[LEGAL NOTICE NO. 113]

MARITIME TRANSPORT DECREE 2013
(DECREE NO. 20 OF 2013)

Maritime (Fiji Maritime Code) Regulations 2014

IN exercise of the powers conferred upon me by section 240*(b)*,*(c)* and *(f)* of the Maritime Transport Decree 2013, I hereby make these Regulations—

Short title and commencement

1. These Regulations may be cited as the Maritime (Fiji Maritime Code) Regulations 2014 and shall come into force on a date appointed by the Minister in the *Gazette*.

Interpretation

2. In these Regulations unless the context otherwise requires—

"accommodation space" means passenger spaces, corridors, lavatories, cabins, offices, crew spaces, shops, bond stores, isolated pantries and lockers and similar spaces within a ship;

"Administration" means the Government of the State under whose authority a ship is operating and whose flag the ship is entitled to fly;

"approved" means approved by the Chief Executive Officer;

"approved servicing centres" in relation to inflatable life rafts, inflatable lifejackets, inflated rescue boats and hydrostatic release units, means a facility for servicing inflatable life rafts and inflatable lifejackets that has been approved for that purpose by the Chief Executive Officer and approved in writing by the manufacturer of the inflatable life rafts and inflatable lifejacket as a servicing centre for that product;

"Assigning Authority" means an authorised organisation that has entered into a Memorandum of Agreement with the Chief Executive Officer in accordance with the IMO Assembly Resolution A.739 (18) and the Annexes as amended by Resolution MSC 208(81) thereto entitled Adoption of Amendments to the Guidelines for the Authorization of Organizations Acting on Behalf of the Authority and whereby that organization's employees may survey and assign load lines to Fiji ships in accordance with the Load Line Convention;

"Authorised" means authorised by the Chief Executive Officer;

"Authorised Officers" has the same meaning under section 2 of the Decree;

"Authorised person" means a person employed by an authorized organization or appointed under section 38(1) of the Decree to carry out such inspections and such audits as the Authority considers necessary for the purposes of these Regulations;

"Authority" means the Maritime Safety Authority of Fiji;

"breadth" means the maximum breadth measured in metres amidships—

(a) in the case of a metal hull – to the molded line of the frame; and

(b) in the case of any other hull – to the outer surface of the hull.

"Cargo Space" means all spaces appropriated for cargo including trunks leading to such spaces;

"Chief Executive Officer" means the Chief Executive Officer of the Maritime Safety Authority of Fiji;

"Classification Society" means a recognised organization authorized by the Chief Executive Officer to conduct such inspections and such audits as the Authority considers necessary for the purposes of these Regulations. These classification societies are listed in appendix 2, paragraph 14 of these Regulations.

"Code" means the Maritime Ship Registration Code set out in the Schedule to these Regulations;

"Commercial Ship" has the same meaning under section 2 of the Decree;

"Control Station" includes those spaces in which the ship's radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment is centralized or in the case of the engine room its control station;

"Crew Accommodation" or "Crew Space" means such parts of the ship set aside for the exclusive use of the Crew;

"Decree" means the Maritime Transport Decree 2013;

"Depth" means the molded depth measured in metres at mid length from the base line to the top of the freeboard deck beams at the side of the ship or, in the case of all open and well-deck ships, to the top of the gunwale. For the purposes of this definition, the base line is the line projected by the plane forming the top of the keel where a plate keel is fitted. In the case of a timber or composite ship, the top of the keel shall be read as a reference to the lower edge of the keel rabbet—

(a) in the case of a ship which has a bar keel or in which the form at the lower part of the midship section is of a hollow character, or thick garboards are fitted, the top of the keel shall be read as a reference to the point where the flat of the bottom continued inward cuts the side of the keel of the ship; and

(b) in each case the plane shall be horizontal when extended transversely;

"Examiner" means a person appointed by the Chief Executive Officer to conduct examinations and assessments of the kinds specified by the Chief Executive Officer;

"Existing Ship" means a ship which is not a new ship;

"Fiji Register of Ships" means the Fiji Register of Ships established under section 11(1) of the Ship Registration Decree 2013;

"Fiji Trade (Territorial waters voyage)" means voyage, trade or operation of a ship from a port or place in Fiji for more than 15 nautical miles to another port or place in Fiji that is within the archipelagic waters and territorial seas of Fiji;

"Fire Safety Systems Code" (or FSS Code) means the International Code on Fire Safety Systems as adopted by IMO Resolution MSC.98 (73), as amended by IMO Resolutions MSC.206 (81), MSC.217 (82), MSC.292 (87) and MSC.311 (88);

"Fishing Ship" has the same meaning as given under section 2 of the Decree;

"Inland waters voyage" means a voyage, trade or operation of a ship within the inland waters of Fiji which include rivers, lakes and dams which terminates at the shoreline of any island of Fiji;

"Inshore Waters Voyage" means a voyage, trade or operation of a ship of not more than 15 nautical miles from a port of place in Fiji to another port or place in Fiji within the archipelagic waters of Fiji;

"ISO" means the International Organization for Standardization, 1, Rue de Varambe, CH-1211 Geneva, 20, SWITZERLAND;

"Length" in accordance with the Code, means the distance—

(a) from the fore part of the hull to the after part of the hull; or

(b) transom taken at the upper side of the uppermost weathertight deck; or

(c) in the case of open ships, at the height of the gunwale, the protrusion of a stempost or sternpost is not included in this measurement;

"Lifesaving appliances" means any device, arrangement, apparatus or thing intended to sustain the lives of people in distress, or to signal their distress, or to alert people onboard a ship to an emergency, and includes lifebuoys, lifejackets, immersion suits, anti-exposure suits, visual signals, survival craft, rescue boats, evacuation systems, line-throwing appliances, and general alarm and public address systems;

"Lifesaving equipment" means equipment stored in or belonging to a lifesaving appliance and required to be carried onboard a ship;

"Master" means a person having command or charge of a ship, but does not include a pilot;

"Nautical Mile" means the International nautical mile of 1,852 metres;

"New Ship" means a ship—

(a) the keel of which was laid or which was at a similar stage of construction; or

(b) that has been substantially—

(i) altered; or

(ii) reconstructed on or after the coming into force of the applicable provisions;

"Open Ship" means a ship which has no weather tight deck for the whole or part of the length of the ship e.g. a rowing boat with open bottom boards or a half cabin ship with a cockpit aft fitted with loose deck panels;

"Owner" has the same meaning as given under section 2 of the Decree;

"Passenger" has the same meaning as given under section 2 of the Decree;

"Passenger Ship" means a ship engaged in domestic or international voyages which carries more than twelve passengers;

"Proper Officer" in relation to any country other than Fiji, means—

(a) the person who is, by the law of that country, authorised or required—

(i) to do or perform the act or duty to which reference is made in the provisions of the Decree in which the expression occurs; or

(ii) to do or perform, in relation to ships registered in or belonging to that country, any act or duty of the same nature as the act or duty to which reference is made in the provisions of the Decree in which the expression occurs;

(b) a consular officer of Fiji in any other country;

"Recognised organization" means an organization which has entered into a Memorandum of Agreement with the Chief Executive Officer in compliance with the IMO Assembly Resolution A.739 (18) and the Annexes as amended by Resolution MSC 208(81) thereto entitled *Adoption of Ammendments to the Guidelines for the Authorization of Organizations acting on behalf of the Administration*, governing the undertaking of particular survey and certification functions by the organization's employees under the Decree and the maritime and marine protection regulations. This recognized organisation includes classification societies which are periodically audited and given instructions by the Authority for the purpose of survey, audit and certification;

"Service Space" means spaces used for galleys, main pantries, stores (except isolated pantries and lockers), mail and special rooms, workshops other than those forming part of the machinery spaces and trunks to such spaces;

"Sheltered waters voyage" means a limited voyage, trade or operation of a ship within protected waters adjacent to beaches or landings within Fiji;

"Ship" has the same meaning under section 2 of the Decree;

"SOLAS" in respect of an item or appliance means that the item or appliance shall comply with the requirements of the SOLAS CONVENTION, taking into account the date on which the ship's keel was laid or was at a similar stage of construction;

"SOLAS ship" means a ship to which SOLAS Convention applies as set out in Regulations 1 and 3 of Chapter I of SOLAS or a Fiji registered ship to which SOLAS Convention would apply if that ship were to undertake an international voyage;

"Special Personnel" means All able bodied persons having some knowledge of safety procedures and handling of safety equipment on board who are not directly or indirectly paying passengers, carried on board a ship in connection with the special purpose of the ship, or because of the need to be on board for special work being carried out on the ship, and who are not members of the crew engaged in navigation, engineering or maintenance of the ship or attached to the ship to provide services for other persons on board;

"Standards Abbreviations" means—

(a) A.S. refers to the Australian Standard;

(b) ASTM refers to the American Standard for Testing Materials; and

(c) ALPGA refers to the Australian Liquidified Petroleum Gas Association;

"Superstructure" means a decked structure, including a raised quarter deck, on the freeboard deck extending from side to side of the ship or with the side plating of the structure not being inboard of the shell plating by more than 4 per cent of the breadth of the ship. Where, in pursuance of the above, a lower deck is specified as the freeboard deck of a ship, any part of the hull which extends above the deck so specified shall be deemed to be a superstructure;

"Surveyor" means a person from the Authority or recognised organizations that holds the prescribed maritime documents issued in accordance with section 24 of the Decree certifying them to provide the tests, inspections or the survey, audit, or certification of ships, maritime equipment or products;

"Tanker" means a cargo ship constructed or adapted for the carriage of bulk fluid cargoes;

"Tonnage" means the gross tonnage of the ship;

"unlimited voyage" means a voyage, trade or operation of a ship from any port or place in Fiji beyond the Exclusive Economic Zone of Fiji to another port or place outside Fiji or conversely; and

"Unmanned Machinery Space" means a decked propulsion machinery space which under normal operating conditions is not occupied or is intermittently occupied.

Purpose

3. The purpose of these Regulations is to give legal effect to the Fiji Maritime Code set out in the Schedule which details the standards and requirements relating to commercial ships of more than 15 meters in registered length.

Fiji Maritime Code given force of law

4.—(1) The Code shall have the force of law in Fiji.

(2) This Code has effect except to the extent where there is any inconsistency between this Code and any provisions of the Decree, the Decree shall prevail.

Application

5.—(1) These Regulations apply to all—

(a) ships more than 15 meters in registered length as registered in the Fiji Register of Ships; and

(b) SOLAS ships.

(2) In respect of the construction, survey and safe operation of ships of this type the Chief Executive Officer shall be guided by the standard and requirements of the Code as set out in the Schedule.

(3) The prescribed surveys and inspections in respect of a ship are those specified in paragraph 14 of the Schedule.

Ships to be properly manned

6.—(1) Subject to sub-regulation (3), neither the owner nor the master of a ship above 15 metres in registered length shall send or take the ship to sea or permit the ship to remain at sea with fewer qualified seafarers on board than the complement prescribed in respect of that ship by paragraph 3 of the Schedule.

(2) Any owner or master of a ship who fails to comply with sub-regulation (1) commits an offence and is liable upon conviction to a fine not exceeding $2,000 or a term of imprisonment of up to 3 months, or to both.

(3) Where a ship to which sub-regulation (1) applies is at a port or any other place and does not have on board the prescribed number of seafarers of a particular class, the Chief Executive Officer may, where he or she is satisfied that—

(a) a qualified seafarer of that class is not available for employment at that port or place;

(b) it would be unreasonable to require the owner or master to obtain a qualified seafarer of that class from another port or place; and

(c) the safety of the ship would not he endangered,

allow the ship, subject to any conditions he or she thinks fit, to go to sea without carrying the prescribed complement of seafarers of that class.

(4) Where this Regulation applies in respect of a ship, the master and the owner of the ship shall each take such action as may be necessary to ensure that any conditions imposed under sub-regulation (3) are observed.

(5) Any owner or master of a ship who breaches any conditions prescribed under sub-regulation (3) commits an offence and is liable upon conviction to a fine not exceeding $2,000 or a term of imprisonment of up to 3 months, or to both.

Ships to be surveyed

7. Ships of more than 15 meters in registered length shall undergo the surveys and inspections prescribed in paragraph 14 of the Schedule.

Principles to be followed in carrying out surveys

8. In carrying out a survey, a surveyor shall be guided, as appropriate, by the following provisions of the Schedule—

(a) paragraph 5 – Construction and Stability;

(b) paragraph 6 – Passenger and Crew accommodation;

(c) paragraph 7 – Loadlines;

(d) paragraph 8 – Tonnage measurement;

(e) paragraph 9 – Engineering;

(f) paragraph 10 – Life Saving Appliances;

(g) paragraph 11 – Fire Appliances;

(h) paragraph12 – Radio Equipment;

(i) paragraph 13 – Navigation and miscellaneous equipment;

(j) paragraph 14 – Survey and Certificate of Survey; and

(k) paragraph 15 – Emergency procedures and safety of navigation.

Requirement to carry certain safety equipment

9.—(1) The owner and the master of a ship of more than 15 metres in registered length shall each ensure—

(a) that there is carried on or fitted in the ship the safety equipment specified in respect of the ship by paragraph 10 of the Schedule;

(b) that there is carried on or fitted in the ship the Navigation and miscellaneous equipment specified in respect of the ship by paragraph 13 of the Schedule; and

(c) that the safety equipment, navigation and miscellaneous equipment fitted or carried in accordance with sub-paragraph *(a)* and *(b)* is in good order and ready for use, before the ship goes to sea.

(2) Any owner or master of a ship who fails to comply with this regulation commits an offence and is liable upon conviction to a fine not exceeding $2,000 or a term of imprisonment of up to 3 months, or to both.

Emergency procedures and safety navigation

10.—(1) A person shall comply with any obligation or duty imposed upon him or her under paragraph 15 of the Code.

(2) Any person who fails to comply with sub-regulation (1) commits an offence and shall be liable upon conviction to a fine not exceeding $3000 or a term of imprisonment of up to 3 months, or to both.

Repeal

11. The Maritime (Fiji Maritime Code) Regulation 1990 is hereby repealed.

Made this 14th day of December 2014.

P. TIKODUAUDA
Minister of Transport & Infrastructure

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SCHEDULE

FIJI MARITIME CODE
(SHIPS OF MORE THAN 15 METERS IN REGISTERED LENGTH)

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TABLE OF PROVISIONS

PARAGRAPH

PARAGRAPH 1

INTRODUCTION AND GENERAL REQUIREMENTS

The Code is divided as follows:

Part 1 : Preliminary
Part 2 : Operational Areas and Classification of Ships
Part 3 : General
Part 4 : Submission of Information

Appendix A – Clarification of terms used in definition of Measured length
Appendix B – Boundaries of Inshore service areas

PART 1—PRELIMINARY

1.1. For convenience of presentation and application this Schedule is produced in paragraphs, each dealing with an appropriate area of control. Each paragraph shall always be read in conjunction with this paragraph "Introduction and General Requirements" and such other paragraph or paragraphs to which a special reference may be made.

1.2. These Requirements shall apply to all new ships and except when otherwise specified in a paragraph, to all existing ships as far as is considered reasonable and practicable by the Chief Executive Officer.

