light should be sufficient to distinguish details. The light should create suitable contrast conditions and should not glare.

6.8.3 Fish-holds should be provided with lighting ensuring adequate lighting in all conditions, both for orientation and during work in the hold.

6.8.4 The lighting should not interfere with the keeping of a proper lookout.

6.8.5 Where practicable, provision should be made for some form of emergency lighting.

6.9 Ventilation in working spaces

6.9.1 Ventilation in enclosed working spaces should be in accordance with the provisions of 5.10.

6.10 Medical services

6.10.1 Medical supplies, equipment and instructions as required by the Competent Authorities should be provided in all vessels, taking into account the risks to which crew are exposed[*]. Guidance on the basic first aid kit can be found in annex XXIII.

6.10.2 Vessels should carry an appropriate medical guide or instructions, as required by the Competent Authority. The medical guide or instructions, should be illustrated, should explain how the medical supplies are to be used.

6.10.3 The medicine chest should contain equipment and medical supplies that are not outdated, suitable for the expected service of the vessel (e.g., unlimited trips; trips of less than a certain distance from the nearest port with adequate medical equipment; service in harbours and very close to shore).

[*] International guidance relating to first aid at sea laid down in the International Medical Guide for Ships, prepared by the International Labour Organization, the International Maritime Organization and the World Health Organization, may serve as a guide. In addition, some regional guidelines have also been developed. Refer to EU Council Directive 92/29/EEC on the minimum safety and health requirements for improved medical treatment on board vessels.

6.10.4 Appropriate instructions including contact details should be provided to enable the crew to consult effectively with medical services ashore.

6.10.5 Where the operating area of the vessel changes, the medical supplies carried should be reviewed.

6.10.6 All instructions should be in a language understood by the crew and should be accompanied by illustrations to facilitate ease of understanding and communication.

6.11 Miscellaneous

6.11.1 To the extent possible, protective clothing and safety working equipment should be provided to the crew and instruction and training given on its use, appropriate to prevent injury or illness to the crew. Refer to annex XIX for guidelines on appropriate protective equipment.

6.11.2 Clothing for crew members working on deck should be capable of supporting the wearer in the water in the event of being washed overboard. A personal flotation device or a self-inflating working lifejacket may be used for this purpose.

6.11.3 All reasonable steps should be taken to minimize harmful noise and vibration.

6.11.4 The Competent Authority should ensure that the crew are made aware of the health hazards in connection with the carriage of fish in bulk, the depletion of oxygen in the hold, and should advise the crew concerning safe working practices in this regard.

6.11.5 The Competent Authority should ensure that crew members joining a vessel are made aware by the skipper of the particular hazards of the working of the vessel.

6.11.6 Arrangement of fish processing equipment should ensure free access for inspection, operation and cleaning of the equipment and where applicable, be suitably guarded.

6.11.7 Where practicable all work stations on deck should be visible from the wheelhouse.

6.11.8 Where practicable, enclosed working spaces should be provided with an adequate system of heating and/or a supply of fresh air.

6.11.9 Where practicable any deck obstructions and head height obstructions that are a hazard should be painted with a bright, conspicuous colour.

6.11.10 In vessels without an enclosed working space, and where practicable, a shelter which does not affect the stability of the vessel, made of tarpaulin or a similar material should be provided to protect crew from excessive exposure to sun and weather. The shelter may also be used to collect rainwater or as an emergency sail.

CHAPTER 7 LIFE SAVING APPLIANCES

PART 1 – GENERAL

7.1 Definitions

7.1.1 *Buoyant apparatus* means flotation equipment (other than lifeboats, liferafts, life buoys and life-jackets) designed to support a specified number of persons who are in the water and of such construction that it retains its shape and properties. Guidance on the requirements for buoyant apparatus can be found in annex XX.

7.1.2 *Float-free launching* is that method of launching a survival craft whereby the craft is automatically released from a sinking vessel and ready for use.

7.1.3 *Inflatable appliance* is an appliance which depends upon non-rigid, gas-filled chambers for buoyancy and which is normally kept un-inflated until ready for use.

7.1.4 *Launching appliance or arrangement* is the means for transferring a survival craft from its stowed position safely to water.

7.1.5 *Novel life-saving appliance or arrangement* is a life-saving appliance or an arrangement which embodies new feature not fully covered by the provisions of this chapter but which provides an equal or higher standard of safety.

7.1.6 *Personal flotation device* means flotation equipment designed to keep a person afloat and does not hinder a person's ability to work while wearing it.

7.1.7 *Retro-reflective material* is a material which reflects in the opposite direction a beam of light directed at it.

7.1.8 *Survival craft* is a craft capable of sustaining the lives of persons in distress from the time of abandoning the vessel.

7.2 Evaluation, testing and approval of life-saving appliance and arrangements

7.2.1 Except as provided in 7.2.4, life-saving appliances and arrangements to which this chapter refers should be approved by the Competent Authority.

7.2.2 The Competent Authority should have procedures for the approval of life saving appliances and novel life-saving appliances and their arrangements. These procedures should also include the conditions whereby approval would continue or would be withdrawn.

7.2.3 Guidance can be found in annex XXI for the requirements for live-saving appliances. Part C of chapter VII of the Protocol* may also be used.

7.2.4 Life-saving appliances referred to in this chapter for which specifications are not included in annex XXI or in the applicable provisions of the Protocol, should be to the satisfaction of the Competent Authority.

* Chapter III of SOLAS/Life Saving Appliances Code may also be used.

7.3 Production tests

7.3.1 The Competent Authority should require proof that life-saving appliances have been subjected to such production tests as are necessary to ensure that the life-saving appliances are manufactured to the same standard as the approval prototype.

PART 2 – VESSEL REQUIREMENT

7.4 Number and types of survival craft

7.4.1 Every vessel of design categories A and B should be provided with at least one liferaft or buoyant apparatus, unless the vessel complies with the requirements for built-in buoyancy in 3.12, having the capacity to accommodate at least the total number of persons on board.

7.4.2 The Competent Authority, taking into account the vessel's navigational area, conditions of operation and size of the vessel, may permit vessels to carry other types of survival craft of a type and number to the satisfaction of the Competent Authority. Such survival craft may be of rigid or semi-rigid construction. The Competent Authority should consider the local meteorological conditions and area of operations and may require a liferaft or buoyant apparatus to be carried on any vessel.

7.5 Availability and stowage of survival craft

7.5.1 Survival craft should:

.1 be readily available in case of emergency;

.2 be capable of being launched safely and rapidly;

.3 be so stowed that:

.3.1 the marshalling of persons should not be impeded;

.3.2 their prompt handling is not impeded;

.3.3 embarkation can be effected rapidly and in good order;

.3.4 the operation of any other survival craft is not interfered with.

7.5.2 Survival craft and launching appliances, if fitted, should be in working order and available for immediate use before the vessel leaves port and kept so at all times when at sea.

7.5.3 Lashings, if used, should be fitted with an automatic release system of an approved type. Refer to annex XXIII on the correct fitting of automatic release systems.

7.5.4 The Competent Authority, if satisfied that the constructional features of the vessel and fishing operations render it unreasonable and impractical to apply particular provisions of this paragraph, may accept relaxation from such provisions, provided that the vessel is fitted with alternative launching and recovering arrangements adequate for the service intended.

7.5.5 All survival craft should be marked with the same registration or other identification marks as used for the vessel as referred to in 7.11.1.

7.6 Lifejackets and Personal flotation devices

7.6.1 A lifejacket of an approved type or a personal flotation device accepted by the Competent Authority should be carried, for every person on board.

7.6.2 Lifejackets should comply with the provisions of the recommendations for testing lifejackets, see annex XXII.

7.6.3 Lifejackets should be so placed as to be readily accessible and their position should be clearly indicated.

7.6.4 The Competent Authority should determine whether lifejackets or personal flotation devices or a combination of both should be carried onboard.

7.7 Immersion suits

7.7.1 For vessels operating in areas where low water or air temperature can be expected, an approved immersion suit of an appropriate size should be provided for every person on board. If the Competent Authority deems it impractical due to the size of the vessel, consideration should be given to alternate provisions.

7.7.2 Immersion suits should be placed as to be readily accessible and their position should be clearly indicated.

7.8 Lifebuoys

7.8.1 Decked vessels of 7 m or more LOA, should be provided with at least one lifebuoy which should be attached to a buoyant line of not less than 18 m in length.

7.8.2 All lifebuoys should be so placed as to be readily accessible and should always be capable of being rapidly deployed and should not be permanently secured in any way.

7.8.3 All lifebuoys should be in a bright contrasting colour to the sea and marked with the same registration or other identification marks as used for the vessel as referred to in 7.11.1.

7.9 Distress signals

7.9.1 Every vessel should be provided, to the satisfaction of the Competent Authority, with means of making effective distress signals by day and by night.

7.9.2 The Competent Authority when considering the amount and types of pyrotechnics carried should consider the area and the nature of the fishing operation. As a minimum the following pyrotechnics should be carried:

.1 Four parachute rockets for vessels of design categories A and B, two of the rockets may be replaced by hand held flares.

.2 Two hand held flares for vessels of design categories C1, C2 and D.

7.9.3 Distress signals should be of an approved type. They should be correctly stored in a dry place so placed as to be readily accessible and their position should be clearly indicated.

7.10 Retro-reflective materials on life-saving appliances

7.10.1 All survival craft, lifejackets, personal floatation devices, immersion suits and lifebuoys should be fitted with retro-reflective material in accordance with the requirements of the Competent Authority.

7.11 Miscellaneous

7.11.1 To facilitate aerial rescue operations, wheelhouse tops or other prominent horizontal surfaces should be painted in a highly visible colour and should bear the vessel's registration or other identification marks in letters and/or numerals in contrasting colours to the background. Similar marks on the sides of the wheelhouse would also facilitate search and identification by aircraft*.

7.11.2 The Competent Authority should ensure that the crew receives adequate training in the use and inspection of life-saving appliances and that the skipper regularly inspects the equipment.

7.11.3 The following additional safety equipment should be carried on all vessels:

.1 whistle;

.2 mirror; and

.3 torch.

7.11.4 Hand rails or similar means, e.g., a capsize rope** should be fitted to the vessel to allow persons to hold on to the vessel in the event of a capsize.

7.11.5 Every vessel should carry adequate means of recovering persons from the water.

7.11.6 Life-saving appliances should be maintained as required by the manufacturer and to the satisfaction of the Competent Authority.

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* Marking of fishing vessels for identification should be in accordance with uniform and internationally recognizable vessel marking systems, such as the Food and Agriculture Organization (FAO) of the United Nations standard specifications for marking and identification of fishing vessels. Refer to FAO technical guidelines for responsible fisheries-No.1 fishing operations. (ISBN 92-5-103914-3) and MSC/Circ.572.

** The rope should be 1.5 times the length of the vessel fitted with a snap shackle, or equivalent, at each end with attachment at each end of the vessel on deck.

7.12 Recommendations to Competent Authorities

Life-saving appliances for vessels of different design categories					
Distance from safe haven	**≤ 5 nm**	**≤ 20 nm**	**≤ 100 nm**	**≤ 200 nm**	**> 200 nm**
Liferaft	A[+], B[+]	A[+], B[+]	A, B, C1[+] C2[+] D[+]	A, B, C1, C2, D	A, B, C1, C2, D
Buoyant apparatus		C1[♣], C2[♣], D[♣]			
Life jacket[♥]	A, B, C1[♦] C2[♦] D[♦♣]	A, B, C1[♦], C2[♦], D[♦♣]	A, B, C1[♦], C2[♦], D[♦♣]	A, B, C1, C2, D	A, B, C1, C2, D
Immersion suit[♠]	A, B	A, B	A, B	A, B	A, B
Lifebuoy[•]	A, B, C1, C2, D	A, B, C1, C2, D	A, B, C1, C2, D	A, B, C1, C2, D	A, B, C1, C2, D
Distress signals: 4 parachute rockets[+++]	A, B	A, B	A, B	A, B	A, B
Distress signals: 2 hand flares	C1, C2, D	C1, C2, D	C1, C2, D	C1, C2, D	C1, C2, D
Capsize rope	A, B, C1, C2, D	A, B, C1, C2, D	A, B, C1, C2, D	A, B, C1, C2, D	A, B, C1, C2, D
Whistle, mirror and torch	A, B, C1, C2, D	A, B, C1, C2, D	A, B, C1, C2, D	A, B, C1, C2, D	A, B, C1, C2, D

[+] The liferaft may be substituted with a buoyant apparatus.

♣ Recommended.

♥ For every person on board.

♦ The life jacket may be substituted with a personal floatation device.

♠ For every person on board a vessel operating in areas where low water or air temperature can be expected.

• Where the vessel is decked and 7 m in LOA or over.

[+++] Two of the rockets may be replaced by hand flares.

CHAPTER 8 EMERGENCY PROCEDURES AND SAFETY TRAINING

8.1 Emergency instructions

8.1.1 The Competent Authority should ensure that all vessels are provided with clear instructions, which should be written where practicable, for the crew, which should be followed in case of emergency. These instructions should be given to a new crew member before sailing on their first trip. The duties* assigned to the crew may include:

.1 closing of valves, scuppers, overboard shoots, skylights, portholes and other similar openings in the vessel;

.2 supply of additional equipment to survival craft and other life-saving appliances;

.3 preparations and launching of survival craft;

.4 general preparation of other life-saving appliances;

.5 use of communication equipment; and

.6 fire fighting.

8.2 Abandon ship training

8.2.1 The Competent Authority should ensure that the crew receives on-board training in the use of the vessel's life-saving appliances, including survival craft equipment. It should be given as soon as possible after a new crew member joins the vessel. Such training should include at least the following:

.1 operation and use of the vessel's life-saving equipment including the launching of liferafts, the donning of lifejackets, personal flotation devices and immersion suits, and precaution against injury and damage caused by sharp objects;

.2 problems of sudden unexpected immersion in cold water and hypothermia, first aid treatment for cold water shock/hypothermia and other appropriate first aid procedures;

.3 special instructions necessary for use of the vessel's life-saving appliances in severe weather and sea conditions;

.4 measures for survival when adrift;

.5 precautions against sharks and other biting fish; and

.6 landing and survival ashore.

* Annex XXX gives guidance on Basic Pre-sea Safety training.

8.3 Training in emergency procedures

8.3.1 Crews should be adequately trained, to the satisfaction of the Competent Authority, in their duties in the event of emergencies[**].

[**] Annex XXI, section I, 3.2, of part A of the Code of Safety for Fishermen and Fishing Vessels, section 8.3 in part B of the same Code and the joint FAO/ILO/IMO Document for guidance on training and certification of fishing vessel personnel, as amended, may also be used as guidance when determining items to be included in such training.

CHAPTER 9 RADIO COMMUNICATIONS

PART 1 – GENERAL

9.1 Application

9.1.1 Unless expressly provided otherwise this chapter should apply to vessels of all design categories engaged on voyages exclusively in sea areas A1 or A2 where radio communications or mobile telephone coverage is provided. Where no land based reception is available vessels should not operate beyond sight of shore, and have means of signalling distress as per 7.9.

9.1.2 No provision in this chapter should prevent the use by any vessel or person in distress of any means at its disposal to attract attention, make known its position and obtain help.

9.2 Definitions

9.2.1 For the purpose of this chapter, the following terms should have the meanings defined below and all other terms and abbreviations which are used in this chapter and which are defined in the Radio Regulations should have the meanings as defined in those Regulations.

9.2.2 *Continuous watch* means that the radio watch concerned should not be interrupted other than for brief intervals when the vessel's receiving capability is impaired or blocked by its own communications or when the facilities are under periodical maintenance or checks.

9.2.3 *Digital selective calling (DSC)* means a technique using digital codes which enables a radio station to establish contact with, and transfer information to, another station or group of stations, and comply with the relevant recommendations of the ITU radio communications sector (ITU-R).

9.2.4 *Maritime safety information* means navigational and meteorological warnings, meteorological forecasts and other urgent safety related messages broadcasted to vessels.

9.2.5 *Radio Regulations* means the Radio Regulations annexed to, or regarded as being annexed to, the most recent International Telecommunication Convention which is in force at any time.

9.2.6 *Sea area A1* means an area within the radiotelephone coverage of at least one VHF coast station in which continuous DSC alerting is available, as may be defined by the Competent Authority.

9.2.7 *Sea area A2* means an area, excluding sea area A1, within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is available, as may be defined by the Competent Authority.

9.2.8 *Sea area A3* means an area, excluding sea areas A1 and A2, within the coverage of an Inmarsat geostationary satellite in which continuous alerting is available.

9.2.9 *Sea area A4* means an area outside sea areas A1, A2 and A3.

9.3 Watches

9.3.1 Every vessel equipped with a VHF installation should while at sea maintain, when practicable, a continuous listening watch on VHF channel 16.

9.4 Sources of energy

9.4.1 Where applicable, there should be available at all times, while the vessel is at sea, a supply of electrical energy, complying with the relevant requirements of 4.9.2, sufficient to operate the radio installations and to charge any batteries used as part of a reserve source or sources of energy for the radio installations.

9.4.2 Where applicable, a reserve source or sources of energy, complying with the relevant requirements of 4.10, should be provided on every vessel to the satisfaction of the Competent Authority, to supply radio installations, for the purpose of conducting distress and safety radio communications, in the event of failure of the vessels main and emergency source of electrical power. The reserve source of energy should be capable of simultaneously operating:

.1 the VHF radio installation in sea area A1;

.2 the VHF radio installation and the MF or HF or satellite installation in sea area A2;

.3 the navigation lights and emergency lighting; and

.4 for a period of at least three hours.

9.4.3 Where applicable the reserve source of energy should be independent of the propulsion machinery of the vessel and the vessels electrical system.

9.4.4 Where a reserve source of energy consists of a rechargeable accumulator battery or batteries:

.1 means of automatically charging such batteries should be capable of recharging them to minimum capacity requirements within 10 h; and

.2 the capacity of the battery or batteries should be checked using an appropriate method, at intervals not exceeding 12 months.

9.5 Performance standards

9.5.1 Equipment to which this chapter applies, except for the domestic radio equipment its ancillary equipment, and mobile telephones, should be of a type approved by the Competent Authority. Such equipment should conform to appropriate performance standards.

9.6 Maintenance requirements

9.6.1 Adequate tools and spares should be carried to enable the equipment to be maintained.

9.6.2 The Competent Authority should ensure that radio equipment required by this chapter is maintained to provide the availability of the functional requirements specified in 9.11, 9.12 and 9.16 and to meet the recommended performance standards* of such equipment.

9.6.3 Satellite EPIRBs should be tested at intervals not exceeding 12 months for all aspects of operational efficiency with particular emphasis on frequency stability, signal strength, coding and registration. The test should be performed within three months prior to or after the expiry date or anniversary date.

9.6.4 The EPIRBs should be subject to maintenance at intervals not exceeding five years. The maintenance is to be performed by approved personnel preferably at an approved shore based maintenance facility.

9.7 Radio personnel

9.7.1 Where applicable, vessels should carry personnel qualified for distress and safety radio communications to the satisfaction of the Competent Authority.

9.8 Alternative arrangements

9.8.1 In lieu of the equipment required in this chapter, the Competent Authority may approve a domestic local system of radio communications, provided it is at least as effective as the requirements of this chapter.

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* Performance standards for shipborne VHF radio installations capable of voice communication and digital selective calling (resolution A.609(15)).

Performance standards for shipborne MF radio installations capable of voice communication and digital selective calling (resolution A.610(15)).

Performance standards for shipborne MF/HF radio installations capable of voice communication, narrow band direct-printing and digital selective calling (resolution A.613(15)).

Performance standards for Float-Free Satellite Emergency Position-Indicating Radio Beacons (EPIRBs) operating on 406 MHz (resolution A.695(17)).

Type approval of Satellite Emergency Position-Indicating Radio Beacons (EPIRBs) operating in the COSPAS-SARSAT System (resolution A.696(17)).

9.9 Equipment requirement overview based on design category and area of operation

Design category	A/B				C1/C2/D	
Sea area	**A1-VHF DSC**	**A1-No VHF DSC**	**A2-MF DSC**	**A2-No MF DSC**	**A1**	**Beyond A1**
VHF radio installation or handheld VHF		×		x	×	x
VHF with DSC on channel 70	×		×			
VHF DSC watch receiver	×		×			
MF with TEL on 2182 kHz				x		
MF with DSC on 2187.5 kHz			×			
HF radio installation (9.12.4)			× DSC	× TEL		×*
Mobile telephone					×	
Radio receiver to receive weather forecasts	×	×	×	×	×	
SART	×	×	×	×		
EPIRB	×	×	×	×		
Means of initiating the transmission of ship-to-shore distress alerts by a radio service other than MF			×	×		

* Where practicable.

PART 2 – REQUIREMENTS FOR VESSELS OF DESIGN CATEGORIES A AND B

9.10 Radio installations and equipment for vessels of design categories A and B

9.10.1 Every vessel of design categories A and B should be provided with radio installations throughout its intended voyage and complying with the requirements of 9.11 and, as appropriate for the sea area or areas through which it would pass during its intended voyage, the requirements of 9.12. Annex XXVI may be used as guidance for the requirements for radio installations.

9.10.2 For an overview of equipment requirements see 9.9.

9.11 Radio equipment – Sea area A1 or sea areas within the coverage of a VHF coast station operating on a 24 hours a day, 7 days a week basis

9.11.1 Every vessel of design categories A and B should be provided with a:

.1 VHF radio installation capable of transmitting and receiving:

.1.1 DSC on the frequency 156.525 MHz (channel 70). It should be possible to initiate the transmission of distress alerts on channel 70 from the position from which the vessel is normally navigated; and

.1.2 radiotelephony on the frequencies 156.300 MHz (channel 6), 156.650 MHz (channel 13) and 156.800 MHz (channel 16);

.2 VHF DSC watch receiver which may be separate from, or combined with, that required by 9.11.1.1;

.3 radio receiver for weather forecasts*;

.4 satellite emergency position-indicating radio beacon (satellite EPIRB);

.5 search and rescue radar transponder (SART) operating in the 9 GHz band, if considered necessary by the Competent Authority.

9.11.2 The VHF radio installation, required by 9.11.1.1, should also be capable of transmitting and receiving general radio communications using radiotelephony.

9.11.3 If operating experience justifies a departure from the requirements of 9.11.1, the Competent Authority may accept that the VHF radio installation and the VHF DSC watch receiver may be replaced with a hand-held VHF apparatus based on:

.1 the hand-held VHF apparatus should be mounted in a bracket;

.2 the source of power should be sufficient for the entire voyage;

.3 if required by the Competent Authority, the hand held VHF apparatus should be connected to an external antenna;

.4 on vessels operating within the coverage of a VHF/DSC coast station, the hand-held VHF radiotelephone apparatus should be capable of transmitting and receiving DSC distress signal on frequency 156.525 MHz (channel 70).

9.11.4 On vessels operating in areas without VHF/DSC coverage the requirement of 9.11.1.1 is not applicable.

9.12 Radio equipment − Sea areas A1 and A2 or sea areas within the coverage of an MF coast station providing a continuous watch on 2182 kHz as well as a continuously operating VHF station

9.12.1 In addition to meeting the requirements of 9.11, every vessel of design categories A and B engaged on voyages beyond sea area A1, but remaining within sea area A2, should be provided with:

.1 an MF radio installation capable of transmitting and receiving, for distress and safety purposes, on the frequencies:

.1.1 2187.5 kHz using DSC; and

* Competent authorities should ensure that weather forecasts are broadcast on frequencies that can be received on this type of radio.

.1.2 2182 kHz using radiotelephony;

.2 a radio installation capable of maintaining a continuous DSC watch on the frequency 2187.5 kHz which may be separate from or combined with, that required by 9.12.1.1; and a means of initiating the transmission of ship-to-shore distress alerts by a radio service other than MF.

9.12.2 It should be possible to initiate transmission of distress alerts by the radio installations specified in 9.12.1.1 and 9.12.1.2 from the position from which the vessel is normally navigated.

9.12.3 If the vessel is operating exclusively within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is not available, but is providing a continuous watch on 2182 kHz, the vessel need not to be equipped with the DSC functions in 9.12.1.

9.12.4 Where operational experience justifies departure from the requirements of 9.12.1, 9.12.2 and 9.12.3, the Competent Authority may allow the replacement of the MF radio installation with an HF radio installation, or a satellite ship-earth-station capable of transmitting and receiving for distress and safety purposes.

9.13 Radio equipment – Sea areas outside the coverage of a VHF coast station operating on a 24 hours a day, 7 days a week basis and an MF coast station providing a continuous watch on 2182 kHz as well as a continuously operating VHF station

9.13.1 Vessels engaged on voyages in sea areas A3 or A4 should comply with the requirements related to the Global Maritime Distress and Safety System (GMDSS). Refer to annex XXVI of these recommendations for a description of the GMDSS.

9.14 Watches

9.14.1 In addition to the requirements of 9.3.1, every vessel of design categories A and B should while at sea maintain either a continuous watch:

.1 on VHF DSC channel 70, if the vessel, in accordance with the requirements of 9.12.1.2, is fitted with a VHF DSC radio installation;

.2 on the distress and safety DSC frequency 2187.5 kHz, if the vessel, in accordance with the requirements of 9.12.1, is fitted with an MF DSC radio installation; or

.3 on the radiotelephone distress frequency 2182 kHz if the vessel is operating within the radiotelephone coverage of an MF coast station in which continuous DSC alerting is not available or is not fitted with the MF DSC functions in 9.12.1.1 and 9.12.1.2.

9.14.2 Vessels of design categories A and B should while at sea maintain a radio watch for broadcasts of maritime safety information on the appropriate frequency or frequencies on which such information is broadcast for the area in which the vessel is operating.

9.15 Position-updating

9.15.1 All two-way communication equipment carried on board a vessel of design categories A and B which is capable of automatically including the vessel's position in the distress alert should be automatically provided with this information from an internal or external navigation receiver, if either is installed. Where a Vessel Monitoring System (VMS) is fitted it could be used for this purpose. If such a receiver is not installed, the vessel's position and the time at which the position was determined should be manually updated at intervals not exceeding four hours, while the vessel is underway, so that it is always ready for transmission by the equipment.

PART 3 – REQUIREMENTS FOR VESSELS OF DESIGN CATEGORIES C1, C2 AND D

9.16 Radio installations and equipment for vessels of design categories C1, C2 and D

9.16.1 Every vessel of design categories C1, C2 or D should be provided with a:

.1 VHF radio installation or a handheld VHF apparatus to the satisfaction of the Competent Authority; and

.2 radio receiver for weather forecasts.

9.16.2 Vessels engaged exclusively within the coverage of a mobile telephone network may carry, in lieu of the equipment required by 9.16.1.1, a mobile telephone.

.1 The mobile telephone should be pre-programmed for establishing a quick connection to shore-based rescue authorities.

.2 The battery capacity should be sufficient to operate the mobile telephone during the entire voyage.

.3 The mobile telephone should, where applicable be connected to an external antenna.

9.16.3 Where practicable, in addition to meeting the requirements of 9.16.1, every vessel of design categories C1, C2 or D engaged on voyages beyond sea areas with a continuously operating VHF station, should be provided with an MF or HF radio installation as required in 9.12.1 and 9.12.4 or a satellite EPIRB.

9.16.4 For an overview of equipment requirements see 9.9.

CHAPTER 10 NAVIGATIONAL EQUIPMENT

10.1 Navigational equipment

10.1.1 Vessels should be fitted with a compass, which may be hand held or substituted by an alternative acceptable to the Competent Authority, such as a satellite navigation system. If due to the nature of the voyage or the proximity to land the Competent Authority may consider exempting a vessel or group of vessels from this requirement.

10.1.2 It should be possible to read the compass by day and by night from the steering position. Where applicable, securing devices for the compass and compensators should be made of nonmagnetic materials. Fixed compasses should be sited as near the fore-and-aft line of the vessels as practicable, with the lubber line, as accurately as possible, parallel with the fore-and-aft line.

10.1.3 In vessels equipped with an auto-pilot system actuated by a magnetic sensor, which does not indicate the vessel's heading, suitable means should be provided to show this information.

10.1.4 Consideration should be given to fitting vessels with radar. It is recommended that the installation should be capable of operating in the 9 GHz frequency band.

10.1.5 Decked vessels should be provided with suitable means, to the satisfaction of the Competent Authority, for determining the depth of water under the vessel. Where fish-finding devices are fitted, they could be used for this purpose.

10.1.6 If practicable, every vessel should be equipped with a radar reflector meeting the widely accepted performance standards for such devices. See annex XXIX.

10.1.7 All equipment fitted in compliance with this section should be to the satisfaction of the Competent Authority.

10.2 Nautical instruments and publications

10.2.1 Where applicable, suitable nautical instruments, adequate and up-to-date charts and all other nautical publications necessary for the intended voyage should be carried onboard to the satisfaction of the Competent Authority.

10.2.2 An electronic chart display and information system (ECDIS) or electronic chart plotter may be accepted as meeting the chart carriage requirements of 10.2.1.

10.2.3 Back-up arrangements should be provided to meet the functional requirements of 10.2.2.*

* An appropriate folio of paper nautical charts may be used as a back-up arrangement for ECDIS. Other back-up arrangements for ECDIS are acceptable (see appendix 6 to resolution A.817(19), as amended).

10.3 Signalling equipment

10.3.1 Attention is drawn to the need to provide equipment to comply in every respect with the requirements of the International Regulations for Preventing Collisions at Sea 1972, as amended. Refer to annex XXX.

10.3.2 Lights, shapes and flags should be provided to indicate that the vessel is engaged in any specific operation for which such signals are used.

10.3.3 All vessels which are required to carry radio installations should carry the table of life-saving signals contained in the International Code of Signals as far as practicable. Refer to annex XXXI.

10.3.4 Vessels of design categories A and B should carry a table of distress signals. This table can be found in annex XXXII.

10.4 Navigating bridge visibility

Power-driven vessels should meet the following requirements:

.1 The view of the sea surface from the conning position should extend from right ahead to 22.5° abaft the beam on either side of the vessel. Blind sectors caused by any obstruction outside the wheelhouse should be kept as small as possible.

.2 From each side of the wheelhouse, the horizontal field of vision should extend over an arc of at least 225º, that is from at least 45º on the opposite bow through right ahead and then from right ahead to right astern through 180º on the same side of the vessel.

10.5 Navigation lights

10.5.1 Deck lighting should not impair the visibility of navigation and signal lights required by the International Regulations for Preventing Collisions at Sea.

CHAPTER 11 CREW ACCOMMODATION

11.1 General

11.1.1 Unless expressly provided otherwise, this chapter should apply to decked vessels of design categories A and B that are at sea for more than 36 h.

11.1.2 Accommodation of appropriate size and quality should be provided on vessels of all design categories, bearing in mind the length of the voyage, the weather conditions and size of vessel.

11.1.3 Location, structure and arrangement of crew accommodation spaces and means of access thereto should be such as to ensure adequate security, protection against weather, sea, heat, cold, condensation, undue noise, vibration, fumes, odours and effluvia from other spaces. Sleeping rooms should be placed aft of the collision bulkhead, if fitted.

11.1.4 In the choice of materials used for construction of accommodation spaces, account should be taken of properties potentially harmful to the health of personnel or likely to harbour vermin and mould.

11.1.5 All practical measures should be taken to protect crew accommodation and furnishings against the admission of insects and other pests.

11.2 Lighting, heating and ventilation

11.2.1 All crew accommodation spaces should be adequately lit, as far as possible, by natural light. Such spaces should also be equipped with adequate artificial light.

11.2.2 Methods of lighting should not endanger the health or safety of the crew or the safety of the vessel.

11.2.3 Adequate heating facilities in crew accommodation spaces should be provided as required by climatic conditions.

11.2.4 Facilities for heating should be designed so as not to endanger health or safety of the crew or safety of the vessel.

11.2.5 Heating by means of open fires should be prohibited.

11.2.6 Accommodation spaces should be adequately ventilated. Vessels operating in tropical climates should, where practicable, be fitted with mechanical ventilation. The ventilation of galleys and sanitary spaces should be to the open air and, unless fitted with a mechanical ventilation system, be independent from that for other crew accommodation.

11.3 Sleeping spaces

11.3.1 Sleeping spaces should be so planned and equipped as to ensure reasonable comfort for the occupants and to facilitate tidiness.

11.3.2 The minimum number of berths should not be less than half the number of crew onboard. The minimum berth size should be determined by the Competent Authority.

11.3.3 Suitable bedding should be provided for the crew. Mattresses should not be of a type that is liable to develop toxic fumes in cases of fire nor of a type that could attract pests or insects. Mattresses should be provided with a cover of fire retardant material.

11.3.4 Whenever reasonable and practicable, having regard to the size, type or intended service of the vessel, the furnishings of sleeping spaces should include both a fitted cupboard preferably with an integral lock and a drawer for each occupant.

11.4 Eating spaces and cooking facilities

11.4.1 Wherever reasonable and practicable, eating spaces and cooking facilities should be provided separate from sleeping spaces.

11.4.2 Cooking facilities should be of adequate dimensions for the purpose and have sufficient storage space and satisfactory drainage. Where possible, refrigerators or other low-temperature storage should be provided, to the satisfaction of the Competent Authority.

11.4.3 The cooking facility should be provided with cooking utensils, the necessary number of cupboards, shelves, sinks and dish racks of rustproof material and with satisfactory drainage.

11.4.4 The cooking facility should be fitted with suitable facilities for the preparation of hot drinks for the crew at all times.

11.4.5 Cooking appliances should be fitted with fail-safe devices in the event of failure of the power source or fuel. Supplies of fuel in the form of gas or oil should not be stored in the cooking facility.

11.5 Sanitary facilities

11.5.1 Sufficient sanitary facilities, including toilets and washing facilities should be provided to the satisfaction of the Competent Authority.

11.5.2 Soil and waste discharge pipes should not pass through:

.1 fresh water tanks;
.2 drinking water tanks; and
.3 provision stores (where practicable);

nor should they (where practicable) pass overhead in:

.4 eating spaces; and
.5 sleeping spaces.

Such pipes should be fitted with anti-syphon closures.

11.5.3 In general, toilets should be situated convenient to, but separate from, sleeping spaces and eating spaces.

11.6 Water facilities

11.6.1 Filling, storage and distribution arrangements for drinking water should be designed to preclude any possibility of water contamination. Tanks should be designed to allow internal cleaning.

11.6.2 In every vessel, a dedicated supply of at least 2.5 litres of drinking water per person per day should be provided for drinking and cooking purposes.

11.6.3 Where the washing facilities use salt water additional fresh water should be carried to allow the crew to rinse themselves.

11.7 Vessels of design categories A and B, spending less than 36 hours at sea and C1, C2 and D

11.7.1 Vessels should have adequate facilities relating to:

.1 lighting, heating and ventilation;
.2 sleeping spaces;
.3 eating spaces and cooking facilities;
.4 sanitary facilities;
.5 water facilities; and
.6 protection from the elements (refer to 6.11.10).

CHAPTER 12 MANNING, TRAINING AND COMPETENCE

12.1 Manning

12.1.1 The Competent Authority should ensure that vessels are sufficiently and safely manned with a crew necessary for the safe navigation and operation of the vessel, and under the control of a competent skipper. When deciding on the manning the Competent Authority should take into account:

.1 seasonal weather conditions;
.2 sea states in which the vessel could operate;
.3 type of vessel;
.4 the range and risk of the fishing operation;
.5 length of time the vessel is at sea;
.6 distance from shore;
.7 training and experience of the fishermen; and
.8 the need to minimize fatigue.

12.2 Certification of skippers

12.2.1 Where applicable, the skipper should be certificated by the Competent Authority.

12.2.2 Where applicable, the certification should be granted after having passed a written and/or oral and /or practical examination.

12.3 Skippers' standard of competence

12.3.1 The skipper should be sufficiently competent to keep the vessel safe and well managed at all times. This includes:

.1 operating and maintaining machinery and systems;
.2 handling emergencies and using communications to seek help;
.3 first aid;
.4 manoeuvring a vessel, at sea, in port and during fishing operations;
.5 knowledge of navigation;
.6 weather conditions and forecasting;
.7 knowledge of stability;
.8 the use of signals;
.9 knowledge of pollution prevention;
.10 application of the collision regulations; and
.11 understanding and minimizing the risks of fishing operations.

12.4 Skipper and other crew training

12.4.1 The skipper and other crew should be trained in:

.1 the use of fire extinguishers, lifejackets and personal flotation devices;
.2 work place safety; including understanding the dangers associated with fatigue and the consumption of alcohol and drugs;
.3 safe handling of the fishing gear;
.4 safe operation of deck equipment;

.5 basic pre-sea safety training and familiarization (guidance on basic safety training can be found in annex XXXIII);
.6 pollution prevention; and
.7 prevention of onboard accidents applying the principles of risk assessment.

ANNEX I

ILLUSTRATION OF TERMS USED IN THE DEFINITIONS

Figure 1

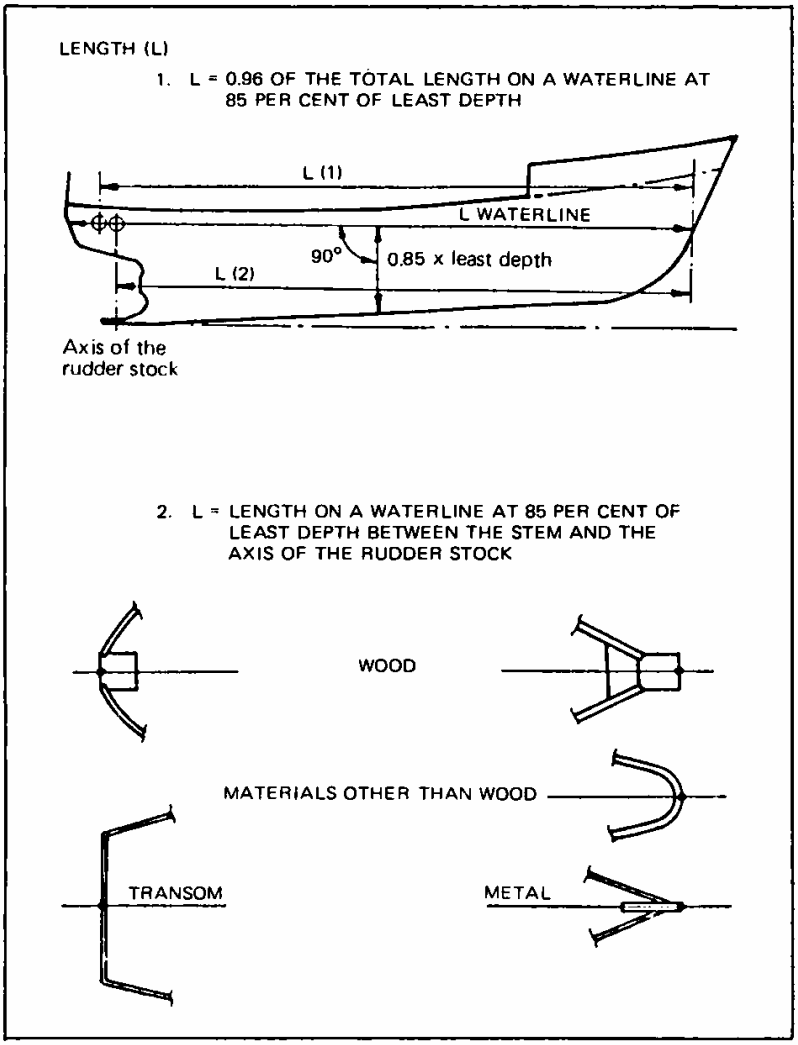


Figure 2

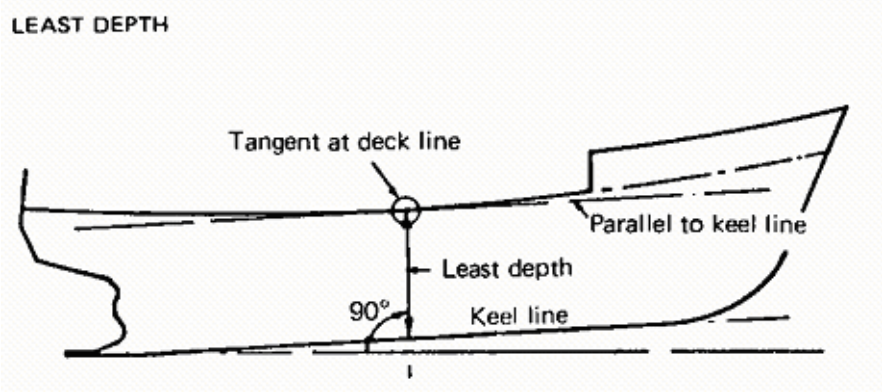


Figure 3

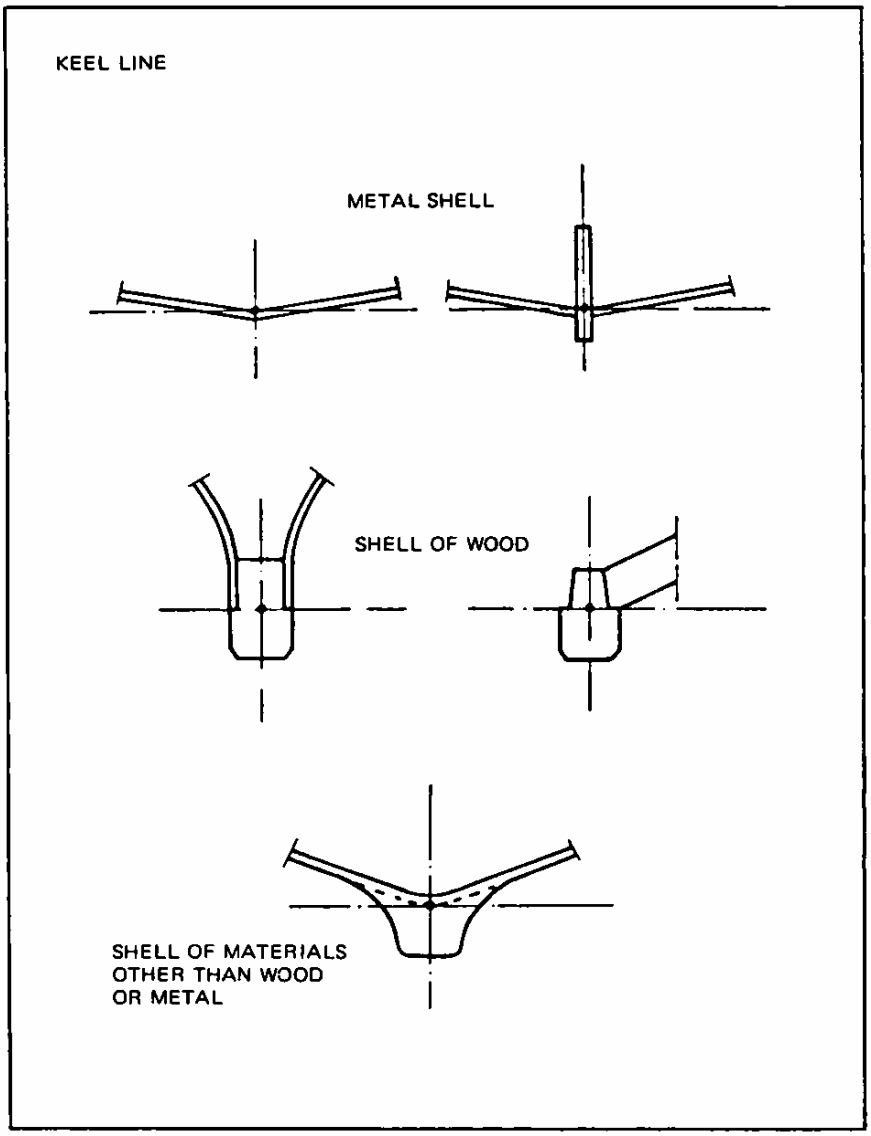

KEEL LINE
METAL SHELL
SHELL OF WOOD
SHELL OF MATERIALS
OTHER THAN WOOD
OR METAL

Figure 4

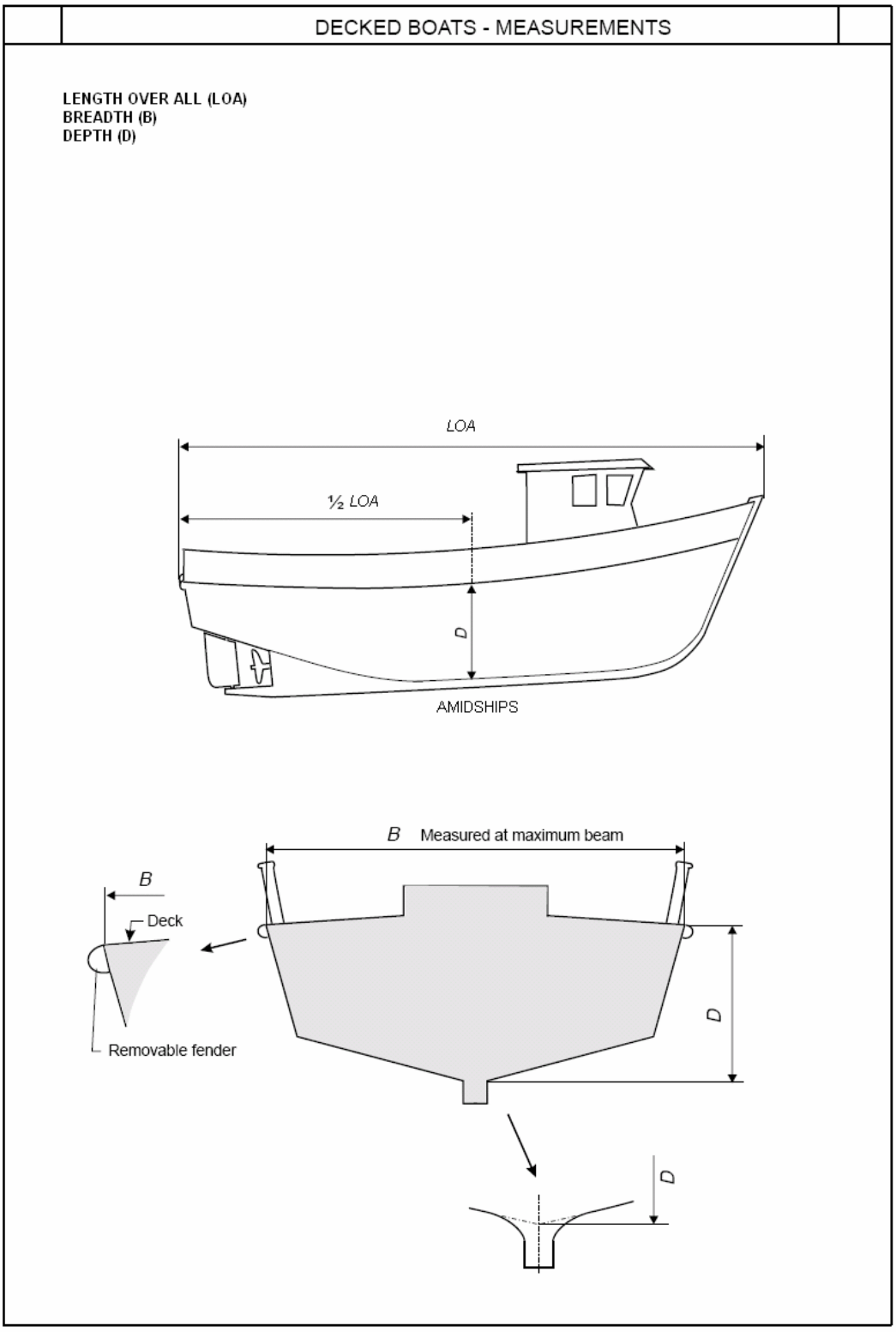

DECKED BOATS - MEASUREMENTS
LENGTH OVER ALL (LOA)
BREADTH (B)
DEPTH (D)
LOA
½ LOA
D
AMIDSHIPS
B
Measured at maximum beam
B
Deck
Removable fender
D
D

Figure 5

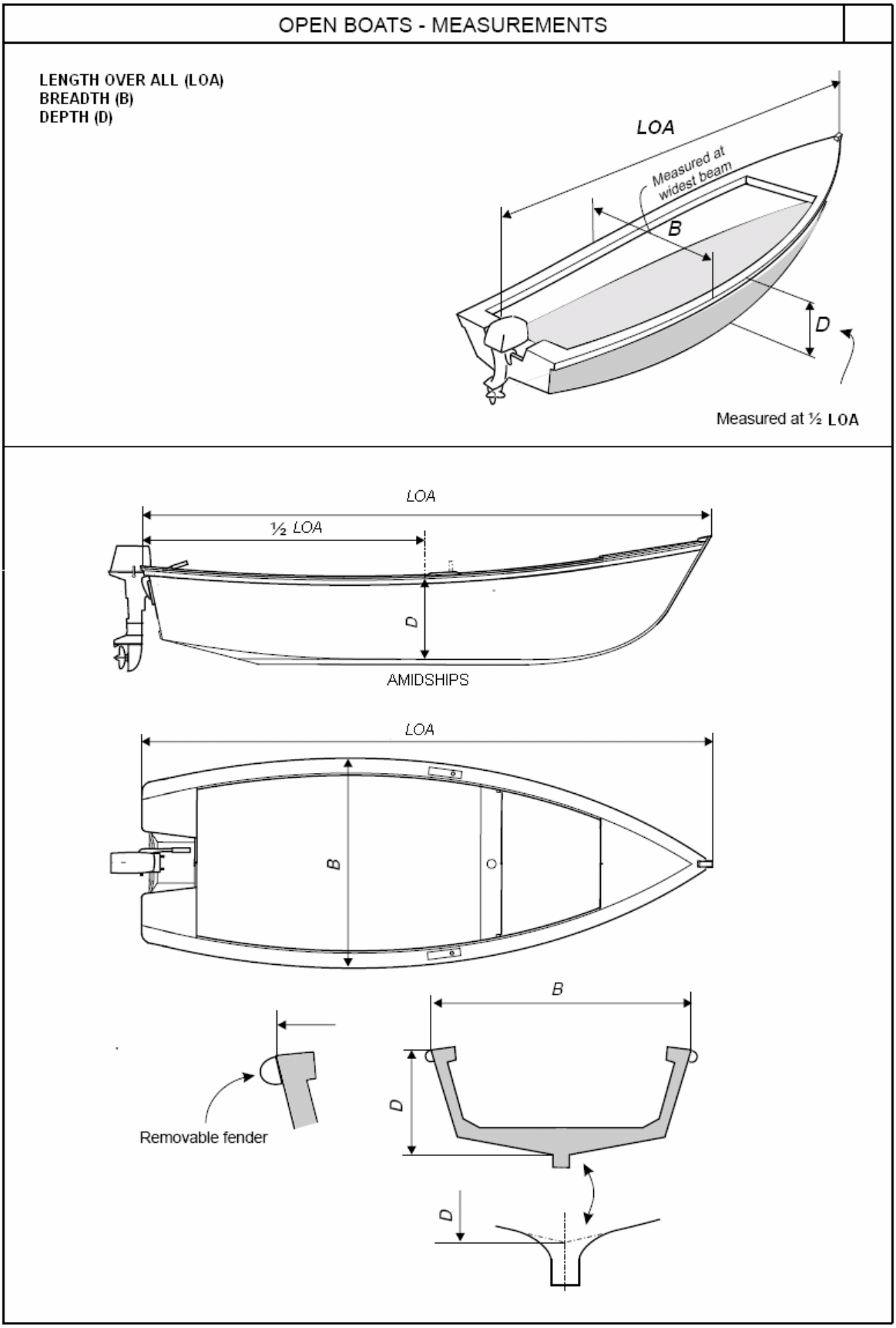
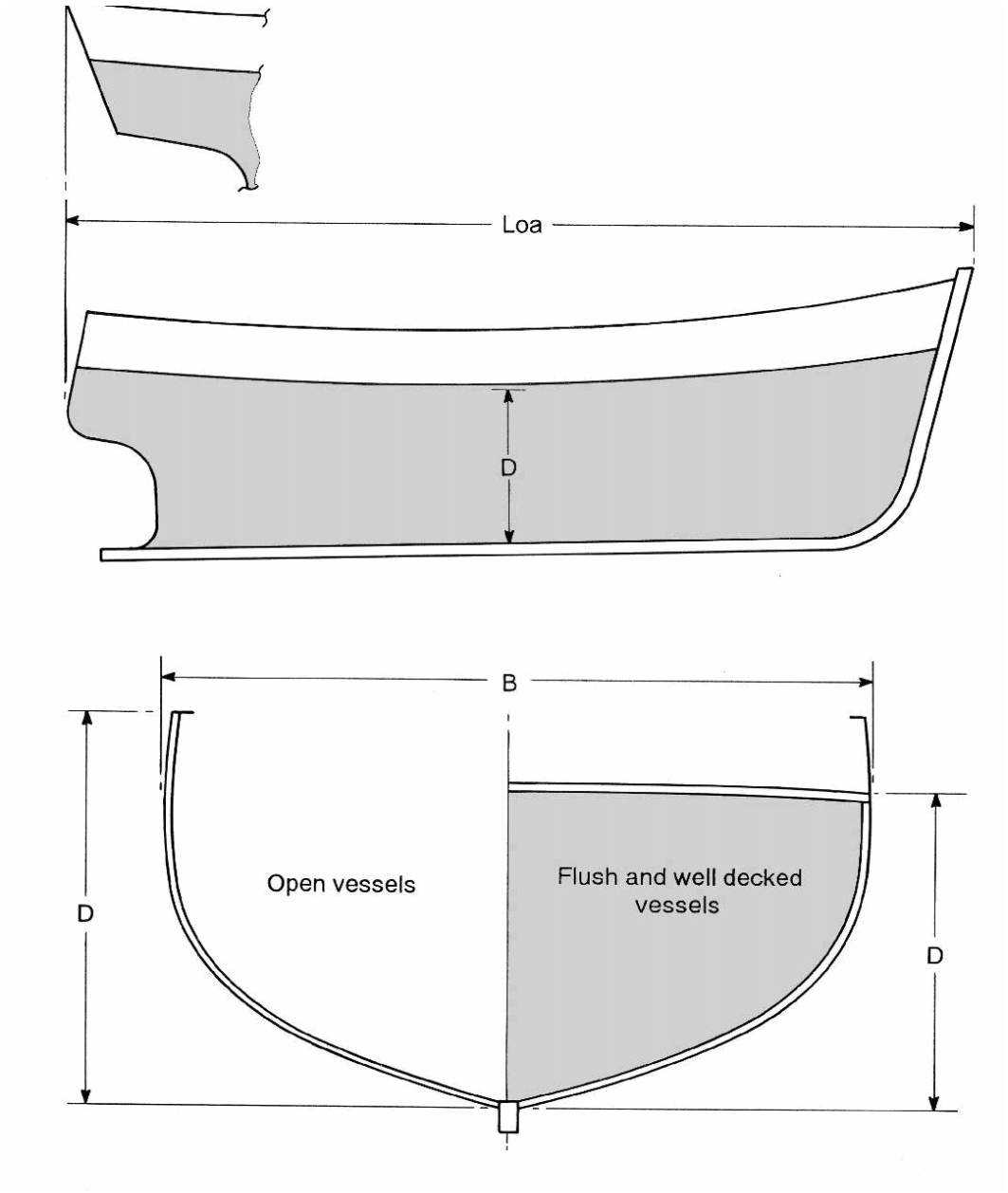

OPEN BOATS - MEASUREMENTS
LENGTH OVER ALL (LOA)
BREADTH (B)
DEPTH (D)
LOA
Measured at widest beam
B
D
Measured at ½ LOA
LOA
½ LOA
D
AMIDSHIPS
LOA
B
B
D
Removable fender
D

Figure 6 – Cubic numeral

LOA x *B* x *D* = Cubic numeral (CuNo)



ANNEX II

RECOMMENDED CONSTRUCTION STANDARDS FOR WOODEN FISHING VESSELS

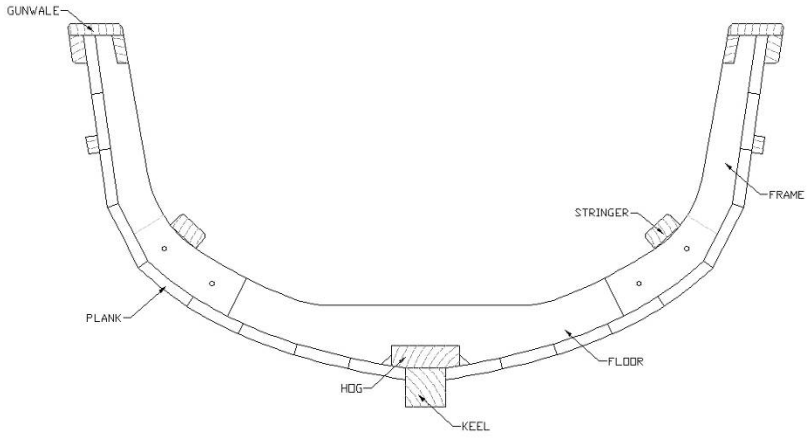
PART 1 – GENERAL

1 Scope

1.1 These construction standards apply to decked fishing vessels of less than 12 m in length and undecked vessels of any size.[1]

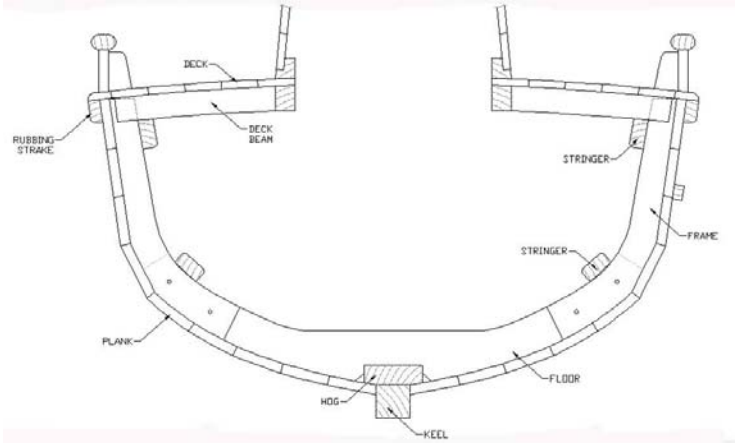
1.2 In general the construction standards apply to fishing vessels of conventional form and wooden construction[2]; that is single hull vessels of plank on frame construction with metal fastenings which in general should consist of:

- substantial backbone structure;
- close spaced transverse frames;
- fore and aft carvel planking fastened to frames with metal fasteners;
- deck, partial deck or full deck;
- longitudinal structure including gunwale, bilge stringer and engine beds.



[1] These construction standards are under development and require further refinement.

[2] An illustration of conventional wooden construction will be included.



1.3 In general the standards apply to vessels operating at speeds up to 10 knots as shown in the table below. Vessels operating at higher speeds will require special consideration by the Competent Authority.

Vessel Length overall	**Maximum operating speed**
up to 6 metres	7 knots
8 metres	8 knots
10 metres	9 knots
12 metres	10 knots

1.4 A number of vessel types are not covered by the requirements of these construction standards including the following:

- Vessels constructed of plywood or glued wood;
- Vessels of simple construction including vessels such as rafts and dug-out canoes;
- Vessels judged by the Competent Authority to be outside the scope of this standard.

2 Design categories

2.1 These construction standards are based on the division of vessels into appropriate design categories, the categories indicate sea and wind conditions for which a vessel is considered to be suitable, provided that the vessel is correctly operated and at a speed appropriate to the prevailing sea state. Design categories are defined in 1.2.14.

3 Construction standards

3.1 The appropriate standards of construction for wooden vessels should be determined as set out in the table below:

Design category	**Part 1**	**Part 2**	**Part 3**
A	✔	✔	
B	✔	✔	
C1	✔		✔
C2	✔		✔
D	✔		

3.2 Vessels fitted with sails should be considered to operate in design categories C1, C2 and D only unless given special consideration by the Competent Authority.

4 Construction standards for wooden vessels of all design categories

4.1 Introduction

4.1.1 This part of the standard is applicable to vessels in all design categories.

4.2 Timber

4.2.1 Timber should be well seasoned with a moisture content of 15 to 20%, of good quality and free from splits, sap wood and significant knots.

4.2.2 Timber should be selected according to location in the vessel as follows:

Part of vessel	**Preferred density**	**Minimum density**
Hull and deck planking	480 kg/m^3	370 kg/m^3
Keel, deadwood and stem	600 kg/m^3	480 kg/m^3
Frames and engine beds	700 kg/m^3	

4.2.3 Timber should be selected from available species known to have a locally proven record in boatbuilding with good resistance to rot. Keel and underwater planking should preferably have some resistance to marine borers.

4.3 Planking

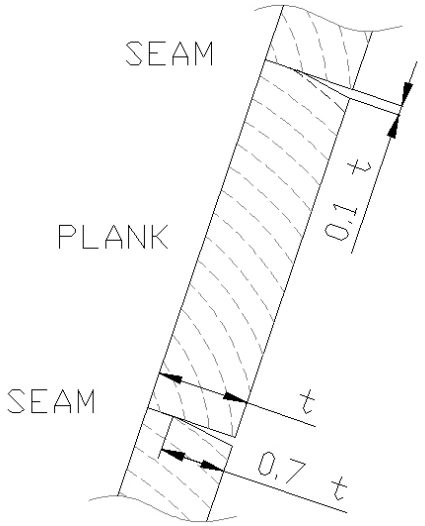
4.3.1 Hull planking should be from long or continuous lengths where possible.

4.3.2 The width of planks should be kept as small as practical, preferably less than 4 times plank thickness but not more than 8 times plank thickness.

4.3.3 Planks up to 150 mm wide should have 2 fastenings at each frame, planks over 150 mm wide should have 3 fastenings at each frame.

4.3.4 Hull planking should be of a thickness which is suitable for the size of boat and the frame spacing. In general planking of 16 mm or less should not be used unless special arrangements are made for framing.

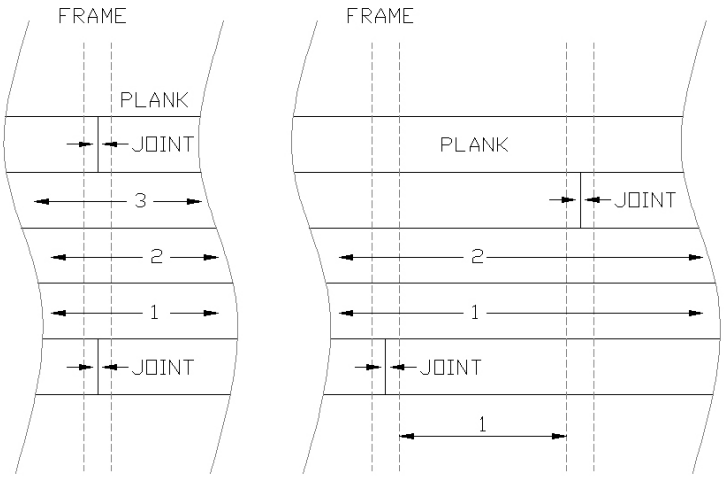
4.3.5 Planks should be fitted tight together; the gap between planks should be less than 3 mm. There should be a caulking seam of width approximately 1/10 of the planking thickness tapering to zero at a depth of about 2/3 of the planking thickness.

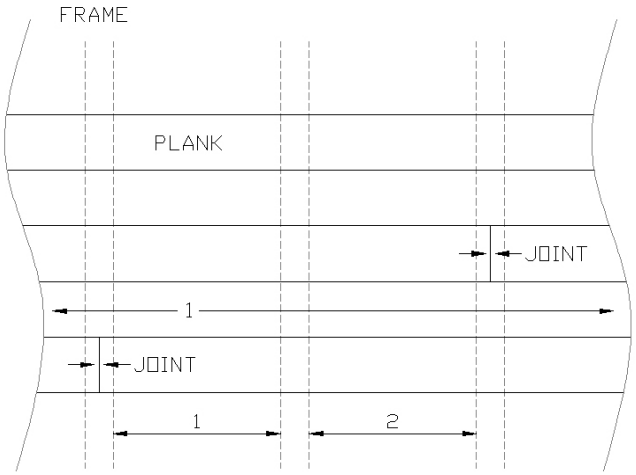


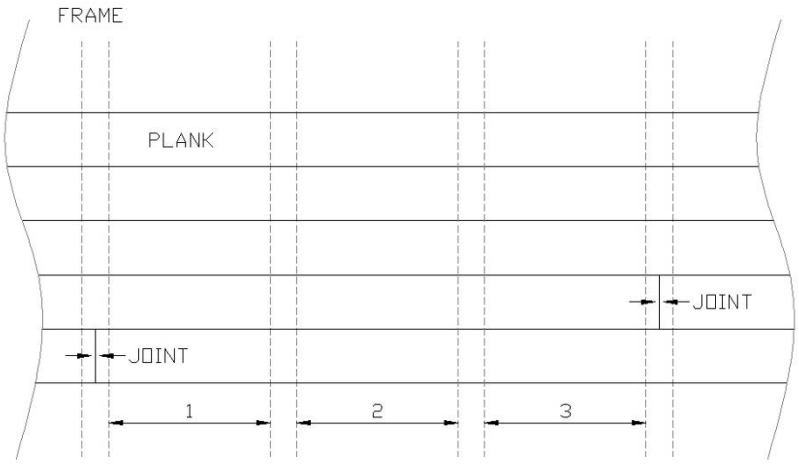
4.3.6 Seams between planks should be caulked with an organic material such as oakum and then filled with flexible waterproof filler. Synthetic fibres should not be used for caulking.

4.3.7 Butt joints between planks should be staggered; the minimum spacing between butt joints should be as follows:

Number of frame spaces between joints	**Planks between joints**
3 frame spaces	Joints on adjacent planks
2 frame spaces	1 plank between joints
1 frame space	2 planks between joints
On same frame	3 planks between joints





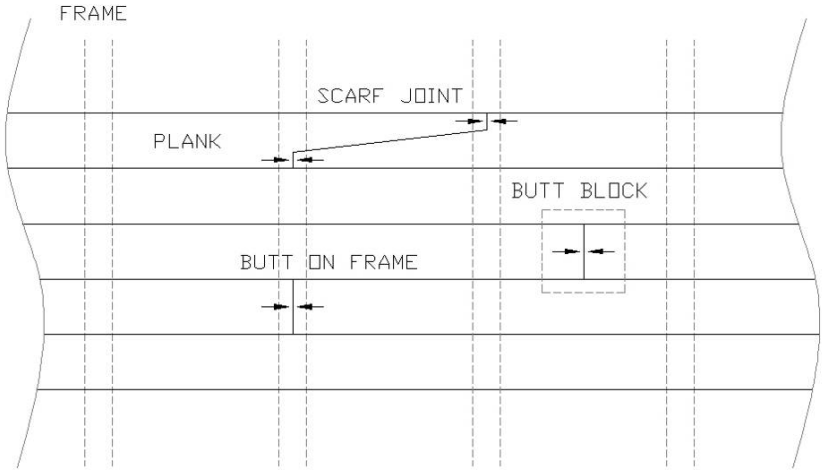


4.3.8 Joints in planks may be made by one of the following methods:

a) on a frame, this may be done where planks and frames are sufficiently large, generally a frame width of 125 mm or more;

b) between frames using butt blocks on the inside of the planking. Butt blocks should have the same thickness as the planking and be 25 mm wider than the planking so that they overlap the adjacent planks. Plank ends should be bolted to the butt blocks with galvanized coach bolts of diameter 6 mm for planking thickness below 20 mm, 8 mm for planking thickness 20-30 mm and 10 mm for thicker planks;

c) by scarf joint spanning two frames.



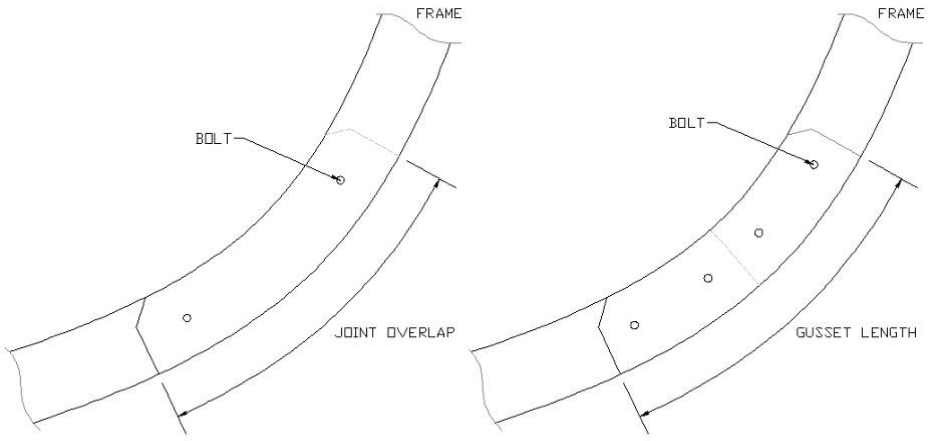
4.4 Frames

4.4.1 Frames should preferably be sawn from timber where the grain follows the curvature of the frame. Grain sloping with an angle of more than 1 in 5 to the direction of the frame should not be allowed.

4.4.2 The bottom frames or floors should be bolted to the keel. Large washers should be used under the head of the bolt and the nut.

4.4.3 Where there are overlaps in frame construction these should be fixed with two bolts. Butt joints in frames should preferably be fixed with double gussets each of half of the frame thickness and with four bolts. The table below gives minimum dimensions:

Bolt diameter	**Overlap joint Minimum length of overlap**	**Butt joint Minimum length of gussets**
8 mm	180 mm	360 mm
10 mm	210 mm	420 mm
12 mm	260 mm	510 mm

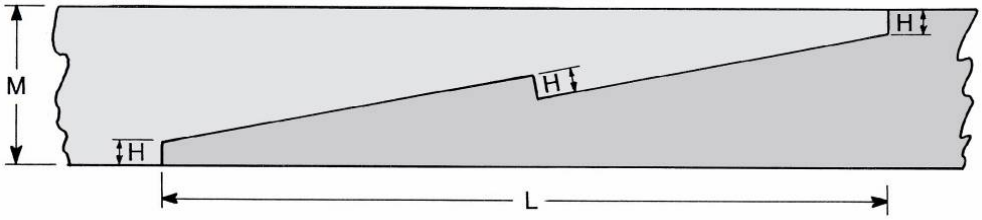


4.4.4 All frame components should be painted with primer before assembly.

4.5 Keel and other components

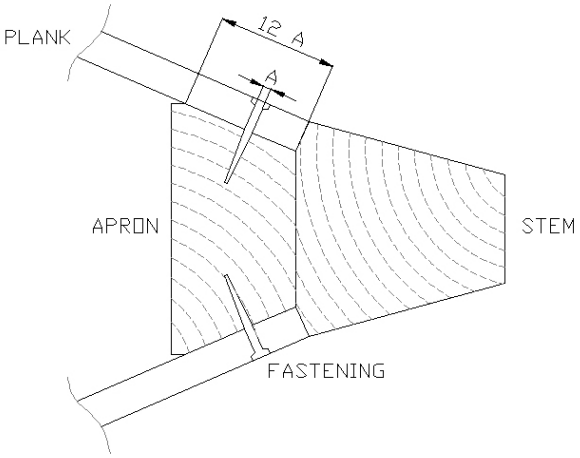
4.5.1 For vessels up to 7 m LOA the keel should preferably be in one length. For larger vessels the keel can be joined with a scarf of length 5 x keel height with end notches of depth 0.2 x keel height. The scarf should be bolted together.

KEEL SCARPH

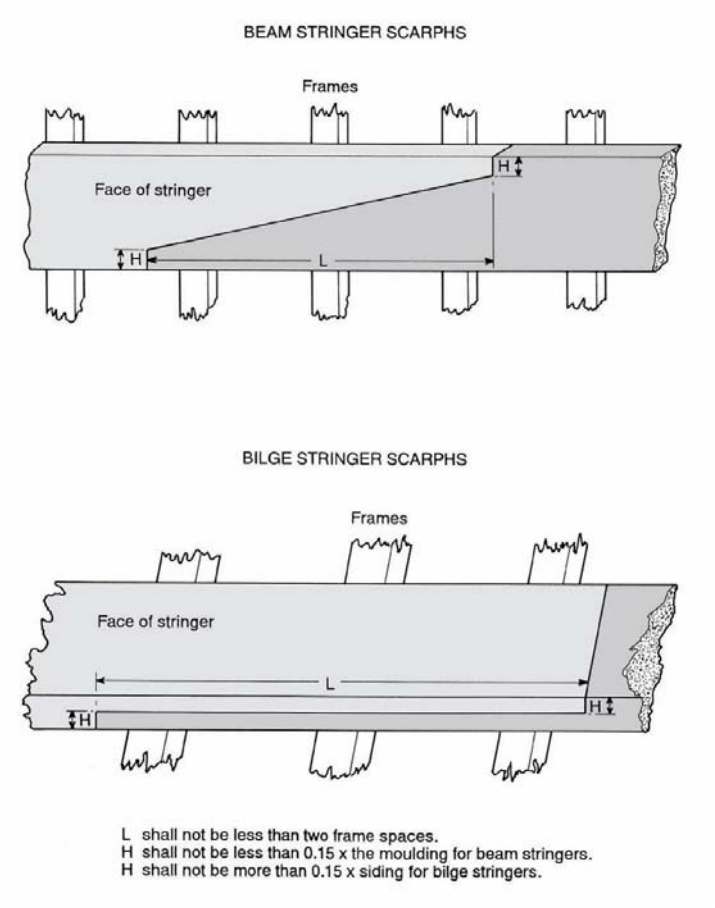


M = Keel moulding
L = Length of scarph = 5 x M
H = 0.2 x M

4.5.2 The width of the stem should be the same as the keel. The landing of the planking on the stem should have a length of 12 x diameter of planking fastenings to avoid splitting the end of planks. To achieve this, an apron or inner stem may have to be fitted to the inside of the stem.



4.5.3 Beam and bilge stringers should run continuously from stem to transom and where possible be of a single length of timber, where joints are required the illustration below shows the requirements. It is good practice for the bilge stringer to be bolted in place.



4.5.4 The transom should be constructed in the same manner as the hull. Generally the transom should be connected to the backbone by the use of a knee bolted in place. Special arrangements should be made where there are large loads from fishing gear or where damage by gear is possible.

4.5.5 The engine beds should be supported by substantial floors over at least 3 frame spaces and should be bolted in place.

4.5.6 A gunwale and rubbing strake should be fitted and should be from timber at least 25 mm thick. Special arrangements should be made where there are large loads from fishing gear or where damage by gear is possible.

4.5.7 A substantial knee should be used at the keel to stem joint, for boats less than 6 metres in length it is recommended that the knee should extend at least 150 mm along each joint and should be bolted in place. For boats of 6 metres and above the knee length should be increase to at least 250 mm.

4.5.8 All components should be primed before assembly.

4.6 Deck

4.6.1 Where a full or partial deck is fitted it should be watertight and of sufficient strength to support any loads placed upon it.

4.6.2 Deck planking should be from long lengths where possible and the width of planks should be kept as small as practical, 125 mm or less is recommended.

4.6.3 Deck planking should be of the same thickness as the hull sides. Planking of 16 mm or less should not be used unless special arrangements are made.

4.6.4 Planks should be fitted tight together; the maximum gap between planks should be 3 mm. There should be a caulking seam of width approximately 1/10 of the planking thickness tapering to zero at a depth of about 2/3 of the planking thickness.

4.6.5 The seams between planks should be caulked with an organic material such as oakum and then filled with flexible waterproof filler. The use of synthetic fibres for caulking is not recommended.

4.6.6 Butt joints between planks should be staggered; refer to 2.2.7 for the minimum spacing between joints.

4.6.7 The deck should be supported by beams; these should be curved (cambered) by at least 20 mm per metre of length. The beams may be spaced at the same centres as the hull framing and their ends are supported by a stringer.

4.6.8 Vessels having features such as a deckhouse, heavy deck gear or large deck hatches should be fitted with larger main beams each side of these. Main beams should have width increased by at least 50% over deck beams. Main beams should also be used to support the ends of partial decks.

4.6.9 It is good practice to support main deck beams, highly loaded areas and the transom by horizontal knees. These will increase the rigidity and strength of the structure and will contribute to a more watertight and longer lasting deck.

4.7 Fastenings

4.7.1 Hot dipped galvanized nails and bolts should be used throughout the vessel, alternatively stainless steel grade AISI 316 fastenings may be used except for planks under the waterline. Electroplated fastenings should not be used.

4.7.2 Bolts should preferably have a hexagonal head and nut fitted with large washers. The minimum bolt size used should be 6 mm.

4.7.3 The bolts in the keel assembly should be as follows:

Length of vessel	Keel bolt diameter
5 to 6 metres	8 mm
6 to 8 metres	10 mm
> 8 metres	12 mm

4.7.4 To avoid splitting timber the minimum distances to the end and edge of timber parts should be as follows:

Bolt diameter	Minimum end distance	Minimum edge distance
up to 8 mm	60 mm	35 mm
10 mm	70 mm	40 mm
12 mm	85 mm	50 mm

4.7.5 Planks should be fastened to the frames with nails of round or square section of the following dimensions:

Planking thickness (mm)	18	20	25	30	35
Minimum nail diameter (mm)	4	5	5	6	8
Minimum nail length (mm)	50	60	75	75	100

4.7.6 Nails should have a head of diameter of at least 2 x nail diameter.

4.7.7 Nails should be countersunk 2–3 mm and the head covered with waterproof, flexible compound.

4.7.8 Planks up to 150 mm wide should have 2 fastenings at each frame, planks over 150 mm wide should have 3 fastenings at each frame.

4.7.9 Bolts which pass through the hull should have caulking grommets under their heads.

PART 2 – RECOMMENDED CONSTRUCTION STANDARDS FOR WOODEN VESSELS OF DESIGN CATEGORIES A AND B

1 Introduction

1.1 The construction standard described here should be applied to all decked vessels in design categories A and B.

2 Construction

2.1 The requirements of **Part 1** should be complied with in addition to the requirements below.

2.2 The strength and construction of the hull, deck and other structures should be built to withstand all foreseeable conditions of the intended service.

2.3 All vessels should meet requirements that are compatible with a recognized wooden vessel construction standard* or an equivalent standard and be built to the satisfaction of the Competent Authority.

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* The standards include:
- the Nordic Boat Standard;
- the construction rules of the United Kingdom Sea Fish Industry Authority (Seafish); and
- construction rules of recognized organizations.

PART 3 – RECOMMENDED CONSTRUCTION STANDARDS FOR WOODEN VESSELS OF DESIGN CATEGORIES C1 AND C2

1 Introduction

1.1 The construction standard described here should be applied to all decked and undecked vessels in design categories C1 and C2.

1.2 The construction standard described here should always be read in conjunction with **Part 1**.

2 Construction

2.1 Planking

2.1.1 Hull planking should be of a thickness which is suitable for the size of vessel and the spacing of frames; table 2.9.1 shows the relationship between plank thickness and frame spacing.

2.2 Frames

2.2.1 The frame dimensions should be suitable for the size of vessel and the spacing of the frames; table 2.9.3 shows typical frame dimensions.

2.2.2 The frame dimensions may be checked against table 2.9.3 or alternatively the required section modulus may be derived from table 2.9.4.

2.3 Keel

2.3.1 The size of keel and hog should be suitable for the size of vessel; table 2.9.5 shows recommended keel and hog dimensions. The hog may be omitted where this is the convention with local construction methods, in such cases the depth of the keel should be increased. Table 2.9.6 shows minimum requirements for bolt size for fastening keel and hog to frames.

2.4 Stem

2.4.1 The stem and apron should have the same width as the keel. Refer to 2.4.2 in Part 1 for details of plank landing dimensions.

2.5 Transom

2.5.1 The transom planking should be at least the same thickness as the hull planking.

2.6 Stringers

The size and number of stringers should be suitable for the size of vessel. Generally stringers should be fitted at the bilge and the top of frames or deck. Table 2.9.7 shows recommended dimensions.

2.7 Deck

2.7.1 Deck planking should be the same thickness as the hull planking.

2.7.2 The size and spacing of deck beams should be suitable for the size of vessel; table 2.9.8 shows recommended deck beam dimensions. The spacing of deck beams may be equal to or less than the hull frame spacing.

2.8 Fastenings

2.8.1 Table 2.9.2 shows the requirements for the fastening of planking to frames.

2.8.2 Table 2.9.6 shows minimum requirements for bolt size for fastening keel and hog to frames.

2.9 Tables[3] of dimensions and scantlings

Table 2.9.1 – Plank thickness and frame spacing for design categories C1 and C2[4]

CuNo	Design category C1 Planking thickness (mm)					CuNo	Design category C2 Planking thickness (mm)				
	18	20	25	30	35		18	20	25	30	35
3	395					3	400				
5	360	395				5	365	400			
10	330	360				10	335	365			
15	305	330	400			15	310	335	410		
20		320	385			20		325	390		
25		310	375	435		25		315	380		
30		300	360	435		30		305	365	430	
35			355	415		35			360	420	
40			350	410		40			355	415	
45			340	400		45			350	410	
50			335	395	450	50			345	400	
55	Frame Spacing			385	440	55	Frame Spacing			390	450
60	(mm)			375	430	60	(mm)			380	435
65				370	435	65				375	430
70				365	420	70				370	425
75				360	415	75				370	420
80				355	410	80				365	415

Note: The plank thickness shown is the minimum; and the frame spacing the maximum.

Table 2.9.2 – Minimum nail size for fastening planks to frames – all design categories

Planking thickness (mm)	18	20	25	30	35
Minimum nail diameter (mm)	4	5	5	6	8
Minimum nail length (mm)	50	60	75	75	100

[3] These tables are under development and may require further refinement.

[4] The difference in frame spacing between categories C1 and C2 is so small that the use of C2 may have to be reviewed.

Table 2.9.3 – Frame dimensions for design categories C1 and C2

CuNo	Design category C1 Frame dimensions (mm)				Design category C2 Frame dimensions (mm)			
	Width	Depth bottom	Depth bilge	Depth top	Width	Depth bottom	Depth bilge	Depth top
3	40	65	55	35	40	60	50	35
5	40	70	55	45	40	65	50	45
10	50	80	65	50	50	80	60	50
15	50	85	70	55	50	85	65	50
20	50	90	75	60	50	85	70	55
25	50	95	75	65	50	90	75	60
30	60	100	75	65	60	95	75	60
35	60	105	80	70	60	100	80	65
40	60	105	80	70	60	100	80	65
45	65	110	80	75	65	105	80	70
50	65	110	85	75	65	105	85	70
55	65	115	85	75	65	110	85	70
60	65	115	85	75	65	110	85	70
65	65	120	90	75	65	115	85	75
70	65	120	90	75	65	115	85	75
75	70	125	90	75	70	115	85	75
80	70	125	90	80	70	115	85	80

Note: Where frame width is not as listed above a check of frame section modulus may be made using the table below. The section modulus is calculated as follows: SM = width x depth^2 / 6 (cm^3), where frame dimensions are in cm.

Table 2.9.4 – Frame section modulus for design categories C1 and C2

CuNo	Design category C1 Frame section modulus (cm^3)			Design category C2 Frame section modulus (cm^3)		
	bottom	bilge	top	bottom	bilge	top
3	27	20	9	25	18	8
5	31	20	14	28	18	13
10	56	34	21	51	31	19
15	62	39	25	57	35	23
20	69	44	29	63	40	27
25	76	50	34	70	46	31
30	100	60	41	92	55	37
35	110	67	47	100	61	43
40	110	67	47	100	61	43
45	129	73	57	118	66	52
50	129	81	57	118	74	52
55	140	81	57	128	74	52
60	140	81	57	128	74	52
65	152	90	65	139	82	59
70	152	90	65	139	82	59
75	176	97	70	161	88	64
80	176	97	78	161	88	72

Note: Where frame width is not as listed above a check of frame section modulus may be made using the table below. The section modulus is calculated as follows: SM = width x depth^2 / 6 (cm^3), where frame dimensions are in cm.