PART 2—OPERATIONAL AREAS AND CLASSIFICATION OF SHIPS

1.3. Operational Areas shall apply to appropriate paragraphs of these Requirements as follows:

1.3.1 "International Voyage" means a voyage—

(a) from a port or place in Fiji to a port or place outside Fiji;

(b) from a port or place outside Fiji to a port or place in Fiji; or

(c) from a port or place outside Fiji to another port or place outside Fiji.

1.3.2 "Near Coastal Trade" means a voyage, trade or operation of a ship from a port or place in Fiji to any port or place within the limits of the Exclusive Economic Zone of Fiji;

1.3.3 "Fiji Trade (territorial waters voyage)" means a voyage, trade or operation of a ship from a port or place in Fiji for more than 15 nautical miles to another port or place in Fiji that is within the archipelagic waters and the territorial seas of Fiji;

1.3.4 "Inshore Voyage" means a voyage, trade or operation of a ship of not more than 15 nautical miles from a port or place in Fiji to another port or place in Fiji within the archipelagic waters of Fiji;

1.3.5 "Sheltered waters voyage" means a limited voyage, trade operation of a ship within inland waters and protected waters adjacent to beaches or landings within Fiji.

1.4. Classification of ships shall apply to all paragraphs of these Requirements as follows:

1.4.1 Class 1 Passenger ships engaged on International Voyages.

1.4.2 Class 2 Non-Passenger ships engaged on International Voyages.

Class 2A Non-Passenger ships of 500 GT and over engaged in International Voyages.

Class 2B Non-Passenger ships of less than 500 GT engaged in International Voyages.

1.4.3 Class 3 Ships other than ships engaged in International Voyages.

Class 3A Ships engaged in the near coastal waters voyage.

Class 3B Ships engaged in the Fiji Trade (Territorial waters voyage).

Class 3D Ships engaged in trade within the inshore waters of Fiji (inshore water voyage).

Class 3E Ships engaged in trade within the sheltered waters of Fiji (sheltered water voyage).

Class 3F Ships engaged in trade within the inland waters of Fiji (inland water voyage).

1.5 Ship Limited by Manning.

A ship of any class may be subject to a restricted area of operations if the manning or the qualifications of the personnel are insufficient for the area of operations allowed by its certificate of survey.

PART 3—GENERAL

1.6 Exemption and Equivalents.

1.6.1 The Chief Executive Officer may, subject to the principles embodied in these Requirements, exempt a ship, or ships included in a specified class of ship, from the application of any of the provisions of these Requirements to the extent that the Chief Executive Officer is satisfied that compliance with such provision or provisions is unreasonable or impracticable in relation to that ship or those ships.

1.6.2 Where these Requirements provide that a particular fitting, material, appliance or apparatus, or type thereof, shall be fitted or carried in a ship or that any particular provision shall be made, the Chief Executive Officer may allow any other fitting, material, appliance or apparatus, or type thereof, to be fitted or carried, or any other provision to be made to that ship, 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 these Requirements.

1.6.3 The Chief Executive Officer will exercise his or her power under this paragraph only after receipt of a written application from the owner of a specified class of ship, which sets out the grounds of the application and which is supported by such evidence as the Chief Executive Officer may, at or after the time of application, require in order to enable the Chief Executive Officer to adequately investigate the application.

1.6.4 The Chief Executive Officer may grant an exemption or make an allowance under this paragraph subject to such conditions the Chief Executive Officer may impose to ensure that the safety standards or requirements are maintained.

1.7 Requirements not otherwise specified.

Where in case of a ship, provisions are not made in these Requirements to cover a specific matter, the Chief Executive Officer may determine what special provisions shall apply to that matter.

1.8 Sufficiency of Machinery, Equipment and Components.

In any inspection in which detailed requirements or specifications are not laid down or determined by the Chief Executive Officer for specific items, such items shall be sufficient for the intended service, and conform to good marine practice.

1.9. Positioning of Equipment.

Items of equipment required by these Requirements shall be positioned to the satisfaction of the surveyor.

1.10. Materials

All materials shall be of a good quality conforming to good marine practice and free from defects and when required materials shall be covered by test certificates issued by an approved authority Standards Institute or an authorized classification society. The cost of any tests required for the materials shall be borne by the owner.

1.11 Workmanship

Manufacture and construction shall conform to good marine practice. The Chief Executive Officer may require any item not in accordance with the approved plans and specifications, or any material, workmanship, or arrangement that is deficient to be rectified. Welding carried out on any steel or aluminum ship shall be by certified welders and approved by the Authority.

PART 4—SUBMISSION OF INFORMATION

1.12. Preliminary Information, Plans and Specifications to be submitted.

1.12.1 Before a ship is built or an existing ship is to be purchased or substantially altered, the owner or intending owner shall contact the Authority and provide the Chief Executive Officer with the following information as necessary for initial assessment—

(a) Ship Identification, e.g. name or construction number if any;

(b) Name of owner or intending owner;

(c) Hull construction material;

(d) Principal dimensions of ship;

(e) Principal details and specifications of all machineries onboard the ship ;

(f) Full set of Ship's plans and drawings (Hard copies and electronic copies);

(g) Stability calculation/ booklet for the ship;

(h) Material Construction Certifications from Approved Manufacturers/ Suppliers;

(i) Ship Construction Quality Booklet/Certification;

(j) Nature of the service in which the ship will be engaged;

(k) Intended area of operations of the ship;

(l) Gross tonnage(s) and net tonnage(s) or estimated lower and upper limits of gross tonnage(s);

(m) Whether the ship is to be classed or is classed and if so the name of the Classification Society and details of the Classification;

(n) Whether the ship will hold or holds a Load Line Certificate and/or Cargo Ship Safety Construction Certificate issued by a Classification Society; and

(o) Whether the ship, being an existing ship, holds any other certificates relating to survey and if so the type of each certificate, its date of expiry and the name of the authority who issued the certificate.

1.14.2 Before a ship is built or an existing ship is to be purchased, chartered or substantially altered for operations within the jurisdiction of the Chief Executive Officer, the owner, or intending owner, shall comply with the requirements of the survey and Certificates of Survey and, to ensure that the requirements of other paragraphs relating to the construction, equipment and outfitting of that ship shall be met, submit appropriate information, plans and data to the Chief Executive Officer for assessment and approval.

1.14.2.1. The information submitted shall be in accordance with the following—

(a) Information shall be sufficient in detail to ensure that all the relevant requirements have been incorporated in the design. Extraneous and irrelevant information should be omitted where practicable. Written material including electronic copies shall be submitted in the English language.

(b) Where any doubt exists, as to the information required to be submitted, clarification should be sought from the Chief Executive Officer.

(c) Print outs should be clear, easy to read and properly identified. Electronic copies of documentation should also be provided.

(d) The number of copies submitted shall be sufficient to permit the retention of two by the Chief Executive Officer.

(e) Where a design is amended, subsequent to the initial submission, every plan, specification, etc. affected by the alteration, shall be amended accordingly and the date of amendment recorded. As necessary revised copies shall be forwarded immediately to the Chief Executive Officer.

(f) Drawings and plans should be submitted according to one or more of the following scales: 1:1, 1:2, 1:5, or multiples of 10 thereof.

1.14.2.2. The extent of the information to be submitted will be dependent on classification and size of the ship. The following may be used as a general guide—

(a) all the information outlined in sub-paragraph 1.14.1 unless such information has previously been submitted in accordance with that sub- paragraph;

(b) the general arrangement plans;

(c) the construction plans, including transverse and longitudinal sections;

(d) Tank Capacity Plan;

(e) Shell Expansion Plans;

(f) Shafting Arrangement Plans;

(g) the lines plan;

(h) plans, specifications or data sheets to cover—

(i) the scantlings of all members, including methods of fastening;

(ii) the details of the closing devices;

(iii) the bilge pumping arrangements;

(iv) the details of the oil fuel system, including tanks, filling and venting arrangements, piping and valves;

(v) where applicable, the arrangements for the loading, carriage and discharge of liquid cargoes;

(vi) the structural fire protection arrangements and fixed fire appliances;

(vii) the details of the rudder and stern frame, propeller brackets, engine and thrust sea rings, propeller shafting, bearings and couplings, steering gear and alternative method of steering;

(viii) where applicable, the welding schedule, the laminating schedule or the plastering programme;

(ix) electrical equipment and wiring diagram.

(i) the preliminary stability information; and

(j) such further plans, information and data as the Chief Executive Officer may require to determine the proper construction, machinery, equipment and safety of the ship.

1.14.2.3 The provisions of this regulation also applies to the Maritime (Fiji Small Craft Code) Regulations 2014. Small boat builders should submit their drawings and plans for approval by the Authority. The approval of small boat builders and their standard drawings and plans should be sufficient for the purpose of this Part. For the purpose of building new boats under the Maritime (Fiji Small Craft Code) Regulations 2014, approved boat builders may facilitate the process of survey and registration.

APPENDIX A

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CLARIFICATION OF TERMS USED IN DEFINITION OF MEASURED LENGTH
(as referred to in paragraph 4)

A1.0 The following terms used in the definition of Measured Length should be interpreted as follows—

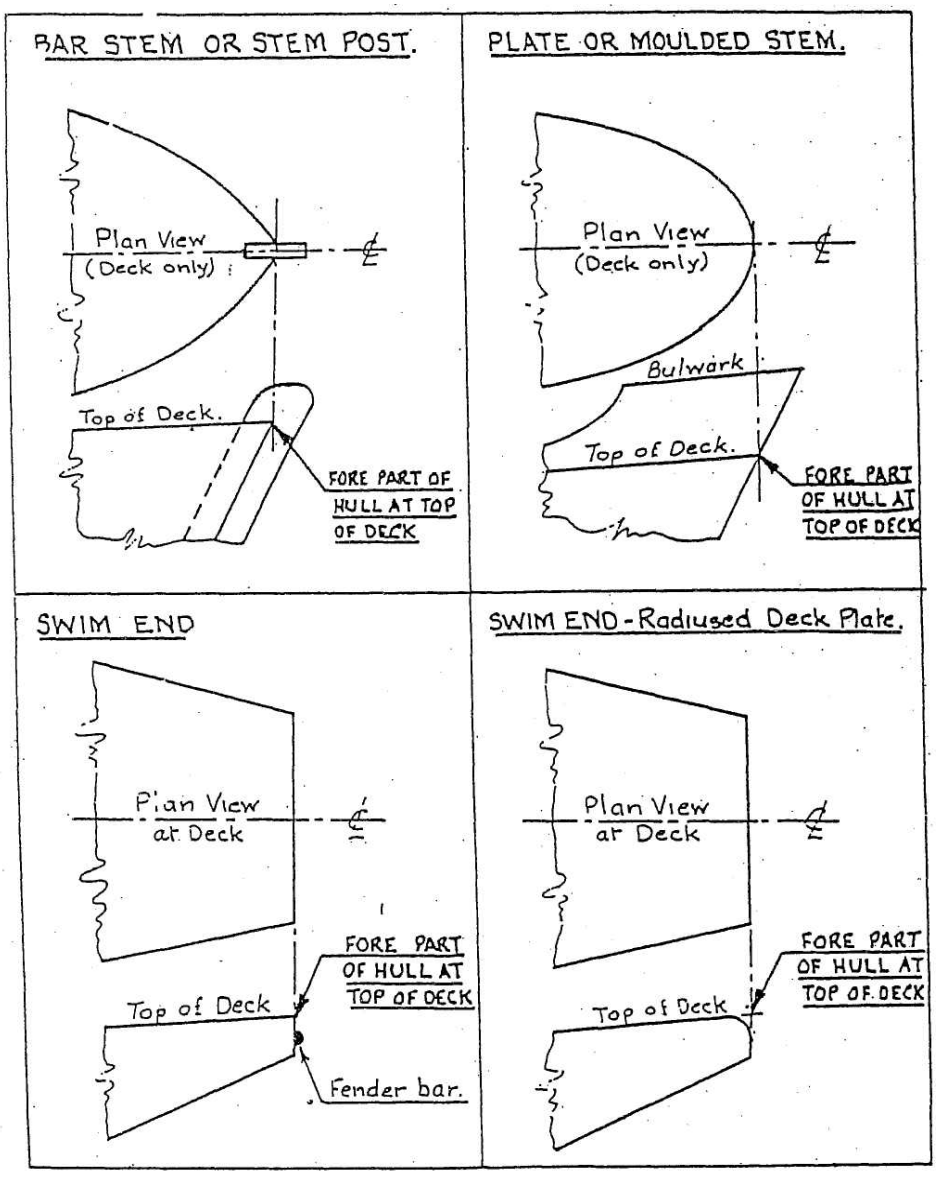
Forepart of hull—
The leading edge of the shell plating, planking or other structural material or, in the case of bar stems or stem posts, the intersection of the outside of the shell plating or planking with the stem bar or post but, in all cases, excluding any member added to the exterior of the hull e.g. fender, sponson, rubbing strip, etc.

After part of the hull—
The trailing edge of the shell plating, planking or other structural material or, in the case of stern bars or posts, the intersection of the outside of the shell plating or planking with the stern bar or post but, in all cases, excluding any member added to the exterior of the hull, e.g. fender, sponson, rubbing strip, etc.

Height of gunwale—
The top edge of the fore and after member which is fitted round the inside of the ship at the top of the side shell plating, planking or other structural material.
As a further guide to the interpretation of Measured Length reference should be made to the Guidance for Measuring Diagrams included in this appendix.