Table 2.9.5 – Keel and hog dimensions – all design categories

CuNo	Keel dimensions (mm) Width	Depth	Hog dimensions (mm) Width	Depth
5	65	53	123	47
10	70	72	128	47
15	75	78	129	47
20	92	110	164	60
25	95	121	166	60
30	98	133	168	62
35	100	142	170	62
40	104	148	173	62
45	107	155	192	66
50	110	163	195	75
55	113	168	197	75
60	116	172	200	75
65	120	177	203	75
70	122	182	205	75
75	125	185	206	78
80	125	190	206	78

Note: Vessels up to CuNo = 20 are assumed to be open boats and above this are assumed to be decked boats.

Table 2.9.6 – Minimum bolt size for fastening keel and hog to frames – all design categories

CuNo	Keel bolts (mm)
5	6
10	8
15	8
20	8
25	10
30	10
35	12
40	12
45	12
50	12
55	12
60	12
65	16
70	16
75	16
80	16

Table 2.9.7 – Stringer dimensions

CuNo	Sectional area of stringer (cm^2) Bilge	Beam
3	15	15 *
5	18	18 *
10	20	20 *
15	20	20 *
20	25	25
25	30	30
30	30	30
35	30	30
40	35	35
45	35	35
50	35	40
55	40	50
60	40	50
65	40	60
70	50	65
75	50	65
80	50	75

Note: * indicates where consideration may be given to omitting the beam stringer should fishing or construction methods require this.

Table 2.9.8 – Deck beam dimensions

CuNo	Deck beam dimensions (mm) Mid beam	End of beam
3	30 x 60	50
5	30 x 60	50
10	40 x 60	50
15	40 x 60	50
20	45 x 65	55
25	45 x 75	55
30	45 x 85	55
35	45 x 90	55
40	45 x 95	55
45	50 x 100	55
50	55 x 100	60
55	55 x 100	60
60	55 x 105	60
65	55 x 105	60
70	55 x 110	70
75	55 x 110	70
80	60 x 115	70

ANNEX III

RECOMMENDED CONSTRUCTION STANDARDS FOR GRP FISHING VESSELS

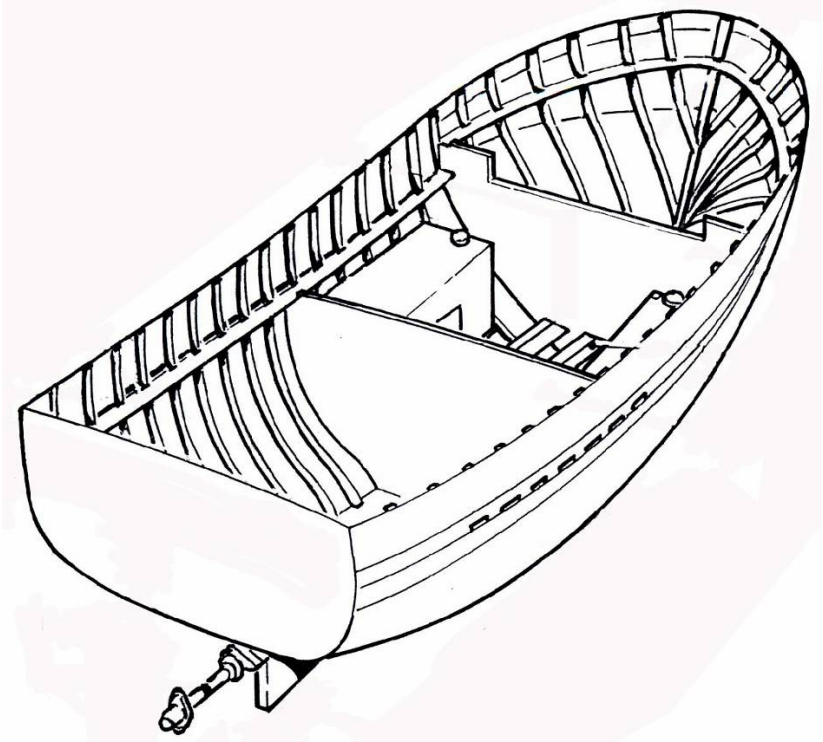
PART 1 – GENERAL

1 Scope

1.1 These construction standards apply to decked vessels of less than 12 m in length and undecked vessels of any size.[1]

1.2 In general the standards apply to vessels of conventional form and of glass reinforced plastic construction[2] (GRP); that is single hull vessels of glass rovings and mat and polyester resin construction which in general should consist of:

- moulded hull of single-skin or sandwich construction;
- deck of GRP sheathed plywood, GRP or traditional timber construction;
- transverse framing; and
- longitudinal structure including gunwale, stringers, engine beds.



1.3 Standards are given for vessels operating at speeds up to 20 knots as shown in the tables given in part 3. Vessels operating at higher speeds will require special consideration by the Competent Authority.

[1] These construction standards are under development and require further refinement.

[2] An illustration of conventional GRP construction will be included.

1.4 A number of vessel types are not covered by the requirements of these construction standards including the following:

- vessels constructed of other materials such as Kevlar reinforcements and epoxy resins;
- vessels propelled by paddles or oars only; and
- vessels judged by the Competent Authority to be outside the scope of this standard.

2 Design categories

2.1 These construction standards are based on the division of vessels into appropriate design categories, the categories indicate sea and wind conditions for which a vessel is considered to be suitable, provided that the vessel is correctly operated and at a speed appropriate to the prevailing sea state. Design categories are defined in 1.1.12.

3 Construction standards

3.1 The appropriate standards of construction for GRP vessels should be determined as set out in the table below:

Design category	Part 1	Part 2	Part 3
A	✔	✔	
B	✔	✔	
C1	✔		✔
C2	✔		✔
D	✔		

3.2 Vessels fitted with sails should be considered to operate in categories C1, C2 and D only unless given special consideration by the Competent Authority.

3.3 Consideration should be given by the Competent Authority to increasing the scantlings given in the standards in parts of a vessel where special conditions may arise, including:

- operation of fishing gear likely to damage structure by impact or abrasion; and
- landing and hauling out of vessels on beaches and river banks.

4 Construction standards for GRP vessels of all design categories

4.1 Materials

4.1.1 Resins should be approved for marine use and be mixed and used in accordance with the manufacturers' recommendations.

4.1.2 Glass reinforcements should be approved for marine use and may be in the form of chopped strand mat, woven rovings, fabric; powder bound mat or other approved materials.

4.1.3 Colour pigment may be used in the gel coat sufficient to give a satisfactory colour; the amount used should be in accordance with the manufacturers' recommendations. No pigment should be used in the lay-up resin of the hull laminates.

4.1.4 Formers for stiffeners should be of rigid foam, timber, metal or other approved materials. Where timber is used it should have a moisture content of not more than 15%.

4.1.5 Careful attention should be paid to the manufacturers' recommendations concerning the storage and use dates of the materials to be used.

4.2 Workshop practice

4.2.1 All building activities should be carried out under a fixed roof and preferably in an enclosed workshop.

4.2.2 The cleanliness of the workshop is important for the health of workers and to prevent the contamination of the resin and reinforcements.

4.2.3 Waste material, dust, sand and other contaminants should be removed from the workshop immediately.

4.2.4 The moulding area should be kept clear of dust and accumulations of waste material which could contaminate the mould surfaces.

4.2.5 The recommended humidity and temperature ranges under which laminating may take place are: temperature 15 to 25 C, humidity 70%. The moulding process should cease if the following limits are reached: temperature <13 or >32 C, humidity >80%.

4.2.6 The workshop should be as free as practical from dust and fumes to allow comfortable and safe working conditions. Styrene fumes are heavier than air and should be removed from moulds by the use of mechanical ventilation systems.

4.2.7 Completed mouldings should not be taken outside the workshop environment within 7 days of the start of the moulding process. Where mouldings are moved outside after this period they should be protected from rain.

4.2.8 The addition of catalyst to polyester products should be strictly controlled within the limits set by the manufacturers. Tables giving amounts of catalyst / resin should be provided in the workshop.

4.2.9 The catalyst must be properly dispersed through the resin by very thorough mixing.

4.2.10 Where a primary bond will be achieved little preparation of the surface is required prior to further laminating or bonding. A primary bond is generally achieved if the surface has cured for about 24 to 48 hours and is still chemically active, allowing a chemical bond.

4.2.11 Where a secondary bond will be achieved additional surface preparation is required in the form of abrasion and cleaning. A secondary bond is achieved when the surface has cured for over 48 h and is no longer chemically active; in this case the bond relies on the adhesive properties of the resin.

4.3 Laminate lay up

4.3.1 The outside surface of all laminates should have a layer of gel coat or be treated with equivalent surface protection after completion of moulding. This layer should be 0.4 to 0.6 mm thick.

4.3.2 The gel coat should only be left exposed in accordance with the manufacturers' recommendations; generally this will be a maximum of 24 h.

4.3.3 Heavy reinforcements should not be applied directly to the gel coat; the first two layers should consist of a light chopped strand mat of maximum weight 300 g/m^2, unless the Competent Authority is satisfied that manufacturing experience justifies variation from this figure.

4.3.4 Where woven rovings are incorporated these should be alternated with a layers of chopped strand mat.

4.3.5 A suitable top coat should be applied in bilge and keel areas where water will accumulate, unless the Competent Authority is satisfied that manufacturing experience justifies variation.

4.3.6 Laminates should be locally increased in thickness in way of fittings and equipment, the increased is to be gradually reduced to the normal thickness by stepped layers.

4.3.7 Any holes or openings cut in laminates should be sealed with resin or other suitable material.

4.3.8 The overlap of mats or woven rovings should be a least 50 mm and the shift of subsequent reinforcement overlaps should be at least 100 mm.

4.3.9 Laminate should be laid up in accordance with a documented sequence.

4.3.10 Laminates should be worked in such a way that they are fully consolidated; that is thoroughly wetted out, free from blisters, air gaps, delamination, resin starved areas or excess resin.

4.3.11 The interval between layers is to be carefully timed to enable proper completion of each laminate.

4.3.12 The time elapsed between the completion of hull or deck laminate and the bonding of structural members should be kept within the limits of the manufacturers' recommendations.

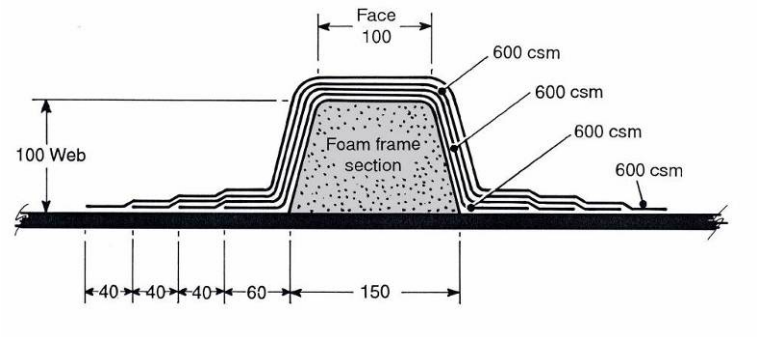
4.4 Hull construction[3]

4.4.1 The hull bottom should be a solid laminate of glass reinforcements in resin, laid up to a satisfactory weight. The keel and sheerstrake areas of the hull should have additional reinforcements.

4.4.2 Hulls should be adequately stiffened; this may be in the form of longitudinal or transverse stiffeners or a combination of both.

[3] Further illustrations may be added to this section in the future.

4.4.3 Stiffeners may be constructed by moulding over foam or hollow formers which should be bonded to the inside hull laminate, see 4.3.10 and 4.3.11 for a description of primary and secondary bonding. Frame formers may be of top hat or rectangular section. Where frames have gunwales or stringers through bolted, the core of the frames is to be of timber.



Typical frame construction

4.4.4 Floors moulded over formers are to be fitted to the tops of the frames at the centreline and bonded to the frames.

4.4.5 Stringers, where fitted, may use foam or hollow formers and should be bonded to the hull shell, see 4.3.10 and 4.3.11 for a description of primary and secondary bonding. Alternatively these may be formed a combination of other longitudinal structural members such as soles, decks and lockers.

4.4.6 In vessels below 7 m LOA where a combination of bonding of internal furniture and hull form provides adequate stiffening, the framing may be omitted subject to the approval of the Competent Authority.

4.4.7 In undecked boats the required bottom stiffening may be provided wholly or partly formed by the bonded-in flooring arrangement.

4.4.8 Where through-bolting connections are required, e.g. for gunwales or beam stringers, fastenings should be hot dip galvanized or stainless steel. The edges of the laminate and the fastening holes should be sealed with resin or other suitable material.

4.4.9 The hull surface gel coat is to be adequately protected in way of all fishing gear hauling positions by GRP sheathing, metal, hard rubber or plastic to prevent damage.

4.4.10 Discontinuities and hard points in the structure should be avoided. Where the strength of a stiffener may be reduced by attachment of fittings, openings, etc. additional laminates should be included.

4.4.11 Transoms not subjected to loads from outboard engines or steering arrangements should have scantlings as required for the shell laminate.

4.4.12 The glass weight at the corner of the transom and hull shell should be increased by 100%. The additional reinforcement should be stepped down by 40 mm per 600 g/m^2 of reinforcement weight.

4.4.13 Transoms that are to be used for the mounting of outboard engines should be constructed to include a marine grade plywood panel of sufficient dimension and of adequate strength for the proposed installation.

4.4.14 The stem should be moulded to include a gradual reduction from the keel weight to that required for the sheer.

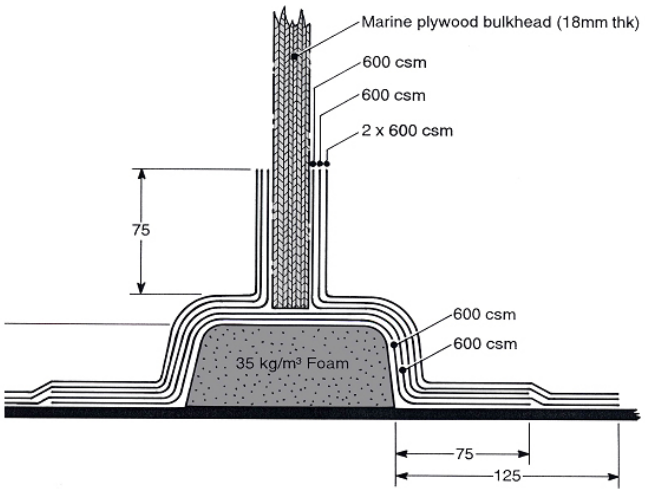
4.4.15 The centre of the hull aft of the keel to the transom is to be stiffened by lay-ups as required for the keel.

4.4.16 Where fitted, rubbing strakes may be of hardwood, rubber or plastic; securing bolts should be hot dip galvanized and sealed to prevent leakage.

4.4.17 Engine seatings should generally be continuous structures and where space permits, the seatings should extend at least twice the length of the engine, unless the Competent Authority is satisfied that manufacturing experience justifies variation.

4.4.18 The seatings should be bonded to the hull and stiffened transversely with floor sections and side support brackets. A continuous flat steel plate of adequate thickness and width is to be fitted to the top of the seating in way of the engine and gearbox and bonded to the seating.

4.4.19 Where included, it is recommended that bulkheads are fitted to a rigid foam core seating or frame section. When not practical to fit on a frame position, the bulkhead should be bonded to the shell with double angles of a satisfactory weight.



Typical bulkhead installation

4.4.20 Bolt connections to be well sealed and glassed over to prevent leakage.

4.4.21 Consideration should be given to including easily replaceable sacrificial structures in locations where impact or abrasion could occur. These may include structures in way of trawl doors, chains, cables, lines and other fishing equipment.

4.5 Deck construction

4.5.1 Decks may be of GRP sheathed plywood, GRP or traditional timber construction.

4.5.2 A beam shelf or stringer is to be bonded to the hull shell to support the deck beams. A system combining through bolting and bonding is recommended.

4.5.3 Deck beams should be fitted at each frame position; with longitudinal stiffening provided by hatches and carlings as required.

4.5.4 Decks in way of gallows, warp leads, deck machinery and heavy work positions should have additional stiffening and pillars to the approval of the Competent Authority.

4.5.5 Main beams should be fitted in way of all deck openings, machinery and deckhouse casings, and in way of masts and heavy deck machinery.

4.5.6 Where deck beams of timber are fitted reference should be made to annex II.

4.5.7 Where decks and deck beams are of GRP construction, openings in the deck may be stiffened by forming continuously moulded flanges, the weight of which should be 25% greater than the laid up deck laminate weight. Deck openings over 500 mm in length should be fitted with longitudinal stiffening.

4.5.8 Plywood decks should be bolted and bonded to the beam shelf and bonded to the hull. The complete deck area should be sheathed with a GRP laminate. Special attention should be paid to the sheathing in way of working areas that may require extra protection.

4.5.9 Where laid timber planked decking is used for decks reference should be made to annex II.

PART 2 – RECOMMENDED CONSTRUCTION STANDARDS FOR GRP VESSELS OF DESIGN CATEGORIES A AND B

1 Introduction

1.1 The construction standard described here should be applied to all decked vessels in design categories A and B.

2 Construction

2.1 In general the requirements of Part 1 should be complied with in addition to the requirements below.

2.2 The strength and construction of the hull, deck and other structures should be built to withstand all foreseeable conditions of the intended service.

2.3 All vessels should meet requirements that are compatible with a recognized GRP vessel construction standard* or an equivalent standard and be built to the satisfaction of the Competent Authority.

* The standards include:
.1 the Nordic Boat Standard;
.2 the construction rules of the United Kingdom Sea Fish Industry Authority (Seafish); and
.3 construction rules of recognized organizations.

PART 3 – RECOMMENDED CONSTRUCTION STANDARDS FOR GRP VESSELS OF DESIGN CATEGORIES C1 AND C2

1 Introduction

1.1 The construction standard described here should be applied to all decked and undecked vessels in design categories C1 and C2.

1.2 The construction standard described here should always be read in conjunction with Part 1.

2 Construction[4,5]

2.1 Hull and deck

2.1.1 Hull bottom laminate should be of a thickness which is suitable for the size of vessel, the spacing of frames (or panel size) and the speed of operation of the vessel; tables 2.1.1 and 2.1.2 show the required laminate thickness and equivalent fibre weight.

2.1.2 Hull side laminate should be of a thickness which is suitable for the size of vessel, the spacing of frames (or panel size) and the speed of operation of the vessel; tables 2.1.3 and 2.1.4 show the required laminate thickness and equivalent fibre weight.

2.1.3 Deck laminate should be of a thickness which is suitable for the size of vessel, the spacing of frames (or panel size) and the speed of operation of the vessel; table 2.1.5 shows the required laminate thickness and equivalent fibre weight.

2.2 Stiffeners

2.2.1 Hull bottom stiffeners should be of a size which is suitable for the size of vessel, the spacing of stiffeners (or panel size) and the speed of operation of the vessel; tables 2.1.6, 2.1.7, 2.1.10 and 2.1.11 show the required section modulus.

2.2.2 Hull side stiffeners should be of a size which is suitable for the size of vessel, the spacing of stiffeners (or panel size) and the speed of operation of the vessel; tables 2.1.8, 2.1.9, 2.1.12 and 2.1.13 show the required section modulus.

2.2.3 The properties of typical square section “top hat” stiffeners are given in table 2.1.14.

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4 Tabulated information is based on *Simplified Method for Scantling Determination* from ISO standard 12215.

5 These tables are under development and may require further development and refinement.

Table 2.1.1 – Table of hull BOTTOM LAMINATE thickness/weight for Reference Laminate Slow speed vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
3	6	3.6	1540	4.5	1920	6.7	2880	8.9	3840
10	7	4.4	1900	5.5	2380	8.3	3560	11.0	4750
24	8	5.1	2210	6.4	2760	9.6	4140	12.8	5510
46	9	5.6	2410	7.0	3010	10.5	4510	14.0	6010
79	10	6.1	2620	7.6	3280	11.4	4920	15.2	6550

Table of hull BOTTOM LAMINATE thickness/weight for Modified Laminate Slow speed vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
3	6	3.2	1821	4.0	2276	6.0	3414	8.0	4552
10	7	4.0	2249	5.0	2811	7.4	4217	9.9	5623
24	8	4.6	2613	5.8	3267	8.6	4900	11.5	6533
46	9	5.0	2849	6.3	3561	9.4	5342	12.6	7122
79	10	5.5	3106	6.9	3882	10.3	5824	13.7	7765

Table 2.1.2 – Table of hull BOTTOM LAMINATE thickness/weight for Reference Laminate Medium speed vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
3	12	4.4	1900	5.5	2380	8.3	3560	11.0	4750
10	14	5.4	2320	6.7	2890	10.1	4340	13.4	5780
24	16	6.1	2640	7.7	3300	11.5	4950	15.3	6600
46	18	6.9	2980	8.7	3730	13.0	5590	17.3	7450
79	20	8.0	3440	10.0	4290	15.0	6440	20.0	8580

Table of hull BOTTOM LAMINATE thickness/weight for Modified Laminate
Medium speed vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
3	12	4.0	2249	5.0	2811	7.4	4217	9.9	5623
10	14	4.8	2742	6.0	3427	9.1	5141	12.1	6854
24	16	5.5	3127	6.9	3909	10.3	5864	13.8	7818
46	18	6.2	3534	7.8	4418	11.7	6627	15.6	8836
79	20	7.2	4070	9.0	5087	13.5	7631	18.0	10175

Table 2.1.3 – Table of hull SIDE LAMINATE thickness/weight for Reference Laminate
Slow speed vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
3	6	2.6	1140	3.3	1430	5.0	2140	6.6	2850
10	7	2.8	1200	3.5	1490	5.2	2240	6.9	2980
24	8	3.1	1320	3.8	1650	5.7	2480	7.7	3300
46	9	3.3	1410	4.1	1770	6.1	2650	8.2	3530
79	10	3.5	1520	4.4	1900	6.6	2850	8.8	3800

Table of hull SIDE LAMINATE thickness/weight for Modified Laminate
Slow speed vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
3	6	2.4	1349	3.0	1687	4.5	2530	6.0	3374
10	7	2.5	1414	3.1	1767	4.7	2651	6.2	3534
24	8	2.8	1564	3.4	1955	5.2	2932	6.9	3909
46	9	2.9	1671	3.7	2088	5.5	3133	7.4	4177
79	10	3.2	1799	4.0	2249	6.0	3374	7.9	4498

Table 2.1.4 – Table of hull SIDE LAMINATE thickness/weight for Reference Laminate Medium speed vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
3	12	2.6	1120	3.3	1400	4.9	2100	6.5	2800
10	14	2.9	1270	3.7	1590	5.5	2380	7.4	3170
24	16	3.3	1410	4.1	1770	6.1	2650	8.2	3530
46	18	3.6	1560	4.5	1950	6.8	2920	9.0	3890
79	20	3.9	1680	4.9	2100	7.3	3150	9.8	4200

Table of hull SIDE LAMINATE thickness/weight for Modified Laminate Medium speed vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
3	12	2.3	1328	2.9	1660	4.4	2490	5.9	3320
10	14	2.6	1499	3.3	1874	5.0	2811	6.6	3749
24	16	2.9	1671	3.7	2088	5.5	3133	7.4	4177
46	18	3.3	1842	4.1	2303	6.1	3454	8.1	4605
79	20	3.5	1992	4.4	2490	6.6	3735	8.8	4980

Table 2.1.5 – Table of DECK LAMINATE thickness/weight for Reference Laminate All vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
3	12	4.4	1900	5.5	2370	8.3	3550	11.0	4740

Table of DECK LAMINATE thickness/weight for Modified Laminate All vessels

CuNo	Max Speed (kts)	Panel width b (mm) 400		500		750		1000	
		Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)	Laminate thickness (mm)	Fibre weight (g/m^2)
79	20	4.0	2244	5.0	2805	7.4	4208	9.9	5610

Table 2.1.6 – Table of BOTTOM STIFFENER modulus for Reference Laminate
Slow speed vessels

		Stiffener spacing s (mm)							
		400	400	400	400	500	500	500	500
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	6	0.7	1.6	2.8	4.4	0.9	2.0	3.5	5.5
10	7	1.3	2.9	5.2	8.1	1.6	3.7	6.5	10.2
24	8	2.7	6.1	10.8	16.9	3.4	7.6	13.5	21.1
46	9	3.2	7.2	12.8	20.0	4.0	9.0	16.0	25.0
79	10	3.8	8.6	15.2	23.8	4.8	10.7	19.0	29.7
		Stiffener spacing s (mm)							
		750	750	750	750	1000	1000	1000	1000
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	6	1.3	3.0	5.3	8.2	1.8	3.94	7.0	10.9
10	7	2.4	5.5	9.8	15.2	3.3	7.3	13.0	20.3
24	8	5.1	11.4	20.3	31.6	6.8	15.2	27.0	42.2
46	9	6.0	13.5	24.0	37.5	8.0	18.0	32.0	50.0
79	10	7.1	16.0	28.5	44.5	9.5	21.4	38.0	59.4

Table 2.1.7 – Table of BOTTOM STIFFENER modulus for Modified Laminate
Slow speed vessels

		Stiffener spacing s (mm)							
		400	400	400	400	500	500	500	500
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	6	0.6	1.3	2.4	3.7	0.7	1.7	3.0	4.6
10	7	1.1	2.5	4.4	6.9	1.4	3.1	5.5	8.6
24	8	2.3	5.2	9.2	14.3	2.9	6.5	11.5	17.9
46	9	2.7	6.1	10.9	17.0	3.4	7.7	13.6	21.3
79	10	3.2	7.3	12.9	20.2	4.0	9.1	16.2	25.2
		Stiffener spacing s (mm)							
		750	750	750	750	1000	1000	1000	1000
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	6	1.1	2.5	4.5	7.0	1.5	3.3	6.0	9.3
10	7	2.1	4.7	8.3	12.9	2.8	6.2	11.1	17.3
24	8	4.3	9.7	17.2	26.9	5.7	12.9	23.0	35.9
46	9	5.1	11.5	20.4	31.9	6.8	15.3	27.2	42.5
79	10	6.1	13.6	24.2	37.9	8.1	18.2	32.3	50.5

Table 2.1.8 – Table of SIDE STIFFENER modulus for Reference Laminate
Slow speed vessels

		Stiffener spacing s (mm)							
		400	400	400	400	500	500	500	500
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	6	0.4	0.8	1.4	2.2	0.4	1.0	1.8	2.7
10	7	0.4	0.9	1.5	2.4	0.5	1.1	1.9	3.0
24	8	0.5	1.2	2.2	3.4	0.7	1.5	2.7	4.2
46	9	0.7	1.5	2.6	4.1	0.8	1.8	3.3	5.1
79	10	0.8	1.8	3.3	5.1	1.0	2.3	4.1	6.4
		Stiffener spacing s (mm)							
		750	750	750	750	1000	1000	1000	1000
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	6	0.7	1.5	2.6	4.1	0.9	2.0	3.5	5.5
10	7	0.7	1.6	2.9	4.5	1.0	2.1	3.8	5.9
24	8	1.0	2.3	4.1	6.3	1.4	3.0	5.4	8.4
46	9	1.2	2.7	4.9	7.6	1.6	3.7	6.5	10.2
79	10	1.5	3.5	6.2	9.6	2.1	4.6	8.2	12.8

Table 2.1.9 – Table of SIDE STIFFENER modulus for Modified Laminate
Slow speed vessels

		Stiffener spacing s (mm)							
		400	400	400	400	500	500	500	500
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	6	0.3	0.7	1.2	1.9	0.4	0.8	1.5	2.3
10	7	0.3	0.7	1.3	2.0	0.4	0.9	1.6	2.5
24	8	0.5	1.0	1.8	2.9	0.6	1.3	2.3	3.6
46	9	0.6	1.2	2.2	3.5	0.7	1.6	2.8	4.3
79	10	0.7	1.6	2.8	4.4	0.9	2.0	3.5	5.4
		Stiffener spacing s (mm)							
		750	750	750	750	1000	1000	1000	1000
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	6	0.6	1.3	2.2	3.5	0.7	1.7	3.0	4.6
10	7	0.6	1.4	2.4	3.8	0.8	1.8	3.2	5.0
24	8	0.9	1.9	3.4	5.4	1.1	2.6	4.6	7.2
46	9	1.0	2.3	4.1	6.5	1.4	3.1	5.5	8.6
79	10	1.3	2.9	5.2	8.2	1.7	3.9	7.0	10.9

Table 2.1.10 – Table of BOTTOM STIFFENER modulus for Reference Laminate
Medium speed vessels

		Stiffener spacing s (mm)							
		400	400	400	400	500	500	500	500
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	12	1.2	2.7	4.8	7.5	1.5	3.4	6.0	9.4
10	14	2.3	5.2	9.2	14.4	2.9	6.5	11.5	18.0
24	16	3.6	8.1	14.4	22.5	4.5	10.1	18.0	28.1
46	18	5.2	11.7	20.8	32.5	6.5	14.6	26.0	40.6
79	20	6.8	15.3	27.2	42.5	8.5	19.1	34.0	53.1
		Stiffener spacing s (mm)							
		750	750	750	750	1000	1000	1000	1000
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	12	2.3	5.1	9.0	14.1	3.0	6.8	12.0	18.8
10	14	4.3	9.7	17.3	27.0	5.8	12.9	23.0	35.9
24	16	6.8	15.2	27.0	42.2	9.0	20.3	36.0	56.3
46	18	9.8	21.9	39.0	60.9	13.0	29.3	52.0	81.3
79	20	12.8	28.7	51.0	79.7	17.0	38.3	68.0	106.3

Table 2.1.11 – Table of BOTTOM STIFFENER modulus for Modified Laminate Medium speed vessels

		Stiffener spacing s (mm)							
		400	400	400	400	500	500	500	500
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	12	1.0	2.3	4.1	6.4	1.3	2.9	5.1	8.0
10	14	2.0	4.4	7.8	12.2	2.4	5.5	9.8	15.3
24	16	3.1	6.9	12.2	19.1	3.8	8.6	15.3	23.9
46	18	4.4	9.9	17.7	27.6	5.5	12.4	22.1	34.5
79	20	5.8	13.0	23.1	36.1	7.2	16.3	28.9	45.2
		Stiffener spacing s (mm)							
		750	750	750	750	1000	1000	1000	1000
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	12	1.9	4.3	7.7	12.0	2.6	5.7	10.2	15.9
10	14	3.7	8.2	14.7	22.9	4.9	11.0	19.6	30.5
24	16	5.7	12.9	23.0	35.9	7.7	17.2	30.6	47.8
46	18	8.3	18.6	33.2	51.8	11.1	24.9	44.2	69.1
79	20	10.8	24.4	43.4	67.7	14.5	32.5	57.8	90.3

Table 2.1.12 – Table of SIDE STIFFENER modulus for Reference Laminate
Medium speed vessels

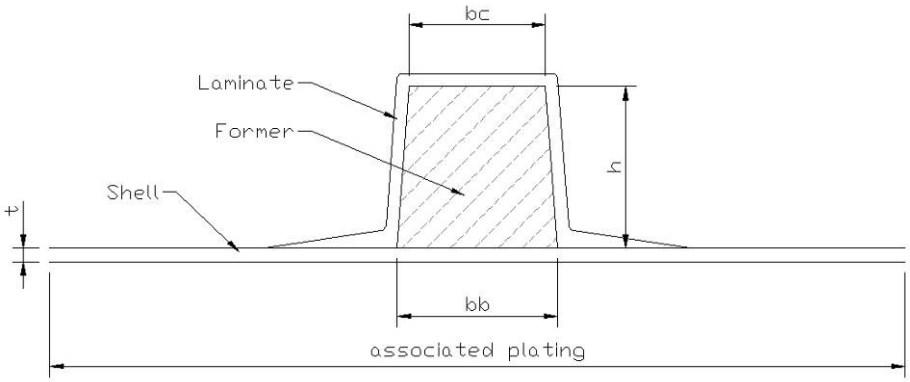
		Stiffener spacing s (mm)							
		400	400	400	400	500	500	500	500
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	12	0.4	0.8	1.4	2.3	0.5	1.0	1.8	2.8
10	14	0.5	1.0	1.8	2.8	0.6	1.3	2.3	3.5
24	16	0.7	1.5	2.6	4.1	0.8	1.8	3.3	5.1
46	18	0.9	1.9	3.4	5.4	1.1	2.4	4.3	6.7
79	20	1.1	2.4	4.3	6.8	1.4	3.0	5.4	8.4
		Stiffener spacing s (mm)							
		750	750	750	750	1000	1000	1000	1000
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	12	0.7	1.5	2.7	4.2	0.9	2.0	3.6	5.6
10	14	0.8	1.9	3.4	5.3	1.1	2.5	4.5	7.0
24	16	1.2	2.7	4.9	7.6	1.6	3.7	6.5	10.2
46	18	1.6	3.6	6.5	10.1	2.2	4.8	8.6	13.4
79	20	2.0	4.6	8.1	12.7	2.7	6.1	10.8	16.9

Table 2.1.13 – Table of SIDE STIFFENER modulus for Modified Laminate
Medium speed vessels

		Stiffener spacing s (mm)							
		400	400	400	400	500	500	500	500
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	12	0.3	0.7	1.2	1.9	0.4	0.9	1.5	2.4
10	14	0.4	0.9	1.5	2.4	0.5	1.1	1.9	3.0
24	16	0.6	1.2	2.2	3.5	0.7	1.6	2.8	4.3
46	18	0.7	1.6	2.9	4.6	0.9	2.1	3.7	5.7
79	20	0.9	2.1	3.7	5.7	1.1	2.6	4.6	7.2
		Stiffener spacing s (mm)							
		750	750	750	750	1000	1000	1000	1000
CuNo	Max Speed	Stiffener length l (mm) 500	750	1000	1250	500	750	1000	1250
	(kts)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)	Section Modulus (cm^3)
3	12	0.6	1.3	2.3	3.6	0.8	1.7	3.1	4.8
10	14	0.7	1.6	2.9	4.5	1.0	2.2	3.8	6.0
24	16	1.0	2.3	4.1	6.5	1.4	3.1	5.5	8.6
46	18	1.4	3.1	5.5	8.6	1.8	4.1	7.3	11.4
79	20	1.7	3.9	6.9	10.8	2.3	5.2	9.2	14.3

Table 2.1.14 – Table of SECTION MODULUS for square stiffeners formed from Reference Laminate

Dimensions of former			Plating		Stiffener	
height h mm	width (base) b_b mm	width (top) b_c mm	thickness t mm	associated width mm	laminate weight g/m^2	Sect. Modulus SM cm^3
25	25	20	5	125	600	1.5
			10	225	600	2.2
			15	325	600	4.6
40	40	35	5	140	600	3.6
			10	240	600	4.4
			15	340	600	6.3
50	50	45	5	150	900	8.2
			10	250	900	9.5
			15	350	900	11.5
60	60	50	5	160	1200	14.5
			10	260	1200	16.6
			15	360	1200	18.9
75	75	65	5	175	1200	22.8
			10	275	1200	25.6
			15	375	1200	28.2
100	100	85	5	200	1800	56.2
			10	300	1800	63.7
			15	400	1800	68.6
125	125	105	5	225	2100	98.3
			10	325	2100	111.7
			15	425	2100	119.6
150	150	125	5	250	2700	172.5
			10	350	2700	198.0
			15	450	2700	212.6



Notes: **Reference Laminate** is E-glass and polyester resin with a glass content of about 30%, this may be sprayed or conventional hand lay-up of chopped strand mat.

Modified Laminate is E-glass and polyester resin with (approximately) alternating layers of chopped strand mat and woven rovings, giving a glass content of about 35% to 40%.

ANNEX IV

RECOMMENDED CONSTRUCTION STANDARDS FOR STEEL FISHING VESSELS

PART 1 – GENERAL

1 Scope

Construction standards apply to single hull, steel vessels of conventional shape operating at moderate speed; that is up to a maximum of 15 knots. Vessels of unusual design or shape and those operating at higher speeds will require special consideration by the Competent Authority.

2 Design categories

2.1 These construction standards are based on the division of vessels into appropriate design categories, the categories indicate sea and wind conditions for which a vessel is considered to be suitable, provided that the vessel is correctly operated and at a speed appropriate to the prevailing sea state. Design categories are defined in 1.1.12.

3 Construction standards

3.1 The appropriate standards of construction for steel vessels should be determined as set out in the table below:

Design category	Part 1	Part 2	Part 3
A	✔	✔	
B	✔	✔	
C1	✔		✔
C2	✔		✔
D	✔		

3.2 Vessels fitted with sails should be considered to operate in design categories C1, C2 and D only unless given special consideration by the Competent Authority.

4 Construction standards for steel vessels of all design categories

4.1 Materials

4.1.1 During construction of the vessel documents should be kept to demonstrate that the materials used are of shipbuilding quality and have certificates issued by recognized organizations or a Competent Authority and with at least the following properties:

- minimum yield stress 240 N/mm^2;
- tensile strength 410 N/ mm^2; and
- ultimate strain 22%.

4.1.2 The materials used should be dry and free from corrosion.

4.1.3 All plates used should have a mean thickness which at least corresponds to the nominal thickness of the plate.

4.1.4 Plates and sections should be stored horizontally so that the materials are not damaged or deformed.

4.2 Alignment of materials

4.2.1 The construction and welded joints in the material should be such that there is good accessibility for welding.

4.2.2 The alignment of plates and profiles should be such that correct scantlings are maintained across all connections and welded joints.

4.2.3 The cutting and preparation of plates should be such that good welded connections can be achieved.

4.3 Welding

4.3.1 All welding work should be carried out by suitably qualified persons. Any failure or unsatisfactory piece of work should be corrected before final painting.

4.3.2 The welding of the hull should be carried out under supervision and be inspected upon completion by an approved welder.

4.3.3 When welding at low temperatures or damp weather, preheating of the steel should be arranged.

4.3.4 When welding plates thicker than 4 mm either a 30 degrees joint should be used or also welding on the back side.

4.3.5 Double continuous welding should always be used in case of:

- foundations;
- end connections and brackets for stiffeners.

4.3.6 Continuous welding should always be used for plates in:

- the hull plating;
- deck and superstructures;
- tanks;
- bulkhead connection to bottom and sides.

4.3.7 Double intermittent welding may be used in other cases. The interruptions should not be longer than the length of the weld and the total length of welding should at least correspond to that of a continuous welding.

4.3.8 One-sided intermittent welding may be used for fastening of stiffeners which are not subjected to a load, e.g., buckling stiffeners.

4.3.9 Fillet welds should normally have an a-measure of at least 3.5 mm.

4.4 Detailed construction

4.4.1 Structural continuity is to be maintained at all primary structural members.

4.4.2 Knee plates should be used where necessary in order to achieve sufficient fastening area.

4.4.3 Stiffeners should be welded to the web frames and girders also where the stiffeners are all continuous through.

4.5 Inspection and testing

4.5.1 The scantlings table (where applicable), material documentation and workmanship for each vessel should be subject to inspections at key stages of its construction.

4.5.2 The testing of welded joints by x-ray or similar method may be carried out in cases where considered necessary.

PART 2 – RECOMMENDED CONSTRUCTION STANDARDS FOR STEEL VESSELS OF DESIGN CATEGORIES A AND B

1 Introduction

1.1 The construction standard described here should be applied to all decked vessels in design categories A and B.

2 Construction

2.1 The requirements of **Part 1** should be complied with in addition to the requirements below.

2.2 The strength and construction of the hull, deck and other structures should be built to withstand all foreseeable conditions of the intended service.

2.3 All vessels should meet requirements that are compatible with a recognized steel vessel construction standard* or an equivalent standard and be built to the satisfaction of the Competent Authority.

PART 3 – RECOMMENDED CONSTRUCTION STANDARDS FOR STEEL VESSELS OF DESIGN CATEGORIES C1 AND C2

1 Introduction

1.1 The construction standard described here should be applied to all decked and undecked vessels in design categories C1 and C2.

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* The standards include:
.1 the Nordic Boat Standard;
.2 the construction rules of the United Kingdom Sea Fish Industry Authority (Seafish); and
.3 construction rules of recognized organizations.

1.2 The construction standard described here should always be read in conjunction with **Part 1**.

2 Scantlings[1,2]

2.1 Minimum scantlings should be in accordance with the table below. Figures may be based on interpolation for boats with a length overall between 8 and 15 metres.

LOA (m)	**8**	**9**	**10**	**11**	**12**	**15**	**Remarks**
Frame Spacing (mm)	Max 500	500	500	500	500	500	
Bar keel							
Sectional Area (cm^2)	15	15	15	15	15	15	Where bar keel is omitted keelplate = 1.5 x t bottom. Total breadth 30 x LOA mm
Centre keel							
Sectional Area (cm^2)	15	16	17	17	18	20	Required only where the bar keel is omitted
Min. Thickness (mm)	6.5	6.5	6.5	6.5	6.5	6.5	
Floor							
Height (mm)	200	210	215	225	230	250	Required only at every third frame on the other frames skeleton floors
Thickness (mm)	4	4	4.5	4.5	5	5	
Flange (mm)	50 x 3.5	50 x 4	50 x 4.5	50 x 4.5	50 x 5	50 x 6	May be omitted where cement is inserted up to the top of the floors
Keelson	UPN 100	UPN 100	UPN 100	UPN 100	UPN 120	UPN 120	(Channel) Required only where centre keel is omitted
Frames							
Web (mm)	90 x 6.5	90 x 6.5	100 x 6.5	100 x 6.5	100 x 7	100 x 7	
Section Mod (cm^3)	10	11.6	12.6	14.7	15.8	19	
Bottom plates (mm)	5	5.5	6	6.5	6.5	7.5	Keel plates and stem plates to be increased by 1 mm
Shell plates (mm)	4.5	5	5.5	5.5	6	6.5	
Bulkheads							
Plates (mm)	5	5.5	5.5	6	6	6.5	
Stiffener web (mm)	50 x 6.5	50 x 6.5	50 x 6.5	50 x 7	50 x 7	50 x 7	Max. spacing 750 mm
Stiffener sec mod (cm^3)	6.5	6.5	6.5	7.5	7.5	7.5	

[1] The scantlings are based on the Simplified Strength Requirements for Steel Boats from the Nordic Boat Standard.

[2] The scantlings are corrected by the factors applicable to fishing vessels set out in the Nordic Boat Standard.

LOA (m)	**8**	**9**	**10**	**11**	**12**	**15**	**Remarks**
Deck							
Plates (mm)	4.5	5	6	6	7	7	
Beam web (mm)	90 x 9	90 x 9	90 x 9	90 x 9	90 x 9	90 x 9	Max. spacing 300 mm. Max. span 3.5 m
Beam sec mod (cm^3)	25	25	25	25	25	25	
Bulwark (mm)	4.5	4.5	4.5	5	5.5	5.5	Stiffener 50 x 6 mm. Max. spacing 500 mm
Superstructure/ deckhouse (mm)	4.5	4.5	4.5	5	5.5	5.5	Stiffener 50 x 6 mm. Max. spacing 500 mm

ANNEX V

RECOMMENDED CONSTRUCTION STANDARDS FOR ALUMINIUM FISHING VESSELS

PART 1 – GENERAL

1 Scope

1.1 Construction standards apply to single hull, aluminium vessels of conventional shape operating at moderate speed; that is up to a maximum of 15 knots. Vessels of unusual design or shape and those operating at higher speeds will require special consideration by the Competent Authority.

2 Design categories

2.1 These construction standards are based on the division of vessels into appropriate design categories, the categories indicate sea and wind conditions for which a vessel is considered to be suitable, provided that the vessel is correctly operated and at a speed appropriate to the prevailing sea state. Design categories are defined in 1.2.14.

3 Construction standards

3.1 The appropriate standards of construction for aluminium vessels should be determined as set out in the table below:

Design category	Part 1	Part 2	Part 3
A	✔	✔	
B	✔	✔	
C1	✔		✔
C2	✔		✔
D	✔		

3.2 Vessels fitted with sails should be considered to operate in design categories C1, C2 and D only unless given special consideration by the Competent Authority.

4 Construction standards for aluminium vessels of all design categories

4.1 General

4.1.1 Vessels may be built in accordance with this section providing that:

- the speed of the vessel is not greater than 15 knots; and
- all structural elements are accessible for inspection and measurement.

4.2 Materials

4.2.1 During construction documents should be kept to indicate that the materials used are seawater resistant aluminium and have certificates issued by a recognized organization or a Competent Authority and have at least the following properties:

σ_2 = 170 N/mm^2.

4.2.2 Plates, profiles and other aluminium materials should be stored horizontally so that the materials are not damaged or deformed.

4.2.3 The material used should be straight and undamaged and have the required scantlings.

4.2.4 Storage premises for welding equipment and electrodes should be kept dry and clean.

4.2.5 Aluminium materials should not be stored together with other metallic materials.

4.2.6 Plates which should be used for the hull should be sea water resistant and should normally have the following material composition:

- Cu max 0.2%
- Fe max 0.5%
- Mg max 2.0%

The following materials fulfil these requirements:

- ASTM: 5052, 5083, 5086, 5154, 5454
- DIN 1725: AlMg2.5, AlMg4.5Mn, AlMg4Mn, AlMg3, AlMg2.7Mn

4.2.7 Stiffeners and profiles should normally have the following material composition:

- Cu max 0.4%
- Fe max 0.5%

The following examples fulfil these requirements:

- ASTM: 6005, 6063, 6351
- DIN 1725: AlMgSi0.7, AlMgSiO,5, AlMgSil

4.3 Shaping of materials

4.3.1 Hardened aluminium materials should normally not be shaped with heat added and cold shaping should only be used when there is a low tension in the material. Aluminium materials should normally be straight or shaped by rolling.

4.3.2 Shaping of plates should normally be made by rolling. Bending to 90 degrees should not be made unless the inner bending radius (R) is at least:

R = f * t

where: f is the bending factor according to the table below
t is the thickness of the material

Alloy	Condition	Bending factor for material thickness (t) in mm					
		1.0	**1.5**	**3.0**	**4.5**	**6.0**	**9.0**
AlMg2.5	02	0	0	0	1	1	1.5
	14	0	1	1.5	2	3	3
	08	2	3	4	5	6	7
AlMg4.5Mn	02	-	0.5	1	1	1.5	2
	32	-	1.5	3	3	3.5	

4.3.3 The cutting of materials should be done so that the edges become straight and without burns or other damages.

4.4 Welding

4.4.1 Welding should not be carried out at a lower temperature than + 5 degrees Celsius.

4.4.2 Welding of hull and deck should be carried out only by persons suitably qualified for the materials and equipment used.

4.4.3 Normally welding electrodes of AlMg4.5Mn or AlMg6 should be used unless it is documented that another electrode will give a better result.

4.4.4 All welding should have full burning through and a smooth surface without burrs or edge burns.

4.4.5 All plates and fastening of watertight bulkheads should be welded with continuous welding.

4.4.6 If intermittent welding is used, the length of weld should be at least as long as the spacing and always end with a continuous weld.

4.4.7 The welding should comply with the dimensions approved in beforehand.

4.4.8 The weld at representative places should be tested with penetrating liquids. Surface cracks should not be accepted.

4.5 Manufacturing premises

4.5.1 Work up and welding of aluminium should be carried out at a dry place under roof and screened off from weather and wind.

4.5.2 The work place should be kept clean and free of work on other metallic materials.

4.5.3 If temperatures lower than 0 degrees Celsius can occur, the manufacturing premises should be so arranged that it can be heated.

4.6 Inspection and testing

4.6.1 The scantlings table (where applicable), material documentation and workmanship for each vessel should be subject to inspections at key stages of its construction.

4.6.2 The testing of welded joints by x-ray or similar method may be carried out in cases where considered necessary.

PART 2 – RECOMMENDED CONSTRUCTION STANDARDS FOR ALUMINIUM VESSELS OF DESIGN CATEGORIES A AND B

1 Introduction

1.1 The construction standard described here should be applied to all decked vessels in design categories A and B.

2 Construction

2.1 In general the requirements of Part 1 should be complied with in addition to the requirements below.

2.2 The strength and construction of the hull, deck and other structures should be built to withstand all foreseeable conditions of the intended service.

2.3 All vessels should meet requirements that are compatible with a recognized aluminium vessel construction standard* or an equivalent standard and be built to the satisfaction of the Competent Authority.

PART 3 – RECOMMENDED CONSTRUCTION STANDARDS FOR ALUMINIUM VESSELS OF DESIGN CATEGORIES C1 AND C2

1 Introduction

1.1 The construction standard described here should be applied to all decked and undecked vessels in design categories C1 and C2.

1.2 The construction standard described here should always be read in conjunction with Part 1.

2 Scantlings[1, 2]

2.1 Minimum scantlings should be in accordance with the table below. Figures may be based on interpolation for boats with a length overall between 8 and 15 metres.

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* The standards include:
.1 the Nordic Boat Standard;
.2 the construction rules of the United Kingdom Sea Fish Industry Authority (Seafish); and
.3 construction rules of recognized organizations.

1 The scantlings are based on the Simplified Strength Requirements for Aluminium Boats from the Nordic Boat Standard.

2 The scantlings are corrected by the factors applicable to fishing vessels set out in the Nordic Boat Standard.

LOA (m)	**8**	**9**	**10**	**11**	**12**	**15**	**Remarks**
Frame Spacing (mm)	Max 300	300	300	300	300	300	
Bar keel							
Sectional Area (cm^2)	18	19	20	21	22	24	Where bar keel is omitted keelplate = 2.5 x t bottom.
Min. Thickness (mm)	17	18	18	19	20	21	Total breadth 30 x LOA mm
Centre keel							
Sectional Area (cm^2)	18	19	20	21	22	24	Required only where the bar keel is omitted
Min. Thickness (mm)	6.5	6.5	7.5	7.5	8.5	8.5	
Floor							
Height (mm)	200	210	215	225	230	250	Required only at every third frame on the other frames skeleton floors
Thickness (mm)	5.5	5.5	5.5	6.5	6.5	6.5	
Flange (mm)	50 x 5.5	50 x 5.5	50 x 5.5	50 x 5.5	50 x 6.5	50 x 6.5	May be emitted where cement is inserted up to the top of the floors
Keelson	UPN 100	UPN 100	UPN 100	UPN 100	UPN 120	UPN 120	(Channel) Required only where centre keel is omitted
Frames							
Web (mm)	90 x 8.5	90 x 8.5	90 x 8.5	95 x 8.5	95 x 8.5	100 x 8.5	
Section Mod (cm^3)	23 cm^3	24 cm^3	25 cm^3	25.2 cm^3	26.3 cm^3	28.4 cm^3	
Bottom plates (mm)	5	5.5	6	6.5	6.5	7.5	Keel plates and stem plates to be increased by 1 mm
Shell plates (mm)	4.5	5	5.5	5.5	6	6.5	
Bulkheads							
Plates (mm)	5	5.5	5.5	6	6	6.5	
Stiffener web (mm)	50 x 6.5	50 x 6.5	50 x 7.5	50 x 7.5	50 x 8.5	50 x 8.5	Max. spacing 500
Stiffener sec mod (cm^3)	6.3	6.3	7.4	7.4	8.4	8.4	
Deck							
Plates (mm)	4.5	5	6	6	7	7	
Beam web (mm)	90 x 9	90 x 9	90 x 9	90 x 9	90 x 9	90 x 9	Max. spacing 300 mm. Max. span 3.5 m
Beam sec mod (cm^3)	31	31	31	31	31	31	
Bulwark (mm)	4.5	4.5	4.5	5	6	6	Stiffener 50 x 6 mm. Max. spacing 600 mm
Superstructure / deckhouse (mm)	3.5	3.5	4.5	4.5	5	6	Stiffener 50 x 6 mm. Max. spacing 300 mm

ANNEX VI

RECOMMENDED STANDARDS FOR ANCHORING AND MOORING EQUIPMENT

1 Anchoring equipment for vessels in design categories A and B

1.1 Vessels should be provided with appropriate anchoring equipment arranged in such a way that it is possible to anchor efficiently and reliably.

1.2 Vessels should be equipped with anchoring equipment in accordance with the following table:

Table of anchoring equipment for vessels in design categories A and B

CuNo	Total anchor weight (kg)	Length of anchor rope (m)	Minimum diameter of anchor rope (nylon rope) (mm)	Length of anchor chain (m)	Diameter of anchor chain (mm)
5	8	20	10	5	8
10	12	25	12	5	8
15	15	30	15	6	8
25	21	32	15	6	8
35	25	35	18	8	9.5
45	31	40	18	8	9.5
60	37	45	20	10	9.5
80	43	50	20	10	9.5
100	52	55	25	15	12
155	62	60	25	15	12

1.3 The anchor weight required in the table above may be distributed between two anchors one of which should be at least 66% of the weight shown.

1.4 Vessels should be equipped with at least one anchor chain of a length and dimension according to the table above. The chain should be provided between the anchor and the anchor rope.

1.5 Vessels should be equipped with anchor rope(s) of length and dimension according to the table above.

1.6 Vessels should be provided with sufficient means to fix the anchor rope to the vessel and protect it against chafing.

1.7 Where operational experience justifies departure from the sizes of anchoring equipment, the Competent Authority may require an increase or permit a reduction in anchoring equipment.

2 Anchoring equipment for vessels in design categories C1 and C2

2.1 Vessels should be provided with anchoring equipment arranged in such a way that it is possible to anchor efficiently and reliably.

2.2 Vessels should be equipped with anchoring equipment in accordance with the following table:

Table of anchoring equipment for vessels in design categories C1 and C2

CuNo	Total anchor weight (kg)	Length of anchor rope (m)	Minimum diameter of anchor rope (nylon rope) (mm)	Length of anchor chain (m)	Diameter of anchor chain (mm)
5	6	20	10	5	8
10	9	25	12	5	8
15	11	30	15	6	8
25	16	32	15	6	8
35	19	35	18	8	9.5
45	23	40	18	8	9.5
60	28	45	20	10	9.5
80	32	50	20	10	9.5
100	39	55	25	15	12
155	47	60	25	15	12

2.3 The anchor weight required in the table above may be distributed between two anchors one of which should be at least 66% of the weight shown.

2.4 Vessels should be equipped with at least one anchor chain of a length and dimension according to the table above. The chain should be provided between the anchor and the anchor rope.

2.5 Vessels should be equipped anchor rope(s) of length and dimension according to the table above.

2.6 Vessels should be provided with sufficient means to fix the anchor rope to the vessel and protect it against chafing.

2.7 The Competent Authority may require increased anchor equipment for vessels fishing in very rough waters and/or may permit reduction in the equipment for vessels operating in sheltered waters.

3 Anchoring equipment for vessels in design category D

3.1 In general vessels should be provided with anchoring equipment arranged in such a way that it is possible to anchor efficiently and reliably. However, where operating conditions allow this requirement may be omitted to the satisfaction of the Competent Authority.

4 Mooring equipment

4.1 All vessels should be provided with appropriate mooring equipment including mooring ropes, bollards and fairleads arranged in such a way that the boat can be moored, tow and be towed efficiently and to the satisfaction of the Competent Authority.

4.2 Mooring equipment, its mountings, decks and bulwarks, where the equipment (including anchoring equipment) is to be located, should be strongly constructed. Appropriate reinforcements to structure should be provided where equipment is fastened and, where through bolts are used, washers or backing plates should be fitted below the nuts.

ANNEX VII

STRUCTURAL STRENGTH OF HATCH COVERS

1 General

1.1 Hatch covers should have strength equal or greater than the surrounding deck of the vessel.

2 Plating

2.1 Plating and planking for hatch covers should have a thickness of at least the following:

CuNo	Steel (mm)	Aluminium (mm)	Wood (mm)	GRP (mm)	(est. g/m^2)
10	4.0	5.0	20	5.0	3000
25	4.5	6.0	25	7.0	4200
45	5.0	6.5	30	7.5	4500
80	6.0	8.0	35	8.0	4800
125	6.0	8.0	40	9.0	5400
155	6.0	8.0	40	9.0	5400

3 Stiffeners

3.1 The following stiffeners may be used for the hatch providing none is longer than 2.0 m and that the maximum spacing of stiffeners is 500 mm.

	Flat Bar Stiffeners	Angle Stiffeners
Steel	50 x 4.5 mm	35 x 35 x 4 mm
Aluminium	64 x 6.5 mm	-
Wood	Beams 45 x 75 mm	-
GRP	As deck beams	-

3.2 Where heavy loads are to be placed on hatch covers the stiffeners should be increased in depth to be double the tabulated depth.

3.3 Structure around the perimeter of the hatch should be sized to be equivalent or greater than the stiffeners listed above.

ANNEX VIII

GUIDANCE IN THE DIMENSIONS OF FREEING PORTS

1 On decked vessels where the fixed bulwarks ends or sides of the superstructure etc. form enclosed wells means to clear entrapped water are to be provided. Where bulwarks on weather parts of the working deck form wells, the minimum freeing port area (A) in m^2, on each side of the vessel for each well on the working deck should be determined in relation to the length (l) and height (h) of bulwark in this well, in accordance with the following table:

Freeing port area (A) in m^2 for vessels of design categories A and B
(for intermediate lengths (l) and heights (h) the value of A should be obtained by linear interpolation)

Height of bulwark (h) in metres	**Length of well (l) in metres (l need not be taken as greater than 70% of the length of the vessel)**								
	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
0.2	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09
0.3	0.07	0.08	0.08	0.09	0.10	0.11	0.11	0.12	0.13
0.4	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17
0.5	0.11	0.13	0.14	0.15	0.16	0.18	0.19	0.20	0.21
0.6	0.14	0.15	0.17	0.18	0.20	0.21	0.23	0.24	0.26
0.7	0.16	0.18	0.19	0.21	0.23	0.25	0.26	0.28	0.30
0.8	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34
0.9	0.20	0.23	0.25	0.27	0.29	0.32	0.34	0.36	0.38
1.0	0.23	0.25	0.28	0.30	0.33	0.35	0.38	0.40	0.43
1.1	0.25	0.28	0.30	0.33	0.36	0.39	0.41	0.44	0.47
1.2	0.27	0.30	0.33	0.36	0.39	0.42	0.45	0.48	0.51

Freeing port area (A) in m^2 for vessels of design categories C1, C2 and D
(for intermediate lengths (l) and heights (h) the value of A should be obtained by linear interpolation)

Height of bulwark (h)	**Length of well (l) in metres (l need not be taken as greater than 70% of the length of the vessel)**								
in metres	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
0.2	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05
0.3	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.08
0.4	0.05	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.10
0.5	0.07	0.08	0.08	0.09	0.10	0.11	0.11	0.12	0.13
0.6	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.14	0.15
0.7	0.09	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18
0.8	0.11	0.12	0.13	0.14	0.16	0.17	0.18	0.19	0.20
0.9	0.12	0.14	0.15	0.16	0.18	0.19	0.20	0.22	0.23
1.0	0.14	0.15	0.17	0.18	0.20	0.21	0.23	0.24	0.26
1.1	0.15	0.17	0.18	0.20	0.21	0.23	0.25	0.26	0.28
1.2	0.16	0.18	0.20	0.22	0.23	0.25	0.27	0.29	0.31

2 The freeing port area according to the table should be increased where the Competent Authority considers that the vessel's sheer is not sufficient to ensure rapid and effective freeing of the deck of water.

3 Freeing ports should be so arranged along the length of bulwarks as to provide the most rapid and effective freeing of the deck from water. Lower edges of freeing ports should be as near as practicable to the deck, the lowest point of the sheer curve and the ends of the well.

4 Large freeing ports should be fitted with bars or other suitable protective arrangements to prevent fish, gear, etc. on deck sliding overboard.

5 The Competent Authority may permit the use of other methods in determining the dimensions of freeing ports*.

* As an alternative ISO 11812 “Small craft – Watertight cockpits and quick-draining cockpits” may be used.

ANNEX IX

AN APPROXIMATE DETERMINATION OF SMALL VESSELS STABILITY BY MEANS OF THE ROLLING PERIOD TESTS*

1 As a supplement to the approved stability information, the initial stability can be approximately determined by means of a rolling period test.

2 Vessels with a high initial stability are "stiff" and have a short rolling period. On the other hand, vessels with a low initial stability are "tender" and have a long rolling period.

3 The following guidance describes a rolling period test which can be performed at any time by the crew of a small vessel.

Test procedure

4.1 The test should be conducted in smooth water with the mooring lines slack and the vessel "breasted off" to avoid making any contact during the rolling test. Care should be taken to ensure that there is a reasonable clearance of water under the keel and the sides of the vessel.

4.2 The vessel is made to roll. This can, for example, be done by crew running together from one side of the vessel to the other. As soon as this forced rolling has commenced the crew should stop and place themselves amidships and the vessel allowed to roll freely and naturally.

4.3 The timing and counting of the oscillations should only begin when it is judged that the vessel is rolling freely and naturally and only as much as it is necessary to accurately time and count these oscillations (approximately 2° - 6° to each side).

4.4 With the vessel at the extreme end of the roll to one side (say port) and the vessel about to move toward the upright, one complete oscillation will have been made when the vessel has moved right across to the other extreme side (i.e., starboard) and returned to the original starting point and is about to commence the next roll.

4.5 By means of a chronometer, the time should be taken for not less than 4 of the complete oscillations. The counting of these oscillations should begin when the vessel is at extreme end of a roll.

4.6 After allowing the roll to completely fade away, this operation should be repeated at least twice more. Knowing the total time for the total number of oscillations made, the time for one complete oscillation, say T seconds, can be calculated.

Determination of whether the initial stability is sufficient

5 If the calculated value of T, in seconds, is less than the breadth of the vessel, in metres, it is likely that the initial stability will be sufficient, provided that the vessel carries full fuel, stores, ice, fishing gear, etc. when the test is made.

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* Drawn from appendix 6 to the annex to the FAO/ILO/IMO Voluntary Guidelines for the Design, Construction and Equipment of Small Vessels, 2005.

6 The rolling period T usually increases and the vessel becomes “tenderer” as the weight of fuel, stores, ice, fishing gear, etc. decreases. As a consequence, the initial stability will also decrease. If the rolling period test is conducted under such circumstances it is recommended, that for the estimate of the initial stability to be considered satisfactory, the calculated value of T, in seconds, should not be more than 1.2 times the breath of the vessel, in metres.

Limitations to the use of this method

7 This method may not be applicable to vessels with a hull shape that dampens the rolling, for example vessels with large bilge keels or vessels of an unconventional design, such as high-speed vessels.

ANNEX X

RECOMMENDED PRACTICE ON PORTABLE FISH-HOLD DIVISIONS*

1 Recognizing the desirability of ensuring the adequate strength of scantlings of portable fish-hold divisions, studies on national practices have been carried out, resulting in the establishment of certain formulae for scantlings, which are recommended to Administrations for their guidance.

2 These formulae represent the average of a wide range of experience covering all types of vessels operating in all sea areas, and in conditions likely to impose the maximum loading on a division. Alternative scantlings might, however, be accepted where experience has shown that these are more appropriate.

3 According to the basic type of construction, the following formulae are recommended for vertical fish-hold divisions:

.1 ***Vertical steel uprights and horizontal wooden boards***

Minimum section modulus of vertical steel uprights

$$Z = 4 \rho sbh^2 \quad (1)$$

Minimum thickness of horizontal wooden boards

$$t = \sqrt{8 \rho sb^2} \quad (2)$$

.2 ***Horizontal steel beams and vertical wooden boards***

Minimum section modulus of horizontal steel beams

$$Z = 4 \rho sHS^2 \quad (3)$$

Minimum thickness of vertical wooden boards

$$t = \sqrt{3.6 \rho sh^2} \quad (4)$$

where:

- Z = section modulus, in cm^3
- t = thickness of wooden board, in cm
- ρ = density of cargo, in t/m^3
- s = maximum transverse distance between any two adjacent longitudinal divisions or line of supports, in m
- h = maximum vertical span of a column taken to be the hold depth, in m
- b = maximum longitudinal distance between any two adjacent transverse divisions or line of supports, in m
- H = vertical span of a division which is supported by a horizontal beam, in m
- S = horizontal distance between adjacent points of support of a horizontal beam, in m

* Drawn from Appendix V of the annex to Assembly resolution A.168(ES.IV) incorporating subparagraphs 4(g) and 4(h) adopted by the eighth Assembly.

4 In applying the above formulae, the following notes should be observed:

.1 The formulae are applicable to longitudinal divisions. Where the divisions are athwartships, the formulae should be modified by interchanging s and b.

.2 The formulae were derived on the assumption that the loads were on one side only of the divisions. When it is known that the divisions will always be loaded on both sides, reduced scantlings may be accepted.

.3 If vertical steel uprights are permanent and well connected at both ends with the structure of the ship, reduced scantlings may be accepted depending upon the degree of security provided by the end connections.

.4 In the formula for vertical wooden boards, the full depth of the hold is assumed as the unsupported span, where the span is less the thickness may be calculated using the reduced span.

.5 The timber used should be of sound durable quality, of a type and grade which has proved satisfactory for fish-hold divisions and the actual finished thicknesses of boards should be those derived from the formulae. The thickness of boards made from good quality hardwood may be reduced by 12.5%.

.6 Divisions made of other materials should have strength and stiffness equivalent to those associated with the scantlings recommended for wood and steel having regard to the comparative mechanical properties of the materials.

.7 Channelways in stanchions to take pound boards should have a depth of not less than 4 cm and the width should be equal to the pound board thickness plus 0.5 cm.

.8 Each pound board should have a length not less than the distance between the bottom of the respective channelways into which it will engage minus 1 cm.

If pound boards have shaped ends to allow a rotational manoeuvre for easy housing, the extent of end shaping should not be more than allowed by a radius equal to one half the length of the board with its centre at the mid length and depth of the board.

5 Figures 1 and 2 illustrate the application of the formulae:

HORIZONTAL WOOD BOARDS – STEEL UPRIGHTS

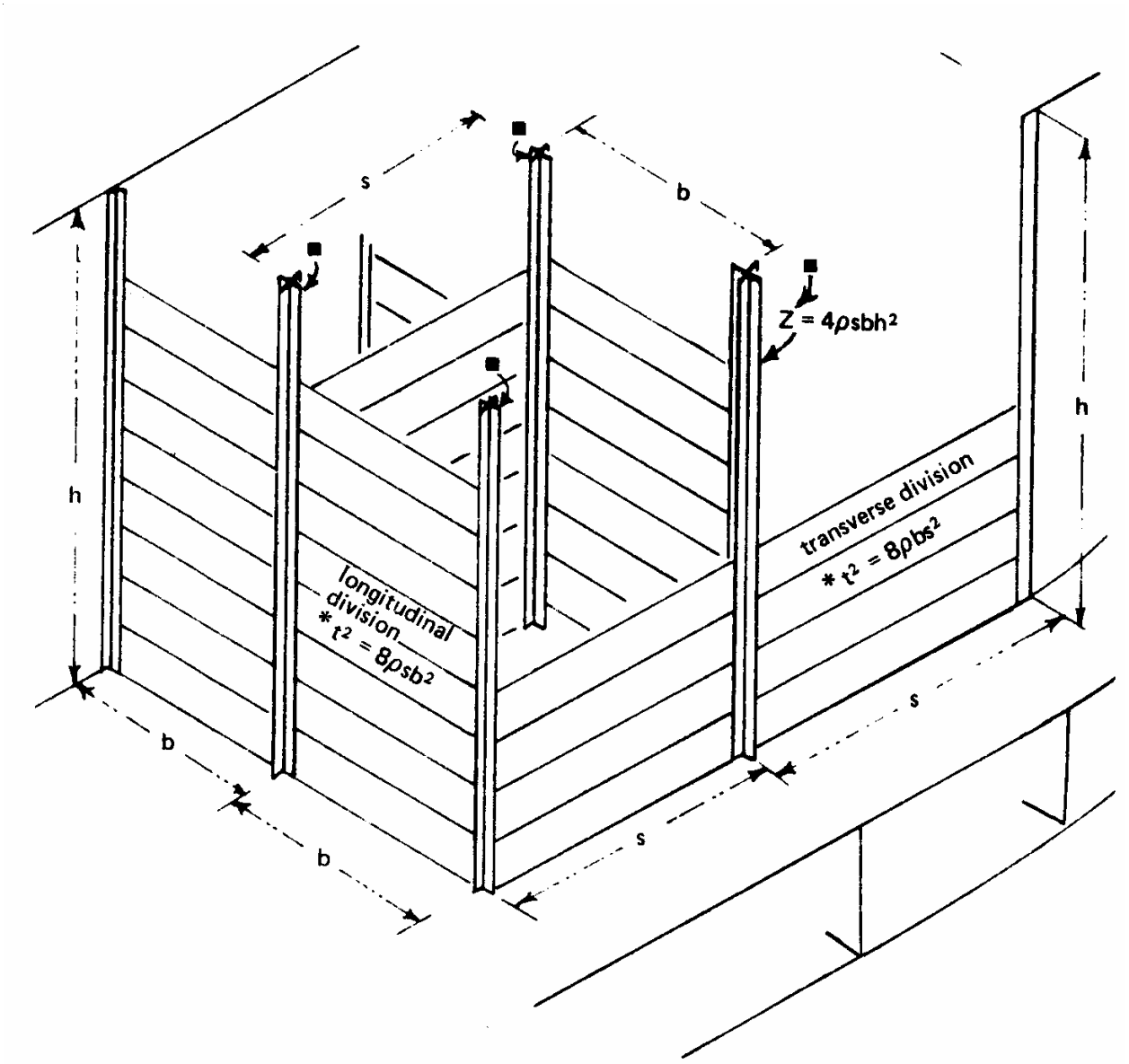


Figure 1

*** *Note*:** When the longitudinal and transverse divisional boards are interchangeable b will equal s and the thickness by either formula will be the same. If the boards are required to be of equal thickness but varying span the greater thickness should be used for all the boards when the section modulus is kept constant for all the uprights.

VERTICAL WOOD BOARDS – STEEL BEAMS

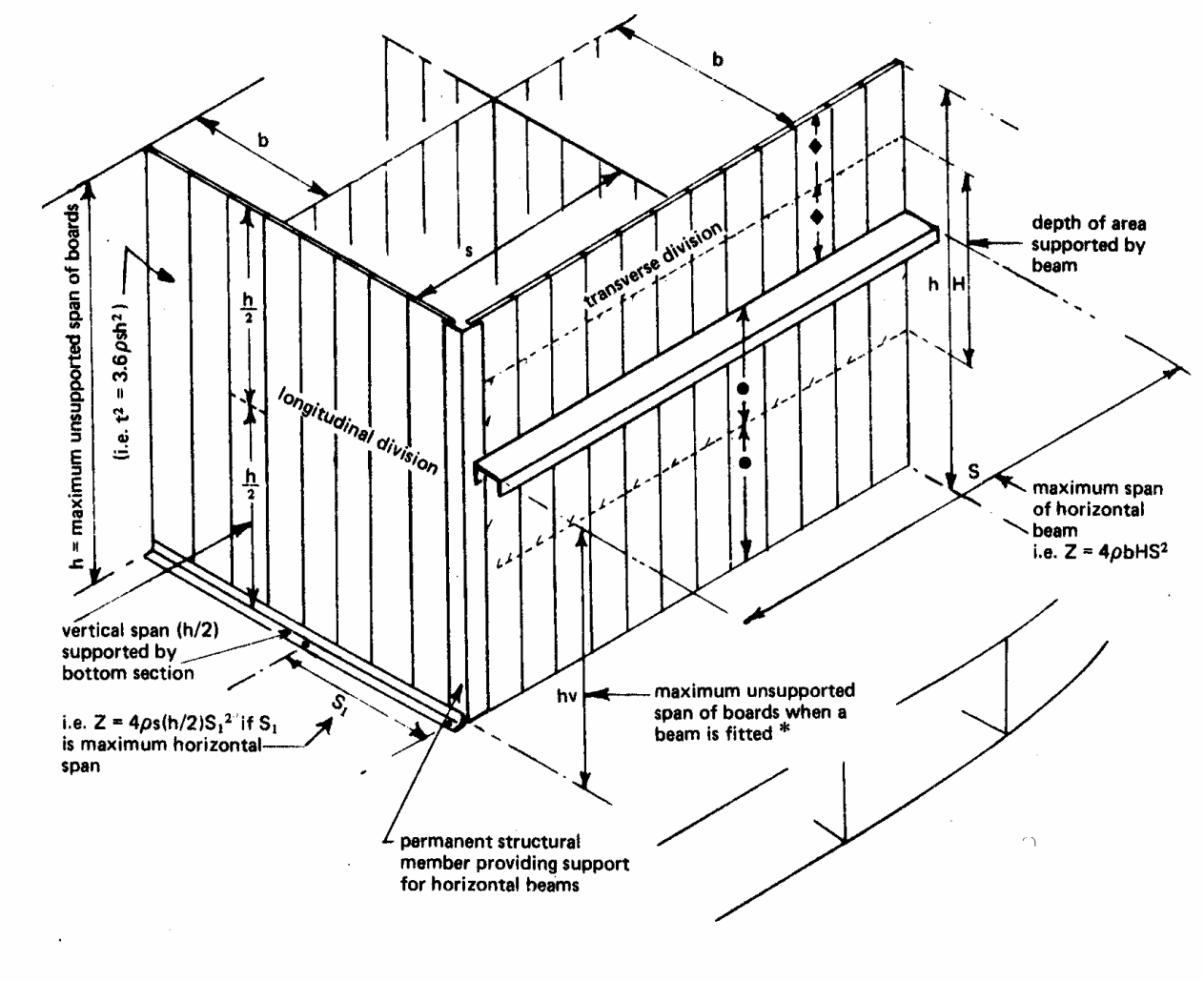


Figure 2

* ***Note*:** If no beam was fitted, the thickness of the vertical wood planks would be given by $t^2 = 3.6\,\rho\,bh^2$. The beam reduces the maximum span to hv and the thickness is now given by $t_1^2 = 3.6\,\rho\,bhv^2$ or $t_1 = t\left(\frac{hv}{h}\right)$.

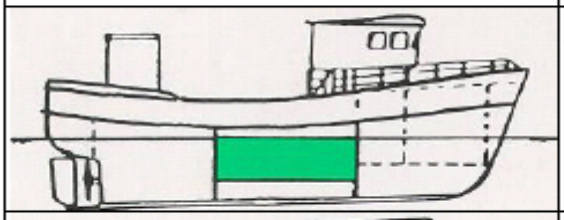
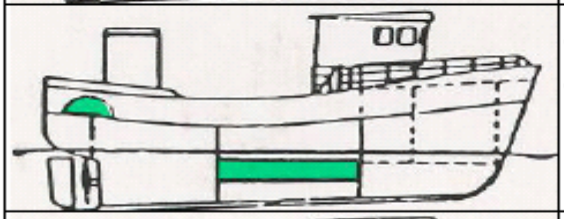
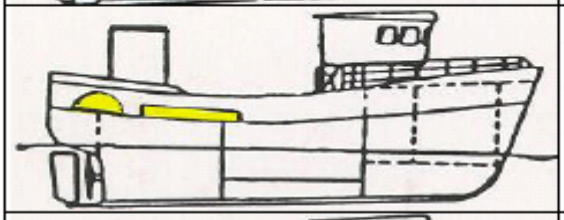
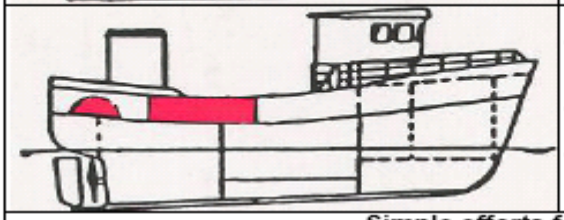
ANNEX XI

AN EXAMPLE OF A STABILITY NOTICE[*1]

[*] In case there is insufficient stability information available to prepare operating conditions, the stability notice should at least contain relevant general precautions.

[1] Additional examples may be included at a later stage, for example from the Wolfson Unit-Research Project 559 May 2006.

STABILITY NOTICE

	PLACEMENT OF GEAR AND CATCH	STABILITY		
		Acceptable	On the Limit	Danger of Capsize
	• Catch in cargo hold			
	• Part load in hold • Gear on deck			
	• Some catch on deck • Gear on deck • Empty cargo hold			
	• Considerable catch on deck • Gear on deck • Empty cargo hold			

Simple efforts for maintaining stability:

Close doors of hatches
Ensure scuppers are open to allow water to drain
Secure catch and gear against shifting
Move gear and catch from deck into cargo hold
Freeboard amidships should be at least 20cm
Avoid excessive aft trim
Minimum Freeboard at stern should be 20 cm
Avoid following seas
Large heeling moments when hauling gear are to be avoided.
Change of trim and heel when trying to free snagged gear can impair stability of vessel.
Do not go to areas with danger of icing.
Remove snow and ice from vessel.

ANNEX XII

GUIDANCE ON ADDITIONAL STABILITY CRITERIA FOR BEAM TRAWLERS*

1 Beam trawlers should meet the stability criteria of 3.2.1 increased, if necessary, to the satisfaction of the Competent Authority.

2 Beam trawlers with a maximum bollard pull of 0.015 L tonnes or more where the bollard pull is measured directly by physical testing at full main engine power should comply with the following additional requirements:

.1 the requirements of 3.2.1.1 for the area under the righting lever curve GZ should be increased by 20%;

.2 the requirement of regulation 3.2.1.2 for the righting lever GZ should be increased by 20%;

.3 the requirement of regulation 3.2.1.4 for the initial metacentric height GM should be increased to 500 mm.

3 Beam trawlers should have a righting lever GZ that is at least 100 mm at angles of heel between 40° and 65° and that is positive up to a heel of 70° when all means of closing are assumed closed.

* The references in this annex refer to paragraphs in the Safety recommendations.

ANNEX XIII

PRACTICAL BUOYANCY TEST

1.1 General

The methods described in 1.2, 1.3 and 1.4 should be used, either by actual test or equivalent calculation.

1.2 Test condition

During the tests, the boat should be in calm water in the light craft condition and then equipped as follows:

.1 A mass equal to 25 % of the dry mass of stores and equipment included in the maximum total load is to be added on the interior deck, on the centreline at LOA/2.

.2 Vulnerable items, such as engines, may be replaced with an appropriate mass at the correct location.

.3 For outboard engines, the builder's maximum recommended power is to be used. Tables 1 and 2 columns 2 and 4 give the appropriate replacement mass to be used with respect to engine power for petrol engines. A heavier mass may be used if it is recorded in the owner's manual. A mass of 86% of the engine dry mass is to be used for diesel, jet-propulsor or electric outboards, if these are supplied as the standard outfit. Boats equipped for use both with and without an outboard engine are to be tested in both conditions.

.4 For inboard engines, the replacement mass to be lead, steel or iron of a mass equal to 75 % of the installed mass of the engine and stern-drive.

.5 As far as practicable, replacement masses are to have the same position of centre of gravity as the actual engine.

.6 Remove portable tanks. Fixed tanks are either to be removed, or should be full with either fuel or water.

.7 All cockpit and similar drains normally open during operation of the boat are to be left open. The plugs of drains for emptying the boat of residual water when ashore should be in place.

.8 Care should be taken throughout the testing to eliminate entrapped air other than in air tanks or air containers.

.9 Void compartments integral with the boat structure and not watertight, built and pressure tested as such, are to be opened so that they become flooded with water.

.10 Boats intended to be fitted with engines of more than 3 kW and which are fitted with integral air tanks which have laminated, glued, welded or bolted seams in their construction, which do not comply with the air pressure test of 2 m head,

must have a number of air chambers opened to atmosphere during testing, according to Table 3.

Table 1 – Mass of single engine installations

Engine power (kW)	Engine + controls (kg)		Battery (kg)	
		2	3	4
		1	Dry	Submerged
0 – 1.9	13.0	11.2	-	-
2.0 – 3.6	23.0	19.8	-	-
3.7 – 5.8	32.0	27.5	-	-
5.9 – 6.9	42.0	36.1	-	-
7.0 –13.9	54.0	46.4	20.4	11.3
14.0 – 17.9	63.0	54.2	20.4	11.3
18.0 – 28.9	82.0	70.5	20.4	11.3
29.0 – 43.9	121.0	104.1	20.4	11.3
44.0 – 54.9	157.0	135.0	20.4	11.3
55.0 – 83.9	187.0	160.8	20.4	11.3
84.0 – 186.0	235.0	202.1	20.4	11.3
> 186	257.0	221.0	20.4	11.3

Note: Power (kW) = (Imperial horsepower) x 0.7457
Imperial horsepower = (power in kW) x 1.341
Power (kW) = (Metric horsepower) x 0.7355
Metric horsepower = (Power in kW) x 1.36

Table 2 – Mass of twin engine installations (kg)

Total engine power (kW)	Engines + controls (kg)		Battery (kg)	
	1	2	3	4
	Dry	Submerged	Dry	Submerged
28.8 – 359	126.0	108.4	40.8	22.7
36.0 – 57.9	164.0	141.0	40.8	22.7
58.0 – 87.9	242.0	208.1	40.8	22.7
88.0 – 109.9	314.0	270.0	40.8	22.7
110.0 – 167.9	374.0	321.6	40.8	22.7
168.0 – 372.0	470.0	404.2	40.8	22.7
> 372	514.0	442.0	40.8	22.7

Table 3 – Numbers of air chambers to be opened during test

Total number of air chambers	Number to be opened
≤ 4	Single largest
> 4 but ≤ 8	Two largest
> 8	Three largest

1.3 Flooded stability test

1.3.1 A metallic test weight with a dry mass of (6dCL) kg (CL = Crew Limit = the highest allowed number of crew members allowed onboard simultaneously, see Table 6) but not less than (15d) kg is to be suspended over the side of the boat at each of four positions in turn. These positions should be at LOA/3 from the ends of the boat (as shown in Figure 1) or at the ends of the cockpit, if this is nearer amidships. No other test weights are to be in the boat during this test, apart from those required by Table 2.

1.3.2 d is a coefficient to account for the buoyancy of the test weight, as given in Table 4. Where test weights are not all of the same material, the calculation should be similar to:

$$\frac{m_L}{1.099} + \frac{m_{CL}}{1.163} + \frac{m_A}{1.612} = 6CL$$

where:

m_L is the mass of lead weights, expressed in kilograms;

m_{CL} is the mass of cast-iron weights, expressed in kilograms;

m_A is the mass of aluminium weights, expressed in kilograms.

1.3.3 As an alternative to suspending a test weight over the side, an equivalent heeling moment (calculated when the boat is upright) may be applied using weights or persons positioned inside the boat at seat level. Persons may only be used if they are not immersed when the boat is heeled.

1.3.4 With the test weight in each position in turn, flood the boat by applying a downwards force at a position on the gunwale at approximately mid-LOA until the deepest point of the gunwale or coaming is between 0.1 m and 0.3 m below the water surface. Hold the boat in this position until the water level has equalized between inside and outside, or for 5 min, whichever is less, and then release the boat.

Note: It is often helpful to partially fill the boat with water before flooding in this manner.