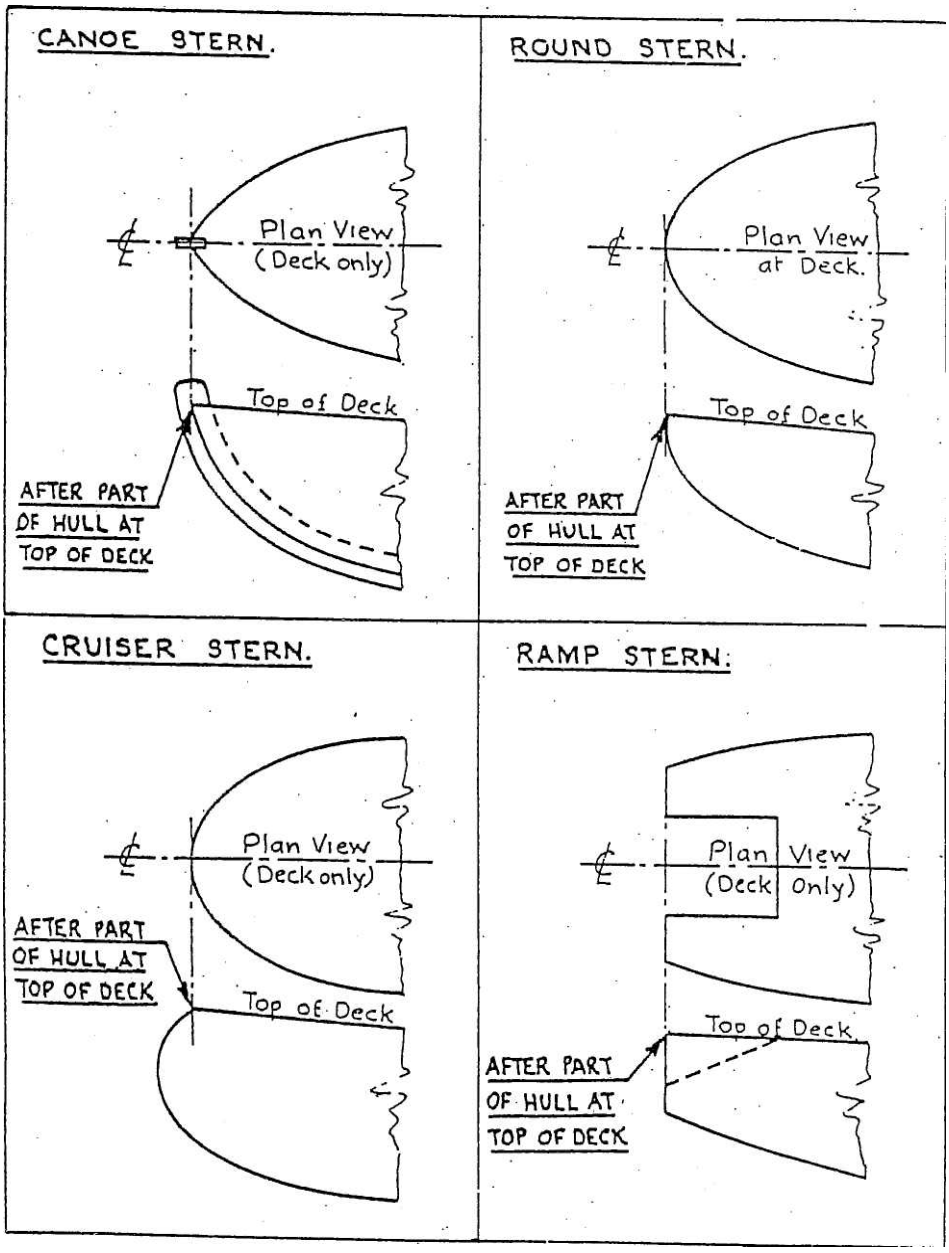
MEASURED LENGTH
GUIDANCE FOR MEASURING—SHEET 1

FORE PART OF HULL

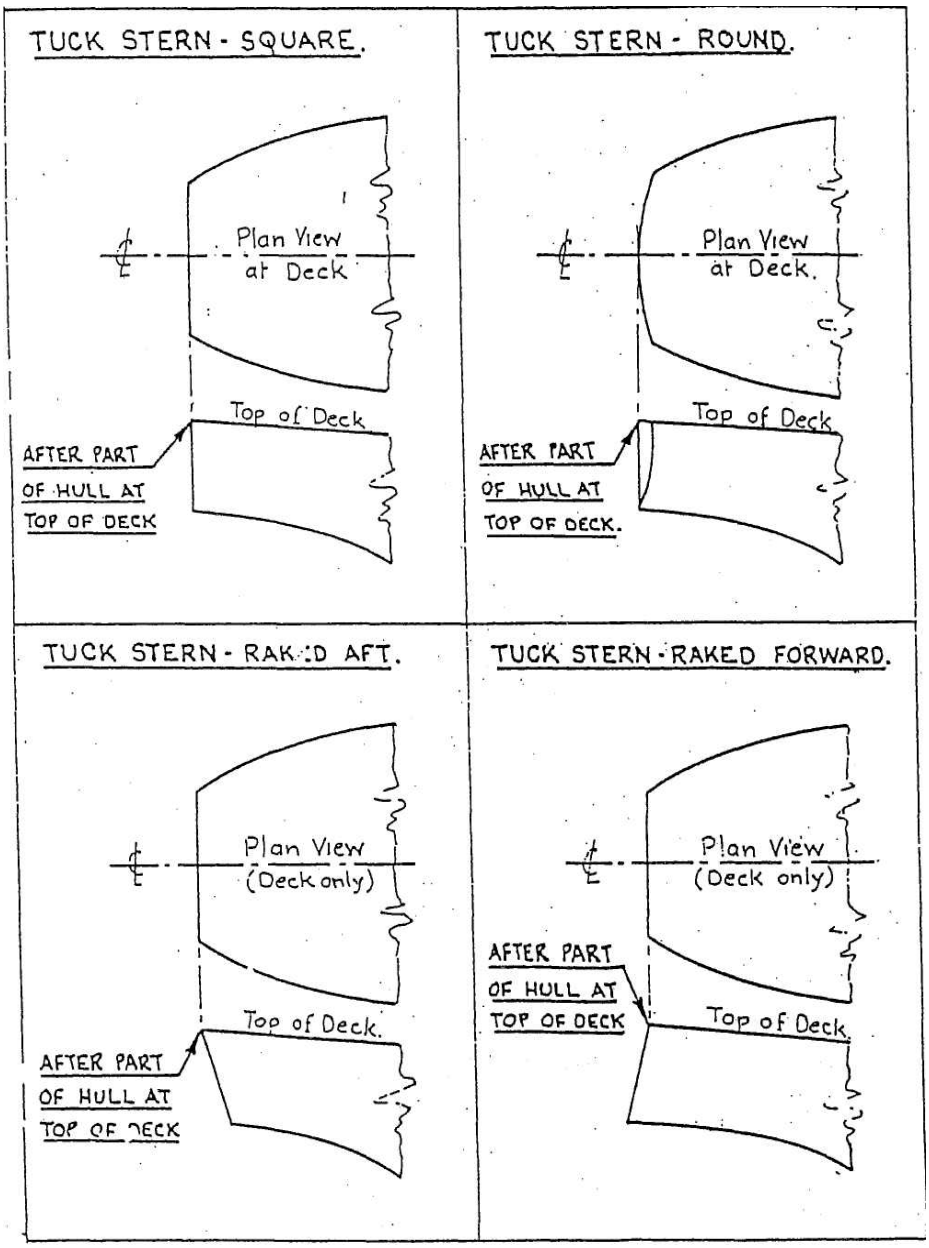


MEASURED LENGTH
GUIDANCE FOR MEASURING—SHEET 2

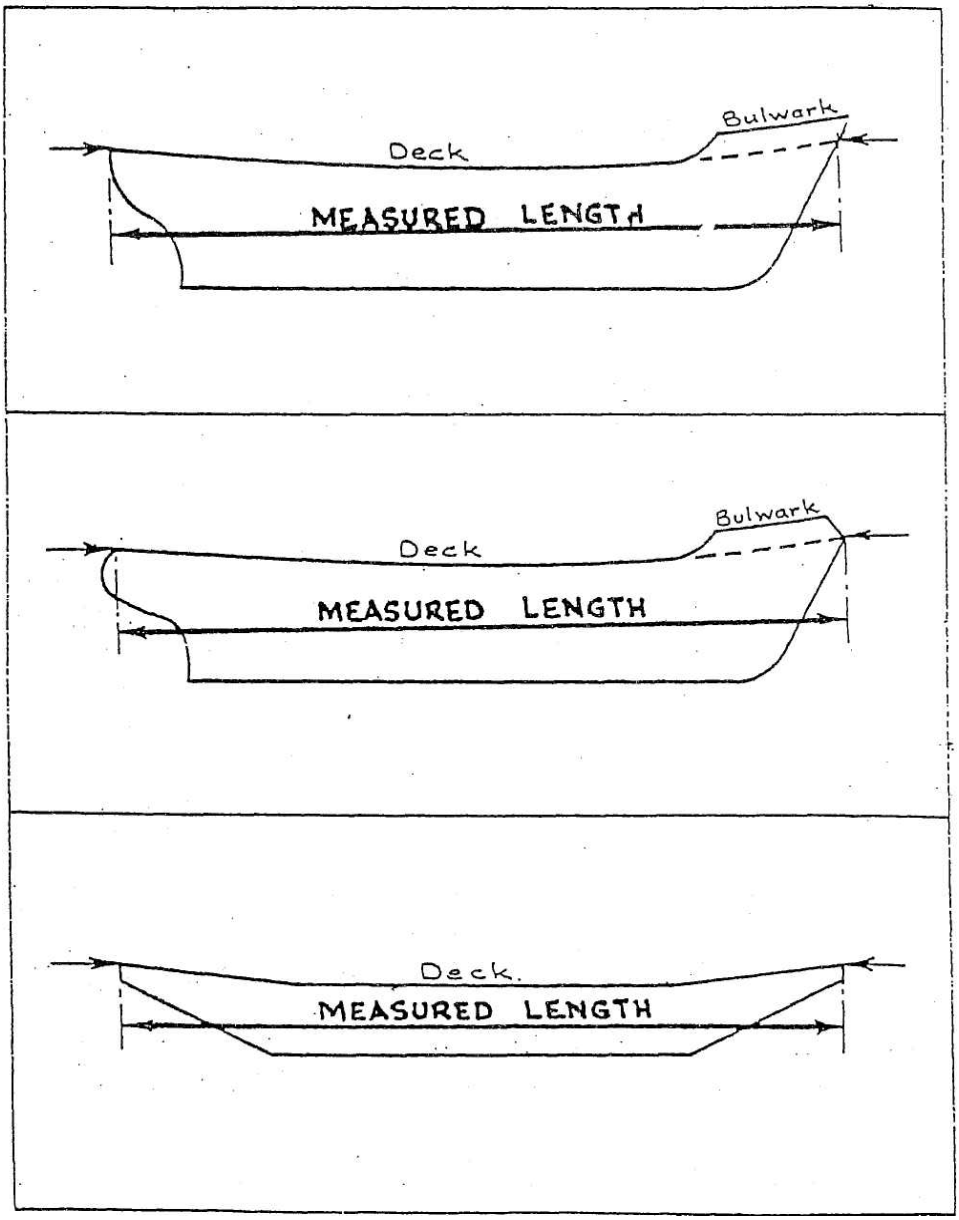
AFTER PART OF HULL



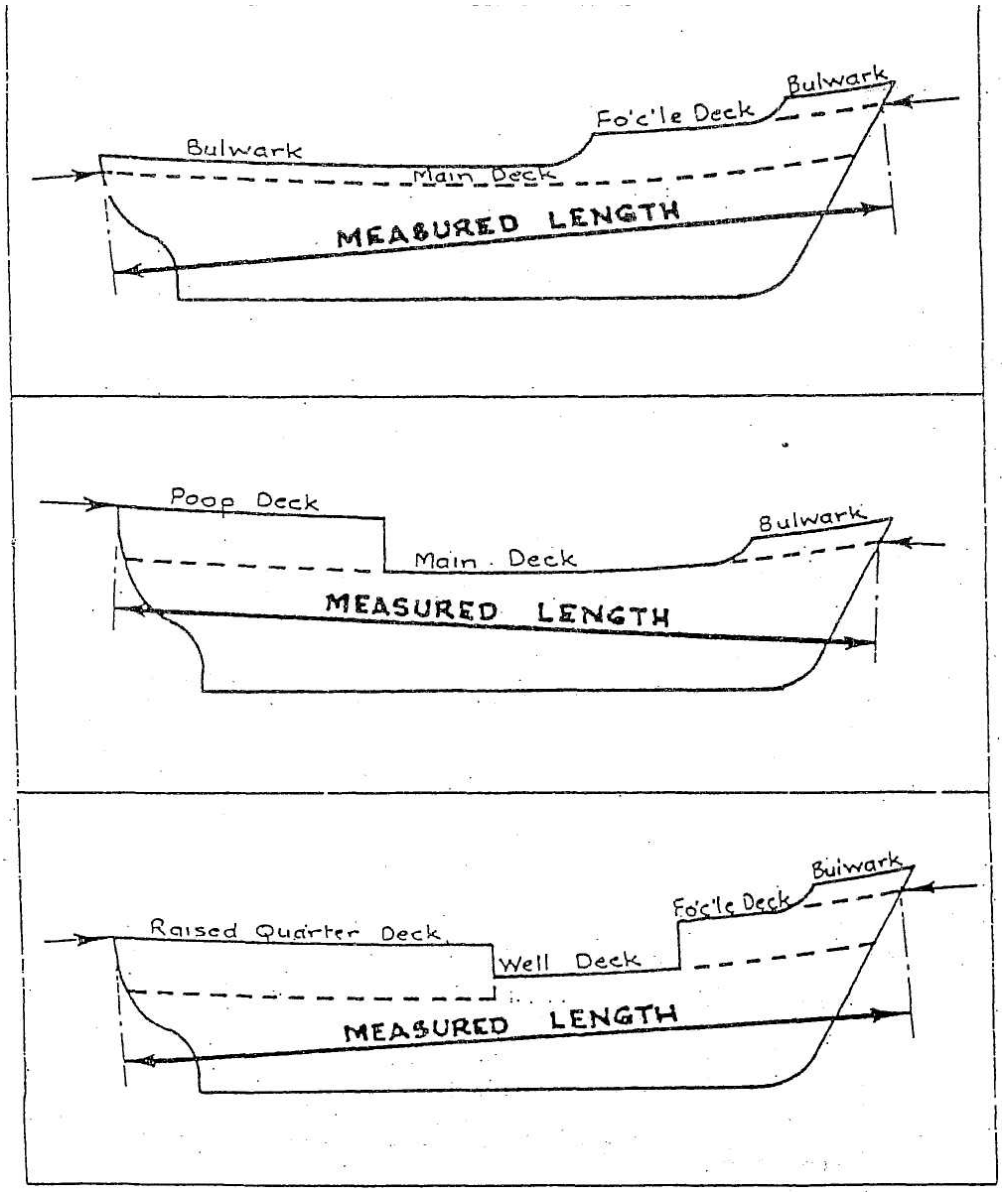
MEASURED LENGTH
GUIDANCE FOR MEASURING—SHEET 3
AFTER PART OF HULL (Cont.)