1.3.5 For each position of the test weights, after a further 5 min have elapsed, the boat must not heel more than 45°.

Table 4 – Material coefficient

Material	Lead	65/35 brass	Steel	Cast iron	Aluminium
Value of d	1.099	1.138	1.151	1.163	1.612

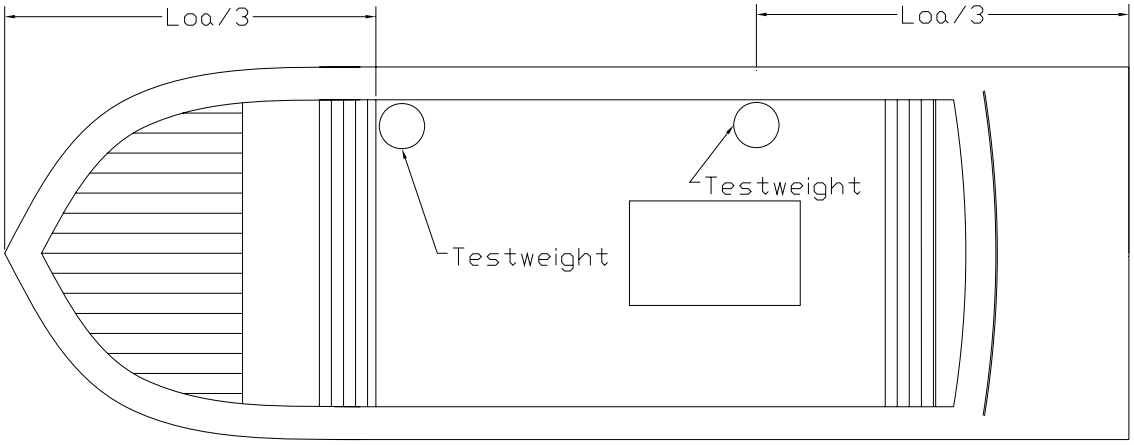


Figure 1 – Test weight positioning

1.4 Flooded buoyancy test

1.4.1 Load metallic test weights on the inner bottom of the boat, evenly about the centre of the area available to the crew, according to the crew limit (CL) as given in Table 5. This area is to have a minimum headroom clearance of 0.6 m above the flooded waterline. Alternatively, provided they are not immersed above the knee, people may be used instead of test weights, provided they have a total dry mass not less than the required mass of test weights if d is taken as 1.1.

Table 5 – Dry mass of test weight (kg)

Property	Design category B	Design category C	Design category D
Dry mass not less than	$4dm_{MTL}/3$	d(60 + 15CL)	d(50 + 10CL)

Where:

m_{MTL} (kg) = maximum load the boat is designed to carry in addition to the light craft condition, comprising the manufacturer's maximum recommended load, including all liquids (e.g. fuel, oils, fresh water, water in ballast or bait tanks and live wells) to the maximum capacity of fixed or portable tanks.

CL = Crew Limit according to Table 6 below.

1.4.2 Flood the boat by applying a downwards force at a position on the gunwale at approximately mid-LOA until the deepest point of the gunwale or coaming is between 0.1 m and 0.3 m below the water surface. Hold the boat in this position until the water level has equalized between inside and outside, or for 5 min, whichever is less, and then release the boat.

Note: It is often helpful to partially fill the boat with water before flooding in this manner.

1.4.3 After a further 5 min have elapsed, the boat should float approximately level with the entire top of the gunwale or coamings (including those across bow or stern) above water. If these criteria are met the vessel is acceptable.

Note: The values of the formulae given in 1.3.1 and 1.4.1 are given in Table 6.

Table 6 – Test weights mass (kg)

Crew limit (CL)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
6dCL, min, 15d	15d	15d	18d	24d	30d	36d	42d	48d	54d	60d
d(60+15CL) =	75d	90d	105d	120d	135d	150d	165d	180d	195d	210d
d(50+10CL) =	60d	70d	80d	90d	100d	110d	120d	130d	140d	150d

ANNEX XIV

GUIDANCE ON TOOLS AND SPARES TO BE CARRIED

Spare Parts	Outboard Motor	Inboard Motor
Manual for engine and other major equipment	X	X
Parts for waterpump (impeller, gasket, replacement pack, etc)	X	X
Sparkplug	X	
Shearpin for propeller	X	
Split pins for propeller nuts	X	
Starting rope	X	
Propeller	X	
Stern gland packing		X
Belts for alternators and pumps		X
Lub oil filter		X
Fuel oil filter (or cartridge) and filter spanner		X
Water repellent oil/spray	X	X
Engine oil, gear oil and grease		X
Bolts, nuts, washers, screws, hoses and hose clamps of varying diameters to suit items on vessel	X	X
Glues, electrical tape, electrical wire, electrical connectors	X	X
Ropes and twine of varying types and diameters	X	X
Bulbs and fuses for lights including navigation lights and torches	X	X
Spare batteries for torches, radio communication equipment, etc.	X	X
Parts for bilge pump(s), including impeller pack	X	X

Tools	Outboard Motor	Inboard Motor
Spanners	X	X
Socket set		X
Adjustable spanners		X
Spark plug spanner	X	
Pliers	X	X
Screwdrivers	X	X
Knife	X	X
Multi tester		X

Tools	Outboard Motor	Inboard Motor
Hydrometer		X
Hammer		X
Wire cutters		X
Hacksaw and spare blades		X
Cold chisel		X
Pipe wrench		X
Torch	X	X
Bailer	X	X

Note: The Competent Authority should decide what spares and tools are required having given consideration to the size of the vessel, the size and type of engine, the distance from assistance, and the communications available with other vessels and the shore. The Competent Authority could consider providing illustrations of tools and spares.

ANNEX XV

STEERING GEAR

1 Installation

1.1 The steering gear should be designed and installed to ensure safe manoeuvring of the vessel at maximum speed and engine power.

1.2 The steering gear should be designed and installed so that it may not come into contact with fishing gear, equipment or other obstacles that may hinder the steering.

1.3 Where steering is by remote control, rudder stops should be fitted.

1.4 Where fitted a steering console or similar arrangement should be built and secured to withstand the forces from the gear and the vessels operator.

1.5 Penetrations in an outboard motor well such as holes for steering cables should be effectively sealed by means of a sleeve or similar device.

1.6 A means of emergency steering should be possible on all vessels, unless fitted with twin screws.

2 Rudder stocks

2.1 If the rudder has a lower bearing point (heel pintle) with the same stiffness as the rudderstock, the diameter of the rudder stock should not be less than that shown in table below.

2.2 The diameter of the bolts in a rudder coupling should not be less than that shown in the table below.

2.3 The stuffing box of the rudder stock housing should have a height of at least 350 mm above the load waterline and be provided with packing material.

3 Rudders

3.1 Rudders of steel, aluminium, and GRP should have a stock from the rudder coupling down to the pintle (where fitted). In case of rudders not fitted with a pintle the diameter may be reduced linearly down from the rudder-coupling.

3.2 Steel or aluminium rudders should have at least two stiffeners across the rudder stock spaced a maximum 600 mm apart. The thickness of the stiffeners should not be less than the thickness of the plate in the rudder.

3.3 Plate-rudders should have a thickness not less than that shown in the table below.

3.4 GRP rudders should enclose steel stiffeners welded to the rudder stock with maximum spacing of 200 mm. The thickness of the steel reinforcements should not be less than the thickness of the plate in a steel rudder.

3.5 Wooden rudders should be made of hardwood and be attached to the rudder stock with steel forks welded to the rudder stock; these should not be less than the thickness of the plate in a steel rudder.

3.6 Rudders of hardwood should have a thickness not less than that shown in the table below.[1]

CuNo	Stock Diameter (mm)	Steel Plate Thickness (mm)	Aluminium Plate Thickness (mm)	Timber Thickness (mm)	Bolt Diameter (mm)
10	30	6	8	25	5
15	30	8	10	40	6
20	30	8	10	45	6
25	40	8	10	50	8
30	40	8	10	60	8
60	45	10	12	65	10
80	45	10	12	70	10
100	45	10	12	75	12

[1] Figures based on information from Seafish rules.

ANNEX XVI

RECOMMENDED PRACTICE FOR EXHAUST SYSTEMS

1 General

1.1 All materials used in exhaust systems should be corrosion resistant and metal parts should not be used in combination in such a way that corrosion will occur.

1.2 Exhaust pipes should be securely mounted so that mechanical wear and vibration are avoided; and such that there is no weight on the engine manifold.

1.3 Exhaust pipes may require flexible connections (bellows) where engines are prone to vibration or where engines are flexibly mounted.

1.4 Exhaust outlets which discharge through the hull below the deck should be provided with means of preventing back flooding into the hull or engine. This may be by the system design described below or by flap, valve or non-return device.

1.5 Exhaust pipes and silencers of every engine should be adequately cooled or lagged to protect persons on board the vessel.

1.6 Oil and fuel pipes should be kept as clear as practicable from exhaust pipes and turbochargers.

1.7 Where multiple engines are installed each engine should have a separate exhaust system.

2 Dry exhaust systems

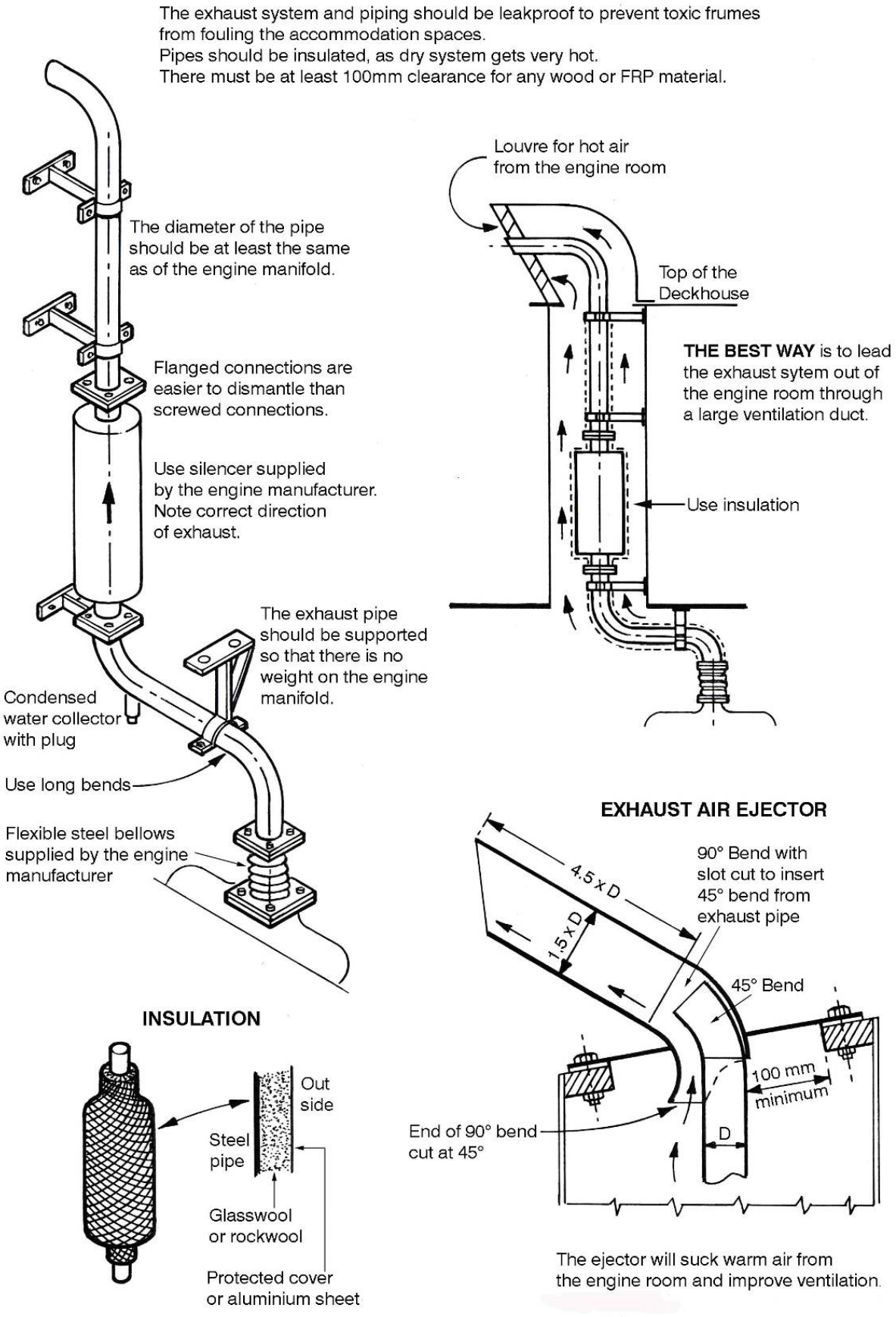
2.1 The exhaust system and piping should be leak proof to prevent the passage of toxic fumes into accommodation spaces.

2.2 There should be at least 100mm clearance between piping and any wood or GRP materials.

2.3 The diameter of exhaust pipes should be sized in accordance with engine manufacturer’s recommendations or at least the same as the engine manifold.

2.4 Typical installation sketches and notes are given in the figures below.

Figure 2.1 – Dry exhaust system – Sketches and notes



3 Water injected (wet) exhaust systems

3.1 The most important factor in the design and installation of wet exhaust systems is the prevention of entry of water into the engine. This may be achieved by the installation of a waterlock chamber into the exhaust line and by the correct positioning of components in relation to the load waterline.

3.2 The diameter of exhaust pipes should be sized in accordance with engine manufacturers' recommendations.

3.3 There are two main types of wet exhaust systems, those with the engine manifold above the load waterline and those with the engine manifold below the load waterline. Typical installation sketches and notes for these types are given in the figures below.

3.4 Exhaust pipes should always be drawn up so that a part is at least 350 mm above the load waterline with a slope downwards to the outlet.

3.5 Exhaust outlets should be at least 100 mm above the load waterline or connected to a fixed pipeline which is drawn up to at least 100 mm above the load waterline.

3.6 The volume of the waterlock chamber should be sufficient to hold all the water in the pipes on either side of it, this will ensure that water does not fill up the waterlock and re-enter the engine.

Figure 3.1 – Wet exhaust system 1 – Sketches and notes

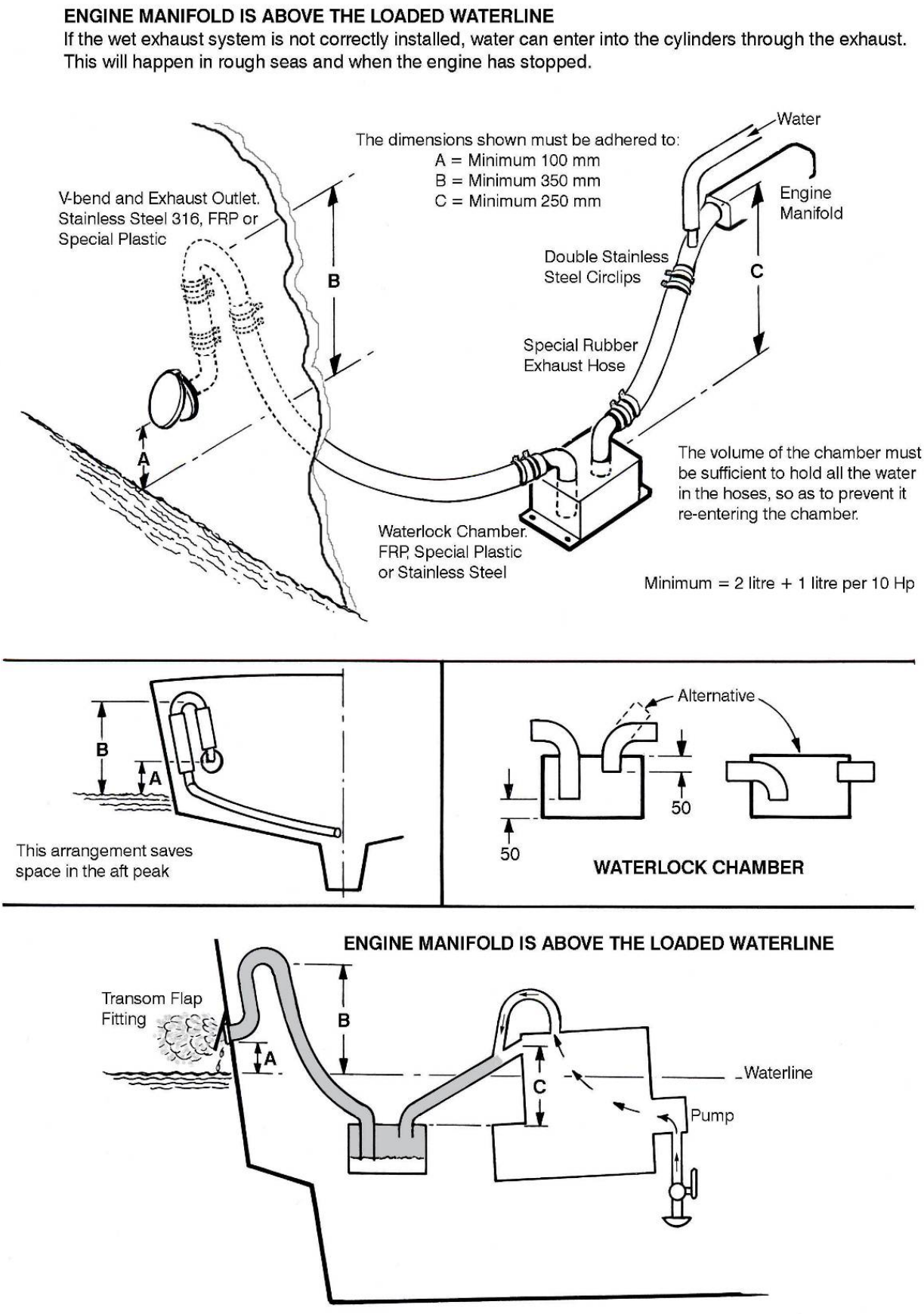
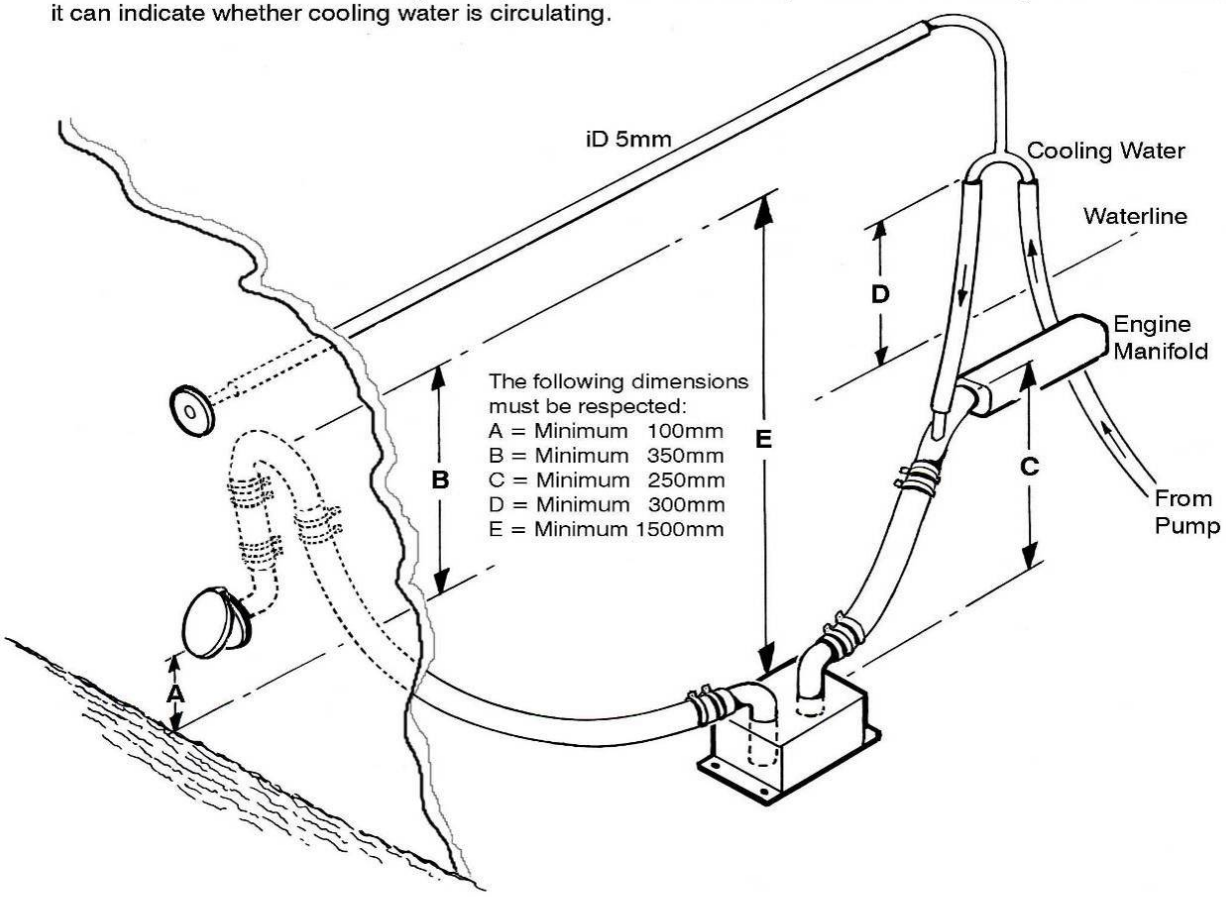


Figure 3.2 – Wet exhaust system 2 – Sketches and notes

ENGINE MANIFOLD IS BELOW LOADED WATERLINE

When the engine has stopped, water will siphon in through the water pump, fill the exhaust system and enter the cylinders. An anti-siphoning bleed pipe, of internal bore5mm and discharging overboard, must be connected to the cooling water pipe. If it is made of clear plastic and led through the deckhouse, it can indicate whether cooling water is circulating.



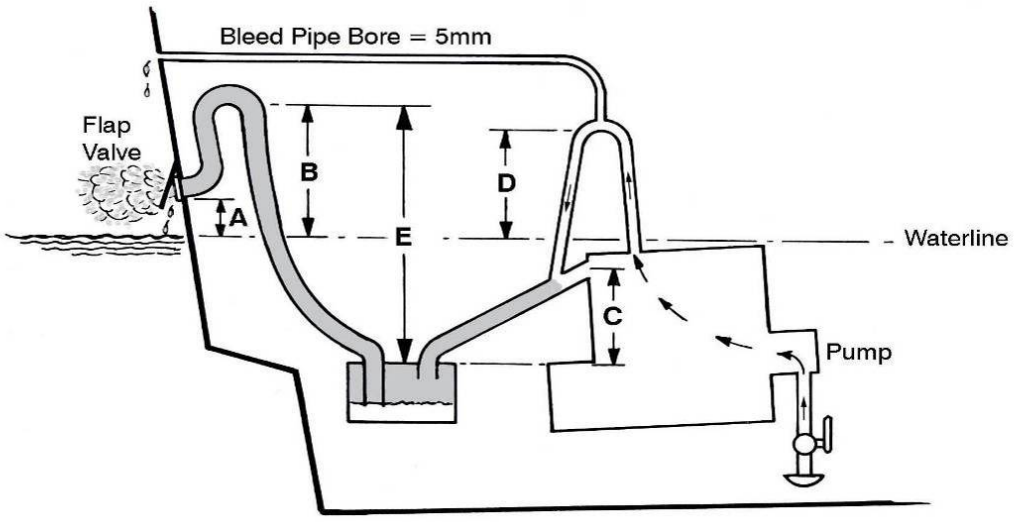
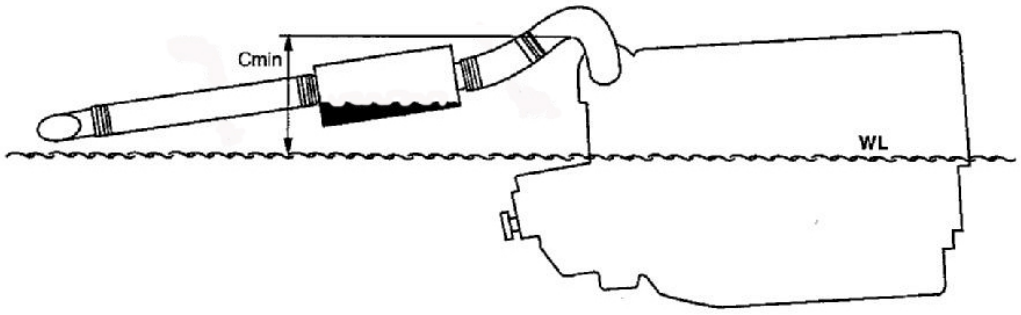


Figure 3.3 – Wet exhaust system 3



An in-line system is not recommended when height (Cmin) exhaust elbow-waterline is less than 350mm.

ANNEX XVII

GUIDANCE ON THE INSTALLATION OF ELECTRICAL EQUIPMENT

A Purpose

1 The purpose of this annex is to provide additional information that may be useful to those persons charged by the Competent Authority with the interpretation and implementation of regulations and technical schedules for the construction, outfitting and survey of decked fishing vessels of less than 12 m in length and undecked fishing vessels of any length. In this regard, due consideration has been given to the fact that there could be substantial differences between the requirements for Class A and B vessels and those in Classes C (1 and 2) and D concerning requirement for main and emergency electrical systems.

2 Furthermore, although it is recognized that only low voltage DC systems of less than 55 V are installed in the majority of vessels covered by these recommendations, the use of higher voltages and multi-phase alternating current systems have not been excluded from chapter 4. Consequently recommendations are also given in this annex concerning such systems.

3 It should also be noted that due it may be necessary to refer to other chapters of these recommendations such as 9.8 on sources of energy for radio communication, as well as the relevant chapters of the Voluntary Guidelines for the Design, Construction and Equipments of Small Fishing Vessels.

B General recommendations

1 Irrespective of the size and type of vessel, particular attention should be given to protection against water ingress and the effects of vibration.

2 Care should be taken to ensure that where systems or circuits of different voltages are to be installed, that they are kept separate from each other and that they should be clearly marked. In addition, it should not be possible to accidentally plug in or otherwise attach electrical equipment to a circuit for which it has not been designed and the same is valid for light fittings.

C Sources of electrical supply

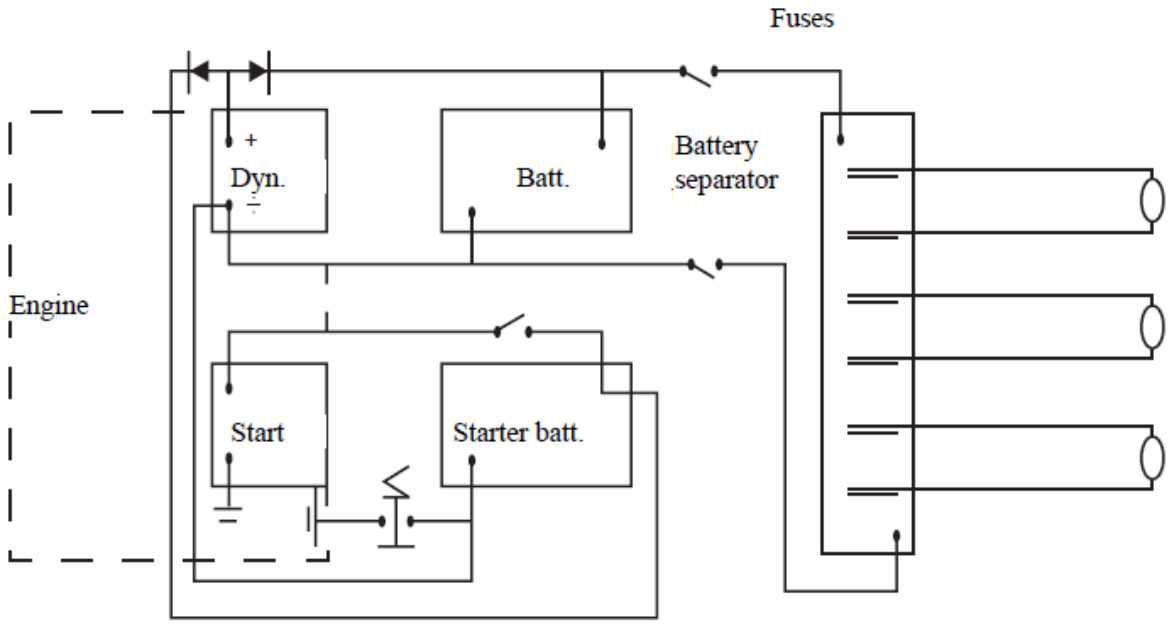
1 *General*

1.1 Where electrical power constitutes the only means of maintaining auxiliary services essential for the propulsion and safety of the vessel, there has to be a means of generating and storing such power. In the case of the majority of decked vessels the main source of power is usually low voltage requiring means to charge sets of batteries. In the case of category A and B vessels the Competent Authority may require two generating sets, one of which may be driven by the main engine. However, in extreme cases, such as powered undecked vessels, it may not be practicable to call for a generator due to the type of the prime mover. Thus in such cases, many vessels may rely on portable electric lamps or oil lamps for navigation and emergency purposes and this should be taken into consideration when determining the minimum candle power requirement in regulations.

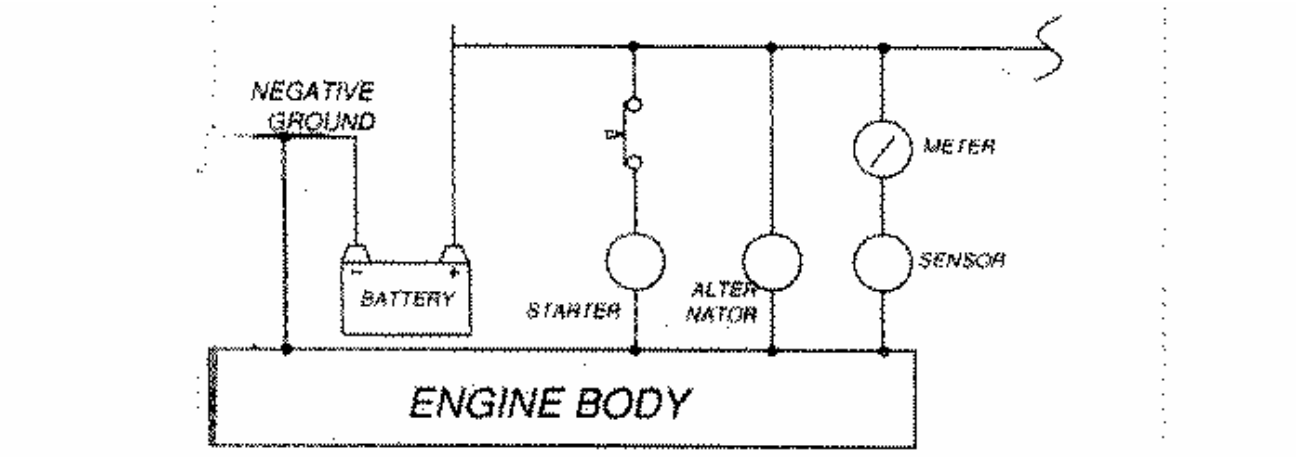
1.2 It may also be noted, that many small vessels use fishing techniques that rely on light attraction and many carry a portable, powered generating set, whereas others rely purely on battery power with no means on board to recharge the battery.

2 *Low voltage electrical systems*

2.1 It is recommended that direct current installations should be wired as insulated return systems and that the hull should not be used to carry current. However, for propulsion engines with a power less than 100 kW, the engine may be used as a conductor during starting only in accordance with the following simplified diagram.



2.2 The engine block may also be used as a common ground return for electrical accessories mounted on the engine, except on metallic vessels where the engine block is not electrically isolated from the hull.



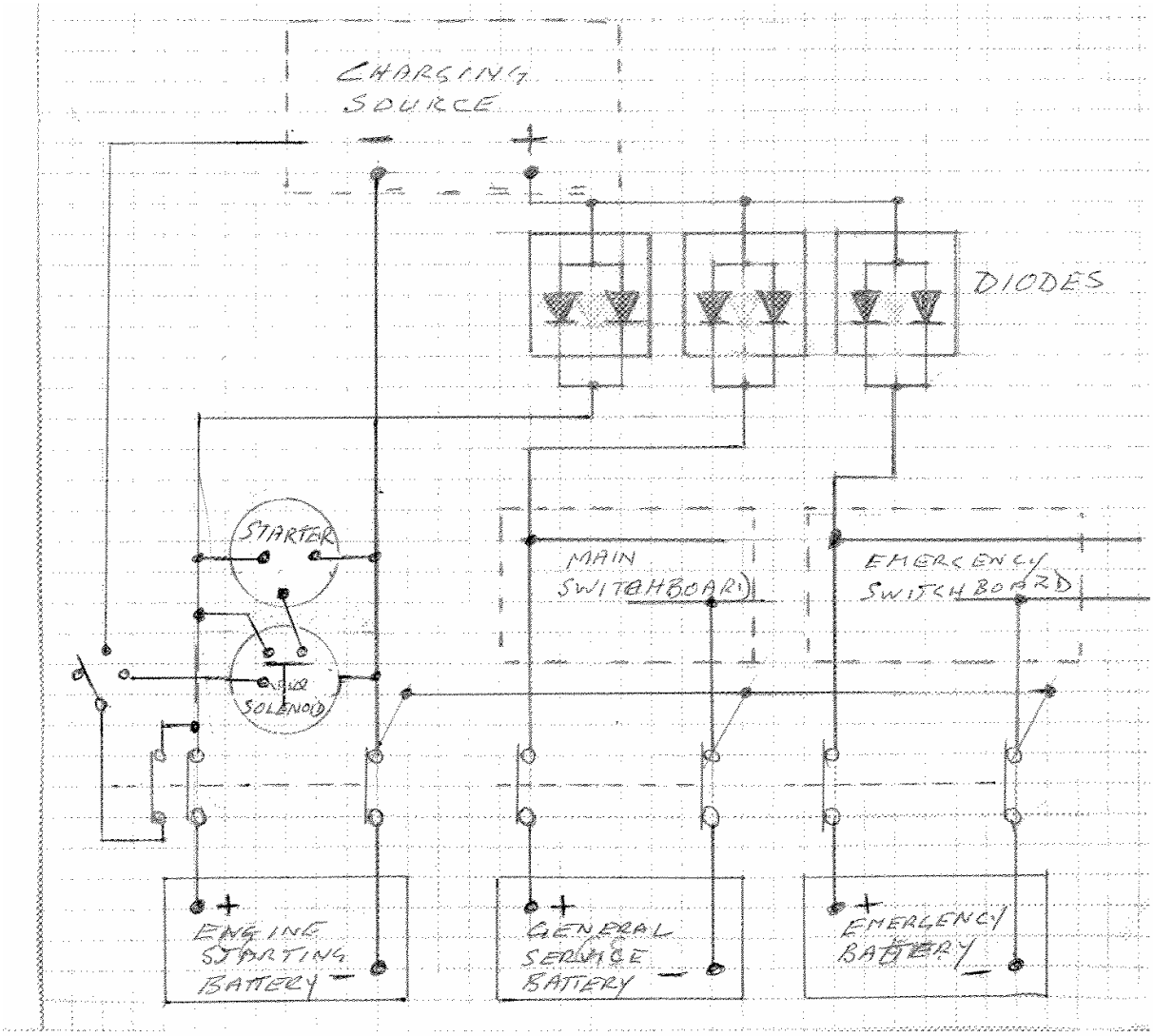
2.3 In certain cases, as provided for in 4.12.18 of chapter 4 and particularly in the case of small vessels, decked and undecked, the single wire system may be exceptionally approved by the Competent Authority provided that the arrangement is safe and that circuits are adequately protected. In the earthing of the engine block through the intermediate shaft and propeller shaft should be taken into consideration.

2.4 Except as mentioned in paragraph C.1.1, when the main source of supply is only an accumulator battery system, means should be provided for recharging except in cases where the Competent Authority is satisfied that it is not practicable to do so taking into consideration the type of vessels and its operation range. The power source for charging may be an alternator or dynamo driven by the main engine through transformers/rectifiers or marine quality chargers.

2.5 The simplest system might be one set of batteries that would cater for general use and would be arranged for continuous charging when, for example, the main engine is hand started.

2.6 However, when the main and/or auxiliary engines are fitted with electric motor starters, the batteries connected to the system for starting should be separate from the batteries used for lighting and general services. All battery banks should be arranged for continuous charging.

2.7 In the event that a further set of batteries is required for emergency purposes only which would also have to be arranged for continuous charging, there would be a need to introduce blocking diodes (see sketch below) in order to prevent accidental paralleling of the general service battery set and the emergency battery set.



2.8 Should a separate set of batteries be required for radio use only, another set of diodes would have to be incorporated in the charging system.

2.9 Battery sets should be fitted with double pole spark proof isolating switches placed close to the battery set. However, change-over switches may be also used if they are of a type that would automatically ensure that when one bank of batteries in a system is selected for discharging, the other bank in the same system would be automatically placed on charge, such switches may be incorporated in the main switchboard.

2.10 Where alarm systems such as a bilge alarm or warning light and automatic bilge pumps are required to cover "in port" conditions, the electrical connections should be made between the battery set and its isolating switch. In the case where two sets of general service batteries are fitted (and not intended for parallel operation), there may be an need to introduce blocking diodes to ensure that the power would be drawn initially from the battery with the highest charge, that is, until such time as the batteries are at the same energy level.

2.11 The Competent Authority, taking into consideration the design of the vessel and type of electrical equipment fitted, as well as the area of operation, may require that the battery powered main source of supply should consist of two individual sets of radio batteries, two sets of lighting and general services batteries and two sets of starting batteries for the main engine. In such cases, one set of the general service batteries and one set of radio batteries could be considered to cover emergency situations.

3 *High voltage electrical systems*

3.1 Chapter 4 provides for a Competent Authority to address electrical systems of higher voltage than normally supplied by accumulator battery systems. In this regard, certain classes of Category A and B vessels may in fact require high voltage systems to power pumps, refrigeration systems and or deck machinery, together with a provision to charge storage batteries for starting the main engine, running radio and equivalent equipment and to meet emergency services. Thus, in addition to low voltage DC systems, there could be provisions for regulations to cover:

DC systems in excess of 110 V;

AC systems in excess of 220 V.

3.1 *110 V DC systems*

3.1.1 Direct current installations should be wired as insulated return systems and double pole switching should be used throughout. The hull should not be used to carry current.

3.1.2 Main and emergency switchboards should be of the dead front to prevent accidental access to live parts. The sides and backs and, where necessary, the fronts of switchboards, should be suitably guarded. Switchboards should also be suitable divided to ensure safe separation between the 110 V system and low voltage circuits.

3.1.3 Earth indicator lamps should be incorporated in the switchboard as a means to detect current leakage. In addition, the switchboard should be fitted with volt and ammeters.

3.1.4 Where only one generator is installed, a fast action double pole circuit breaker should be fitted. In the case of two generators being installed that are not intended for parallel operation, a fast action double pole change over switch should be fitted.

3.2 ***AC systems***

3.2.1 If the main source of supply is an alternating current system, non self-regulating alternators should be provided with automatic voltage regulation.

3.2.2 Where more than one alternator is installed, the Competent Authority may approve the parallel operation of alternators, if synchronizing and power sharing devices are to be fitted. The system should also be fitted with reverse power protection.

3.2.3 Where fitted, the primary windings of transformers should be protected against short circuits by circuit breakers or fuses capable of withstanding power surges. If transformers are arranged for parallel operation, they should be provided with secondary isolation.

3.2.4 Although provision should be made for a shore connection to the main switchboard, the arrangement should be such that individual circuits aboard the vessel cannot be energized by more than one source of electrical power at any one time.

3.2.5 Cables for AC systems should be kept separate from DC systems and run in separate trays or trays that are suitably subdivided and have the approval of the Competent Authority.

3.2.6 Switchgear for AC systems should be fitted in switchboards and panels that are separate from those containing DC systems.

3.2.7 Switchgear and sockets should be so designed as to prevent the fitting of low voltage equipment and lamps into high voltage systems.

3.2.8 In unpolarized systems, double pole circuit breakers that open both live and neutral conductors are required and fuses should not be installed in unpolarized systems.

3.3 ***Battery charging***

3.3.1 The use of transformers and marine quality battery chargers may be considered by the Competent Authority.

4 ***Emergency source of electrical power***

4.1 In the event that a self-contained emergency source of electrical power is required, it should be located outside the machinery spaces above the working deck. It should be so arranged as to ensure that it would function in the event of fire or other causes of failure of the main electrical installations.

4.2 The emergency source of electrical power, which may be either a generator or an accumulator battery, should be capable, having regard to starting current and the transitory nature of certain loads, of serving simultaneously, for a period of at least three hours:

.1 a VHF radio installation or an MF radio installation or a ship-earth station or an MF/HF radio installation depending on the sea area for which the vessel is to be equipped;

.2 internal communication equipment, fire detecting systems and signals, which may be required in an emergency; and

.3 the navigational lights if solely electrical and the emergency lights where applicable such as:

.3.1 at launching stations and over the side of the vessel;
.3.2 in all alleyways, stairways and exits;
.3.3 in spaces containing machinery or the emergency source of power;
.3.4 at or in control stations; and
.3.5 in fish handling and fish processing spaces.

4.3 The arrangements for the emergency source of electrical power should comply with the following:

.1 where the emergency source of electrical power is a generator, it should be provided with an independent fuel supply and with efficient starting arrangements. Unless a second independent means of starting the emergency generator is provided, the single source of stored energy should be protected to preclude its complete depletion by the automatic starting system;

.2 where the emergency source of electrical power is an accumulator battery, it should be capable of carrying the emergency load without recharging whilst maintaining the voltage of the battery throughout the discharge period within plus or minus 12% of its nominal voltage. In the event of failure of the main power supply, this accumulator battery should be automatically connected to the emergency switchboard and should immediately supply at least those services specified in 4.2. The emergency switchboard should be provided with an auxiliary switch allowing the battery to be connected manually in case of failure of the automatic connection system.

4.4 The emergency switchboard should be installed as near as is practicable to the emergency source of power. Where the emergency source of power is a generator, the emergency switchboard may be located in the same place unless the operation of the emergency switchboard could be impaired.

4.5 Any accumulator battery should be installed in a well-ventilated space, but not in the space containing the emergency switchboard. An indicator should be mounted in a suitable space on the main switchboard or where suitable to indicate when the battery constituting the emergency source of power is being discharged. The emergency switchboard should be supplied in normal operation from the main switchboard by an inter-connector feeder protected at the main switchboard against overload and short circuit. When the system is arranged for feed back operation, the inter-connector feeder should also be protected at the emergency switchboard against short circuit.

4.6 An emergency generator and its prime mover and any accumulator battery should be so arranged as to ensure that they will function at full rated power when the vessel is upright and when rolling up to an angle of 22.5° either way and simultaneously pitching 10° by bow or stern, or is in any combination of angles within those limits.

4.7 Battery level indicators should be mounted in a highly visible position on the on the main switchboard or in the machinery control room to facilitate monitoring of the condition of batteries constituting the emergency source of supply as well as any batteries required for the starting of an independent, power driven emergency generator.

4.8 The emergency source of electrical power and automatic starting equipment should be so constructed and arranged as to enable adequate testing to be carried out by the crew while the vessel is in operating condition.

D Switchboards

1 Switchboards should be so arranged as to give ease of access to apparatus and equipment, without danger to crew or maintenance staff. The sides and backs and, where necessary, the front of switchboard, should be suitably guarded. Exposed ''live'' parts having voltages to earth exceeding a voltage to be specified by the Competent Authority should not be installed on the front of such switchboards. There should be non-conducting mats or gratings on the floor at the front.

2 All outgoing circuits from the switchboards should be double pole and open circuit protected. Lighting circuits should be separate from power circuits.

3 The main switchboard should be fitted with voltmeter and ammeter for each generator and with earth lamps. The emergency switchboard should also be fitted with a voltmeter, ammeter and earth lamps.

4 In the case of AC installations, each section of the switchboard, supplied by an individual alternator, should be fitted with a voltmeter, a frequency meter and an ammeter, switched to allow the current to be measured in each phase. Where applicable a sub-distribution board fitted in the wheelhouse should be fitted with a voltmeter and a switch to isolate it from the mains.

5 Where electrical power, other than a low voltage supply, constitutes the only means of maintaining auxiliary services essential for the propulsion and the safety of the vessel, the main switchboard should be designed to allow preferential tripping of non-essential services to reduce the risk of overload and premature actuation of the emergency source of supply.

6 For safety purposes, it is important for electric circuits and the current-carrying capacity of each circuit to be permanently indicated, together with the rating or setting of the appropriate overload protective device to be identified on switchboards and where appropriate on distribution boxes. It is also important to plan the preferential tripping of circuit breakers to safeguard essential circuits in the event of an overload situation of a generator or alternator.

7 Each separate circuit should be protected against short circuit as well as against overload to the satisfaction of the Competent Authority.

8 Piping conveying liquid should not be fitted above or close to switchboards or other electrical equipment. Where such arrangements are unavoidable, provision should be made to prevent leakage damaging the equipment. The current-carrying capacity of each circuit should be permanently indicated, together with the rating or setting of the appropriate overload protective device.

E Electric cables and conductors

1 In general, electrical wiring should be of marine grade materials only and should conform to the best marine practices of installation and workmanship. When selecting cables, however, particular attention should be given to environmental factors such as temperature and contact with substances, e.g. polystyrene, which degrades PVC insulation.

2 Cables which are not provided with electrical protection should be kept as short as possible and be “short circuit proofed”, e.g. single core with an additional insulating sleeve over the insulation of each core. Normal marine quality cable that is single core will meet this recommendation without an additional sleeve, since it has both conductor insulation and a sheath.

3 Where clips are used to secure cables, it is preferable to use cable trays in order to provide better protection to a cable and prevent the effect of sag. In the event that cable trays cannot be fitted the distance between clips should close enough to prevent excessive sagging of the cable (between the clips).

4 From a safety point of view, power cables of different voltages should be kept separate from each other and should be colour coded or otherwise marked for ease of identification.

F Earthing arrangements

1 All electrical installations should be bonded to earth and each bonding point should be accessible for maintenance.

2 The Competent Authority may approve grounded distribution systems provide that the common ground part of the vessel is only used as a means of maintaining the return side of the system at earth potential and the grounded side of the system should be of negative polarity.

3 On wood and composite hulled vessels, a continuous ground conductor should be installed to facilitate the grounding of non-conducting exposed metal parts; the ground conductor should terminate at a copper plate or sintered bronze fitting that are area not less than 0.2 m^2 fixed to the keel below the light waterline so as to be fully immersed under all conditions of heel; the minimum size of the ground conductor should be not less than 16 mm.

4 Earth plates should not be placed within, or close to, the propeller aperture.

5 Every ground connection to the ship's structure or on wood and composite ships to the continuous ground conductor should be made in an accessible position and should be secured by a screw or connector of brass or other corrosion-resistant material used solely for that purpose.

6 Exposed permanently fixed metal parts of electrical machines or equipment which are not intended to be “live”, but which are liable under fault conditions to become “live” should be earthed (grounded) unless:

.1 they are supplied at a voltage not exceeding 55 V direct current (DC) or 55 V, root mean square, between conductors; auto-transformers should not be used for the purpose of achieving this alternative current voltage; or

.2 they are supplied at a voltage not exceeding 250 V by safety isolating transformers supplying one consuming device only; or

.3 they are constructed taking into account the principle of double insulation.

7 Radar, radio and other navigational equipment that require to be earthed should have a separate grounding point and the connection should be of adequate dimensions and of the least resistance.

8 Where a flexible, non-conducting coupling, is fitted between the engine and gearbox or between the gearbox output shaft and the propeller shafting, the coupling should be bridged by a piece of braided copper conductor.

G Precautions against shock, fire and other hazards of electrical origin

1 Cable systems and electrical equipment should be so installed as to avoid or reduce interference with radio operation.

2 Cables should be capable of carrying the maximum rated current for the circuit. The cross sectional area should be sufficient to ensure that the voltage drop will not exceed 6% of the nominal rating under maximum rated load for the circuit. Electrical wiring should be of marine grade multi-strand tinned copper wire cores with an approved insulated cover.

3 All electrical cables should be at least of a flame-retardant type and should be so installed as not to impair their original flame-retarding properties. The Competent Authority may permit the use of special types of cables when necessary for particular applications, such as radio frequency cables, which do not comply with the foregoing.

4 Electric cables should be supported in such a manner as to avoid chafing or other damage and should not be located close to hot surfaces such as engine exhausts. Except as permitted by the Competent Authority in exceptional circumstances, all metal sheaths and armour of cables should be electrically continuous and should be earthed.

5 Where cables are not metal sheathed or armoured and there might be a risk of fire in case of an electrical fault, special precautions should be taken to the satisfaction of the Competent Authority.

6 Electrical wiring and electrical equipment installed in vessels should be of marine grade materials only and should conform to the best marine practices of installation and workmanship. Electrical equipment exposed to the weather should be protected from dampness and corrosion as well as mechanical damage.

7 Lighting fittings should be arranged to prevent temperature rises which could damage the wiring and to prevent surrounding material from becoming excessively hot.

8 In spaces where flammable mixtures are liable to collect, and in any compartment assigned principally to the containment of an accumulator battery, no electrical equipment should be installed unless the Competent Authority is satisfied that it is:

.1 essential for operational purposes;
.2 of a type that will not ignite the mixture concerned;
.3 appropriate to the space concerned; and
.4 appropriately certified for safe usage in the dusts, vapours or gases likely to be encountered.

9 Where a potential explosion risk exists in or near any space, all electrical equipment as well as fittings installed in those spaces should be either explosion-proof or intrinsically safe to the satisfaction of the Competent Authority.

H Lighting systems

1 Lighting for machinery spaces and work spaces should be supplied from at least two separate final sub-circuits and arranged in such a manner that failure of one final sub-circuit should not leave the space in darkness.

2 Lighting of normally unattended spaces such as fish hold and net stores should be controlled from outside the space.

3 An emergency source of power should be made available for a signalling lamp if carried.

I Electric motors

1 In general, every electric motor should be provided with a means of starting and stopping so located that the person controlling the motor can easily operate it.

2 With the exception of an engine starter motor, the circuits supplying electric motors should be fitted with short circuit and overload protection.

3 In the case of steering gear motors, overload protection is not mandatory; therefore in the event of failure of any of the steering gear circuits, an alarm should sound in the wheelhouse. In addition indicators should also be installed in the wheelhouse to give an indication when steering gear motors and units are in operation. If protection against excess current is provided it should be a circuit breaker and should be set at not less than twice the full load current of the motor or circuit and should be arranged to allow the passage of the appropriate starting current.

4 Where electric motors are fitted to deck machinery, the operating device should automatically return to the stop position when released. Emergency stops should also be provided at positions as set out in the recommendations given in 6.7 of chapter 6. The mechanical component of the deck machinery should be fitted with an appropriate fail-safe braking system. It should be noted, however, that it is common practice to incorporate electro magnetic braking systems in machinery driven by an electric motor and this should be taken into consideration at the approval stage of the individual units of machinery.

5 Fans and pumps driven by electric motors should be fitted with a remote control. The remote control should be positioned outside the machinery space concerned, for stopping the motors in the event of a fire in the space in which they are located.

J Lightning conductors

1 Lightning conductors should be fitted on wooden masts. They should be of continuous copper tape or copper rope having a cross section of not less than 75 mm^2 and secured to a copper spike of 12 mm diameter projecting at least 150 mm beyond the top of the mast.

2 In the case of metal hulls, the lower end of the conductor should be earthed to the hull.

3 In the case of wood or other non-metallic hulls, the lower end of the conductor should be attached to an earth plate. All sharp bends should be avoided and only bolted or riveted joints should be used.

ANNEX XVIII

BASIC FIRST AID KIT*

Basic First Aid Kit	Essential	Recommended
Bandage	X	
Band aids	X	
Sterile dressings	X	
Sterile gauze	X	
Adhesive tape	X	
Scissors	X	
Safety pins	X	
Antiseptic cream	X	
Tweezers	X	
Liquid antiseptic		X
Pain killing tablets		X
Sunscreen		X
Eyewash		X
First Aid Book		X

* ***Note***: The competent authority could consider providing illustrations of these items.

ANNEX XIX

PERSONNEL PROTECTIVE EQUIPMENT

		Working Gear				**Protective gear**							**Specialist Protection**	
ACTIVITY	LOCATION	Oilskins *(and partial)*	Boiler Suit	Work Boots	Gloves	Hard hat	Ear Protection	Safety line/ Harness	Lifejacket/ Buoyancy Equipment	Safety Goggles	Rubber Gloves/Apron	Insulated Jacket and Trousers	Breathing Apparatus	Oxygen Meter
Fishing Watch	Working Deck	●	●	■	●	■			■					
Any	Engine-room		■	■	●	●	■							
Any	Aloft	●	●	■	■	■		●						
Any	Outboard	●		■	■	●		●	■					
Grinding and Cutting	Engine-room		■	■	■	●	●			■				
Grinding and Cutting	Working Deck		■	■	■	●				■				
Exposed Work including Shooting and Hauling	Working Deck	■		■	■	■			■					
Mooring	Working Deck			■	■	■			■					
Stowage/ Handling	Fish Room			■	■									
Stowage	Refrigerated Fish Room			■	■	●						■		
Battery Maintenance	Engine-room		■	■			●			■	■			
Battery Maintenance	Wheelhouse		■	■		●				■	■			
Loading/ Unloading Fish Boxes and Lifting Gear	Working Deck			■	■	■								
Any	Enclosed Space			■									■	■
Vessel Maintenance	Inside			■	■					●				
Vessel Maintenance	Outside			■	■	■			■	■				

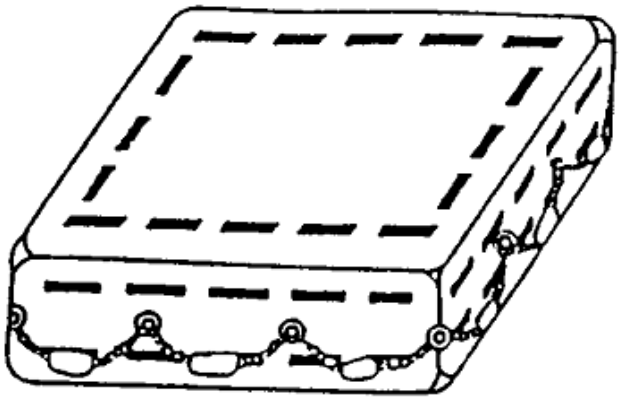
The Competent Authorities could use this table, having considered the risks and local circumstances, to decide on what personal protective equipment is required.

■ Means a High Priority item.
● Means a priority dependent upon local circumstances and the location.

ANNEX XX

REQUIREMENTS FOR BUOYANT APPARATUS

Buoyant Apparatus



(a) No type of buoyant apparatus should be accepted unless it satisfies the following conditions:

(i) it is of such size and strength that it can be thrown from the place where it is stowed into the water without being damaged;
(ii) it is clearly marked as to the number of persons it is to support;
(iii) it can be stowed where it is readily accessible, can be quickly and easily detached from the vessel and easily launched by hand. Wherever practical, buoyant apparatus should be float-free. Such arrangements are to be to the satisfaction of the Competent Authority;
(iv) it is made of buoyant material and robust construction;
(v) it would be effective and stable when floating either way up;
(vi) the air cases or equivalent buoyancy are placed as near as possible to the sides of the apparatus, and such buoyancy is not be dependent upon inflation;
(vii) it is fitted with a painter and has a line securely becketed round the outside;
(viii) it is painted in a highly visible colour and fitted with reflective tape;
(ix) it is recommended that there is a watertight container available for crew abandoning the vessel; containing the relevant safety equipment such as the distress signals required to be carried onboard and drinking water; and
(x) where a container is used as the buoyant apparatus consideration should be given to reducing the permeability.

(b) Testing should be carried out to indicate the number of people the buoyant apparatus is capable of supporting with a freeboard of not less than half its depth, for a period of time acceptable to the Competent Authority.

ANNEX XXI

GUIDANCE ON THE REQUIREMENTS FOR LIFESAVING EQUIPMENT

1 Liferaft

1.1 *General requirements for liferafts*

(1) Construction of liferafts

(a) Every liferaft should be so constructed as to be capable of withstanding exposure for 15 days afloat in all sea conditions.

(b) The liferaft should be so constructed that when it is dropped into the water from a height of 2 metres, the liferaft and its equipment will operate satisfactorily.

(c) The liferaft and its fittings should be so constructed as to enable it to be towed at a speed of 3 knots in calm water when loaded with its full complement of persons and equipment and with one of its sea-anchors streamed.

(d) The liferaft should have a canopy to protect the occupants from exposure which is automatically set in place when the liferaft is launched and waterborne. The canopy should comply with the following:

(i) it should provide insulation against heat and cold by means of either two layers of material separated by an air gap or other equally efficient means. Means should be provided to prevent accumulation of water in the air gap;
(ii) its interior should be of a colour that does not cause discomfort to the occupants;
(iii) each entrance should be clearly indicated and be provided with efficient adjustable closing arrangements which can be easily and quickly opened from inside and outside the liferaft so as to permit ventilation but exclude seawater, wind and cold. Liferafts accommodating more than eight persons should have at least two diametrically opposite entrances;
(iv) it should admit sufficient air for the occupants at all times, even with the entrances closed;
(v) it should be provided with at least one viewing port;
(vi) it should be provided with means for collecting rainwater.

(2) Equipment

(a) The normal equipment of every liferaft should consist of:

(i) one buoyant rescue quoit, attached to not less than 30 metres of buoyant line;

(ii) one knife of the non-folding type having a buoyant handle and lanyard attached and stowed in a pocket on the exterior of the canopy near the point at which the painter is attached to the liferaft. In addition, a liferaft which is permitted to accommodate 13 persons or more should be provided with a second knife which need not be of the non-folding type;

(iii) for a liferaft which is permitted to accommodate not more than 12 persons, one buoyant bailer. For a liferaft which is permitted to accommodate 13 persons or more, two buoyant bailers;

(iv) two sponges;

(v) two sea-anchors each with a shock-resistant hawser and tripping line, one being spare and the other permanently attached to the liferaft in such a way that when the liferaft inflates or is waterborne it will cause the liferaft to lie oriented to the wind in the most stable manner. The strength of each sea-anchor and its hawser and tripping line should be adequate for all sea conditions. The sea-anchors should be fitted with a swivel at each end of the line and should be of a type which is unlikely to turn inside-out between its shroud lines;

(vi) two buoyant paddles;

(vii) three tin-openers; safety knives containing special tin-opener blades are satisfactory for this requirement;

(viii) one first-aid outfit in a waterproof case capable of being closed tightly after use;

(ix) one whistle or equivalent sound signal;

(x) one waterproof electric torch suitable for Morse signalling together with one spare set of batteries and one spare bulb in a waterproof container;

(xi) an efficient radar reflector, unless a survival craft radar transponder is stowed in the liferaft;

(xii) one daylight signalling mirror with instructions on its use for signalling to ships and aircraft;

(xiii) one copy of the life-saving signals referred to in regulation V/16 of the International Convention for the Safety of Life at Sea, 1974, on a waterproof card or in a waterproof container;

(xiv) one set of fishing tackle;

(xv) a food ration totalling not less than 10,000 kilojoules for each person the liferaft is permitted to accommodate; these rations should be kept in airtight packaging and be stowed in a watertight container;

(xvi) watertight receptacles containing a total of 1.5 litres of fresh water for each person the liferaft is permitted to accommodate, of which 0.5 litres per person may be replaced by a de-salting apparatus capable of producing an equal amount of fresh water in 2 days;

(xvii) one rustproof graduated drinking vessel;

(xviii) six doses of anti-seasickness medicine and one seasickness bag for each person the liferaft is permitted to accommodate;

(xix) instructions on how to survive;

(xx) instructions for immediate action;

(b) The marking should be block capitals of the Roman alphabet.

(c) Where appropriate the equipment should be stowed in a container which, if it is not an integral part of, or permanently attached to, the liferaft, should be stowed and secured inside the liferaft and be capable of floating in water for at least 30 minutes without damage to its contents.

1.2 ***Inflatable liferafts***

(1) Inflatable liferafts should comply with the requirements of 1.1 and, in addition, should comply with the requirements of this paragraph.

(2) Construction of inflatable liferafts

(a) The main buoyancy chamber should be divided into not less than two separate compartments, each inflated through a non-return inflation valve on each compartment. The buoyancy chambers should be so arranged that, in the event of any one of the compartments being damaged or failing to inflate, the intact compartments should be able to support, with positive freeboard over the liferaft's entire periphery, the number of persons which the liferaft is permitted to accommodate, each having a mass of 75 kilograms and seated in their normal positions.

(b) The floor of the liferaft should be waterproof and should be capable of being sufficiently insulated against cold either:

(i) by means of one or more compartments that the occupants can inflate, or which inflate automatically and can be deflated and reinflated by the occupants; or
(ii) by other equally efficient means not dependent on inflation.

(c) The liferaft should be inflated with a non-toxic gas. Inflation should be completed within a period of 1 minute at an ambient temperature of between 18 degrees Celsius and 20 degrees Celsius and within a period of 3 minutes at an ambient temperature of –30 degrees Celsius. After inflation the liferaft should maintain its form when loaded with its full complement of persons and equipment.

(d) Each inflatable compartment should be capable of withstanding a pressure equal to at least 3 times the working pressure and should be prevented from reaching a pressure exceeding twice the working pressure either by means of relief valves or by a limited gas supply. Means should be provided for fitting the topping-up pump or bellows required by 1.2(9)(a)(ii) so that the working pressure can be maintained.

(3) Carrying capacity of inflatable liferafts

The number of persons which a liferaft should be permitted to accommodate should be equal to the lesser of:

(i) the greatest whole number obtained by dividing by 0.096 the volume, measured in cubic metres, of the main buoyancy tubes (which for this purpose should include neither the arches nor the thwarts, if fitted) when inflated; or

(ii) the greatest whole number obtained by dividing by 0.372 the inner horizontal cross-sectional area of the liferaft measured in square metres (which for this purpose may include the thwart or thwarts, if fitted) measured to the innermost edge of the buoyancy tubes; or

(iii) the number of persons having an average mass of 75 kilograms all wearing lifejackets, that can be seated with sufficient comfort and headroom without interfering with the operation of any of the liferaft's equipment.

(4) Access into inflatable liferafts

(a) Entrances should have a boarding ladder, the lowest step of which should be situated not less than 0.4 metres below the liferaft's light waterline.

(b) There should be means inside the liferaft to assist persons to pull themselves into the liferaft from the ladder.

(5) Stability of inflatable liferafts

(a) Every inflatable liferaft should be so constructed that, when fully inflated and floating with the canopy uppermost, it is stable in a seaway.

(b) The stability of the liferaft when in the inverted position should be such that it can be righted in a seaway and in calm water by one person.

(c) The stability of the liferaft when loaded with its full complement of persons and equipment should be such that it can be towed at speeds of up to 3 knots in calm water.

(6) Containers for inflatable liferafts

(a) The liferaft should be packed in a container that is:

(i) so constructed as to withstand hard wear under conditions encountered at sea;

(ii) of sufficient inherent buoyancy, when packed with the liferaft and its equipment, to pull the painter from within and to operate the inflation mechanism should the vessel sink;

(iii) as far as practicable watertight, except for drain holes in the container bottom.

(b) The liferaft should be packed in its container in such a way as to ensure, as far as possible, that the waterborne liferaft inflates in an upright position on breaking free from its container.

(c) The container should be marked with:

(i) maker's name or trade mark;
(ii) serial number;
(iii) name of approving authority and the number of persons it is permitted to carry;
(iv) type of emergency pack enclosed;
(v) date when last serviced;
(vi) length of painter;
(vii) maximum permitted height of stowage above waterline (depending on drop-test height and length of painter);
(viii) launching instructions.

(7) Markings on inflatable liferafts*

The liferaft should be marked with:

(i) maker's name or trade mark;
(ii) serial number;
(iii) date of manufacture (month and year);
(iv) name of approving authority;
(v) name and place of servicing station where it was last serviced;
(vi) number of persons it is permitted to accommodate over each entrance in characters not less than 100 millimetres in height of a colour contrasting with that of the liferaft.

(8) Additional equipment for inflatable liferafts

(a) In addition to the equipment, every inflatable liferaft should be provided with:

(i) one repair outfit for repairing punctures in buoyancy compartments;
(ii) one topping-up pump or bellows.

(b) The knives required should be safety knives.

2 Lifejackets

2.1 *General requirements for lifejackets*

(a) A lifejacket should not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds.

(b) A lifejacket should be so constructed that:

(i) after demonstration, a person can correctly don it within a period of 1 minute without assistance;
(ii) it is capable of being worn inside-out or is clearly capable of being worn in only one way and, as far as possible, cannot be donned incorrectly;
(iii) it is comfortable to wear;

* See also 7.5.5 of the Recommendations.

(iv) it allows the wearer to jump from a height of at least the deck level into the water without injury and without dislodging or damaging the lifejacket.

(c) A lifejacket should have sufficient buoyancy and stability in calm fresh water to:

(i) lift the mouth of an exhausted or unconscious person not less than 120 millimetres clear of the water with the body inclined backwards at an angle of not less than 20 degrees and not more than 50 degrees from the vertical position;
(ii) turn the body of an unconscious person in the water from any position to one where the mouth is clear of the water in not more than 5 seconds.

(d) A lifejacket should have buoyancy which is not reduced by more than 5 per cent after 24 h submersion in fresh water.

(e) A lifejacket should allow the person wearing it to swim a short distance and to board a survival craft.

(f) Each lifejacket should be fitted with a whistle firmly secured by a cord.

3 Immersion suits

3.1 *General requirements for immersion suits*

(a) The immersion suit should be constructed with waterproof materials such that:

(i) it can be unpacked and donned without assistance within 2 minutes taking into account any associated clothing, and a lifejacket if the immersion suit is to be worn in conjunction with a lifejacket;
(ii) it will not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds;
(iii) it will cover the whole body with the exception of the face. Hands should also be covered unless permanently attached gloves are provided;
(iv) it is provided with arrangements to minimize or reduce free air in the legs of the suit;
(v) following a jump from a height of not less than 4.5 metres into the water there is no undue ingress of water into the suit.

(b) An immersion suit which also complies with the requirements of 2 may be classified as a lifejacket.

(c) An immersion suit should permit the person wearing it, and also wearing a lifejacket if the immersion suit is to be worn in conjunction with a lifejacket to:

(i) climb up and down a vertical ladder at least 5 metres in length;
(ii) perform normal duties during abandonment;
(iii) jump from a height of not less than 4.5 metres into the water without damaging or dislodging the immersion suit, or being injured;
(iv) swim a short distance through the water and board a survival craft.

(d) An immersion suit which has buoyancy and is designed to be worn without a lifejacket should be fitted with a light complying with the requirements of 2.3 and the whistle prescribed by 2.1(f).

(e) If the immersion suit is to be worn in conjunction with a lifejacket, the lifejacket should be worn over the immersion suit. A person wearing such an immersion suit should be able to don a lifejacket without assistance.

3.2 ***Thermal performance requirements for immersion suits***

(a) An immersion suit made of material which has no inherent insulation should be:

(i) marked with instructions that it must be worn in conjunction with warm clothing;
(ii) so constructed that, when worn in conjunction with warm clothing and with a lifejacket if the immersion suit is to be worn with a lifejacket, the immersion suit continues to provide sufficient thermal protection following one jump by the wearer into the water from a height of 4.5 metres to ensure that when it is worn for a period of 1 hour in calm circulating water at a temperature of 5 degrees Celsius the wearer's body core temperature does not fall more than 2 degrees Celsius.

(b) An immersion suit made of material with inherent insulation when worn either on its own or with a lifejacket, if the immersion suit is to be worn in conjunction with a lifejacket, should provide the wearer with sufficient thermal insulation following one jump into the water from a height of 4.5 metres to ensure that the wearer's body core temperature does not fall more than 2 degrees Celsius after a period of 6 h immersion in calm circulating water at a temperature of between 0 degrees Celsius and 2 degrees Celsius.

(c) The immersion suit should permit the person wearing it with hands covered to pick up a pencil and write after being immersed in water at 5 degrees Celsius for a period of 1 hour.

3.3 ***Buoyancy requirements***

A person in fresh water wearing either an immersion suit complying with the requirements of 2 or an immersion suit with a lifejacket should be able to turn from a face-down to a face-up position in not more than 5 seconds.

4 Lifebuoys

4.1 ***Lifebuoy specification***

Every lifebuoy should:

(i) have an outer diameter of not more than 800 millimetres and an inner diameter of not less than 400 millimetres;
(ii) be constructed of inherently buoyant material; it should not depend upon rushes, cork shavings or granulated cork, any other loose granulated material or any air compartment which depends on inflation for buoyancy;

(iii) be capable of supporting not less than 14.5 kilograms of iron in fresh water for a period of 24 h;
(iv) have a mass of not less than 2.5 kilograms;
(v) not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds;
(vi) be constructed to withstand a drop into the water from the height at which it is stowed above the waterline in the lightest seagoing condition or 30 metres, whichever is the greater, without impairing either its operating capability or that of its attached components;
(vii) if it is intended to operate the quick-release arrangement provided for the self-activated smoke signals and self-igniting lights, have a mass sufficient to operate the quick-release arrangement or 4 kilograms, whichever is the greater;
(viii) be fitted with a grabline not less than 9.5 millimetres in diameter and not less than 4 times the outside diameter of the body of the buoy in length. The grabline should be secured at four equidistant points around the circumference of the buoy to form four equal loops.

4.2 ***Buoyant lifelines***

Buoyant lifelines should:

(i) be non-kinking;
(ii) have a diameter of not less than 8 millimetres;
(iii) have a breaking strength of not less than 5 kilonewtons.

5 Rocket parachute flares

5.1 The rocket parachute flare should:

(i) be contained in a water-resistant casing;
(ii) have brief instructions or diagrams clearly illustrating the use of the rocket parachute flare printed on its casing;
(iii) have integral means of ignition;
(iv) be so designed as not to cause discomfort to the person holding the casing when used in accordance with the manufacturer's operating instructions.

5.2 The rocket should, when fired vertically, reach an altitude of not less than 300 metres. At or near the top of its trajectory, the rocket should eject a parachute flare, which should:

(i) burn with a bright red colour;
(ii) burn uniformly with an average luminous intensity of not less than 30,000 candela;
(iii) have a burning period of not less than 40 seconds;
(iv) have a rate of descent of not more than 5 metres per second;
(v) not damage its parachute or attachments while burning.

6 Hand flares

6.1 The hand flare should:

(i) be contained in a water-resistant casing;
(ii) have brief instructions or diagrams clearly illustrating the use of the hand flare printed on its casing;
(iii) have a self-contained means of ignition;
(iv) be so designed as not to cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions.

6.2 The hand flare should:

(i) burn with a bright red colour;
(ii) burn uniformly with an average luminous intensity of not less than 15,000 candela;
(iii) have a burning period of not less than 1 minute;
(iv) continue to burn after having been immersed for a period of 10 seconds under 100 millimetres of water.

ANNEX XXII

RECOMMENDATION FOR TESTING LIFEJACKETS*

PART 1 – PROTOTYPE TEST

1 Testing

1.1 *Temperature test*

The lifebuoys should be alternately subjected to surrounding temperatures of -30°C and +65°C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for a total of 10 cycles, is acceptable:

.1 an 8 h cycle at +65°C to be completed in one day;

.2 the specimens removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;

.3 an 8 h cycle at -30°C to be completed the next day; and

.4 the specimens removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day.

1.2 *Test for oil resistance*

One of the lifebuoys should be immersed horizontally for a period of 24 h under a 100 mm head of diesel oil at normal room temperature. After this test the lifebuoy should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.

1.3 *Fire test*

The other lifebuoy should be subjected to a fire test. A test pan 30 cm x 35 cm x 6 cm should be placed in an essentially draught-free area. Water should be put in the bottom of the test pan to a depth of 1 cm followed by enough petrol to make a minimum total depth of 4 cm. The petrol should then be ignited and allowed to burn freely for 30 s. The lifebuoy should then be moved through flames in an upright, forward, free-hanging position, with the bottom of the lifebuoy 25 cm above the top edge of the test pan so that the duration of exposure to the flames is 2 seconds. The lifebuoys should not sustain burning or continue melting after being removed from the flames.

* Refer to the Standardized life-saving appliance evaluation and test report forms (MSC/Circ.980).

2 Lifejackets

2.1 *Temperature cycling test*

A lifejacket should be subjected to the temperature cycling as prescribed in 1.1 and should then be externally examined. If the buoyancy material has not been subjected to the tests prescribed in 2.7, the lifejacket should also be examined internally. The lifejacket materials should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.

2.2 *Buoyancy test*

The buoyancy of the lifejacket should be measured before and after 24 hour complete submersion to just below the surface in fresh water. The difference between the initial buoyancy and the final buoyancy should not exceed 5% of the initial buoyancy.

2.3 *Fire test*

A lifejacket should be subjected to the fire test prescribed in 1.3. The lifejacket should not sustain burning or continue melting after being removed from the flames.

2.4 *Test for oil resistance*

2.4.1 The lifejacket should be tested for oil resistance as prescribed in 1.2.

2.4.2 If the buoyancy material has not been subjected to the tests prescribed in 2.7, the lifejacket should also be examined internally and the effect determined. The material should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.

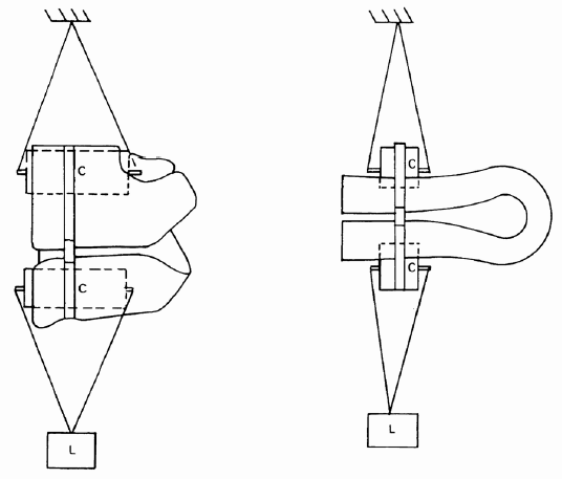
2.5 *Tests of materials for cover, tapes and seams*

The materials used for the cover, tapes, seams and additional equipment should be tested to the satisfaction of the Competent Authority to establish that they are rot-proof, colour-fast and resistant to deterioration from exposure to sunlight and that they are not unduly affected by sea water, oil or fungal attack.

2.6 *Strength tests*

Body or lifting loop strength tests

2.6.1 The lifejacket should be immersed in water for a period of 2 min. It should then be removed from the water and closed in the same manner as when it is worn by a person. A force of not less than 3,200 N (2,400 N in the case of a child-size lifejacket) should be applied for 30 min to the part of the lifejacket that secures it to the body of the wearer (see figure 1) or to the lifting loop of the lifejacket. The lifejacket should not be damaged as a result of this test.



Vest-type lifejacket Yoke or over-the-head-type lifejacket

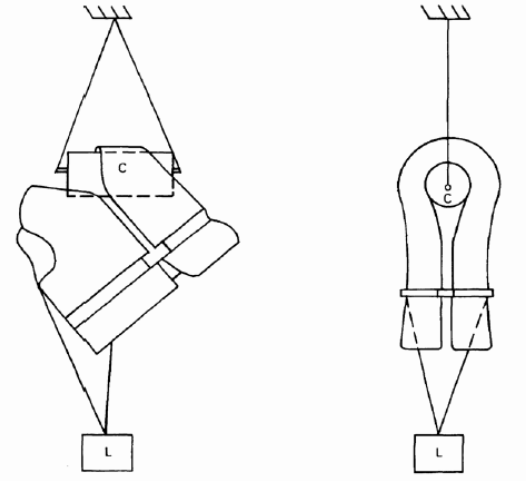
C – Cylinder: 125 mm diameter for adult sizes
50 mm diameter for child sizes

L – Test load

Figure 1 – Body strength test arrangement for lifejackets

Shoulder strength test

2.6.2 The lifejacket should be immersed in water for a period of 2 min. It should then be removed from the water and closed in the same manner as when it is worn by a person. A force of not less than 900 N (700 N in the case of a child-size lifejacket) should be applied for 30 min to the shoulder section of the lifejacket (see figure 2). The lifejacket should not be damaged as a result of this test.



Vest-type lifejacket Yoke or over-the-head-type lifejacket

C – Cylinder: 125 mm diameter for adult sizes
50 mm diameter for child sizes

L – Test load

Figure 2 – Shoulder strength test arrangement for lifejackets

2.7 *Additional tests for lifejacket buoyancy material other than cork or kapok*

The following tests should be carried out on eight specimens of lifejacket buoyancy materials other than cork or kapok.

Test for stability under temperature cycling

2.7.1 Six specimens should be alternately subjected for 8 hour to surrounding temperatures of -30°C and +65°C. These alternating cycles need not follow immediately after each other and the following procedure, repeated for ten cycles, is acceptable:

.1 an 8 hour cycle at +65°C to be completed in one day;

.2 the specimens removed from the warm chamber on the same day and left exposed under the ordinary room conditions until the next day;

.3 an 8 hour cycle at -30°C to be completed the next day; and

.4 the specimens removed from the cold chamber that same day and left exposed under the ordinary room conditions until the next day.

2.7.2 The dimensions of the specimens should be recorded at the end of the 10-cycle period. The specimens should be carefully examined and should not show any sign of external change of structure or of mechanical qualities.

2.7.3 Two of the specimens should be cut open and should not show any sign of internal change of structure.

2.7.4 Four of the specimens should be used for water absorption tests, two of which should be so tested after they have also been subjected to the diesel oil test as prescribed in 1.2.

Tests for water absorption

2.7.5 The tests should be carried out in fresh water and the specimens should be immersed for a period of seven days under a 1.25 m head of water.

2.7.6 The tests should be carried out:

.1 on two specimens as supplied;

.2 on two specimens which have been subjected to the temperature cycling as prescribed in 2.7.1; and

.3 on two specimens which have been subjected to the temperature cycling as prescribed in 2.7.1 followed by the diesel oil test as prescribed in 2.4.

2.7.7 The specimens should be at least 300 mm square and be of the same thickness as used in the lifejacket. Alternatively, the entire lifejacket may be subjected to the test. The dimensions should be recorded at the beginning and end of these tests.

2.7.8 The results should state the mass in kilograms which each specimen could support out of the water after one and seven days immersion (the selection of a test method suitable for obtaining this result directly or indirectly is left to the discretion of the testing Competent Authority). The reduction of buoyancy should not exceed 16% for specimens which have been exposed to the diesel oil conditioning and should not exceed 5% for all other specimens. The specimens should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities.

2.8 ***Donning test***

2.8.1 As lifejackets will be used by uninitiated persons, often in adverse conditions, it is essential that risk of incorrect donning be minimized. Ties and fastenings necessary for proper performance should be few and simple. Lifejackets should readily fit various sizes of adults, both lightly and heavily clad. Lifejackets should be capable of being worn inside-out, or clearly in only one way.

Test subjects

2.8.2 These tests should be carried out with at least six able-bodied persons of the following heights and weights:

Height	Weight
1.4 m – 1.6 m	1 person under 60 kg 1 person over 60 kg
1.6 m – 1.8 m	1 person under 70 kg 1 person over 70 kg
over 1.8 m	1 person under 80 kg 1 person over 80 kg

.1 at least one and not more than two of the persons should be females with no more than one female in the same height range; and

.2 for the approval of the lifejackets, the test results obtained from each of the participating subjects should be acceptable except as provided otherwise.

Clothing

2.8.3 Each test subject should be tested wearing normal clothing. The test should be repeated with the test subject wearing heavy-weather clothing.

Test

2.8.4 After demonstration, the test subjects should correctly don lifejackets within a period of 1 min, without assistance.

Assessment

2.8.5 The observer should note:

.1 ease and speed of donning; and

.2 proper fit and adjustment.

2.9 *Water performance tests*

2.9.1 This portion of the test is intended to determine the ability of the lifejacket to assist a helpless person or one in an exhausted or unconscious state and to show that the lifejacket does not unduly restrict movement. All tests should be carried out in fresh water under still conditions.

Test subjects

2.9.2 These tests should be carried out with at least six persons as described in 2.8.2. Only good swimmers should be used, since the ability to relax in the water is rarely otherwise obtained.

Clothing

2.9.3 Subjects should wear only swimming costumes.

Preparation for water performance tests

2.9.4 The test subjects should be made familiar with each of the tests set out below, particularly the requirement regarding relaxing and exhaling in the face-down position. The test subject should don the lifejacket, unassisted, using only the instructions provided by the manufacturer. The observer should note the points prescribed in 2.8.5.

Righting tests

2.9.5 The test subject should swim at least three gentle strokes (breast stroke) and then with minimum headway relax, with the head down and the lungs partially filled, simulating a state of utter exhaustion. The period of time should be recorded starting from the completion of the last stroke until the mouth of the test subject comes clear of the water. The above test should be repeated after the test subject has exhaled. The time should again be ascertained as above. The freeboard from the water surface to the mouth should be recorded with the test subject at rest.

Drop test

2.9.6 Without readjusting the lifejacket, the test subject should jump vertically into the water, feet first, from a height of at least 4.5 m. When jumping into the water, the test subject should be allowed to hold on to the lifejacket during water entry to avoid possible injury. The freeboard to the mouth should be recorded after the test subject comes to rest.

Assessment

2.9.7 After each of the water tests described above, the test subject should come to rest with the mouth clear of the water by at least 120 mm. The average of all subjects' trunk angles should be at least 30° back of vertical, and each individual subject's angle should be at least 20° back of vertical. The average of all subjects' faceplane (head) angles should be at least 40° above horizontal, and each individual subject's angle should be at least 30° above horizontal. In the righting test, the mouth should be clear of the water in not more than 5 s. The lifejacket should not become dislodged or cause harm to the test subject.

2.9.8 When evaluating the results of a test in accordance with 2.9.5, 2.9.6 and 2.9.7, the Competent Authority may, in exceptional circumstances, disregard the results of a test on a subject if the results show a very slight deviation from the specified criteria, provided the Competent Authority is satisfied that the deviation can be attributed to the unusual size and stature characteristics of the test subject and the results of tests on other subjects, chosen in accordance with 2.9.2, show the satisfactory performance of the lifejacket.

Swimming and water emergence test

2.9.9 All test subjects, without wearing the lifejacket, should attempt to swim 25 m and board a liferaft or a rigid platform with its surface 300 mm above the water surface. All test subjects who successfully complete this task should perform it again wearing the lifejacket. At least two thirds of the test subjects who can accomplish the task without the lifejacket should also be able to perform it with the lifejacket.

2.10 ***Children's lifejacket tests***

As far as possible, similar tests should be applied for approval of lifejackets suitable for children.

2.10.1 When conducting water performance tests under 2.9, child-size lifejackets should meet the following requirements for their critical flotation stability characteristics. The range of sizes for child-size lifejackets, should be considered based on the test results. Devices should be sized by height or by height and weight.

2.10.2 Test subjects should be selected to fully represent the range of sizes for which the device is to be approved. Devices for smaller children should be tested on children as small as approximately 760 mm tall and 9 kg mass. At least six test subjects should be used for each 380 mm and 16 kg of size range:

.1 Turning time. Each individual subject should turn face-up in not more than 5 s.

.2 Freeboard. The combined results for clearance of the mouth above the water for all subjects should average at least 90 mm; each individual subject under 1,270 mm and 23 kg should have at least 50 mm clearance, and each individual subject over 1,270 mm and 23 kg should have at least 75 mm clearance.

.3 Trunk angle. The average of all subjects' results should be at least 40° back of vertical, and each individual subject's result should be at least 20° back of vertical.

.4 Faceplane (head) angle. The average of all subjects' results should be at least 35° above horizontal, and each individual subject's result should be at least 20° above horizontal.

.5 Mobility. Mobility of the subject both in and out of the water should be given consideration in determining the acceptability of a device for approval.