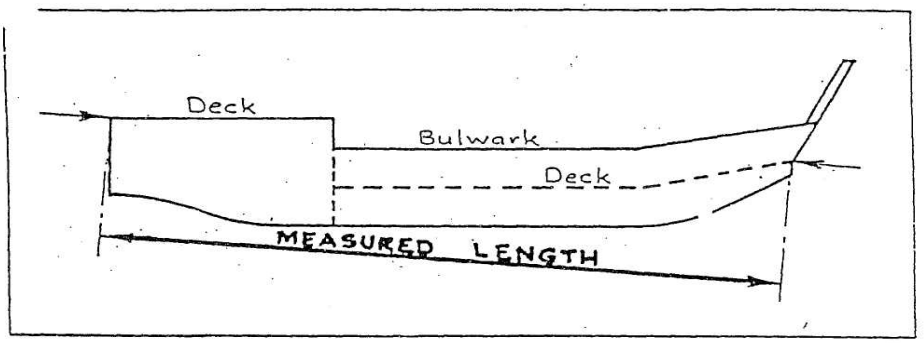
MEASURED LENGTH
GUIDANCE FOR MEASURING—SHEET 4 SINGLE DECK SHIPS



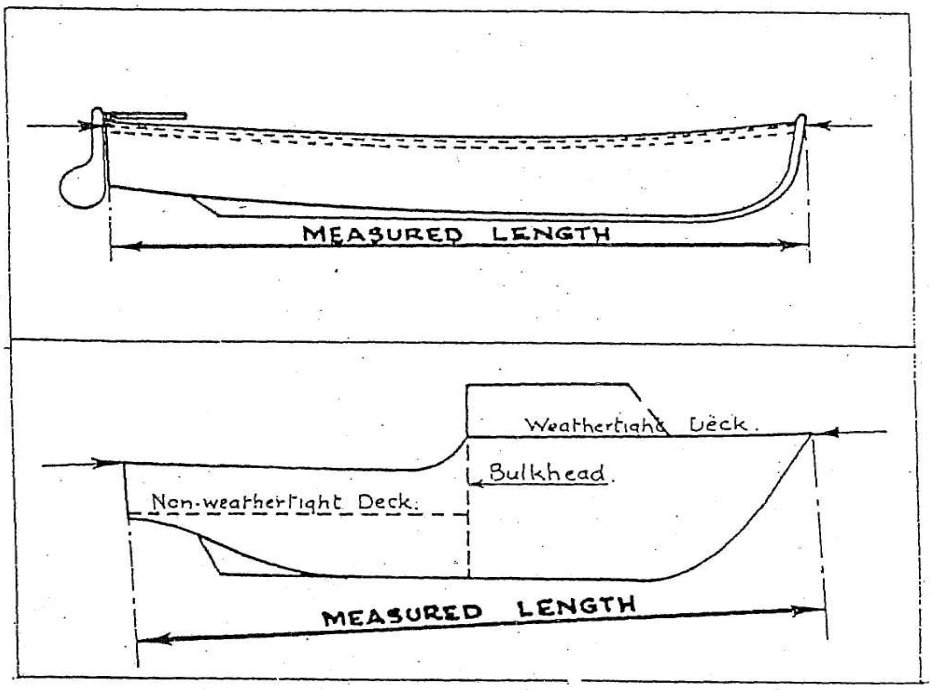
MEASURED LENGTH
GUIDANCE FOR MEASURING—SHEET 5 MULTIPLIE DECK SHIPS



MEASURED LENGTH
GUIDANCE FOR MEASURING—SHEET 6 LANDING BARGES, ETC



OPEN VESSELS



MEASURED LENGTH
GUIDANCE FOR MEASURING—SHEET 7

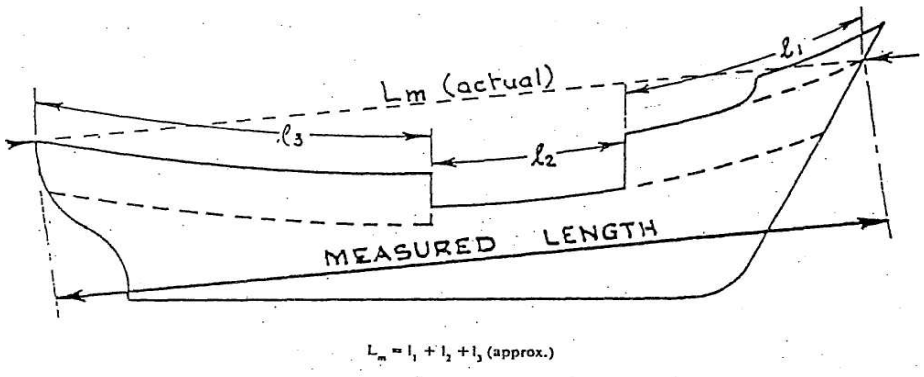
MEASURING ON EX1STING SHIP

Measured length should, wherever possible, be taken in a direct line between the two defined extremities.

On an existing ship this would normally be achieved by setting up sight boards at the stem and stern, together with as many intermediate sights as are necessary to circumvent obstructions or breaks in the uppermost weather tight deck or, if the ship is out of the water, by measuring between plumb lines dropped from the defined extremities, in which case, care should be taken to ensure that the measurement is taken between points on the plumb lines which are equidistant from the points of origin (i.e. the top of deck or gunwale).

However, the measurement is to be taken, when agreed to by the Authority and the owner, by means of a tape laid along the deck or decks. It is a fact that the measurement thus taken will be in excess of the true measurement due to the curvature of the deck, as illustrated in the sketch below where the sheer of the deck has been exaggerated for clarity. In most cases this increase in length will be of little concern, however, if the measurement is critical, the length should be checked by either of the two methods described above.

MEASUREMENT OF LENGTH (Lm) BY TAPE LAID ON DECK
Note: Sheer exaggerated for clarity.



APPENDIX B

BOUNDARIES OF INSHORE SERVICE AREAS

Inshore waters voyage means a voyage, trade or operation of a ship of not more than 15 nautical miles from a port or place in Fiji to another port or place in Fiji within the archipelagic waters of Fiji subject to the following:

B1.0 VITI LEVU

(a) Archipelagic waters in the Beqa channel, Toberua passage to Moturiki and the east and north coast of Ovalau to Levuka.

(b) Lautoka to Vomo Islands, then a straight line to the northern most point of the Mamanuca Islands, the Mamanuca Reefs, and the Malolo Barrier Reef to Navula Reef light, to Uverite Point.

(c) The exclusion of the Yasawas and Yalewa Kalou islands and the imaginary line within a twelve mile range from the main islands.

B2..0 TAVEUNI

The sea area bounded on the landward side by the main island and, on the seaward side by the 100 fathom line from Vuna Reef Light to Black Point, then a line 1 mile from the reef to north end of Taveuni, then to the inside of the reef surrounding the Laucala Island only.

B3.0 VANUA LEVU TO TAVEUNI

Inclusion of archipelagic waters in the Somosomo strait enclosed by a line drawn from the northern point of Taveuni to the north of Kioa islands and the closest point of land between Taveuni and Buca to the south and for any operation beyond the internal waters restricted to a twelve mile range from the ship's own ports.

PARAGRAPH 2
CERTIFICATES OF COMPETENCY

Contents

2.8 The Chief Executive Officer may decline to issue certificates of competency to certain people.

2.9 Form of Certificate of Competency.

2.10 Capacities that holders of certificates of competency may serve in on a registered ship.

2.11 Revalidation of certificate of Competency.

2.12 Review of Chief Executive Officer decisions.

2.1 Chief Executive Officer not to issue certificates of competency except to qualified persons.

2.1.1 The Chief Executive Officer shall not issue a certificate of competency to an applicant unless he is satisfied that—

(a) the applicant has passed any appropriate examination leading to a qualification for the class of certificate applied for; and

(b) the applicant has successfully completed any supplementary courses appropriate to that class of certificate.

2.1.2 The appropriate examination leading to a qualification for each class of certificate of competency that shall be passed for the purpose of sub-paragraph 2.1.1*(a)*, and the curriculum in respect of each of those examinations are prescribed—

(a) in respect of deck officers-in the Maritime (STCW Convention) Regulation 2014;

(b) in respect of engineering officers- in the Maritime (STCW Convention) Regulation 2014; and

(c) in respect of ratings- in the Maritime (STCW Convention) Regulation 2014.

2.1.3 The appropriate supplementary courses that shall be successfully completed for the purposes of sub-paragraph 2.1.1 *(b)* before a class of certificate of competency maybe applied for, and the aims and scopes of those courses are prescribed in the Maritime (STCW Convention) Regulation 2014.

2.2 Conduct of examinations for certificates of competency

2.2.1 The Chief Executive Officer may conduct, or approve the conduct of, examinations leading to qualifications for each class of certificate of competency.

2.2.2 The examinations referred to in sub-paragraph 2.2.1 shall be conducted in the manner prescribed in the Maritime (STCW Convention) Regulation 2014.

2.3 Conditions of entry to examinations for certificates of competency.

2.3.1 The Chief Executive Officer shall not permit a person to enter for an examination leading to a qualification for a class of certificate of competency unless it first satisfies itself that the applicant has the qualifications and has satisfied the other pre-requisition prescribed in respect of that examination.

2.3.2 The qualifications and pre-requisition referred to in sub-paragraph 2.3.1 are prescribed—

(a) in respect of deck officers – in the Maritime (STCW Convention) Regulation 2014;

(b) in respect of engineering officers- in the Maritime (STCW Convention) Regulation 2014;

(c) in respect of ratings in the Maritime (STCW Convention) Regulation 2014.

2.4 Examination fees

The fees to be paid by candidates to enter for an examination leading to a qualification for the various classes of certificates of competency are prescribed in the Maritime (STCW Convention) Regulation 2014.

2.5 Application for certificate of competency

The prescribed application form for a certificate of competency is the form specified in the Maritime (STCW Convention) Regulation 2014.

2.6 Application fee for a certificate of competency

2.6.1 The prescribed application fee for a certificate of competency is prescribed in the Maritime (STCW Convention) Regulation 2014.

2.6.2 The fee prescribed under sub-paragraph 2.6.1 shall also apply in respect of a document issued under sub-paragraph 2.8.2.

2.7 Any lower class certificate of competency to be surrendered

2.7.1 Where an applicant for a certificate of competency is already the holder of a lower class certificate of competency he shall surrender that lower class certificate to the Chief Executive Officer on the issue to him by the Chief Executive Officer of the Higher class certificate.

2.7.2 The Chief Executive Officer may refuse to issue a certificate of competency to a person who fails to comply with sub- paragraph 2.7.1.

2.8 Chief Executive Officer may decline to issue certificates of competency to certain people—

2.8.1 Where an application for a certificate of competency is made by a person who is neither a citizen of Fiji nor of any other country which is a member of the South Pacific Forum it may decline to issue the certificate applied for.

2.8.2 Where the Chief Executive Officer, acting in accordance with sub-paragraph 2.8.1, declines to issue a certificate of competency to a person who would otherwise be entitled to the issue of that certificate the Chief Executive Officer shall

instead issue that person with a document, certifying the examination results of the applicant in respect of any examination which the applicant sat and which would otherwise have led to a qualification for a certificate of competency.

2.8.3 A document issued under sub-paragraph 2.8.2 shall, as far as practicable, be in such form as to satisfy the reasonable requirements of the appropriate authorities in the applicant's home country.

2.9. Form of Certificate of Competency

The form of a certificate of competency is as prescribed in the Maritime (STCW Convention) Regulation 2014.

2.10 Capacities that holders of certificates of competency may serve in on a registered ship

The capacities that the holders of each class of certificate of competency may serve in on a registered ship are set out in the Maritime (STCW Convention) Regulation 2014.

2.11 Revalidation of certificate of competency

2.11.1 The Chief Executive Officer shall not validate a certificate of competency for seagoing purposes for a period exceeding 5 years, nor shall it revalidate a certificate of competency for seagoing purposes for a period exceeding 5 years.

2.11.2 The manner in which a certificate of competency may be revalidated for seagoing purposes and any requirements to be complied with on that revalidation are prescribed in the Maritime (STCW Convention) Regulation 2014.

2.12 Review of Chief Executive Officer decisions

2.12.1 A person aggrieved by a decision of the Chief Executive Officer in respect of the grant, endorsement or revalidation of a certificate of competency or service may exercise his or her right of appeal to the Maritime Appeals Committee pursuant to section 264 of the Decree.

2.12.2 An application for review under sub-paragraph 2.12.1 shall be accompanied by the fee prescribed by the Maritime (STCW Convention) Regulation 2014.

2.12.3 On receipt of an application under sub-paragraph 2.12.1 the Maritime Appeals Committee shall sit to deliberate on the issue.

2.12.4 The Chief Executive Officer shall give the Maritime Appeals Committee appointed in accordance with sub-paragraph 2.12.3 all necessary details and assistance necessary to allow the Committee to determine the review.

2.12.5 The decision of the Maritime Appeals Committee appointed in accordance with sub-paragraph 2.12.3 on a review under that sub regulation shall be deemed to be the decision of the Chief Executive Officer and shall have effect accordingly.

2.12.6 A person or persons appointed under sub-paragraph 2.12.3 may, where appropriate, be a person or include a person with experience in the relevant field of knowledge or experience.

PARAGRAPH 3

SAFE MANNING

Contents

3.1 This paragraph should be read in conjunction with the Introduction and General Requirements paragraph.

3.2 Full details of safe manning requirements are contained in the Maritime (STCW Convention) Regulation 2014. This paragraph describes the principal provisions of those regulations for the general guidance of owners, masters and seafarers.

3. 3 Safe manning regulations apply to Fiji registered ships including fishing ships, Government ships, and trading ships any of which are above 15 metres in registered length.

3. 4 The ship shall display a "Manning certificate" issued by the Chief Executive Officer, stating the minimum number of qualified seafarers and other persons to be carried.

3. 5 The owner of a ship shall apply to the Chief Executive Officer for the issue of a Manning Certificate in respect of the ship. The Chief Executive Officer shall refer the application to the qualification and licensing division.

3.6 If a ship owner(s) requires the review of a manning certificate of his or her ship, he or she shall submit a written request for the review of the current manning to the Chief Executive Officer. The written request should contain the proposed manning of the ship.

3.7 The Chief Executive Officer shall refer the request for the review of a safe manning of a ship to a Manning Committee.

3.8 The Manning Committee shall consist of a deck Examiner (a public officer administering the Decree); an engineer examiner (a public officer administering the Decree); a deck and engineer surveyor (with extensive seagoing commercial ship experience).

3.9 In reviewing the minimum safe manning requirements of a ship, the manning committee is guided by IMO Res A.890(21) Principles of Safe Manning, and the manning tables set out in the Schedule of the Maritime (STCW Convention) Regulation 2014.

3.10 Dispensations from the manning scale may be issued only in cases of exceptional necessity and only after careful consideration by the manning committee.

PARAGRAPH 4

SHIPPING OFFICE

Contents

This paragraph should be read in conjunction with the Introduction and General Requirements paragraph and paragraph 4 of schedule 1.

4.1 Employment agreement

(a) Owners of Fiji Ships and all foreign ships visiting our ports shall have seafarers' employment agreement or collective agreement that substantially complies with the employment agreement set out in the relevant Regulations of the Decree,

(b) Seafarer's employment agreement or collective agreement on Fiji ships shall be approved by the Chief Executive Officer.

4.1.1 Ship owner applies to shipping officer to open the employment agreement with a seafarer. Shipping officer checks that the standard and non-standard paragraphs are in agreement with the Decree and the relevant Regulations under the Decree. The owner informs the shipping officer that the employment agreement has been made, and the list of seafarers to whom it applies. The Shipping officer checks the seafarers are registered seafarers and each holds a "Seafarer's Employment Record Book".

4.1.2 The seafarer's employment agreement is signed by both the employer and the seafarer. The original seafarer's employment agreement is kept by the ship owner and a copy is given to the seafarer for his keeping.

4.1.3 A multiple ship agreement may be made which is suitable for a multiple ship company where seafarers are changing ships frequently, on short voyages

(to cut out unnecessary signing on/off the main employment agreement). Basically a seafarer signs the main employment agreement, to be bound by the employment agreement while he is actually on a crew list of one of the company's ships. The crew list will have endorsed on it a statement that it binds the seafarer and the ship owner to the employment agreement. (It becomes binding by the seafarer signing against his name on the crew list, and the Master signing last). It becomes revoked at the end of the voyage to which the crew list refers. It is up to the company to develop this system which should comply with the relevant Regulations of the Decree and the shipping officer to approve.

4.1.4 Validity of the seafarer's employment agreement shall be determined by the ship owner and the seafarer.

4.2 Termination of the Seafarer's Employment Agreement with a seafarer

The ship owner shall notify the intention to terminate the Employment Agreement with a seafarer to the Chief Executive Officer. The Chief Executive Officer will ensure that requirements for termination of the Seafarer's Employment Agreement as prescribed in the relevant Regulations of the Decree which must be complied with.

4. 3 Special protection for seafarer being left behind outside Fiji

There is special protection for seafarers being left behind outside Fiji such as the repatriation requirements as prescribed in the relevant Regulations of the Decree which must be complied with.

4.4 Employment age and medical check requirements

4.4.1 Employment of persons below 16years old is prohibited.

4.4.2 Employment of persons under the age of 18 years as ship's cook is prohibited.

4.4.3 Persons under l8years requires yearly medical examination, and persons above 18 years require two yearly medical examination.

4.4.4 All seafarers shall undergo a medical examination by a recognised medical practitioner prior to employment. The medical examination is carried out in accordance with the Maritime (STCW Convention) Regulations 2014.

4.5 Wages and deductions

Proper accounts for wages shall be given to the seafarer on termination of the Employment Agreement. The seafarer may make allotments of his wages to not more than 2 people.

4.6 Crew accommodation

Crew accommodation shall meet minimum standards specified in paragraph 6 of this schedule and the requirements prescribed in the relevant Regulations of the Decree which must be complied with.

4.7 Water and food provisions

There shall be adequate water and food provisions on a ship. These provisions shall be of good quality, of nutritive value and of sufficient variety. They shall also be free of anything likely to cause harm or render them uneatable.

4.8 Medical stores

Medical stores are to be carried as specified in the Maritime (Ships Medical Requirements) Regulations 2014.

4.9 Misconduct of seafarers

Misconduct of seafarers leading to an accident, incident or mishap. If two such records against a seafarer occur within a two year period the Chief Executive Officer shall notify the ship owner to suspend the seafarer from employment. The Chief Executive Officer will take possession of the seafarer's certificate of competency or Employment Record Book which effectively bars him from further employment as a seafarer.

4.10 Returns of births and deaths on ships

Returns of births and deaths on ships which shall be made and recorded in the ship's official log book as prescribed in the Maritime (Logbook) Regulations 2014.

4.11 Seafarer's Employment Record Book

Gives details of how a Seafarer's Employment Record Book is obtained and what shall be done with it.

4.12 Crew lists

What a crew list shall contain and to whom it shall be produced.

4.13 Contractual conditions of Seafarer's forms

Forms which relate to the contractual conditions of Seafarers and, (Schedules) copies of the Official Log Book, all of which are available at the shipping office.

PARAGRAPH 5—CONSTRUCTION AND STABILITY

Contents

PART 1—PRELIMINARY

This paragraph should be read in conjunction with the Introduction and General Requirements paragraph.

5.1 In this paragraph—

(a) the provisions of Part 2 apply to all ships;

(b) the provisions of Part 3 apply to SOLAS ships; and

(c) the provisions of Part 4 and Part 5 apply to ships other than SOLAS ships.

PART 2—GENERAL REQUIREMENTS FOR SHIP

5.2 MSAF Ships Number

The owner and master of a ship registered in Fiji shall ensure that the ship is permanently marked with the letters MSAF followed by the official number issued to the ship by the Registrar of ships.

5.3 Structural Strength

5.3.1 Subject to particular requirements in this paragraph, the structural strength of every ship shall be sufficient for the service for which the ship is intended.

5.3.2 A ship constructed in accordance with the appropriate rules of a Classification Society authorized by the Chief Executive Officer or with the appropriate provisions of this Part shall be accepted as complying with 5.3.1 of this Part.

5.3.3 The structural requirements for a ship of unusual design shall be to the satisfaction of the Chief Executive Officer.

5.3.4 The structural requirements for a ship constructed wholly or partly of materials not specifically included in requirements referred to in 5.3.2 of this Part shall be to the satisfaction of the Chief Executive Officer. In determining structural requirements not otherwise specified, regard shall be had to the following Sub-sections of Section 5 of the Australian Uniform Shipping Law Code as amended by the Australian National Standards for Commercial Vessels (NSCV);—

(a) Sub-section H-Aluminium

(b) Sub-section I-Copper Nickel

(c) Sub- section J-Ferro Cement

(d) Sub-section K-Fibre Reinforced Plastic

(e) Sub-section L-Steel

(f) Sub-section M-Timber.

5.4 Design Loadings

For the purpose of sub-paragraph 5.3.2 of this Part, where a ship is not constructed in accordance with a recognized organization or a Classification Society , then the structure shall be designed to the satisfaction of the Chief

Executive Officer and having regard to Part II of Sub-Section G, Section 5 of the Australian Uniform Shipping Law Code as amended by the Australian National Standards for Commercial Vessels (NSCV).

5.5 Ship owner's obligation

A ship owner intending to construct ships of more than 15 meters in length shall ensure that the ship is built according to the provisions of this paragraph or equivalent approved designs of a classification society or equivalent international standards in an approved shipbuilding facility.

5.6 Anchors and Cables

5.6.1 Equipment to be provided

Every ship shall be provided with anchor equipment designed, for quick and safe operation which shall consist of anchors, cables, stoppers and a windlass or other arrangements for dropping and hoisting the anchor and for holding the ship at anchor in all foreseeable service conditions.

5.6.2 Acceptable Equipment

For the purposes of sub-paragraph 5.6.1, equipment shall comply with paragraph 13, Appendix H of the Miscellaneous Equipment.

5.6.3 Anchor Windlass

Where requirements in respect of an anchor windlass are not otherwise provided under sub-paragraph 5.6.2, the requirements of this paragraph shall be met as follows—

(a) The windlass shall be of sufficient power to lift each anchor and its full length of cable.

(b) Each cable lifter shall be fitted with a release coupling and a brake of sufficient capacity for the safe stopping of anchors and cable when paying out.

(c) A windlass with brake engaged and release couplings disengaged shall be able to withstand a static pull of 45% of the required cable minimum breaking strength on all cable lifters simultaneously and without any brake slip.

(d) If a chain stopper is not fitted, a windlass shall be able to withstand a static pull equal to the minimum breaking strength of the cable without release of the cable.

(e) An adequate cover or seal shall be provided for each spurling pipe, to prevent flooding of the cable locker when the ship is at sea.

PART 3—REQUIREMENTS FOR SOLAS SHIPS

5.7 Construction—Structure, subdivision and stability, machinery and electrical installations

The requirements for structure, subdivision and stability, machinery and electrical installations of SOLAS ships are dealt with under the relevant provisions of Chapter II – 1 of the SOLAS Convention as amended by Resolution MSC 57(67) with particular reference to the following Parts:

Part B — Subdivision and Stability

Part C — Machinery installations

Part D — Electrical installations

Part E — Additional requirements for periodically unattended machinery spaces

5.8 Construction—Fire Protection, Fire Detection and Fire Extinction

The requirements for Fire Protection, Fire Detection and Fire Extinction of SOLAS ships are dealt with under the relevant provisions of Chapter II – 2 of the SOLAS Convention, as amended by Resolution MSC 57(67) with particular reference to the following Parts of that Chapter:

Part B — Prevention of fire and explosion;

Part C — Suppression of Fire;

Part D — Escape;

Part E — Operational requirements;

Part F — alternative design and arrangement; and

Part G — Special Requirements.

5.9 Stability

The requirements for stability for SOLAS ships are dealt with under the relevant provisions of Chapter II-1 of the SOLAS Convention as amended by Resolution MSC 57(67) with particular reference to the following Regulations of Part B of that Chapter—

Regulation 5 – Stability information for passenger ships and cargo ships;

Regulation 8 – Special requirements concerning passenger ship stability;

Regulation 9 – Double bottoms in passenger ships and cargo ships other than tankers;

Regulation 19 – Damage Control Information; and

Regulation 35 – 1 – Bilge Pumping Arrangements.

5.10 Rudders and Steering Gear

The requirements for the steering gear of SOLAS Convention ships are dealt with under the relevant provisions of Chapter 11 - 1 of the SOLAS Convention as amended by Resolution MSC 57(67) with particular reference to the following Regulations of Part C of that Chapter:

Regulation 29 — Steering gear; and
Regulation 30 — Additional requirements for electrical and electrohydraulic steering gear.

PART 4—REQUIREMENTS FOR SHIPS OTHER THAN SOLAS SHIPS

5.11 Watertight Subdivision

5.11.1 Bulkheads and other enclosures of watertight spaces and arrangements to maintain watertight integrity shall be designed, constructed and tested to the satisfaction of the Chief Executive Officer and having regard to the relevant provisions of Sub-Section C and D of Section 5, of the Australian Uniform Shipping Laws Code.

5.11.2 Every ship shall be provided with an efficient system capable of pumping from or draining any watertight compartment not permanently appropriated for ship services and for which other efficient means of pumping are not provided. Arrangements of the system shall be to the satisfaction of the Chief Executive Officer having regard to the provisions of paragraph 17, Section 9, of the Australian Uniform Shipping Laws Code.

5.12 Structural Fire Protection

The hull, superstructure, structural bulkheads, decks, deckhouses and structural components below decks shall be so constructed as to provide the fullest practicable degree of fire protection to the satisfaction of the Chief Executive Officer and having regard to the relevant provisions of Sub-Section F, Section 5, of the Australian Uniform Shipping Laws Code.

5.13 Stability

5.13.1 A ship shall be so designed and constructed as to provide adequate intact stability for the anticipated service conditions which shall be determined according to criteria acceptable to the Chief Executive Officer.

5.13.2 Every ship shall at all times be provided with information acceptable to the Chief Executive Officer, relating to the ship's stability characteristics under different service conditions.

5.13.3 In determining requirements under 5.13.1. and 5.13.2 regard shall be had to Section 8 of the Australian Uniform Shipping Laws Code.

5.14 Rudders and Steering gear

5.14.1 Every ship shall be provided with a main steering gear and with an auxiliary means of actuating the rudder.

5.14.2 For the purposes of paragraph 5.14.1 the provisions shall be to the satisfaction of the Chief Executive Officer having regard to the appropriate recognized organisation or a Classification Society or equivalent international standards recognized by the Chief Executive Officer.

PART 5—MISCELLANEOUS PROVISIONS

5.15 Modifications for Existing Ships

In the case of a ship, other than a SOLAS ship, that is an existing ship the Chief Executive Officer may permit such modifications to the requirements of this Part as he or she thinks, fit, having regard to—

(a) the age of the ship; and

(b) the trade in which the ship is, or is about to be, engaged.

PART 6—CONSTRUCTION—USE OF ASBESTOS ONBOARD SHIPS

5.16 Ships built before 1 July 2002 and have in their structure and fittings Asbestos Containing Material (ACMs) are only permitted to maintain these ACMs, as long as they do not pose a risk to the crew's health. The crew will be made aware of the dangers of asbestos and trained to deal with asbestos in case disturbance of the ACMs cannot be avoided. Such ships shall strictly comply with IMO Resolution MSC/Circ. 1045 Guidelines for Maintenance and Monitoring of Onboard Materials Containing Asbestos. Ship owners or operators shall ensure that their ships comply with this provision.

Any person who fails to comply with this sub-paragraph commits an offence and is liable upon conviction to a fine not exceeding $5000 or 3 months imprisonment or both.

5.17 New installations of Asbestos Containing Material (ACMs) are prohibited from being used onboard ships and only under exceptional circumstances the Chief Executive Officer may approve the use of ACMs onboard ships for vanes, joints and insulations. Under these circumstances, strict compliance with IMO Resolution MSC/Circ. 1045 Guidelines for Maintenance and Monitoring of Onboard Materials Containing Asbestos shall be adhered to. Ship owners or operators shall ensure that their ships comply with this provision.

Any person who fails to comply with this sub-paragraph commits an offence and is liable upon conviction to a fine not exceeding $5000 or 3 months imprisonment or both.

5.18 Six months after the gazettal of this regulation, new installation of ACMs on board all Fiji ships will, without exception, no longer be allowed. Ship owners or operators shall ensure that their ships comply with this provision.

Any person who fails to comply with this sub-paragraph commits an offence and is liable upon conviction to a fine not exceeding $5000 or 3 months imprisonment or both.

PARAGRAPH 6

PASSENGERS AND CREW ACCOMMODATION

Contents

6.1 General

This paragraph shall be read in conjunction with the Introduction and General Requirements paragraph.

In this paragraph, crew accommodation means the accommodation to be provided for the Master, Crew and Special Personnel on board ships and passenger accommodation means accommodation provided for passengers on board a ship.

6.2 Application

6.2.1 This paragraph applies to ships of above15 meters in registered length.

6.2.2 The Chief Executive Officer may not require compliance with any of the provisions of this paragraph on ships which are normally engaged on voyages for periods of less than 36 hours, or in which the crew or passengers are not required to reside on board.

6.2.3 In addition, the conditions may be varied in the case of any ship if the Chief Executive Officer is satisfied after consultation with the ship's owners that the variations made provide corresponding advantages as a result of which the overall conditions are not less favourable than those that would result from the full application of the provisions of the paragraph.

6.3 Ship owner's obligations

Ship owners of ships of more than 15 meters in length shall ensure that the ship is built or manufactured according to the provisions of this paragraph or equivalent designs of authorised classification societies and/or international standards approved by the Chief Executive Officer in an approved shipbuilding facility.

PASSENGERS ACCOMMODATION

6.4 General

A ship that engages in voyages of 30 minutes duration or more shall be equipped with seating for every passenger that the ship is certified to carry.

6.5 Passengers seating

6.5.1 If continuous fixed seating is installed, 450 mm^2 of seating shall be allowed for each person.

6.5.2 Any fixed seating installed shall provide for ready escape, with passageways between fixed seating of—

(a) not less than 600 mm wide, if the passageway is 4.5 metres or less in length; or

(b) not less than 750 mm wide, if the passageway is more than 4.5 metres in length.

6.5.3 Seats shall not be installed in working areas of a deck, or in areas between deckhouses or superstructures and bulwarks or rails, or in internal closed passageways where the width of the space is less than 1 metre.

6.5.4 Passengers seating shall be under a cover or awning, such that the passengers are adequately sheltered from rain and spray.

6.6 Toilet Facilities

6.6.1 Toilet facilities shall be provided in accordance with the following:

Number of passengers the ship is certified to carry	Toilet facilities required
up to 12 passengers	1 wc and 1 hand basin
13 to 50 passengers	2 wc and 2 hand basins (or 1 hand basin if both wc are in one compartment)

51 to 100 passengers	3 wc and 3 hand basins (or 2 hand basins if 2 or more wc are in one compartment)
Each additional 100 passengers or remainder over 100	1 additional wc and 1 additional hand basin

6.6.2 An open boat is not required to be provided with toilet facilities

CREW ACCOMMODATION

6.9 General

6.9.1 The location, means of access, structure and arrangement of crew accommodation in relation to other spaces shall be such as to ensure adequate security and protection against weather, sea and undue noise.

6.9.2 There shall be no direct openings into sleeping rooms from fish or cargo holds and spaces, from machinery spaces, from galleys, lamp and paint rooms or from engine, deck and other bulk store rooms, drying rooms, communal wash places or water closet spaces. That part of the bulkhead separating such places from sleeping rooms and external bulkheads shall be constructed of approved material and shall be watertight and gastight.

6.9.3 External bulkheads of sleeping rooms and mess rooms shall be adequately insulated. All machinery casings and all boundary bulkheads of galleys and other spaces in which heat is produced shall be adequately insulated where there is a possibility of resulting heat effects in adjoining accommodation or passageways. Protection shall be provided from heat effects of steam and/or hot-water service pipes.

6.9.4 Internal bulkheads shall be of material which is not likely to harbor vermin.

6.9.5 Sleeping rooms, mess rooms, recreation rooms and passageways in the crew accommodation space shall be insulated to prevent condensation or over-heating.

6.9.6 Main steam and exhaust pipes for winches and similar gear shall, whenever practicable, not pass through crew accommodation or through passageways leading to crew accommodation; where they do pass through such accommodation or passageways they shall be adequately insulated.