2.11 *Tests for inflatable lifejackets*

2.11.1 Two inflatable lifejackets should be subjected to the temperature cycling test prescribed in 1.1 in the uninflated condition and should then be externally examined. The inflatable lifejacket materials should show no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities. The automatic and manual inflation systems should each be tested immediately after each temperature cycling test as follows:

.1 after the high temperature cycle (test in 1.1.1), the two inflatable lifejackets taken from a stowage temperature of +65°C, one should be activated using the automatic inflation system by placing it in sea water at a temperature of +30°C and the other should be activated using the manual inflation system; and

.2 after the low temperature cycle (test in 1.1.3), the two inflatable lifejackets taken from a stowage temperature of -30°C, one should be activated using the automatic inflation system by placing it in sea water at a temperature of -1°C and the other should be activated using the manual inflation system.

2.11.2 The test in 2.8 should be conducted using lifejackets both in the inflated and uninflated conditions.

2.11.3 The tests in 2.9 should be conducted using lifejackets that have been inflated both automatically and manually, and also with one of the compartments uninflated. The tests with one of the compartments uninflated should be repeated as many times as necessary to perform the test once with each compartment in the uninflated condition.

Tests of materials for inflatable bladders, inflation systems and components

2.11.4 The material used for the inflatable bladder, inflation system and components should be tested to establish that they are rot-proof, colour fast and resistant to deterioration from exposure to sunlight and that they are not duly affected by sea water, oil or fungal attack.

Material tests

2.11.5 Resistance to rot and illumination tested according to AATCC Method 30:1981 and ISO 105-B04:1988 Illumination should take place to Class 4-5.

2.11.6 Following exposure to rot or illumination tests above the tensile strength should be measured using the grab method given in ISO 5082. Minimum tensile strength should be not less than 300 N per 25 mm in the warp and weft direction.

Coated fabrics

2.11.7 Coated fabrics used in the construction of inflatable buoyancy chambers should comply with the following requirements:

.1 coating adhesion should be tested in accordance with ISO 2411:1991 by dropping the lifejacket from a height of 18 m into the water at 100 mm/min and should be not less than 50 N per 50 mm width;

.2 coating adhesion should be tested when wet following ageing according to ISO 188 with an exposure of 336 ± 0.5 h in fresh water at (70.0 ± 1.0)°C, following which the method at ISO 2411:1991 of dropping the lifejacket from a height of 18 m into the water at 100 mm/min and should not be less then 40 N per 50 mm width;

.3 tear strength should be tested in accordance with ISO 4674:1977 using method A1 and should not be less than 35 N;

.4 resistance to flex cracking should be tested in accordance with ISO 7854:1984 method A using 9,000 flex cycles, there should be no visible cracking or deterioration;

.5 breaking strength should be tested in accordance with ISO 1421:1977 using the CRE or CRT method, following conditioning for 24 ± 0.5 h at room temperature and should not be less than 200 N per 50 mm width**;**

.6 breaking strength should be tested in accordance with ISO 1421:1977 using the CRE or CRT method, following conditioning immersed in fresh water for 24 ± 0.5 h at room temperature and should not be less than 200 N per 50 mm width;

.7 elongation to break should be tested in accordance with ISO 1421:1977using the CRE or CRT method following conditioning at room temperature for 24 ± 0.5 h and should not be more than 60%;

.8 elongation to break should be tested in accordance with ISO 1421:1977using the CRE or CRT method following conditioning immersed in fresh water at room temperature for 24 ± 0.5 h and should not be more than 60%;

.9 the resistance to exposure to light when tested in accordance with ISO 105-BO2:1988 and the contrast between the unexposed and exposed samples should not be less than class 5;

.10 the resistance to wet and dry rubbing when tested in accordance with ISO 105-X12:1995 and should not be less than class 3;

.11 the resistance to sea water should not be less than class 4 in accordance with ISO 105-EO2:1978 and the change in colour of the specimen should not be less than class 4.

Operating head load test

2.11.8 The operating head load test should be carried out using two lifejackets, one lifejacket to be conditioned at -30°C for 8 h and the other at +65°C for 8 h. After mounting on the mannequin or the test form the lifejackets should be inflated, and a steady force of 220 ± 10 N applied to the operating head as near as possible to the point where it enters the buoyancy chamber. This load should be maintained for 5 min during which the direction and angle in which it is applied should be continuously varied. On completion of the test the lifejacket should remain intact and should hold its pressure for 30 min.

Pressure test

2.11.9 The inflatable buoyancy chambers should be capable of withstanding an internal over pressure at ambient temperature. A lifejacket should be inflated using the manual method of inflation, after inflation the relief valves should be disabled and a fully charged gas cylinder according to the manufacturers recommendation should be fitted to the same inflation device and fired. The lifejacket should remain intact and should hold its pressure for 30 min. The lifejackets should show no signs of damage such as cracking, swelling or changes of mechanical qualities and that there has been no significant damage to the lifejacket inflation component. All fully charged gas cylinders used in this test should be sized according to the markings on lifejacket.

2.11.10 With one buoyancy chamber inflated, the operating head on the opposite buoyancy chamber should be fired manually, using a fully charged gas cylinder according to the manufacturers recommendations. The operation of the relief valves should be noted to ensure that the excess pressure is relieved. The lifejacket should remain intact and should hold its pressure for 30 min. The lifejackets should no signs of damage such as cracking, swelling or changes of mechanical qualities and that there has been no significant damage to the lifejacket inflation component.

2.11.11 Air retention test: One inflation chamber of a lifejacket is filled with air until air escapes from the over-pressure valve or, if the lifejacket does not have an over-pressure valve, until its design pressure, as stated in the plans and specifications, is reached. After 12 h the drop in pressure should not be greater than 10%. This test is then repeated as many times as necessary to test a different chamber until each chamber has been tested in this manner.

Compression test

2.11.12 The inflatable lifejacket packed in the normal manner should be laid on a table. A bag containing 75 kg of sand and having a base of 320 mm diameter should be lowered onto the lifejacket from a height of 150 mm in a time of 1 s. This should be repeated ten times, after which the bag should remain on the jacket for not less than 3 h. The lifejacket should be inflated by immersion into water and should inflate fully; the jacket should be inspected to ensure that no swelling or change of mechanical properties has occurred; and the jacket should be checked for leaks.

Test of metallic components

2.11.13 Metal parts and components of a lifejacket should be corrosion-resistant to sea water and should be tested in accordance with ISO 9227:1990 for a period of 96 h. The metal components should be inspected and should not be significantly affected by corrosion, or affect any other part of the lifejacket and should not impair the performance of the lifejacket.

2.11.14 Metal components should not affect a magnetic compass of a type used in small boats by more than 1°, when placed at a distance of 500 mm from it.

Inadvertent inflation test

2.11.15 The resistance of an automatic inflation device to inadvertent operation should be assessed by exposing the entire lifejacket to sprays of water for fixed period. The lifejacket should be fitted correctly to a free-standing mannequin of adult size, with a minimum shoulder height of 1,500 mm. The lifejacket should be deployed in the mode in which it is worn ready for use but not deployed as used in the water (i.e. if it is equipped with a cover which is normally worn closed, then the cover should be closed for the test. Two sprays should be installed so as to spray fresh water onto the lifejacket, as shown in the diagram. One should be positioned 500 mm above the highest point of the lifejacket, and at an angle of 15° from the vertical centre line of the mannequin and the bottom line of the lifejacket. The other nozzle should be installed horizontally at a distance of 500 mm from the bottom line of the lifejacket, and points directly at the lifejacket. These nozzles should have a spray cone of 30°, each orifice being 1.5 ± 0.1 mm in diameter, and the total area of the orifice should be 50 ± 5 mm², the orifice being evenly spread over the spray nozzle area.

2.11.16 The air temperature should be 20°C, and water should be supplied to the sprays at a pressure of 0.3 kPa to 0.4 kPa, a flow of 600 *l*/h, and a temperature of 18°C to 20°C.

2.11.17 The sprays should be turned on, and the lifejacket exposed to the following series of test to access the ability of the jacket to resist inadvertent inflation:

.1 5 min with the high spray on the front of the lifejacket;

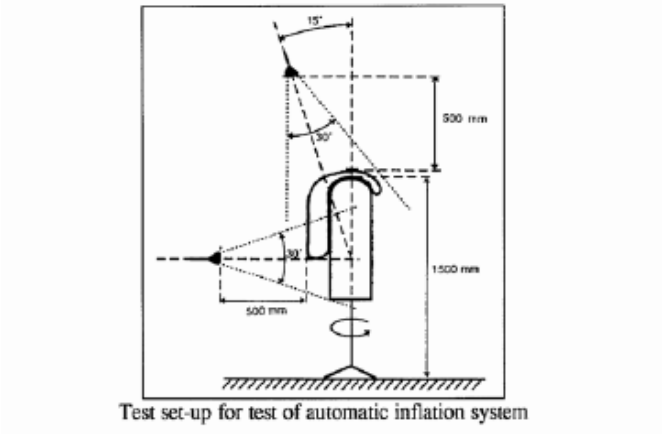
.2 5 min with the high spray on the left side of the lifejacket;

.3 5 min with the high spray on the back of the lifejacket; and

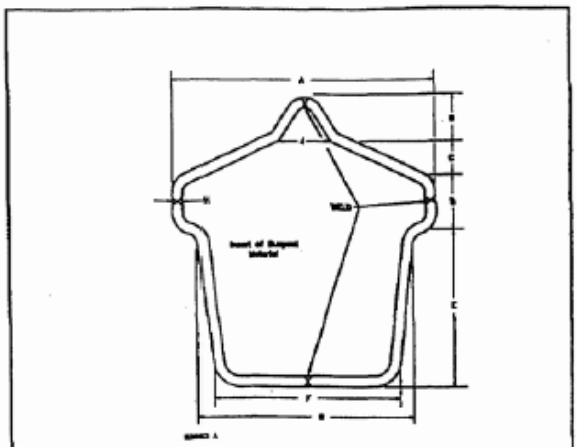
.4 5 min with the high spray on the right side of the lifejacket.

2.11.18 During exposures specified in 2.11.17.1, 2.11.17.2 and 2.11.17.4 above, the horizontal spray should be applied for 10 periods of 3 s each to the front, left or right sides (but not back) as with the high spray.

Alternative former



Test set-up for test of automatic inflation system



Size	Dimensions – (mm)								
	A	B	C	D	E	F	G	H	J
Adult	(610)	(114)	(76.2)	(127)	(381)	(432)	(508)	(25.4)	(178)

2.11.19 After completing the above test the lifejacket should be removed from the mannequin and immersed in water to verify that the auto-inflation system functions.

PART 2 – PRODUCTION AND INSTALLATION TESTS

1 General

1.1 Representatives of the Competent Authority should make random inspections of manufacturers to ensure that the quality of life-saving appliances and the materials used comply with the specification of the approved prototype life-saving appliance.

1.2 Manufacturers should be required to institute a quality control procedure to ensure that life-saving appliances are produced to the same standard as the prototype life-saving appliance approved by the Competent Authority and to keep records of any production tests carried out in accordance with the Competent Authority instructions.

1.3 Where the proper operation of life-saving appliances is dependent on their correct installation in vessels, the Competent Authority should require installation tests to ensure that the appliances have been correctly installed in a vessel.

2 Individual buoyancy equipment for lifejackets

Production tests

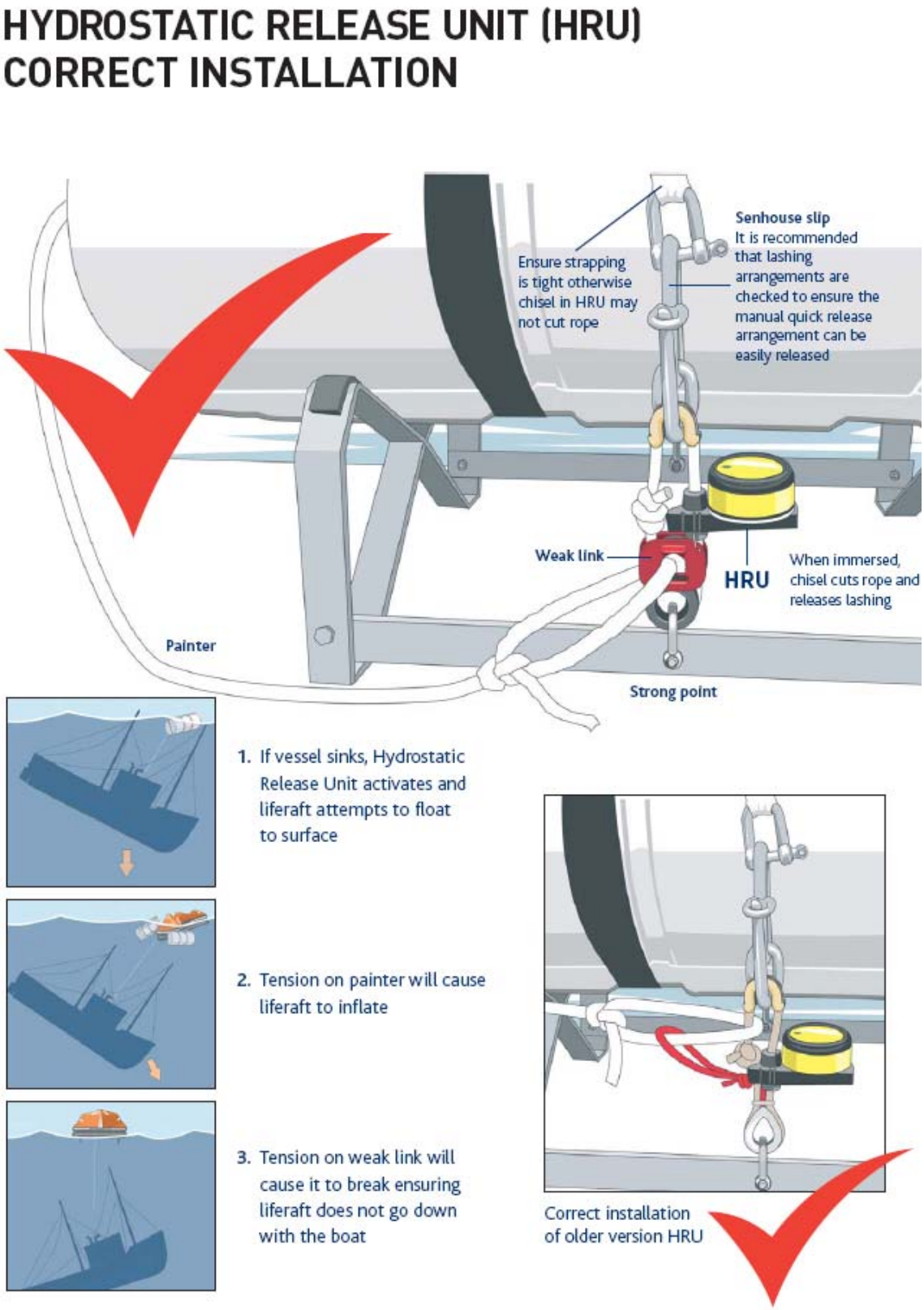
2.1 Manufacturers should be required to carry out a buoyancy test on at least 0.5% of each batch of lifejackets produced, subject to a minimum of one from every batch.

Inspections by the Competent Authority

2.2 Inspections by a representative of the Competent Authority should be made at intervals of at least one per 6,000 lifejackets produced, subject to a minimum of one inspection per calendar quarter. When the manufacturer's quality control program results in lifejackets that are consistently free of defects, the rate of inspection may be reduced to one in every 12,000. At least one lifejacket of each type in production should be selected at random by the inspector and subjected to detailed examination including, if necessary, cutting open. Inspectors should also be satisfied that the flotation tests are being conducted satisfactorily; if this is not the case, a flotation test should be undertaken.

ANNEX XXIII

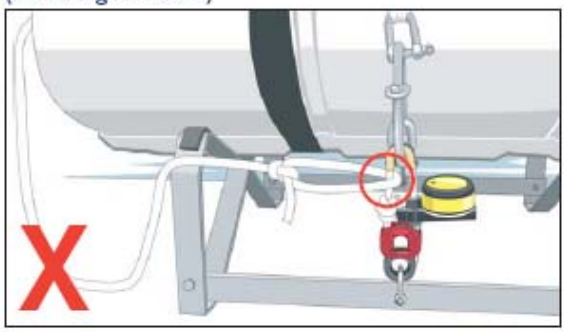
CORRECT SECURING OF HYDROSTATIC RELEASE UNITS*



* Source: Royal National Lifeboat Institution (United Kingdom).

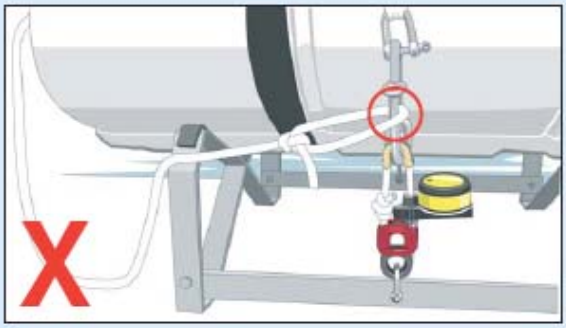
INCORRECT INSTALLATION

Painter secured to HRU
(not through weak link)



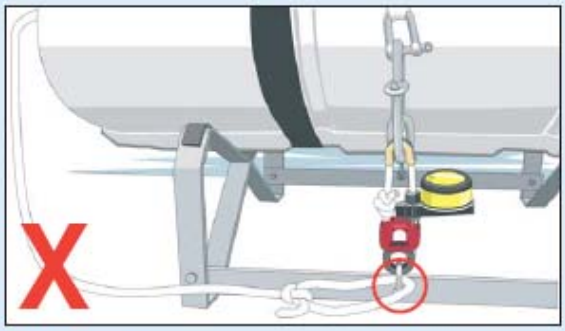
1. HRU will activate
2. Liferaft will be released but will **NOT** automatically inflate and will eventually drift away

Painter secured to senhouse slip



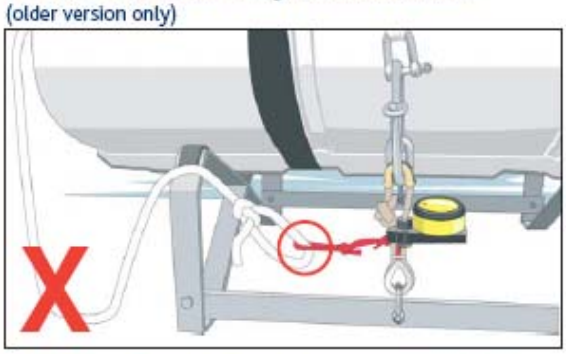
1. HRU will activate
2. Liferaft will float free and eventually inflate
3. Because the painter is secured to the slip, the liferaft will **NOT** be released to the surface

Painter secured directly to strong point



1. HRU will activate
2. Liferaft will float free and eventually inflate
3. Because the painter is secured directly to the strong point, the liferaft will **NOT** be released to the surface **EVEN IF** it is attached to the weak link as well

Painter secured only to weak link
(older version only)



1. Will work correctly for automatic release, but:
2. If liferaft is thrown overboard in an emergency (or comes adrift at sea) it may be lost

ANNEX XXIV

SAFETY TRAINING IN EMERGENCY PROCEDURES

1 Training in emergency procedures

The Competent Authority should take such measures as it may deem necessary to ensure that crews are adequately trained in their duties in the event of emergencies and to avoid panic in such situations. Such training should include, as appropriate:

.1 types of emergencies which may occur, such as collisions, fire, grounding and foundering;
.2 types of life-saving appliances normally carried on vessels;
.3 need to adhere to the principles of survival;
.4 value of training and drills;
.5 first aid training;
.6 need to be ready for any emergency and to be constantly aware of;
.7 location of each crew member's own and spare lifejackets;
.8 means of escape;
.9 recovering and caring for a person who has fallen overboard;
.10 actions to be taken in respect to lifting persons from vessels and survival craft by helicopter;
.11 actions to be taken when abandoning ship, including:
  .1 putting on suitable clothing;
  .2 donning of lifejacket; and
  .3 collecting additional protection such as blankets, time permitting;
  .4 how to board survival craft from vessel and water; and
  .5 actions to be taken when in the water, such as:
    .1 fire or oil on the water;
    .2 cold conditions; and
    .3 shark-infested waters;
.12 how to right a capsized survival craft;
.13 actions to be taken when aboard a survival craft, such as:
  .1 protection against cold or extreme heat;
  .2 using a drogue or sea anchor;
  .3 keeping a look-out;
  .4 protection against seasickness;
  .5 proper use of fresh water and food;
  .6 effects of drinking sea water; and
  .7 importance of maintaining morale;
.14 recovering and caring for survivors;
.15 facilitating detection by others;
.16 checking equipment available for use in the survival craft and using it correctly;
.17 remaining, so far as possible, in the vicinity;
.18 main dangers to survivors and the general principles of survival; and
.19 actions to be taken in respect of fire fighting appliances.

ANNEX XXV

SAFE OPERATION OF WINCHES, LINE HAULERS AND LIFTING GEAR

General

In general all deck machinery involved in the handling of fishing gear and catch should be designed, installed and used in a way that prevents accidents and injuries.

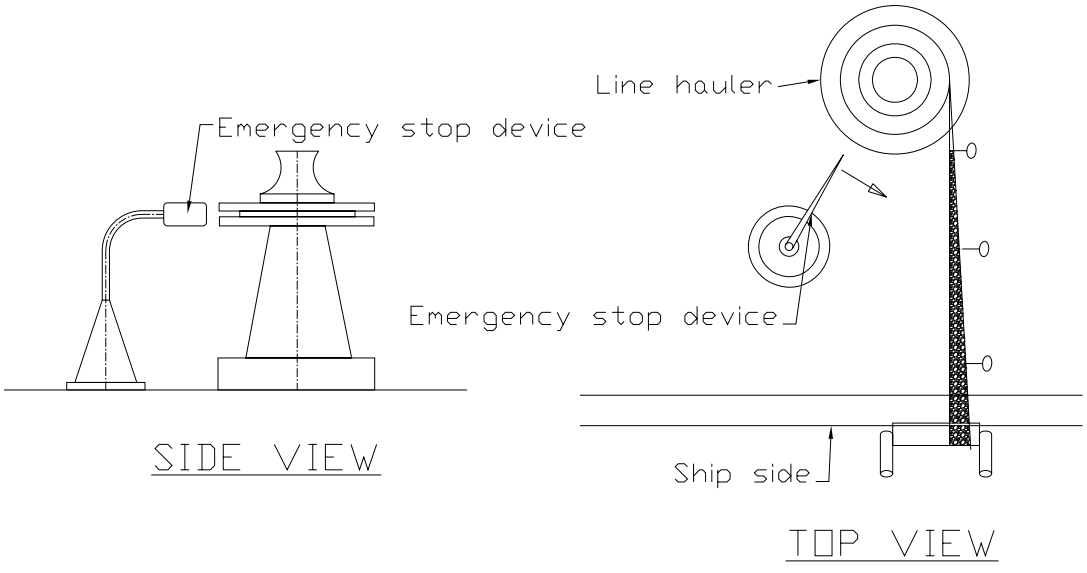
1 Emergency stop safety devices on winches and hauling equipment

1.1 All powered equipment used for the handling of fishing gear and catch such as winches, line and net hauling equipment and other deck machinery which upon use represents a danger for the operator if dragged towards or into the equipment during working operations should be fitted with emergency stop safety devices. The emergency stop should be provided at the winch and at the remote station as well as in the wheelhouse. Emergency stops on the equipment should be activated by any part of the body of the person being hauled towards the equipment. See examples and illustrations below.

1.2 The purpose of these devices is to cause an automatic stop of the equipment, without any action from the operator, if he is dragged towards the actual equipment.

1.3 In particular such devices are very important on single-handed vessels where only one person is onboard. It will normally not be sufficient to have emergency shut of buttons that must be manually activated, due to the fact that in an emergency situation on a single-handed vessel the person to activate this may have his hands, feet, or clothing trapped in the fishing gear and therefore is unable to activate the emergency stop button himself.

Illustrations



2 Winches

2.1 The design of winch systems should ensure that when power is supplied to the winch, the control valves and levers; would always be in the stop/neutral position.

2.2 Winches should be provided with means to prevent overhoisting and to prevent the accidental release of a load if power supply fails. Where practicable, winches with wire storage drums should be fitted to avoid the need to use warping heads.

2.3 Winches should be equipped with brakes capable of effectively arresting and holding the safe working load. Brakes should be proof-tested before installation with a static load suitably in excess of the maximum safe working load to the satisfaction of the Competent Authority. Brakes should be provided with simple and easily accessible means of adjustment. Every winch drum, which could be uncoupled from the drive, should be furnished with a separate brake independent of the brake connected with the drive.

2.4 Where manually-operated “guiding on” gear is installed, the operating wheels should be without open spokes or protrusions that could cause injury to the operator and should be capable of being disengaged when the warps are paying out. Preferably the “guiding on” gear should be capable of being disengaged when the warps are paying out.

2.5 Where practicable, winches should be reversible.

2.6 Winch barrels should be provided with means for fastening wire ends, for instance clamps, shackles or other equally effective method which should be so designed as to prevent kinking of the wires.

2.7 Where a fishing winch is provided with local and remote controls, these should be so arranged as to prevent simultaneous operation. The operator should have a clear view of the winch and adjacent area from either position. An emergency cut-off should be provided at the winch and at the remote station as well as in the wheelhouse.

2.8 Where a fishing winch is controlled from the wheelhouse, an emergency control switch at the winch should be provided. Where a second control at the winch is required by the Competent Authority, the arrangement should be such as to make simultaneous control from both control positions impossible, as well as to show which control position is in operation. Where necessary, emergency switches for winches should be provided remote from the winch to protect fishermen working in places which are dangerous for operation of warps and trawl boards. Where a fishing winch is controlled from the bridge, the arrangements should be such that the operator has a direct or televised clear view of the winch and adjacent area.

3 Line and net hauling equipment

3.1 Line and net hauling equipment should be fitted with devices to ensure that the designated safe working load is not exceeded. Such devices should be tested to the satisfaction of the Competent Authority.

3.2 Where line and net hauling equipment is intended to be blocked or braked in the stop position, the arrangements should be tested to the satisfaction of the Competent Authority.

3.3 Where line and net hauling equipment is controlled from the wheelhouse or from a position remote from the equipment, means should be provided at the equipment to stop hauling and/or shooting in an emergency. In like manner, when the main controls are at the equipment, means should be provided in the wheelhouse to stop it in an emergency.

3.4 The arrangement of the safety devices should also ensure that an emergency stop would be activated if a person is pulled towards a line or net hauling equipment.

4 Lifting gear

4.1 Cranes should be well constructed of sound material and the design should conform with national standards that may be appropriate. They should be tested to the satisfaction of the Competent Authority and the crane should be marked with the designated maximum safe working load. In the case of a crane fitted with an extendable jib, the safe working load at various radii should be clearly marked as close as practical to the operating controls.

4.2 In general, cranes adapted to carry net hauling equipment should be so designed that in the fail safe condition, the hanging point of the jib should not be too high or extend so far beyond the bulwark that retrieval of fishing gear or equipment would endanger the crew.

4.3 The braking or blocking arrangements of a crane should be tested to at least 1.5 times the designated safe working load to the satisfaction of the Competent Authority.

4.4 Lifting and hoisting appliances, as well as derricks and similar equipment including all parts of the working gear thereof, whether fixed or movable, and all plant should be of good construction, reliable material, adequate strength and free from patent defect. They should be adequately and suitably anchored, supported or suspended having regard to the purpose for which they are used and should be marked with the safe working load. They should have easy access for maintenance. Guards should be provided to prevent any undesirable movement of lifted or hoisted parts, such as codend or fishing gear, which could present danger to the crew.

4.5 Lifting and hoisting appliances, as well as derricks, should be protected from overhoisting.

4.6 The Competent Authority should ensure that lifting and hoisting appliances, as well as derricks, should be tested at least every two years and the results entered in the record of the vessel.

4.7 No such appliance of a kind referred to in 4.2 nor any part or working gear thereof, should be taken into use for the first time or after it has undergone any substantial repair unless it has been tested and the result entered in the record of the vessel.

5 Deck machinery and tackle

5.1 All elements of a fishing gear system, including warping heads, winches, warps, wires, tackle, nets, etc., should be designed, arranged and installed to provide safe and convenient operation. In so far as is possible, such components should be of a suitable strength so that, in the event of an overload strain, the failure will occur on the designated weak link in the system. All crew members should be made aware of the designated weak link in the system.

5.2 Warp guards should be fitted where practicable between warp lead rollers.

5.3 Sheaves and rollers should be guarded where practicable.

5.4 Chains or other suitable devices should be provided for stoppering off.

5.5 Wires, chains and warps provided should be of adequate strength for the anticipated loads.

5.6 Where practicable, provision should be made to stop trawl boards swinging inboard, such as the fitting of a portable prevention bar at the gallows aperture or other equally effective means.

5.7 Lifting and running parts of the fishing gear should be of adequate strength for the anticipated loads.

5.8 Provision should be made for the stowage of bulky netting to allow for drainage and to prevent lateral movement. The stowage area should be of adequate dimensions to keep the centre of gravity of the stowed net to a minimum and to allow for the crew to work in safety when flaking down nets.

5.9 Moving parts of winches line and net hauling equipment and of warp and chain leads which may present a hazard should be as far as practicable adequately guarded and fenced.

5.10 Quick release devices should preferably be fitted in the case of beam trawling and in purse seining that can be activated in an emergency from the wheelhouse and at the main control station if not in the wheelhouse.

5.11 The design and construction of winches, line and net hauling equipment should, where practicable, be such that the maximum effort necessary for operating handwheels, handles, crank handles, levers, etc., should not exceed 160 N and in the case of pedals not exceed 320 N.

5.12 The design parameters of the equipment should not be exceeded.

ANNEX XXVI

THE GMDSS SYSTEM*

General

Vessels intended to comply completely with the GMDSS system can use the information listed below related to a complete GMDSS installation as reference. Actual minimum requirements are mentioned in the recommendations.

1.1 The Global Maritime Distress and Safety System (GMDSS)

The basic concept of the GMDSS is that search and rescue authorities ashore, as well as vessels in the immediate vicinity of the vessel in distress, will be rapidly alerted to a distress incident so that they can assist in a co-ordinated Sea Air Rescue operation with the minimum delay.

The system also provides for urgency and safety communications and the promulgation of navigational and meteorological warnings and forecasts and other urgent safety information to vessels.

In other words, every vessel is able, irrespective of the GMDSS Sea Area in which it operates, to perform those communication functions which are essential for the safety of the vessel itself and of other vessels operating in the same area.

The equipment to be carried depends on the sea area in which vessels operate. There are four sea areas:

- **A1** means an area within the radiotelephone coverage of at least one VHF coast station in which continuous alerting by Digital Selective Calling is available;

- **A2** means an area within the radiotelephone coverage of at least one MF coast station in which continuous alerting by DSC is available;

- **A3** means an area within the coverage of an Inmarsat geostationary satellite in which continuous alerting is available and;

- **A4** means an area outside of sea areas Al, A2 and A3.

1.2 Functional requirements

Every vessel, while at sea, complying with the GMDSS system should be capable:

a. of transmitting ship-to-shore alerts;
b. of receiving shore-to-ship distress alerts;
c. of transmitting and receiving ship-to-ship distress alerts;
d. of transmitting and receiving search and rescue co-ordinating communications;
e. of transmitting and receiving on-scene communications;

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* Drawn from Chapter 9 of the FAO/ILO/IMO Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels, 2005

f. of transmitting and receiving maritime safety information;
g. of transmitting and receiving ship-to-ship communications.

1.3 Installation, location and control of radio equipment

Every vessel should be provided with radio installations capable of complying with the functional requirements prescribed above throughout its intended voyage unless exempted by the Competent Authority.

Where it is feasible to comply with the functional requirements prescribed above by means of a fixed installation, every radio installation should:

a. be so located that no harmful interference of mechanical, electrical or other origin affects its proper use, and so as to ensure electromagnetic compatibility and avoidance of harmful interaction with other equipment and systems;

b. be so located as to ensure the greatest possible degree of safety and operational availability;

c. be protected against harmful effects of water, extremes of temperature and other adverse environmental conditions;

d. be clearly marked with the call sign, the ship station identity and other codes as applicable for the use of the radio installation.

Control of the VHF radiotelephone channels, required for navigational safety, should be immediately available in the wheelhouse, convenient to the steering position.

Every radio transmitter and receiver fitted in accordance with the Radio Regulations of the Competent Authority should be provided with a suitable antenna or antennas. The antennas should be so constructed and sited to enable each radio installation to perform effectively its intended communication function.

Where it is not feasible to comply with the requirements prescribed by above by means of a fixed installation, every radio installation should:

a. be an approved portable waterproof transmitter and receiver;

b. be provided with a suitable antenna; and

c. be provided with a fully charged sealed reserve power pack at all times while the vessel is at sea.

1.4 Radio equipment to be provided for all sea areas

Every vessel should be provided with:

a. a VHF radio installation capable of transmitting and receiving radiotelephony on the frequencies 156.300 MHz (channel 6), 156.650 MHz (channel 13), and 156.800 MHz (channel 16);

b. a satellite emergency position-indicating radio beacon (satellite EPIRB) which should be:

i capable of transmitting a distress alert either through the polar orbiting satellite service operating in the 406 MHz and 121.5 MHz bands, or the 1.6 GHz band;
ii installed in a readily accessible position;
iii ready to be manually released and capable of being carried by one person into a survival craft;
iv capable of floating free if the vessel sinks and of being automatically activated when afloat; or
v capable of being activated manually.

1.5 Additional radio equipment to be provided for sea areas A1 and A2

In addition to meeting the requirements of 1.4, every vessel engaged on voyages beyond sea area A1, but remaining within sea area A2, should be provided with:

1. A VHF radio installation capable of transmitting and receiving:

i DSC on the frequency 156.525 MHz (Channel 70). It should be possible to initiate the transmission of distress alerts on channel 70 from the position from which the vessel is normally navigated; and
ii radiotelephony on the frequencies 156.300 MHz (Channel 6), 156.650 MHz (Channel 13), and 156.800 MHz (Channel 16);

2. a radio installation capable of maintaining a continuous DSC watch on VHF channel 70, which may be separate from, or combined with, that required by 1.i;

3. an MF radio installation capable of transmitting and receiving, for distress and safety purposes, on the frequencies:

i 2187.5 kHz (assigned frequency) using DSC; and
ii 2182 kHz using radiotelephony; and

4. a radio installation capable of maintaining a continuous DSC watch on the frequency 2187.5 kHz (assigned frequency) which may be separate from, or combined with, that required by 3.i.

1.6 Radio watches

Every vessel while at sea should maintain a continuous watch:

i on VHF channel 16;
ii on VHF DSC channel 70, if the vessel is fitted with a VHF DSC installation; and
iii on the distress and safety DSC frequency 2187.5 kHz (assigned frequency), if the vessel is fitted with an MF DSC radio installation.

Every vessel, while at sea, should maintain a radio watch for broadcasts of maritime safety information on the appropriate frequency or frequencies on which such information is broadcasted for the area in which the vessel is navigating.

1.7 Sources of energy

There should be available at all times, while the vessel is at sea, a supply of electrical energy sufficient to operate the radio installations and to charge any batteries used as part of a reserve source or sources of energy for the radio installations.

A reserve source or sources of energy should be provided on every vessel complying with the provisions of 1.4, to supply radio installations, for the purpose of conducting distress and safety radio communications, in the event of failure of the vessel's main source of electrical power. The reserve source or sources of energy should be capable of simultaneously operating the VHF radio installation required by 1.4, and any of the additional loads mentioned in 1.5 for a period of at least six hours.

The reserve source or sources of energy should be independent of the propelling power of the vessel and the vessel's electrical system.

The reserve source or sources of energy may be used to supply the electrical lighting required by 1.3.

Where a reserve source of energy consists of a rechargeable accumulator battery or batteries:

a. a means of automatically charging such batteries should be provided, which should be capable of recharging them to minimum capacity requirements within 10 h; and

b. the capacity of the battery or batteries should be checked, using an appropriate method, at intervals not exceeding 12 months, when the vessel is not at sea.

The location and installation of accumulator batteries which provide a reserve source of energy should be such as to ensure:

a. the highest degree of service;

b. a reasonable lifetime;

c. reasonable safety;

d. that battery temperatures remain within the manufacturer's specifications whether under charge or idle;

e. that when fully charged, the batteries will provide at least the minimum required hours of operation under all weather conditions; and

f. that the batteries are situated in the upper part of the vessel.

If an uninterrupted input of information from the vessel's navigational or other equipment to a radio installation required by the Radio Regulations of the Competent Authority is needed to ensure its proper performance, means should be provided to ensure the continuous supply of such information in the event of failure of the vessel's main or emergency source of electrical power.

For the purpose of calculating the required capacity of the reserve source or sources of energy, the following formula is recommended for determining the electrical load to be supplied by the reserve source or sources of energy for each radio installation required for distress conditions:

> ½ of the current consumption necessary for transmission + the current consumption necessary for reception + the current consumption of any additional loads.

1.8 Performance standards

Equipment required to be provided under the Radio Regulations of the Competent Authority should conform to appropriate performance specifications issued by the relevant authorities.

1.9 Serviceability and maintenance requirements

Equipment should be so designed that the main units can be replaced readily, without elaborate recalibration or readjustment.

Where applicable, equipment should be so constructed and installed that is readily accessible for inspection and on-board maintenance purposes.

Adequate information should be provided to enable the equipment to be properly operated and maintained.

1.10 Radio personnel

Every vessel should carry personnel qualified for distress and safety radio communication purposes as specified below.

The personnel should be holders of at least the Restricted Certificate of Competency in Radiotelephony (VHF) granted by the relevant authorities.

In the case of vessels complying with the additional requirements of 1.5, the personnel should be holders of at least the Radio Operator’s Long Range Certificate granted by the relevant authorities, or an equivalent recognized certificate approved by the Competent Authority.

ANNEX XXVII

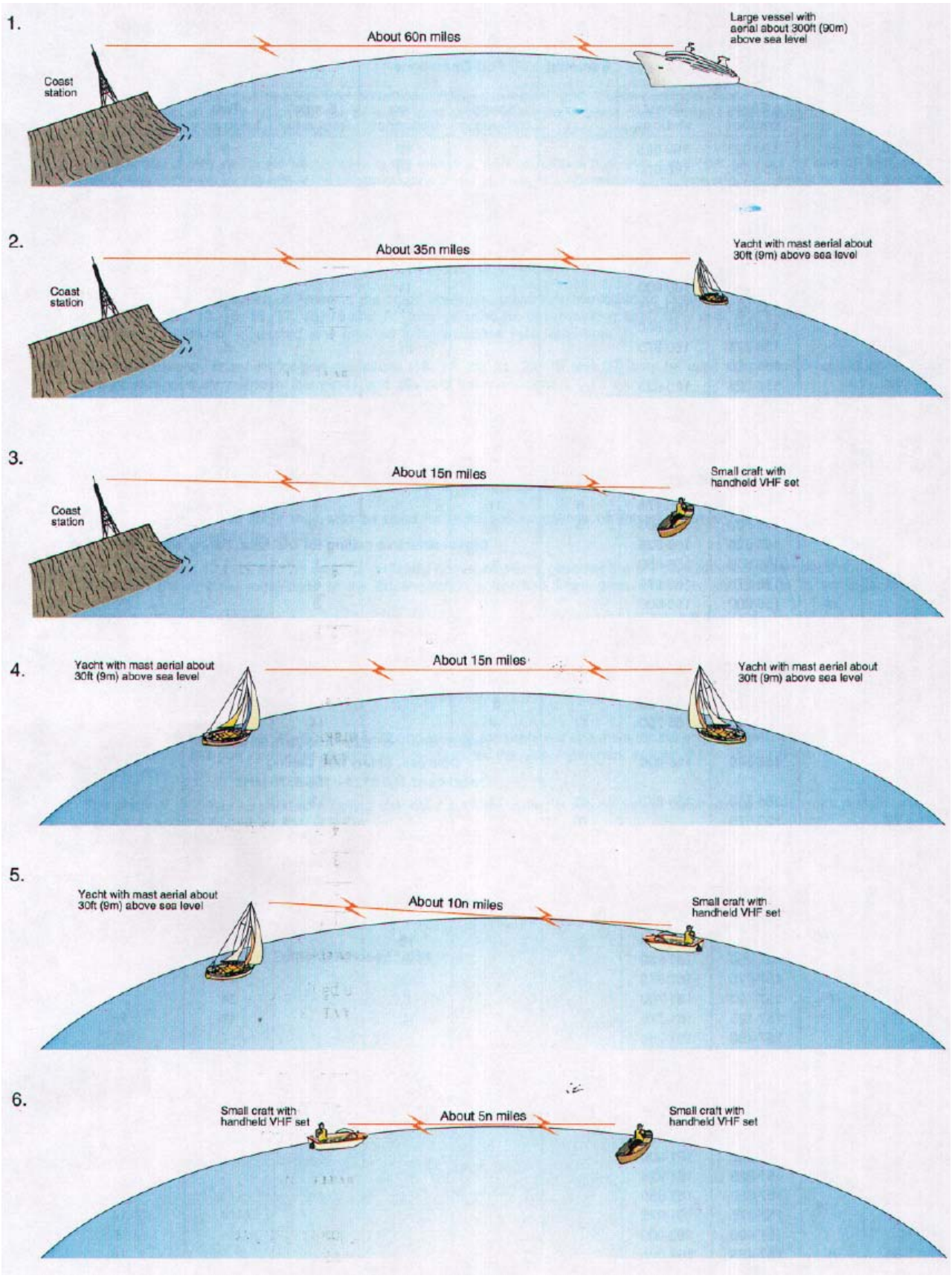
RANGE OF VHF FOR VARIOUS TRANSMITTING/RECEIVING UNITS

It is most important to realize that the transmission and receiving of VHF signals is limited, in theory, to line of sight. This is because the radio waves of VHF do no normally bend around the curvature of the earth. The range may be affected to some degree by barometric pressure and/or increased humidity which often gives grater ranges than normally attained.