6.9.7 Inside paneling or sheeting shall be of material with a surface easily kept clean. Tongued and grooved boarding or any other form of construction likely to harbour vermin shall not be used.

6.9.8 The wall surface and deckheads in sleeping rooms and mess rooms shall be easily kept clean, and, if painted, shall be light in colour; lime wash shall not be used.

6.9.9 The docks in all crew accommodation shall be of approved materials and construction and shall provide a surface impervious to damp and easily kept clean.

6.9.10 Exposed decks over crew accommodation shall be sheathed with wood or have equivalent insulation.

6. 9. 11 Where the floorings are of composition, the joining with the sides shall be rounded to avoid crevices.

6.9.12 Sufficient drainage shall be provided.

6.9.13 All practical measures shall be taken to protect crew accommodation spaces against the admission of flies and other insects.

6 .10 Ventilation

6.10.1 Crew accommodation spaces shall be adequately ventilated.

6.10.2 Ships regularly engaged on voyages in the tropics and other areas with similar climatic conditions, shall be equipped both with mechanical means of ventilation and with electric fans. Provided that only one of these means may be required in spaces where this ensures satisfactory ventilation.

6.10.3 Power for the operation of the aids to ventilation required by sub- paragraph 6.10.2 shall, when practicable, be available at all times when the crew is living or working on board and conditions so require.

6.11 Heating

6.11.1 An adequate system of heating the crew accommodation shall be provided as required by climatic conditions. Ships of Class 3 shall be exempted from this requirement.

6.11.2 The heating system shall, when practicable, be in operation at all times when the crew is living or working on board and conditions so require.

6.11.3 Heating by means of open fires shall be prohibited. Heaters, if used, shall be in a fixed position and so constructed as to reduce fire risks to a minimum. No such heater shall be fitted with a heating medium which is so exposed that clothing, curtains or other flammable materials can be scorched or set on fire by heat from the heater.

6.11.4 The heating system shall be capable of providing a temperature in crew accommodation at a satisfactory level under normal conditions of weather and climate likely to be met with on service.

6.12 Lighting

6.12.1 All crew spaces shall be adequately lit. The minimum standard for natural lighting in living rooms shall be such as to permit a person with normal vision to read on a clear day an ordinary newspaper in any part of the space available for free movement. When it is not possible to provide adequate natural lighting, artificial lighting of the above minimum standard shall be provided.

6.12.2 In all ships electric lights shall, as far as practicable, be provided in the crew accommodation.

6.12.3 An adequate reading light shall be provided for every berth in addition to the normal lighting.

6.13 Free Movement Areas

The clear head room in areas of free movement shall, wherever possible be not less than 2.03 metres.

6.14 Sleeping Rooms

6.14.1 Sleeping rooms shall in no case be forward of the collision bulkhead.

6.14.2 The floor area per person of sleeping rooms, excluding the space occupied by berths and fixed furniture shall not be less than:

Ships Length in metres—	*Area in square metres—*
10 and over but less than 30	0.8
30 and over but less than 35	1.0
35 and over but less than 50	1.85
50 and over but less than 100	2.35
Over 100	2.78

Provided that, in the case of passenger ships in which more than 4 ratings are berthed in one room the minimum per person may be 2.22 square metres.

6.14.3 The number of persons allowed to occupy any sleeping room shall not exceed six.

6.14.4 The maximum number of persons allowed to occupy any sleeping room shall be legibly and indelibly marked in some place in the room where it can conveniently be seen.

6.14.5 Each member of the crew shall be provided with an individual berth.

6.14. 6 Berths shall not be placed side by side in such a way that access to one berth can be obtained only over another.

6.14.7 Berths shall not be arranged in tiers of more than two.

6.14.8 The lower berth in a double tier shall not be less than 0.3m above the floor, the upper berth shall be placed approximately midway between the bottom of the lower berth and the lower side of the deckhead beams.

6.14.9 The minimum inside dimensions of a berth shall wherever practicable be 1.9 metres by 0.80 metres.

6.14.10 If tubular frames are used for the construction of berths, they shall be completely sealed and without perforations which would give access to vermin.

6.14.11 Each berth shall be fitted with a mattress.

6.14.12 When one berth is placed over another a dustproof base shall be fitted beneath the upper berth.

6.14.13 Each occupant shall be provided with a clothes locker of not less than 1.50m height and cross-sectional area 0.19 square metres fitted with a suitable locking

device and a rod for holding clothes on hangers, and a drawer or equivalent space which shall be not less than 0.06 cubic metre.

6.14.14 Any furniture and fittings shall be of smooth, hard material not liable to warp or corrode, or to harbour vermin.

6.14.15 Sidelights in sleeping rooms shall be fitted with means of excluding light.

6.14.16 Each sleeping room shall be fitted with a mirror.

6.14.17 Wherever possible, a separate room should be provided for a member of the crew who suffers from illness or injury.

6.14.18 The number of persons allowed to occupy sleeping rooms shall not exceed the following maxima:

6.14.18.1 officers in charge of a department or a Watch: one person per room;

6.14.18.2 other officers and petty officers: not more than two persons per room;

6.14.18.3 other ratings: not more than 6 persons per room.

6.15 **Mess Rooms**

6.15.1 Mess room accommodation separate from sleeping quarters shall be provided in all ships carrying a crew of more than ten persons. Wherever possible it should be provided also in ships carrying a smaller crew.

6.15.2 The dimensions of each mess room, where provided shall be sufficient for the number of persons using it at any time.

6.15.3 Mess rooms shall be equipped with tables and seats sufficient for true number of persons likely to use them at any one time.

6.15.4 Mess rooms shall be as close as practicable to the galley.

6.15.5 Adequate lockers for mess utensils and proper facilities for washing utensils shall be provided.

6.15.6 The tops of tables and seats shall be of damp resisting material without cracks and easily kept clean.

6.15.7 In ships of more than 30 metres length there shall be a separate mess room for:

6.15.7.1 officers and berthed passengers;

6.15.7.2 ratings.

6.16 Galley

6.16.1 Satisfactory cooking equipment shall be provided on board and shall, wherever practicable, be fitted in a separate galley.

6.16.2 The galley shall be of adequate dimensions for the purpose and shall be well lighted and ventilated.

6.16.3 The galley shall be equipped with cooking utensils, the necessary number of cupboards and shelves, and sinks and dish racks of rust-proof material and

with satisfactory drainage. Where hot water is not supplied to the galley, an apparatus for heating water shall be provided.

6.16.4 Facilities shall be provided for the preparation of hot drinks for the crew at all times.

6.16.5 A cupboard, locker or storeroom of adequate capacity for messing provisions which can be kept dry, and well ventilated to avoid deterioration of stores shall be provided. Where necessary, refrigerators or other low-temperature storage space shall also be provided.

6.17 Sanitation

6.17.1 Sufficient sanitary accommodation, including washing facilities shall be provided.

6.17.2 Sanitary facilities for all members of the crew who do not occupy rooms to which private facilities are attached shall, wherever practicable, be provided on the following scale:

(a) one shower for every six persons or less;

(b) one water closet for every six persons or less; and

(c) one wash basin for every six persons or less.

6.17.3 Cold fresh water and hot fresh water or means of heating water shall be available in all wash places.

6.17.4 Wash basins and shower recesses shall be of adequate size and constructed of material with a smooth surface not liable to crack, flake or corrode.

6.17.5 All water closet spaces shall have independent ventilation to the open air.

6.17.6 The sanitary equipment to be placed in water closet spaces shall be provided with ample flush of water, available at all times and independently controllable.

6.17.7 Soil pipes and waste pipes shall be of adequate dimensions and shall be so constructed as to minimize the risk of obstruction and to facilitate cleaning. They shall not pass through fresh water or drinking water tanks, neither shall they, if practicable, pass overhead in mess rooms or sleeping accommodation.

6.17.8 Sanitary accommodation shall comply with the following requirements:

6.17.8.1 floors shall be of material that is easily cleaned and impervious to damp, and shall be properly drained;

6.17.8.2 bulkheads shall be watertight up to at least 200 mm above the level of the deck;

6.17.8.3 water closet spaces shall not have direct access to spaces where food is stored, prepared or consumed;

6.17.8.4 water closet spaces shall be situated convenient to but separate from sleeping rooms and shall if practicable be separate from washrooms; and

6.17.8.5 where there is more than one water closet in a compartment, they shall be sufficiently screened to ensure privacy.

6 .17. 9 Facilities for washing and drying clothes shall be provided on a scale appropriate to the number of crew and the normal duration of the voyage.

6.17. 10 The facilities for washing clothes shall include suitable sinks equipped with drainage which may be installed in washrooms if separate laundry accommodation is not reasonably practicable. The sinks shall be provided with an adequate supply of cold fresh water and hot fresh water or means of heating water.

6.17.11 Where practicable the facilities for drying clothes may be provided in an adequately ventilated compartment separate from sleeping quarters, mess rooms and water closet spaces.

6.18 Miscellaneous

6.18.1 Sufficient and adequately ventilated accommodation for the hanging of oilskins shall be provided outside, but convenient to the sleeping rooms.

6.18.2 Crew accommodation shall be maintained in a clean and habitable condition and shall be kept free of goods and stores which are not the personal property of the occupants.

PARAGRAPH 7
LOADLINES

Contents

7. 1 This paragraph is divided into Parts as follows—

Part 1 : Preliminary
Part 2 : Requirements for Load Line Convention Ships
Part 3 : Requirements for Ships other than Load Line Convention Ships
Part 4 : Appendices
Appendix A — Computation of freeboard for ships less than 24 metres in length
Appendix B — Conditions of assignment for ships less than 24 metres in length.
Appendix C — Fiji Loadline Certificate
Appendix D — International Load Line Certificate
Appendix E — International Loadline Exemption Cetificate

PART 1—PRELIMINARY

7. 2 This paragraph should be read in conjunction with the Introduction, Definitions and General Requirements paragraph.

PART 2—REQUIREMENTS FOR LOAD LINE CONVENTION SHIPS

7.3 The requirements for determining load lines of Load Line Convention Ships are detailed in the Load Line Convention and the Regulations annexed to that Convention and shall comply with the provisions of this part.

7.4 Owner's and master's obligations

7.4.1 The owner of a Fiji ship engaged in international trade and foreign ship within Fiji's jurisdiction shall—

(a) in the case of a new ship, apply to the Chief Executive Officer or an assigning authority for the assignment of freeboards to the ship;

(b) provide the Chief Executive Officer or the assigning authority with such plans, drawings and specifications and other documents and information relating to the design and construction of the ship as the Chief Executive Officer or assigning authority may require;

(c) cause the ship to be surveyed in accordance with the Load Line Convention and the provisions of this Part; and

(d) afford all necessary facilities for such surveys.

7.4.2 The owner and master of a Fiji ship engaged in international trade and foreign ship within Fiji's jurisdiction shall—

(a) comply with and ensure compliance with this paragraph and the provisions of Articles 2, 3, 7, 10 to 15, Annex I and Annex II of the Load Line Convention;

(b) not allow the ship to proceed on any voyage unless—

(i) it is surveyed, maintained and marked in accordance with this paragraph and the Load Line Convention; and

(ii) there is held in respect of the ship a valid International Load Line Certificate and International Load Line Exemption Certificate as applicable.

7.5 Assigning Authority

7.5.1 The Chief Executive Officer or an assigning authority freeboard(s) to a Fiji ship engaged in international trade in accordance with this paragraph and the Load Line Convention; shall determine—

(a) the particulars of the freeboard(s) to be assigned; which load lines are to be marked on the sides of the ship; and the position where the load lines and deck line are to be marked; and

(b) complete and keep a record of particulars relating to the conditions of assignment.

7.5.2 The Chief Executive Officer or an assigning authority shall survey, inspect or mark any ship in accordance with this paragraph and the Load Line Convention.

7.6 Passenger Ships

If a passenger ship is marked with subdivision load lines and the lowest of those lines is lower than the appropriate load line determined in accordance

with the Load Line Convention, the Chief Executive Officer or an assigning authority shall assign that subdivision load line in place of the appropriate load line if the subdivision load line is required to be marked on the ship and in all other cases, assign that subdivision load line in place of the appropriate load line.

7.7 Assignment of greater than minimum freeboard

The Chief Executive Officer or an assigning authority may assign greater than minimum freeboard to a ship—

(a) at the request of the owner of the ship; or

(b) if the structural strength arrangement of openings in the hull or design of the ship make assignment of the minimum freeboard inappropriate.

7.8 Issue, endorsement and renewal of certificates

7.8.1 Upon application by the owner under section 23 of the Decree, the Chief Executive Officer may, in accordance with section 24 of the Decree and Articles 16 to 18 of the Load Line Convention, issue to any ship that has been surveyed, inspected and marked in accordance with the Convention—

(a) an International Load Line Certificate; or

(b) if the ship has been given an exemption in accordance with paragraph 7.3.8, an International Load Line Exemption Certificate, in the form prescribed in Annex III of the Convention.

7.8.2 Upon application by the owner under section 23 of the Decree, the Chief Executive Officer may, in accordance with section 24 of the Decree and Articles 17 to 19 of the Load Line Convention, endorse or renew – the International Load Line Certificate or the International Load Line Exemption Certificate, of a ship that has been surveyed, inspected and marked in accordance with the Convention.

7.9 Validity of Certificates

7.9.1 Article 19 of the Load Line Convention shall apply to the duration and validity of International Load Line and International Load Line Exemption Certificates.

7.9.2 The Chief Executive Officer may, in accordance with section 27 of the Decree suspend an International Load Line Certificate or International Load Line Exemption Certificate issued by the Chief Executive Officer if—

(a) any material alteration is made to the hull or superstructures of the ship that necessitates the assignment of an increased freeboard;

(b) the fittings and appliances for the protection of means of access to the crew's quarters, openings, guard rails or freeing ports are not maintained in an effective condition; or

(c) the structural strength of the ship is lowered to such an extent that the ship is unsafe.

7.9.3 An International Load Line Certificate or International Load Line Exemption Certificate issued by the Chief Executive Officer shall cease to be valid if a ship ceases to be registered as a Fiji ship.

7.10 Certificates required to be kept on board

The owner and master of a ship shall ensure that the ship's

(a) International Load Line Certificate

(b) International Load Line Exemption Certificate;

is readily available on board for examination by the Chief Executive Officer or an assigning authority at all times.

7.11 Exemptions

7.11.1 The Chief Executive Officer may exempt, in accordance with section 33 of the Decree, any ship that embodies features of a novel kind from any of the provisions of this part, the application of which might seriously impede research into the development of such features and their incorporation in ships. Any such ship shall, however, comply with safety requirements that in the opinion of the Chief Executive Officer are adequate for the service for which it is intended and that ensure the overall safety of the ship and are acceptable to the governments of States to be visited by the ship.

7.11.2 A ship that is not normally engaged in international voyages but that, in exceptional circumstances, is required to undertake a single international voyage may be exempted by the Chief Executive Officer under section 33 of the Decree from any of the requirements of this part, provided it complies with safety requirements that in the opinion of the Chief Executive Officer are adequate for the voyage that it is to undertake.

7.12 Entries to be made in an Official Fiji Logbook

The master of a Fiji ship engaged in international trade that is required to be in possession of an International Load Line Certificate or International Load Line Exemption Certificate shall enter particulars of the deck line and load lines specified in that certificate including the particulars of the depth to which the ship is loaded before the ship proceeds to sea from any dock, wharf, harbour, or other place in the official logbook.

7.13 Port State Control

The owner and the master of a foreign ship within Fiji's jurisdiction to which this part applies shall ensure that the ship carries on board a valid International Load Line Certificate issued under Article 16 or Article 17 of the Load Line Convention, or a valid International Load Line Exemption Certificate issued under Article 16 of the Load Line Convention, or equivalent certificates recognised as such by the Chief Executive Officer under the Decree.

7.14 Existing foreign Loadline Convention Ships

7.14.1 Existing foreign ships which are required to be deregistered from its previous flag and re-registered in Fiji shall undergo a verification survey of the existing loadline marking.

7.14.2 At the completion of the survey, the Chief Executive Officer or assigning authority shall assign loadline marks of Fiji or of the assigning authority and issue the relevant loadline certificate to the ship.

7.15 Load Line Convention Ships surveyed by Classification Society in accordance with the requirements of the Convention when re-registered in Fiji shall undergo a verification survey of the existing load line certificate.

PART 3—REQUIREMENTS FOR SHIPS OTHER THAN LOAD LINE CONVENTION SHIPS

7.16 Definition

In this Part unless the context otherwise requires:

(a) **"length"** means the length taken as 96% of the total length on a waterline at 85% of the least moulded depth measured from the top of the keel, or as the length from the foreside of the stem to the axis of the rudder stock on that waterline if that be greater. In ships designed with a rake of keel, the "waterline on which this length is measured shall be parallel to the designed waterline. Provided that, in a case where no relevant plans of a ship are available, the length maybe taken as 91% of the length overall, except in the case of ships of landing craft type when a figure of 88% of the length overall should be used.

(b) **"moulded depth"** means the vertical distance measured from the top of the keel to the top of the freeboard deckbeams at side. In wood and composite ships the distance is measured from the lower edge of the keel rabbet. Where the form at the lower part of the midship section is of a hollow character or where thick garboards are fitted, the distance is measured from the point where the line of the flat of the bottom continued inwards cuts the side of the keel. In ships having rounded gunwales, the moulded depth shall be measured to the point of intersection of the moulded lines of the deck and sides, the lines extending as though the gunwales were of angular design. Where the freeboard deck is stepped and the raised part of the deck extends over the point at which the moulded depth is to be determined the moulded depth shall be measured to a line of reference extending from the lower part of the deck along a line parallel with the raised part.

(c) **"Position 1"** means a position upon exposed freeboard and raised quarter decks and upon exposed superstructure decks, situated forward of a point located a quarter of the ship's length from the forward perpendicular.

(d) **"Position 2"** means a position upon exposed superstructure decks situated abaft a quarter of the ship's length from the forward perpendicular.

[1] In accordance with the IMO ship Identification Number Scheme, adopted by resolution A600(15).

(e) **"ship"** does not include a ship that is a Load Line Convention ship or a ship in respect of which a valid International Load Line Certificate or an International Load Line Exemption Certificate is in force.

7.17 Owner's and Master's Obligation

7.17.1 The owner and the master of a ship to which this part applies shall not allow the ship to proceed on a voyage unless it is surveyed, maintained and marked in accordance with the requirements of this paragraph.

7.17.2 The master of a ship to which this part applies shall ensure that the appropriate load line on the sides of the ship are not submerged at any time when the ship commences a voyage, during the voyage, or on arrival.

7.18 Freeboard Computation

(a) Subject to the provisions of paragraph 7.27, in the case of a ship of 24 metres length or more, the freeboard shall be computed in the manner set down in the Load Line Convention and the provisions of Part 2 of this paragraph.

(b) Subject to the provisions of paragraph 7.27, in the case of a ship of less than 24 metres length, the freeboard shall be computed in the manner prescribed in Appendix A of this Part.

7.19 Conditions of Assignment

(a) Subject to the provisions of paragraph 7.26, in the case of a ship of 24 metres length or more, the conditions of assignment of freeboard shall be those set down in the Load Line Convention.

(b) Subject to the provisions of paragraph 7.26, in the case of a ship of less than 24 metres length, the conditions of assignment of freeboard shall be those conditions prescribed in Appendix B.

7. 20 Survey

(a) Non-Load Line Convention Ships shall undergo an initial load line survey to establish the ship's freeboard and correct marking.

(b) The owner and master of a new ship to which this paragraph applies shall ensure that the ship is subject to an initial survey before it is put into service.

(c) The owner and master of a new ship shall provide the Chief Executive Officer with such plans, drawings, specifications and other documents and information relating to the design and construction of the ship as the Chief Executive Officer or assigning authority may require.

(d) The freeboard shall be stated on the Survey Certificate.

(e) Maintenance of the Conditions of Assignment of the load line shall be ascertained annually as part of the Annual Survey.

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[2] Insert the date of expiry as specified by the Administration in accordance with article 19(1) of the Convention. The day and the month of this date correspond to the anniversary date as defined in article 2(9) of the Convention, unless amended in accordance with article 19(8) of the Convention.

(f) A surveyor undertaking an initial survey shall make a complete inspection of the ship's structure and equipment and of the relevant information supplied to the master to ensure that the ship complies with this part.

(g) Where, due to an accident, alteration, or general deterioration of the ship it is considered the existing freeboard may be insufficient; or the owner so requests, a Special Load line Survey shall be conducted.

(h) The owner and the master of any ship to which this part applies shall ensure that after any survey required by this paragraph has been completed, no change is made in the structure, equipment, arrangements, material, or scantlings covered by the survey without the sanction of the Chief Executive Officer.

7.21 Certificates required to be kept on board

The owner and master of a ship shall ensure that the ship's—

(a) Fiji Load Line Certificate; or

(b) Fiji Load Line Exemption Certificate,

whichever certificate is applicable, is readily available on board for examination by the Chief Executive Officer at all times.

7.22 Markings

7.22.1 General requirements for marking. A ship shall be marked on each side with:

(a) a draft mark

(b) a deck line mark;

(c) a load line mark; and

(d) the mark of the assigning authority.

The marks described above are specified in Appendix C.

7.22.2 *(a)* The owner of a Fiji ship of 15 metres or more in length shall ensure that the ship is marked on each side of its stem and stern post (and where no stern post is fitted, in the line of the centre of the rudder stock) with a scale of marks showing its draught.

(b) The owner shall ensure that—

(i) the draught marks are in Arabic numerals not less than 100 millimetres in height and spaced 200 millimetres vertically; and

(ii) the lower line of the numerals coincide with the draught shown; and

(iii) all numerals are cut in or welded on and painted either in a light colour on a dark background, or a dark colour on a light background.

7.23 Load Line Marks

7.23.1 The load line mark of a ship shall consist of a ring that is:

(a) 300 mm in outside diameter;

(b) 25 mm in breadth; and

(c) intersected by a horizontal line 375 mm in length and 25 mm in breadth, the upper edge of which passes through the center of ring.

7.23.2 The center of the ring referred to in sub-paragraph 7.23.1 shall be placed at mid length and at a distance equal to the assigned freeboard, measured vertically below the upper edge of the deck line.

7.24 Mark of assigning authority

(a) The letters denoting the assigning authority for the load line of a ship shall be marked on the ship on either side of the load line disc, the base of such letters being in line with the horizontal line referred to in sub-paragraph 7.23.1*(c)*.

(b) The letters referred to in sub-paragraph 7.24 *(a)* shall be 100 mm in height and of proportionate breadth.

(c) Where the assigning Authority is the Maritime Safety Authority of Fiji the marking shall consist of the letter MS placed to the left hand side of the load line disc and the letter AF placed on the right hand side of the load line disc. The letters shall be 100 mm high, 80 mm wide and 15 mm in thickness.

7.25 Details of marking

The ring and lines referred to in this sub-paragraph shall be painted in white or yellow on a dark ground or black on a light ground and shall be permanently marked on the side of the ship in such a manner as to be plainly visible to the satisfaction of the Chief Executive Officer.

7.26 Modification of requirements for existing ships

In the case of a ship that is an existing ship, the requirements of paragraph 8 *(c)* relating to conditions of assignment shall be complied with as far as is in the opinion of the Chief Executive Officer, reasonable and practicable having regard to the efficiency of:

(a) the protection of openings;

(b) the guard-rails and freeing ports; and

(c) the means of access to crew accommodation, provided by the existing arrangements of the fittings and appliances on the ship.

7.27 Freeboards in existing ships

Where freeboards have been assigned by an assigning authority to a ship that is an existing ship and the ship is re-registered to Fiji, the ship may retain those

freeboards provided that the conditions of assignment maintained in the ship are continued as effective as when the original assignment was made and when the ship is uphauled on the slip or dry-docked, the assigning authority marks are changed to MSAF.

PART 4—APPENDICES

Appendix A	—	Computation of freeboard for ships less than 24 metres in length
Appendix B	—	Conditions of assignment for ships less than 24 metres in length
Appendix C	—	Fiji Loadline Certificate
Appendix D	—	International Load Line Certificate
Appendix E	—	International Loadline Exemption Certificate

APPENDIX A

COMPUTATION OF FREEBOARD FOR SHIPS LESS THAN 24 METRES IN LENGTH

A1.0 For all ships having a continuous watertight deck and where hatchways are secured watertight by steel covers or equivalent means: 200 millimetres.

A2.0 For all ships having a continuous watertight deck and where hatchways are secured watertight by wooden boards and tarpaulins: 250 millimetres.

A3.0 For ships which are open or only partly decked:

Length	*Freeboard*
10 metres and over	500 millimetres
6 metres or less	400 millimetres

Freeboard for intermediate lengths are to be obtained by linear interpolation.

A4.0 Additional freeboard for ships licensed to carry passengers

A4.1 In addition to the freeboard assigned in paragraphs A1.0, A2.0 or A3.0 to the ship shall, if necessary, be increased to such that, if all the passengers the ship is licensed to carry are placed on one extreme side of the ship on the uppermost deck, while the ship is in its fully loaded condition, the resultant list shall not submerge the loadline more than 50% of such freeboard assigned. For this purpose it is assumed 13.6 persons to weigh one ton.

APPENDIX B

CONDITIONS OF ASSIGNMENT FOR SHIPS LESS THAN 24 METRES IN LENGTH

B1.0. Sill Height

B1.1 The height above deck of sills in doorways of deckhouses shall comply with the following:

B1.2 The height above the deck of sills in doorways of deckhouses or superstructures on the weather deck from inside from which there is direct access to spaces below the weather deck shall not be less than 300 mm.

B1.3 The height above the deck of sills in doorways of deckhouses, or companion ways on the weather deck which are shielded from the full force of the sea, except those giving direct access to machinery spaces, shall be not less than 150 mm.

B2.0 Hatch Coamings of Standard Height

B2.1 The coamings of hatchways in Position 1 and Position 2 shall be of substantial construction. The height above deck of coamings in Position 1 and Position 2 shall be not less than 450 mm and 300 mm respectively.

B3.0 Hatch Coamings of Reduced or No Height

B3.1 Where hatches situated within the mid half beam of the ship are of a width less than half the beam of the ship, are closed with efficient weather tight covers of steel or other equivalent materials fitted with gaskets and clamping devices and are capable of being rapidly closed and battened down and the Chief Executive Officer is satisfied that the safety of the ship in the sea conditions will not be impaired by so doing, the Chief Executive Officer may:

(a) determine that the coamings of these hatchways shall be of a height less than that specified above; or

(b) determine that the coamings for these hatchways be omitted and in such a case the coamings shall be of the height so specified or the coamings may be omitted.

B4.0 Scuppers and Discharges

Scuppers and discharge pipes which pass through the side of the ship shall comply with the following—

(a) scuppers and discharge pipes, excluding machinery exhaust, in an easily accessible position against the ship's side, except that where approved bilge alarms are fitted, such valves or cocks shall not be required in the case of discharges not exceeding 40 mm internal diameter, the lowest point of which is not less than 225 mm above the load waterline. Waste and soil discharges greater than 40 mm internal diameter from spaces above the freeboard deck which are led through the ship's side more than 225 mm above the summer load waterline maybe fitted with a non-return valve in lieu of a screw-down valve or cock.

(b) Main propulsion machinery exhaust systems shall be fitted with an approved hull fitting, the lower edge of which shall be as high as practicable but not less than 225 mm above the summer load waterline. Such systems may pass through watertight bulkheads aft of the machinery space provided that—

(i) an afterpeak bulkhead is fitted extending to the weather deck;

(ii) the system is passed through the bulkhead or bulkheads as close to the underside of the weather deck as practicable; and

(iii) an approved bulkhead fitting is provided at each watertight bulkhead through which the system passes.

(c) Auxiliary machinery exhaust systems shall comply with the provisions of sub-paragraph 4(*b*)(i) above and shall not pass through watertight bulkheads without the approval of the Chief Executive Officer.

B5.0 Freeing Ports

B5.1 Where bulwarks in the weather portion of a freeboard deck form wells, there shall be provided, on each side of the ship, in each well a minimum freeing port area having the same number of square meters as the number obtained as follows:

(a) Where the length of the well is 20 meters or greater, from the formula:

Freeing port area = 0.07 g

Where

g = length of well in meters; or

(b) Where the length of the well is less than 20 meters, from the following table:

Length of Well (Meters)	*Freeing Port Area (Each bulwark, Square Meters)*
2.5	0.28
5.0	0.52
Length of Well (Meters)	*Freeing Port Area (Each bulwark, Square Meters)*
7.5	0.72
10.0	0.90
12.5	1.07
15.0	1.21
17.5	1.32

The freeing port area for intermediate lengths of well may be determined by interpolation.

B5.2 Where the average height of bulwark exceeds 1.2 meters, the area obtained in accordance with the provisions of sub-paragraph B5.1 shall be increased by the number of square meters ascertained from the formula: 0.04 gh.

B5.3 Where the average height of bulwark is less than 0.9 meters, the area obtained

[3] In accordance with the IMO ship Identification Number Scheme, adopted by resolution A600(15).

[4] Delete as appropriate

in accordance with the provisions of sub-paragraph B5.1 shall be reduced by the number of square meters ascertained from the formula: 0.04 gh2.

B5.4 For the purposes of sub- paragraph B5.2 and B5.3:

g = length of the bulwark in the well;

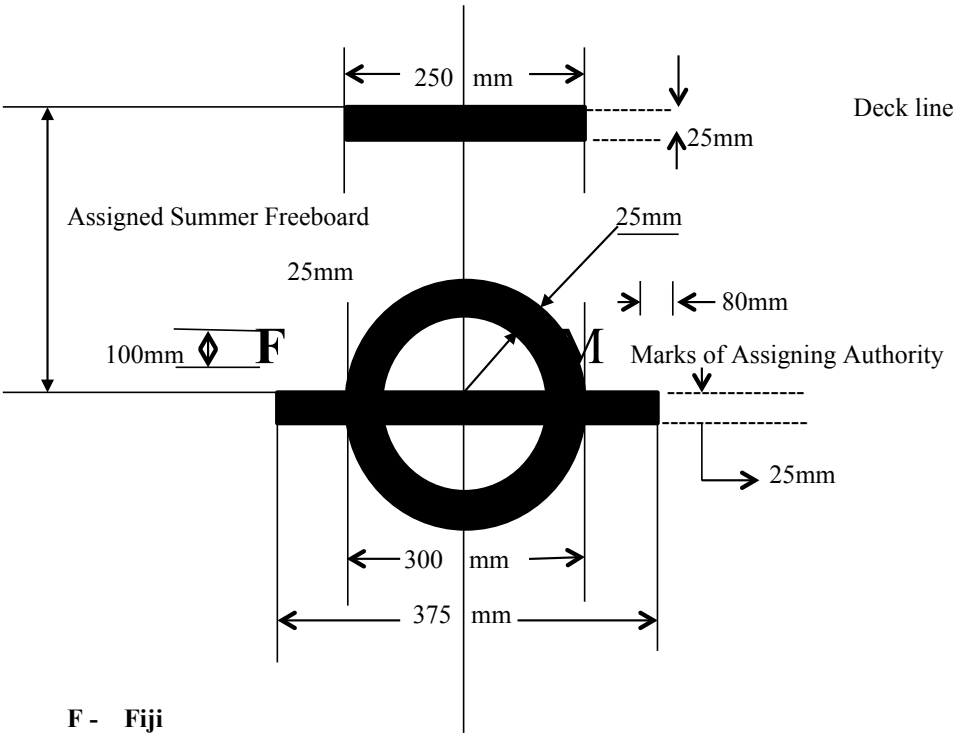
h = the difference in meters between the average height of the bulwark in the well and 1.2 meters; and

h2 = the difference in meters between the average height of the bulwark in the well and 0.9 meters.