This atmospheric refraction results in the radio waves tending to follow curved rather than straight paths.

The bending or refraction arises from a change of wave speed as the waves propagate through the atmosphere, the waves changing direction towards the region of lower wave speed. The degree of bending or refraction depends upon the rate at which the wave speed changes. This is governed by the refractive index of the air and its variation with height which, in turn, depends upon the pressure, temperature and humidity of the air.

Another significant factor in determining range is, generally, the height above sea level of the transmitting and receiving aerials. It should also be noted that the fact that a transmitter and a receiver are within radio sight does not automatically guarantee that an acceptable signal will be received at that point. This will depend, amongst other things, on the power of transmission, the sensitivity of the receiver and the quality and position of the transmission and receiving aerials. The figure below illustrates some typical VHF ranges that can be obtained from various transmitting and receiving stations.


1.
About 60n miles
Large vessel with aerial about 300ft (90m) above sea level
Coast station
2.
About 35n miles
Yacht with mast aerial about 30ft (9m) above sea level
Coast station
3.
About 15n miles
Small craft with handheld VHF set
Coast station
4.
Yacht with mast aerial about 30ft (9m) above sea level
About 15n miles
Yacht with mast aerial about 30ft (9m) above sea level
5.
Yacht with mast aerial about 30ft (9m) above sea level
About 10n miles
Small craft with handheld VHF set
6.
Small craft with handheld VHF set
About 5n miles
Small craft with handheld VHF set

ANNEX XXVIII

USE OF MOBILE TELEPHONES IN DISTRESS AND SAFETY COMMUNICATIONS

The use of mobile telephones in the marine environment offshore is now well established, with users in all areas of the commercial, fishing and leisure communities.

A growing numbers of incidents have occurred where vessels requiring assistance from rescue services have used inland emergency service, or alternatively telephoned direct to request assistance. This procedure through mobile telephone is strongly discouraged.

Use of mobile telephones bypasses the existing dedicated well established international marine distress communications organization on VHF Ch 16.

Cellular radio (mobile telephone) coverage offshore is limited and does not afford the same extensive safety coverage as VHF Ch 16 (monitored 24 hours a day). Consequently a greater risk exists of communications difficulties or even a complete breakdown if an accident should occur at the edge of a cell coverage area.

Subsequent on-scene casualty communications would be restricted and delayed if mobile telephone communications were maintained throughout.

There is always a risk that elements of vital information could be lost or misinterpreted by the introduction of further relay links in the communication chain.

It is not possible to communicate direct to another vessel able to render assistance unless that vessel is also fitted with a mobile telephone and the telephone number is known.

Request for assistance cannot be monitored by other vessels in a position to render assistance. Valuable time would be lost whilst the relevant Coastguard Rescue Co-ordination Centre receives and then re-broadcasts the information to all vessels on the appropriate distress channel(s).

In the interest of Safety of Life At Sea (SOLAS), owners of vessels are urged to carry MARINE communications equipment onboard and to use this medium as the primary means of Distress and Safety communications.

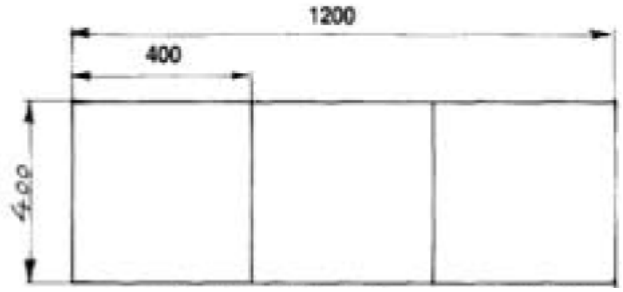
ANNEX XXIX

RADAR REFLECTOR

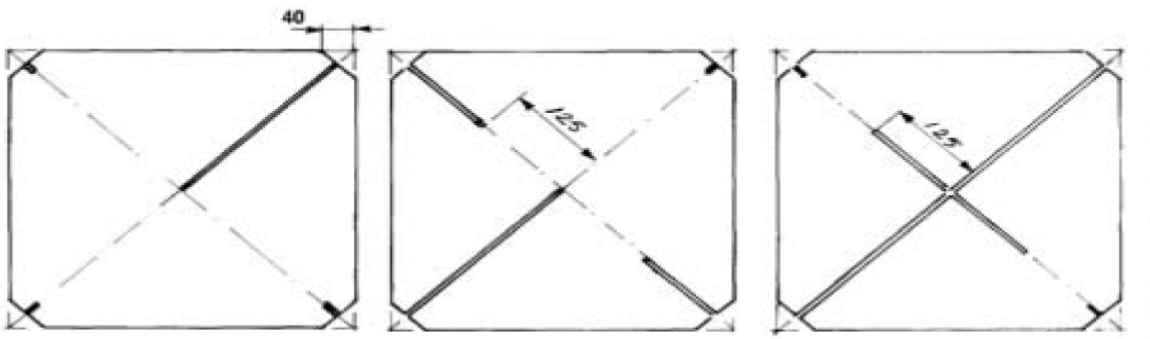
Small vessels should be visible on the radars of other vessels if they are not to be run down. Radar beams transmitted by other vessels must be reflected by small vessels and since a GRP or wooden vessel will reflect radar beams poorly, a small vessel needs a special radar reflector; here is how one can be made:

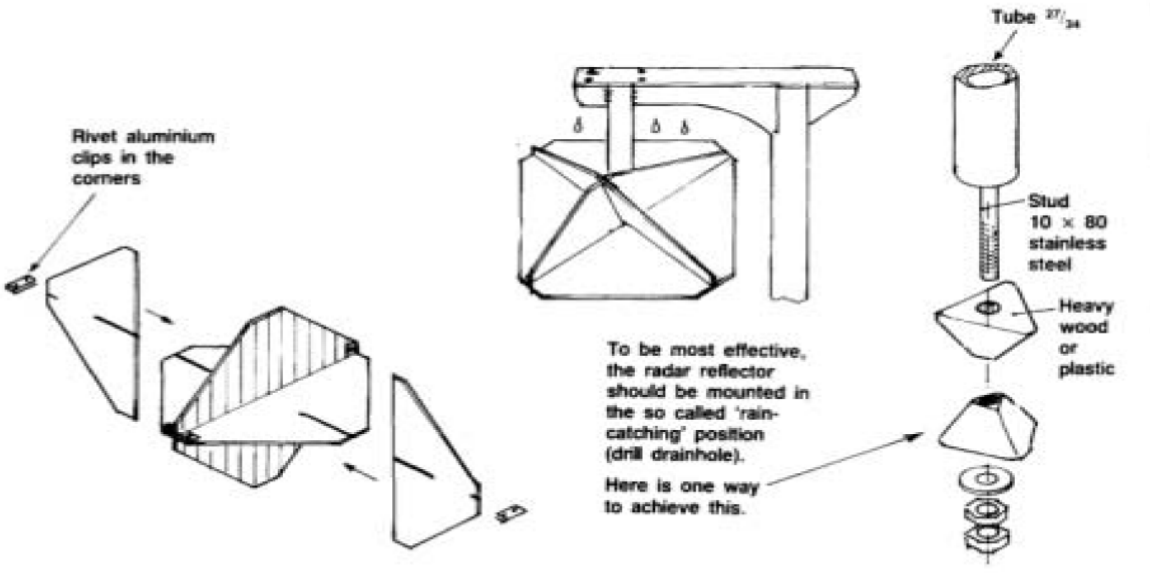
A small boat must be seen on the radar of a large ship at night if it is not to be run down. The radar beams sent by the big ship must be reflected by the small boat. Since an FRP or wooden boat reflects radar beams poorly, the small boat needs a special radar reflector.

Here is how it is made:



Radar reflective material minimum 1.6 mm (16 SWG)





ANNEX XXX

EQUIPMENT REQUIRED TO COMPLY WITH COLLISION REGULATIONS

Rule 22

Visibility of lights

The lights prescribed in the 1972 COLREGS should have an intensity as specified in section 8 of Annex I to the Regulations so as to be visible at the following minimum ranges:

(c) In vessels of less than 12 m in length:

a masthead light, 2 miles;
a sidelight, 1 mile;
a sternlight, 2 miles;
a towing light, 2 miles;
a white, red, green or yellow all-round light, 2 miles.

Rule 23

Power-driven vessels underway

(a) A power-driven vessel underway should exhibit:

(i) a masthead light forward;
(ii) a second masthead light abaft of and higher than the forward one; except that a vessel of less than 50 m in length should not be obliged to exhibit such light but may do so;
(iii) sidelights;
(iv) a sternlight.

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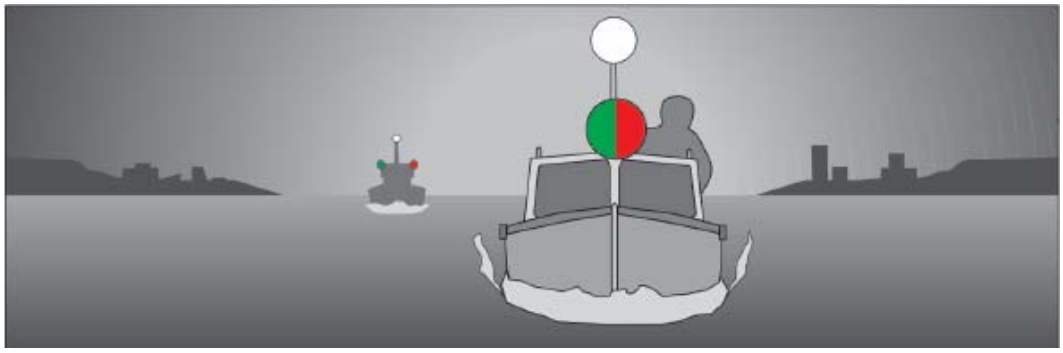
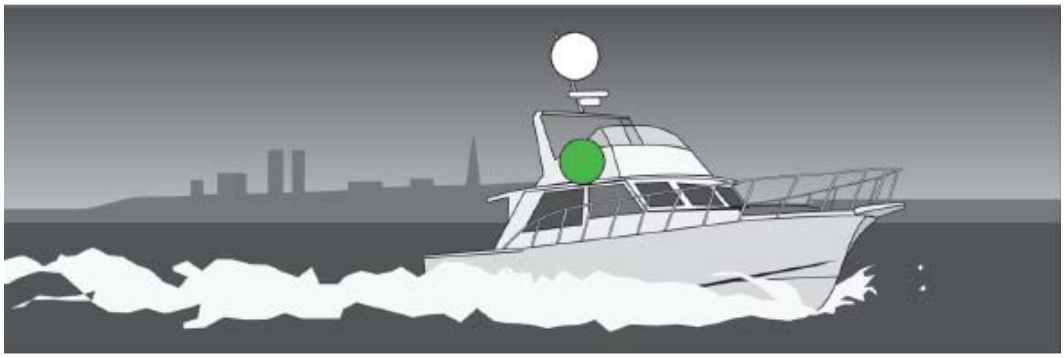


(d) (i) A power-driven vessel of less than 12 m in length may in lieu of the lights prescribed in paragraph (a) of this Rule exhibit an all-round white light and sidelights;



(ii) a power-driven vessel of less than 7 m in length whose maximum speed does not exceed 7 knots may in lieu of the lights prescribed in paragraph (a) of this Rule exhibit an all-round white light and should, if practicable, also exhibit sidelights;

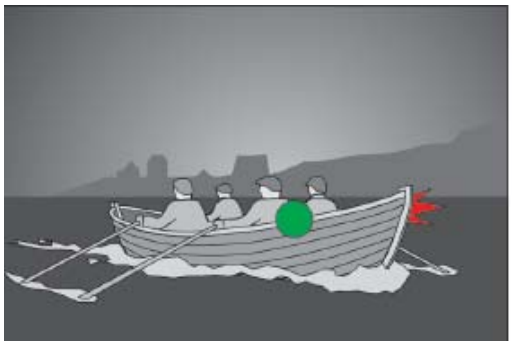
(iii) the masthead light or all-round white light on a power-driven vessel of less than 12 m in length may be displaced from the fore-and-aft centreline of the vessel if centreline fitting is not practicable, provided that the sidelights are combined in one lantern which should be carried on the fore-and-aft centreline of the vessel or located as nearly as practicable in the same fore-and-aft line as the masthead light or the all-round white light.

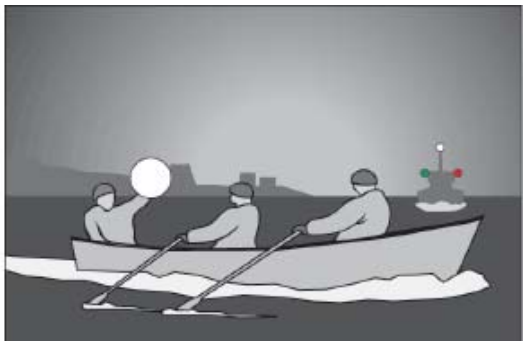
Rule 25

Sailing vessels underway and vessels under oars

(a) A sailing vessel underway should exhibit:

(i) sidelights;
(ii) a sternlight.





(b) In a sailing vessel of less than 20 m in length the lights prescribed in paragraph (a) of this Rule may be combined in one lantern carried at or near the top of the mast where it can best be seen.

(c) A sailing vessel underway may, in addition to the lights prescribed in paragraph (a) of this Rule, exhibit at or near the top of the mast, where they can best be seen, two all-round lights in a vertical line, the upper being red and the lower green, but these lights should not be exhibited in conjunction with the combined lantern permitted by paragraph (b) of this Rule.

(d) (i) A sailing vessel of less than 7 m in length should, if practicable, exhibit the lights prescribed in paragraph (a) or (b) of this Rule, but if she does not, she should have ready at hand an electric torch or lighted lantern showing a white light which should be exhibited in sufficient time to prevent collision.

(ii) A vessel under oars may exhibit the lights prescribed in this Rule for sailing vessels, but if she does not, she should have ready at hand an electric torch or lighted lantern showing a white light which should be exhibited in sufficient time to prevent collision.

(e) A vessel proceeding under sail when also being propelled by machinery should exhibit forward where it can best be seen a conical shape, apex downwards.

Rule 26

Vessels

(a) A vessel engaged in fishing*, whether underway or at anchor, should exhibit only the lights and shapes prescribed in this Rule.

(b) A vessel when engaged in trawling, by which is meant the dragging through the water of a dredge net or other apparatus used as a fishing appliance, should exhibit:

(i) two all-round lights in a vertical line, the upper being green and the lower white, or a shape consisting of two cones with their apexes together in a vertical line one above the other;

(ii) a masthead light abaft of and higher than the all-round green light; a vessel of less than 50 m in length should not be obliged to exhibit such a light but may do so;

(iii) when making way through the water, in addition to the lights prescribed in this paragraph, sidelights and a sternlight.

(c) A vessel engaged in fishing, other than trawling should exhibit:

(i) two all-round lights in a vertical line, the upper being red and the lower white, or a shape consisting of two cones with apexes together in a vertical line one above the other;

(ii) when there is outlying gear extending more than 150 m horizontally from the vessel, an all-round white light or a cone apex upwards in the direction of the gear;

(iii) when making way through the water, in addition to the lights prescribed in this paragraph, sidelights and a sternlight.

* The term vessel engaged in fishing means any vessel fishing with nets, lines, trawls or other fishing apparatus which restrict manoeuvrability, but does not include a vessel fishing with trolling lines or other fishing apparatus which do not restrict manoeuvrability (COLREG, Rule 3, paragraph d.).

(d) The additional signals described in Annex II to these Regulations apply to a vessel engaged in fishing in close proximity to other vessels engaged in fishing.

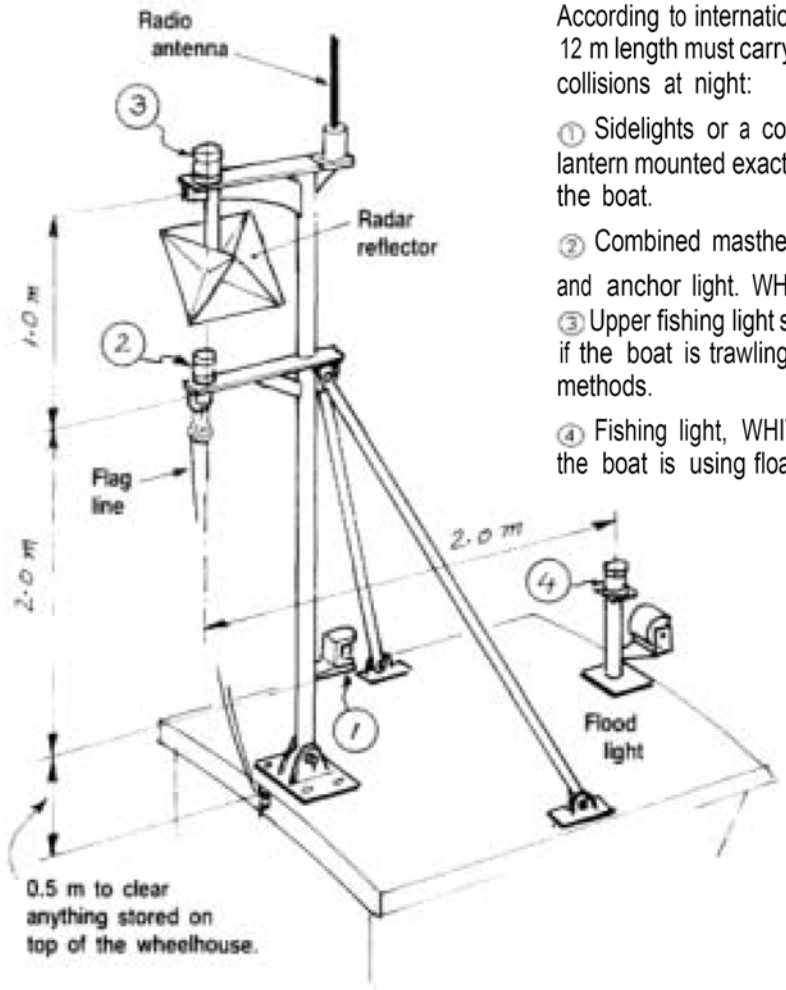
(e) A vessel when not engaged in fishing should not exhibit the lights or shapes prescribed in this Rule, but only those prescribed for a vessel of her length.

Rule 35

Rule 35 Sound signals in restricted visibility

…

(j) A vessel of less than 12 m in length should not be obliged to give the signals prescribed in Rule 35 but, if she does not, should make some other efficient sound signal at intervals of not more than 2 minutes.



According to international rules, fishing boats under 12 m length must carry the following lights to prevent collisions at night:

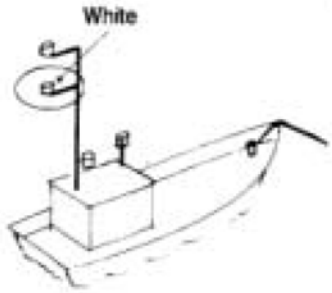
① Sidelights or a combined (RED and GREEN) lantern mounted exactly parallel to the centre line of the boat.

② Combined masthead lantern, lower fishing light and anchor light. WHITE showing all around.

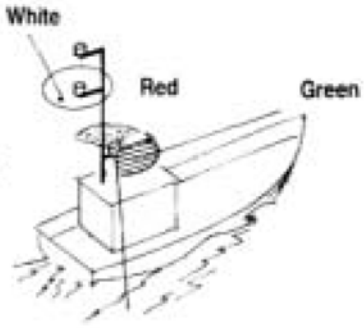
③ Upper fishing light showing all around – GREEN if the boat is trawling, RED for other fishing methods.

④ Fishing light, WHITE showing all around. When the boat is using floating fishing gear extending more than 150 m from the boat, this light indicates the direction of the floating fishing gear so that other boats can avoid the gear.

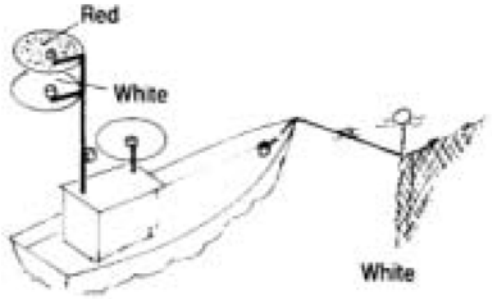
All lights must be fixed at the minimum distances shown in the drawing. All lights must be approved for boats upto 12 m and have bulbs of 18 watts.



Boat at anchor, showing WHITE anchor light



Boat under power, showing RED/GREEN sidelights and WHITE masthead light.



Boat with floating fishing gear extending more than 150 m, showing top RED and lower WHITE fishing light and WHITE directional light.

ANNEX XXXI

INTERNATIONAL CODE OF SIGNALS

INTERNATIONAL CODE OF SIGNALS

ALFA • – 	I HAVE A DIVER DOWN; KEEP WELL CLEAR AT SLOW SPEED.
BRAVO – • • • 	I AM TAKING IN, OR DISCHARGING, OR CARRYING DANGEROUS GOODS.
CHARLIE – • – • 	YES (AFFIRMATIVE OR 'THE SIGNIFICANCE OF THE PREVIOUS GROUP SHOULD BE READ IN THE AFFIRMATIVE').
DELTA – • • 	KEEP CLEAR OF ME; I AM MANOEUVRING WITH DIFFICULTY.
ECHO • 	I AM ALTERING MY COURSE TO STARBOARD.
FOXTROT • • – • 	I AM DISABLED; COMMUNICATE WITH ME.
GOLF – – • 	I REQUIRE A PILOT. WHEN MADE BY FISHING VESSELS OPERATING IN CLOSE PROXIMITY ON FISHING GROUNDS IT MEANS 'I AM HAULING NETS'.
HOTEL • • • • 	I HAVE A PILOT ON BOARD.
INDIA • • 	I AM ALTERING MY COURSE TO PORT.
JULIETT • – – – 	I AM ON FIRE AND HAVE A DANGEROUS CARGO ON BOARD; KEEP WELL CLEAR OF ME.
KILO – • – 	I WISH TO COMMUNICATE WITH YOU.
LIMA • – • • 	YOU SHOULD STOP YOUR VESSEL INSTANTLY.
MIKE – – 	MY VESSEL IS STOPPED AND MAKING NO WAY THROUGH THE WATER.
NOVEMBER – • 	NO (NEGATIVE OR 'THE SIGNIFICANCE OF THE PREVIOUS GROUP SHOULD BE READ IN THE NEGATIVE').
OSCAR – – – 	MAN OVERBOARD.
PAPA • – – • 	**IN HARBOUR;** ALL PERSONS SHOULD REPORT ON BOARD AS VESSEL IS ABOUT TO PROCEED TO SEA. **AT SEA;** IT MAY BE USED BY FISHING VESSELS TO MEAN 'MY NETS HAVE COME FAST UPON AN OBSTRUCTION'.
QUEBEC – – • – 	MY VESSEL IS HEALTHY, AND I REQUEST FREE PRATIQUE.
ROMEO • – • 	(NO SINGLE LETTER MEANING)
SIERRA • • • 	I AM OPERATING ASTERN PROPULSION.
TANGO – 	KEEP CLEAR OF ME; I AM ENGAGED IN PAIR TRAWLING.

UNIFORM • • – 	YOU ARE RUNNING INTO DANGER.
VICTOR • • • – 	I REQUIRE ASSISTANCE.
WHISKEY • – – 	I REQUIRE MEDICAL ASSISTANCE.
X-RAY – • • – 	STOP CARRYING OUT YOUR INTENTIONS AND WATCH FOR MY SIGNALS.
YANKEE – • – – 	I AM DRAGGING MY ANCHOR.
ZULU – – • • 	I REQUIRE A TUG. WHEN MADE BY FISHING VESSELS OPERATING IN CLOSE PROXIMITY ON FISHING GROUNDS IT MEANS 'I AM SHOOTING NETS'.
1ST SUBSTITUTE 	USED TO REPEAT THE FIRST FLAG OR PENNANT IN THE SAME HOIST.
2ND SUBSTITUTE 	USED TO REPEAT THE SECOND FLAG OR PENNANT IN THE SAME HOIST.
3RD SUBSTITUTE 	USED TO REPEAT THE THIRD FLAG OR PENNANT IN THE SAME HOIST.
CODE AND ANSWER 	USED TO ACKNOWLEDGE A SIGNAL.
	• – – – – ONE
	• • – – – TWO
	• • • – – THREE
	• • • • – FOUR
	• • • • • FIVE
	– • • • • SIX
	– – • • • SEVEN
	– – – • • EIGHT
	– – – – • NINE
	– – – – – ZERO

USED ON ALL OCCASIONS WHEN IT IS REQUIRED TO REPRESENT NUMBERS IN FLAG SIGNALLING

NOTE: SINGLE LETTER SIGNALS MAY BE MADE BY ANY METHOD OF SIGNALLING. THE LETTERS B, C, D, E, G, H, I, M, S, T, Z AND FIGURE 5 WHEN MADE BY A SOUND MUST COMPLY WITH INTERNATIONAL REGULATIONS FOR PREVENTING COLLISIONS AT SEA, RULES 34 AND 35. SIGNALS 'K' AND 'S' HAVE SPECIAL MEANINGS AS LANDING SIGNALS FOR SMALL BOATS WITH PERSONS IN DISTRESS.

ANNEX XXXII

DISTRESS SIGNALS*

* Reference to Annex IV of the International Regulations for Preventing Collisions at Sea, 1972, Consolidated Edition 2003.

DISTRESS SIGNALS

1. The following signals, used or exhibited either together or separately, indicate distress and need of assistance.
   - a **gun** or other explosive signal fired at intervals of about a minute;
   - a continuous **sounding** with any fog - signalling apparatus;
   - **rockets** or shells, throwing red stars fired one at a time at short intervals;
   - a signal made by **radiotelegraphy** or by any other signalling method consisting of the group ...---... **(SOS)** in the morse code;
   - a signal sent by radiotelephony consisting of the spoken word **"mayday"**;
   - the International code signal of distress indicated by **N over C flags**;
   - a signal consisting of a square flag having above or below it a ball or anything resembling a ball;
   - **flames** on the vessel (including from a burning tar barrel, oil barrel, etc.);
   - a **rocket parachute flare** or a **hand flare** showing a red light;
   - a **smoke signal** giving off orange - coloured smoke;
   - slowly and repeatedly **raising and lowering arms** outstretched to each side;
   - the radiotelegraph alarm signal;
   - the radiotelephone alarm signal;
   - signals transmitted by emergency position - indicated radio beacons (EPIRB);
   - approved signals transmitted by radio - communication systems;

2. The use or exhibition of any of the foregoing signals except for the purpose of indicating distress and need of assistance and the use of other signals which may be confused with any of the above signals is prohibited.

3. Attention is drawn to the relevant section of the International Code of Signals, the Merchant Ship Search and Rescue Manual and the following signals:
   a. a piece of **orange - coloured canvas** with either a black square and circle or other appropriate symbol (for identification from the air);
   b. a **dye marker**;

ANNEX XXXIII

BASIC PRE-SEA SAFETY TRAINING

Training required by any person going to sea for the first time on decked vessels of less than 12 metres in length and undecked vessels

Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Types of emergencies that can occur, fire collision, grounding, capsize and injury.	Explains actions taken in each event.	Sequence of actions taken on reporting and reacting to the event is appropriate.
Knows the types of emergency equipment available onboard.	Explains what various types of equipment are used for.	Can identify and state what safety equipment is used for and in what circumstances.
Knows the use of a lifejacket, immersion suit (as appropriate) and or flotation aid.	Can demonstrate how to don a lifejacket, immersion suit (as appropriate) and or flotation aid and how to remain afloat and move in the water with and without aids.	Practical demonstration in water that indicates proof of competence.
Knows the use of fire extinguishers and hoses.	Understands the types of fire extinguishers and what types of fire they are used on. Understands the use of jet and spray nozzles.	Practical demonstration extinguishing fires using hoses and extinguishers.
Knows the use of all types of visual distress signalling equipment.	Understands the difference between day and night equipment. When to use the various equipment. Where the equipment is to be found.	Practical demonstration on the use of different types of pyrotechnics. Identify visual distress signals
Understands the dangers associated with the consumption of alcohol and drugs.	Identifies the dangers of consuming alcohol or drugs when going to sea.	Understanding that it is dangerous and illegal to use alcohol and drugs before going to and at sea.
Understands the basic first aid steps to be taken on encountering an accident.	Explains sequence of events and what steps to take prior to the arrival of a qualified person.	Demonstrates how to position a casualty and stop bleeding.

Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Knowledge of common nautical terms.	Understands basic terminology of; direction (north south, port starboard, astern abeam, etc.), parts of a boat, items of equipment, ropes and knots.	Demonstrates ability to point out parts of a boat, direction and items of equipment.
Knowledge of the causes and effects of hypothermia and what precautions can be taken to prevent the onset.	Understands what actions to be taken on finding himself in the water and what equipment is available to prevent the onset of hypothermia.	Explains that he should climb onto an upturned hull, dry out his clothes and use the space blanket found in the capsize bottle.
Knowledge of the requirement that the skipper has to leave personnel and voyage particulars behind with a competent person.	Understands the necessity for leaving contact details ashore before proceeding to sea.	Conveys that he would tell the skipper his name, identity number, next of kin and contact numbers for inclusion on the crew list.
Understands basic safety awareness for work on board vessels.	Explains risks and actions to be taken as concerns social, environmental and living conditions, working environment and safety on deck.	Can identify major risks and actions to be taken to protect safety and health.

It is recommended that when designing training programmes for basic pre-sea safety training, the following should be consulted, as appropriate: the FAO/ILO/IMO Document for Guidance on Training and Certification of Vessel Personnel, in particular Part A – General matters, and Part B – Small vessels. See also IMO model course 1.33, Safety of Fishing Operations (Support Level), 2005 edition.

ANNEX XXXIV

ANNOTATED LIST OF PERTINENT PUBLICATIONS

FAO (www.fao.org)

FAO Code of Conduct for Responsible Fisheries

The Code sets out principles and international standards of behaviour for responsible practices with a view to ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity.

FAO Technical Guidelines for Responsible Fisheries – Fishing Operations

The technical guidelines are given in support of the implementation of the Code of Conduct in relation to fishing operations. They are addressed to States, international organizations, fisheries management bodies, owners, managers and charterers of vessels, and fishermen and their organizations.

FAO Standard Specifications for the Marking and Identification of Vessels

This document contains the specifications of a standardized system for the marking and identification of vessels as endorsed by the FAO Committee on Fisheries, Rome, April 1989.

FAO Safety at sea as an integral part of fisheries management

This paper provides a comprehensive overview of sea safety issues, and concludes that safety at sea should be integrated into fisheries management.

Report of the FAO/SPC regional expert consultation on sea safety in small vessels, Suva, Fiji, 9–13 February 2004

The Consultation was held in Suva from 9 to 13 February 2004. Discussions focused in particular on the significance of good sea accident data, mandatory requirements for vessel registration, vessel inspection and crew certification, enforcement of regulations in remote locations and training requirements for improving safety in small fishing boats. This report lists a number of recommendations together with considerations relating to their implementation.

Aspects of sea safety in the fisheries of pacific island countries

This publication is the report of a survey of fisheries-related sea safety in the Pacific Islands region undertaken by FAO in 2003. It is intended to assist in sensitizing fishery managers that sea safety is a legitimate and important objective of fisheries management, focus more attention on small vessel safety and lead to improved systems for recording/analysing sea accident data and making use of the results. It will also serve as a discussion document at a meeting which is to be attended by motivated people from several relevant disciplines, focused on challenging issues, oriented to small vessels, having the objective of producing results with a positive effect on regional and national sea safety programmes.

Sub-Regional Workshop on Artisanal Safety at Sea, Banjul, The Gambia, 26-28 September 1994

A sub-regional workshop organized by the IDAF on safety at sea was held in Banjul, The Gambia from 26 to 28 September 1994. The objectives of the workshop were: to review the results of the national accidents survey; to identify the fundamental problems and examine information on the status of safety at sea activities in the different countries and to prepare a draft proposal for a sub-regional project on safety at sea.

Fishing boat designs: 1. Flat bottom boats

The purpose of this publication is to present some basic designs of boats that are simple to construct, for use in small-scale, non-industrial fisheries.

Fishing boat designs: 2. V-bottom boats of planked and plywood construction

This publication includes the designs of four small vessels (from 5.2 to 8.5 metres), with comprehensive material specifications and lists, and provides detailed instructions for their construction, both planked and of plywood.

Fishing boat designs: 3. Small trawlers

This publication contains designs of a range of small trawlers suitable for operation in coastal waters and was prepared to provide detailed technical information and guidance on the choice of appropriate vessels to fisheries officers, vessel owners and boatbuilders.

Fishing boat construction: 1. Building a sawn frame fishing boat

The purpose of this publication is to explain how a designer draws the curved shape of a boat and shows where to look for the details of construction and the dimensions necessary to build a boat.

Fishing boat construction: 2. Building a fibreglass fishing boat

This publication is intended to give the reader a sound basic knowledge of GRP and it's possibilities and limitations in boatbuilding.

Fishing boat construction: 3. Building a ferrocement fishing boat

The publication is intended to provide the reader with a sound basic knowledge of ferrocement and its potential and limitations in boatbuilding.

Engineering applications: 1. Installation and maintenance of engines in small vessels

This publication provides a basic handbook covering all details of installation and the necessary maintenance procedures to be adopted for small boatyards, boat owners and fishermen.

Engineering applications: 2. Hauling devices for small fishing craft

This publication provides an introduction to the basic principles involved in the planning and building of a simple hauler.

Engineering applications: 3. Hydraulics for small vessels

This publication provides some ideas and basic rules for general design principles, to mounting details, construction, installation and maintenance of various machines, besides all the other elements that compose a hydraulic circuit.

IMO (www.imo.org)

Code of Safety for Fishermen and Fishing Vessels, 2005. Part A, Safety and Health Practice.

Code of Safety for Fishermen and Fishing Vessels, 2005. Part B, Safety and Health Requirements for the Construction, Equipment of Fishing Vessels.

FAO/ILO/IMO Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels, 2005.

Regulations for Prevention of Collisions at Sea (COLREGs)

The 1993 Torremolinos Protocol and Torremolinos International Convention for the Safety of Vessels (Consolidated edition, 1995)

Code on Intact Stability for All Types of Ships covered by IMO Instruments (resolution A.749(18), as amended)

Code of practice concerning the Accuracy of Stability Information for Vessels (resolution A.267(VIII))

Recommended Practice on Portable Fish-Hold Divisions (resolution A.168(ES.IV), as amended by resolution A.268(VIII), appendix V)

Improved guidelines for marine portable fire extinguishers (resolution A.951(23))

Life-Saving Appliances Code (LSA Code) (resolution MSC.48(66))

Revised recommendations on the testing of life-saving appliances (resolution MSC.81(70), as revised)

Code of Practice for the evaluation, testing and acceptance of prototype novel life-saving appliances and arrangements (resolution A.520(13))

Standardized life-saving appliance evaluation and test report forms (MSC/Circ.980)

Recommendation on performance standards for magnetic compasses (resolution A.382(X))

Recommendation on performance standards for radar equipment (resolution MSC.64(67), annex 4)

Performance standards for survival craft radar transponders for use in search and rescue operations (resolution A.802(19))

Recommendation on performance standards for echo-sounding equipment (resolution A.224(VII), as amended by resolution MSC.74(69), annex 4)

Recommendation on performance standards for devices to indicate speed and distance (resolution A.824(19), as amended by resolution MSC.96(72))

Recommendation on performance standards for shipborne global positioning system receiver equipment (resolution A.819(19), as amended by resolution MSC.112(73))

Recommendation on performance standards for shipborne GLONASS receiver equipment (resolution MSC.53(66)), as amended by resolution MSC.113(73))

Recommendation on performance standards for combined GPS/GLONASS receiver equipment(resolution MSC.74(69), annex 1, as amended by resolution MSC.115(73))

Recommendation on the carriage of electronic position-fixing equipment (resolution A.156(ES.IV)

Recommendation on performance standards for heading control systems (resolution MSC.64(67), annex 3)

Recommendation on performance standards for shipborne DGPS and DGLONASS maritime radio beacon receiver equipment (resolution MSC.64(67), annex 2, as amended by resolution MSC.114(73))

Recommendation on performance standards for radar reflectors (resolution A.384(X), as amended by resolution MSC.164(78))

Recommendation on performance standards for electronic chart display and information systems(ECDIS) (resolution A.817(19), as amended by resolutions MSC.64(67), annex 5, and MSC.86(70), annex 4)

Recommendation on performance standards for daylight signalling lamps (resolution MSC.95(72))

Provision of Radio Services for the Global Maritime Distress and Safety System (GMDSS) (resolution A.704(17))

Carriage of Radar Operating in the Frequency Band 9,300-9,500 MHz (resolution A.614(15))

Carriage of Inmarsat Enhanced Group Call SafetyNET Receivers under the Global Maritime Distress and Safety System (GMDSS) (resolution A.701(17))

Promulgation of maritime safety information (resolution A.616(15))

Search and rescue homing capability (resolution A.615(15))

Operational standards for radiotelephone alarm signal generators (resolution A.421(XI))

General requirements for shipborne radio equipment forming part of the Global Maritime Distress and Safety System (GMDSS) and for electronic navigational aids (resolution A.694(17))

Performance standards for ship-earth stations capable of two-way communications (resolution A.698(17))

Type approval of ship-earth stations (resolution A.570(14))

Performance standards for shipborne VHF radio installations capable of voice communication and digital selective calling (resolution A.609(15))

Performance standards for shipborne MF radio installations capable of voice communication and digital selective calling (resolution A.610(15))

Performance standards for shipborne MF/HF radio installations capable of voice communication, narrow band direct-printing and digital selective calling (resolution A.613(15))

Performance standards for Float-Free Satellite Emergency Position-Indicating Radio Beacons(EPIRBs) operating on 406 MHz (resolution A.695(17))

Type approval of Satellite Emergency Position-Indicating Radio Beacons (EPIRBs) operating in the COSPAS-SARSAT System (resolution A.696(17))

Performance standards for survival craft radar transponders for use in search and rescue operations (resolution A.697(17))

Performance standards for Inmarsat Standard-C ship-earth stations capable of transmitting and receiving direct-printing communications (resolution A.663(16))

Performance standards for enhanced group call equipment (resolution A.664(16))

Performance standards for Float-Free Satellite Emergency Position-Indicating Radio Beacons operating through the geostationary Inmarsat satellite system on 1.6 GHz (resolution A.661(16))

Performance standards for float-free release and activation arrangements for emergency radio equipment (resolution A.662(16))

System performance standards for the promulgation and co-ordination of maritime safety information using high-frequency narrow-band direct-printing (resolution A.699(17))

Performance standards for narrow-band direct-printing telegraph equipment for the reception of navigational and meteorological warnings and urgent information to ships (MSI) by HF (resolution A.700(17))

Code on Noise Levels on board Ships (resolution A.468(XII))

ILO (www.ilo.org)

The majority of the publications mentioned below are available on the ILO website, in particular at http://www.ilo.org/public/english/protection/safework/index.htm.

Guidelines on occupational safety and health management systems (ILO-OSH 2001)

The guidelines aim to contribute to the protection of workers from hazards and to the elimination of work-related injuries, ill-health, diseases, incidents and deaths. They provide guidance for the national and enterprise level, and can be used to establish the framework for occupational safety and health management systems.

Risks and dangers in small-scale fisheries: An overview. By M. Ben-Yami. Working paper

The working paper provides a comprehensive overview of the risks and dangers in small-scale and artisanal fisheries including working conditions, safety approaches in developed and developing countries, accidents associated with the marine environment, navigation and fishing operations, problems associated with boat design and construction as well as other risks and dangers.

Other ILO codes of practice of possible interest to the fishing sector

Safety and health in ports, 2005

Ambient factors in the workplace, 2001

HIV/AIDS and the world of work, 2001

Technical and ethical guidelines for workers' health surveillance, 1998

Recording and notification of occupational accidents and diseases, 1996

Safety in the use of chemicals at work, 1993

Radiation protection of workers (ionizing radiations), 1987

Safety in the use of asbestos, 1984

Protection of workers against noise and vibration in the working environment, 1977

Safety and health in shipbuilding and ship repairing, 1974

SafeWork training manuals

ILO's SafeWork has prepared a number of documents that could be used as teaching manuals and/or as teachers' guides for occupational safety and health courses organized by employers, workers' organizations or educational institutions. Though not specifically aimed at the fishing sector, these documents may be very useful for addressing such issues as noise and vibration, ergonomics, controlling hazards and AIDS.

Ergonomic checkpoints

A collection of practical, easy-to-use ergonomic solutions for improving working conditions. This fully illustrated easy-to-use manual is an extremely useful tool for everyone who wants to improve their working conditions for better safety, health and efficiency. Each of the 128 checkpoints has been developed to help the user look at various workplaces and identify practical solutions which can be made applicable under local conditions. Developed jointly with the International Ergonomics Association, 1996.

International Hazard Datasheets on Occupation, Diver, indigenous fisherman

An International Hazard Datasheets on Occupations is a multipurpose information resource containing information on the hazards, risks and notions of prevention related to a specific occupation. These datasheets are intended for those professionally concerned with health and safety at work including: occupational physicians and nurses, safety engineers, hygienists, education and information specialists, inspectors, employers' representatives, workers' representatives, safety officers and other competent persons.

WHO (www.who.int/en/org)

International Medical Guide for Ships
Guide to ship sanitation, (as amended)

OTHERS

European Union Council Directive 92/29/EEC on minimum safety and health requirements for improved medical treatment on board vessels
Publication IEC 60079

BOBP/MAG/16 - A safety guide for small offshore fishing boats
This publication provides information to boatyards, boat owners and crew on the design and operational aspects related to the safety of decked fishing boats of less than 12 m in length.

Nordic Boat Standard, 1991 (www.sjofartsdir.no)

SEAFISH Construction Standards for under 15m Fishing Vessels
SEAFISH Construction Standards for over 15m to less than 24m registered Length

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