B6.0 Air Pipes and Ventilator Coamings

B6.1 The heights of air pipes and ventilator coamings in Position 1 and Position 2 shall be not less than 450 mm and 300 mm respectively.

APPENDIX C
FIJI LOADLINE



F - Fiji
M – Maritime

[5] Insert the date of expiry as specified by the Administration in accordance with article 19(10) of the Convention. The day and the month of this date correspond to the anniversary date as defined in article 2(9) of the Convention, unless amended in accordance with article 19(8) of the Convention.

APPENDIX D—INTERNATIONAL LOAD LINE CERTIFICATE

Certificate No:

Deadweight:

INTERNATIONAL LOAD LINE CERTIFICATE

ISSUED UNDER THE PROVISIONS OF THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966, AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO UNDER THE AUTHORITY OF THE GOVERNMENT OF FIJI

———

(Maritime Safety Authority of Fiji or Assigning Authority)

Particulars of Ship

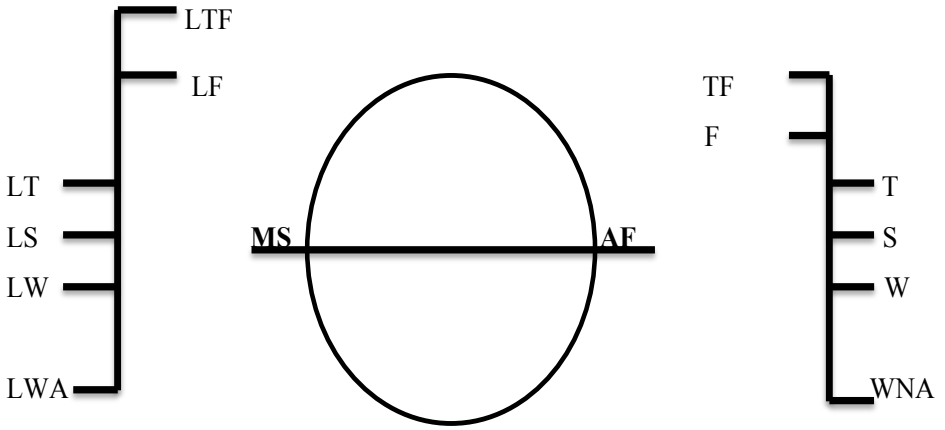
Name of Ship	Distinctive Number or Letters	Port of Registry	Length(L) as defined in article 2(8)	IMO Number[1]

Freeboard assigned as: Type of ship:

Freeboard from Deck Line		*Load Line*
Tropical	mm (T)	mm above (S)
Summer	mm (S) upper edge of line through centre of ring	
Winter	mm (W)	mm below (S)
Winter North Atlantic	mm (WNA)	mm below (S)
Timber tropical	mm (LT)	mm above (LS)
Timber summer	mm (LS)	mm above (S)
Timber winter	mm (LW)	mm below (LS)
Timber winter North Atlantic	mm (LWNA)	mm below (LS)

Allowance for fresh water for all freeboards other than timber
For timber freeboards _____

The upper edge of the deck line from which these freeboards are measured is_____ _____ deck at side.



MSAF or Assigning

Authority Seal

THIS IS TO CERTIFY:

1. That the ship has been surveyed in accordance with the requirements of article 14 of the Convention.
2. That the survey showed that the freeboards have been assigned and load lines shown above have been marked in accordance with the Convention.

This certificate is valid until _____[2]

Subject to the annual surveys in accordance with the article 14(1) *(c)* of the Convention

Completion date of the survey on which this certificate is based:

_____

MSAF or Assigning Authority Seal

Issued at _____

Place of issue of certificate

_____ _____

Date of issue *MSAF or Assigning Authority*

NOTES:

MSAF or Assigning Authority Seal

[6] Delete as appropriate

ENDORSEMENT FOR ANNUAL SURVEYS

THIS IS TO CERTIFY that, at an annual survey required by article 14(1) *(c)* of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Annual Survey:

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Annual Survey:

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Annual Survey:

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Annual Survey:

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

ANNUAL SURVEY IN ACCORDANCE WITH ARTICLE 19(8) *(c)*

THIS IS TO CERTIFY that, at an annual survey required by article 19(8) *(c)* of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Signed: _____
MSAF or Assigning Authority

Place: _____

Date:_____

Endorsement to extend the certificate if valid for less than 5 years where article 19(3) applies

The ship complies with the relevant requirements of the Convention, and this certificate shall, in accordance with article 19(3) of the Convention, be accepted as valid until _____.

_____.

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

MSAF or Assigning Authority Seal

Endorsement where the renewal survey has been completed and article 19(4) applies

The ship complies with the relevant requirements of the Convention, and this Certificate shall, in accordance with article 19(4) of the Convention, be acceptable as valid until _____

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where article 19(5) or 19(6) applies.

The certificate shall in accordance with article 19(5) or 19(6) of the Convention, be acceptable as valid until _____.

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Endorsement for advancement of anniversary date where article 19(8) applies

In accordance with article 19(8) of the Convention, the new anniversary date is_____

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

In accordance with article 19(8) of the Convention, the new anniversary date is _____

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

MSAF or Assigning Authority Seal

APPENDIX E—INTERNATIONAL LOADLINE EXEMPTION CERTIFICATE

INTERNATIONAL LOAD LINE EXEMPTION CERTIFICATE

ISSUED UNDER THE PROVISIONS OF THE INTERNATIONAL CONVENTION ON LOAD LINES, 1966, IN ACCORDANCE WITH ASSEMBLY RESOLUTION A. 883(21) RELATING TO THE GLOBAL IMPLEMENTATION OF THE HARMONIZED SYSTEM OF SURVEY AND CERTIFICATION

UNDER THE AUTHORITY OF THE GOVERNMENT OF

FIJI

by _____
MSAF or Assigning Authority

Particulars of ship

Name of Ship	Distinctive Number or Letters	Port of Registry	Length (L) as defined in article 2(8) (in metres)	IMO Number[3]

THIS IS TO CERTIFY that the ship is exempted from the provisions of the Convention, under the authority conferred by article 6(2)/ 6(4)[4] of the Convention referred to above.

The provisions of the Convention from which the ship is exempted under article 6(2) are:

_____
_____
_____

The voyage for which exemption is granted under article 6(4) is:

From: _____

To: _____

Conditions, if any, on which the exemption is granted under either article 6(2) or article 6(4):

_____
_____
_____

This certificate is valid until_____[5] subject to annual surveys in accordance with article 14(1) *(c)* of the Convention.

Issued at _____
Place of issue of certificate

MSAF or
Assigning
Authority Seal

_____ _____
Date of issue *MSAF or Assigning Authority*

ENDORSEMENT FOR ANNUAL SURVEYS

THIS IS TO CERTIFY that, at an annual survey required by article 14(1) *(c)* of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Annual Survey:

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Annual Survey:

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Annual Survey:

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Annual Survey:

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

MSAF or Assigning Authority Seal

ANNUAL SURVEY IN ACCORDANCE WITH ARTICLE 19(8) (c)

THIS IS TO CERTIFY that, at a survey required by article 19(8) *(c)* of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Endorsement to extend the certificate if valid for less than 5 years where article 19(3) applies

The ship complies with the relevant requirements of the Convention, and this certificate shall, in accordance with article 19(3) of the Convention, be accepted as valid until_____

_____.

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Endorsement where the renewal survey has been completed and article 19(4) applies

The ship complies with the relevant requirements of the Convention, and this Certificate shall, in accordance with article 19(4) of the Convention, be acceptable as valid until_____

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where article 19(5) or 19(6) applies.

The certificate shall in accordance with article 19(5) or 19(6)[6] of the Convention, be acceptable as valid until_____.

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

Endorsement for advancement of anniversary date where article 19(8) applies

In accordance with article 19(8) of the Convention, the new anniversary date is _____

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

In accordance with article 19(8) of the Convention, the new anniversary date is _____

Signed: _____
MSAF or Assigning Authority

Place: _____

Date: _____

MSAF or Assigning Authority Seal

PARAGRAPH 8—TONNAGE MEASUREMENT

CONTENTS

8.1 This paragraph is divided into Parts as follows:

PART 1—PRELIMINARY

8.2 This paragraph should be read in conjunction with the Introduction, Definitions and General Requirements paragraph.

PART 2—TONNAGE MEASUREMENT CONVENTION SHIPS

8.3 Ships to which the Tonnage Measurement Convention applies shall have their tonnage determined according to that convention and the provisions of this Part.

8.4 Requirement for ship to be measured for tonnage

8.4.1 The owner of every Fiji ship engaged in international voyage shall ensure that—

(a) the ship is measured and the net and gross tonnage of the ship calculated by a surveyor—

(i) prior to registration of the ship in accordance with section 5 of the Ship Registration Decree 2013; and

(ii) on completion of the initial construction of the ship; and

(iii) after any alteration to the characteristics of the ship in or accordance with regulation 8.6; and

(b) the ship has an International Tonnage Certificate (1969) issued in accordance with this Part.

8.5 Determination of tonnage

8.5.1 Every surveyor measuring a ship and calculating its gross and net tonnage shall do so in accordance with this paragraph.

8.5.2 The owner and the master of a ship to be measured shall make the ship and all necessary facilities for the inspection and measurement available to the surveyor.

8.5.3 The owner and the master shall produce for the surveyor's use, and retention if required, such plans, drawings, specifications and other documents relating

to the ship that the surveyor may require to enable him or her to calculate the gross and net tonnages of the ship.

8.5.4 Gross tonnage Calculation

The gross tonnage (GT) of a ship shall be determined by the following formula:

$$GT = K1V$$

where: V = Total volume of all enclosed spaces of the ship in cubic metres,

$K1 = 0.2 + 0.02 \log_{10} V$

8.5.5 Net tonnage

The net tonnage (NT) of a ship shall be determined by the following formula:

$$NT = K_2 V_c \left(\frac{4d}{3D}\right)^2 + K_3 \left(N_1 + \frac{N_2}{10}\right)$$

in which formula

(a) the factor $[\frac{4d}{3D}]^2$ shall not be taken as greater than unity; and

(b) the term $K_2 V_c (\frac{4d}{3D})^2$ shall not be taken as less than 0.25GT; and

(c) NT shall not be taken as less than 0.30 GT, and in which:

Vc = total volume of cargo spaces in cubic metres,

$K_2 = 0.2 + 0.02 \log_{10} Vc$

$K_3 = 1.25 \quad \frac{GT + 10{,}000}{10{,}000}$

D = moulded depth amidships in metres,

d = moulded draught amidships in metres,

N_1 = number of passengers in cabins with not more than 8 berths,

N_2 = number of other passengers,

$N_1 + N_2$ = total number of passengers the ship is permitted to carry as indicated in the ship's passenger certificate; when $N_1 + N_2$ is less than 13, N1 and N_2 are to be taken as zero,

GT = gross tonnage of the ship as determined by sub regulation 8.5.4.

8.6 Change of tonnage

The owner of a ship to which this rule applies shall ensure that when any characteristics of the ship such as—

(a) the arrangement; or

(b) the construction; or

(c) the capacity; or

(d) the use of spaces; or

(e) the total number of passengers the ship is permitted to carry (as indicated in the ship's passenger certificate); or

(f) the assigned load line; or

(g) the permitted draught; are altered resulting in an increase in the ship's tonnage, details of the alterations are forwarded within 14 days of the completion of those alterations to a surveyor to allow the surveyor to re-measure the ship and calculate the new gross and net tonnages.

8.7 Measurement and calculation

Every surveyor calculating the gross and net tonnages of a ship for the purposes of this paragraph—

(i) shall measure all volumes—

(a) to the inner side of the shell or structural boundary plating in ships constructed of metal (irrespective of the fitting of insulation or the like); and

(b) to the outer surface of the shell or to the inner side of structural boundary surfaces in ships constructed of any other material; and

(ii) shall include in the calculation of total volume the volumes of appendages; and

(iii) may exclude from the total volume the volumes of spaces open to the sea; and

(iv) shall take to 2 decimal places all measurements used in the calculation of volumes; and

(v) shall calculate the volumes by mathematical and computational methods acceptable to the Chief Executive Officer.

8.8 Issue of certificates

8.8.1 If the owner of a Fiji ship who engages in international voyage to which this paragraph applies makes an application under section 23 of the Decree for an International Tonnage Certificate (1969) in respect of the ship, and the Chief Executive Officer to whom application is made is satisfied that a surveyor has measured the ship and calculated the gross and net tonnages in accordance with the requirements of this Part, the Chief Executive Officer to whom application is made shall issue, under Section 24 of the Decree an International Tonnage Certificate (1969) in respect of the ship, in the form TM1 as prescribed in Part 4 of this paragraph or Appendix II of the Tonnage Convention.

8.8.2 When there is a decrease or increase in the net tonnage of a ship to which this paragraph applies due to—

(a) an alteration or modification in the characteristics of the ship; or

(b) an alteration to the load line because of a change in trade;

a new International Tonnage Certificate (1969) shall be issued by the Chief Executive Officer to the ship when the Chief Executive Officer is satisfied that a surveyor has re-measured the ship and re-calculated the gross and net tonnage in accordance with the requirements of this Part and the Tonnage Convention.

8.8.3 The Chief Executive Officer may issue a new International Tonnage Certificate (1969) to a ship within 12 months of the date of issue of the current International Tonnage Certificate (1969) if—

(a) the ship is transferred to the Fiji flag; or

(b) the ship undergoes alterations or modifications considered by the Chief Executive Officer to be major changes.

8.9 Port State Control

8.9.1 The Chief Executive Officer may inspect a ship flying the flag of a state party to the Tonnage Convention when at a Fiji port or Fiji offshore terminal to verify—

(a) that the ship has a valid International Tonnage Certificate (1969); and

(b) the main characteristics of the ship correspond to the data given in the certificate.

8.9.2 In no case shall the inspection cause any delay to the ship. If the inspection reveals that the main characteristics of the ship differ from those on the International Tonnage Certificate (1969) so as to lead to an increase in the gross tonnage or the net tonnage, the Chief Executive Officer shall inform the Government of the state whose flag the ship is flying without delay.

PART 3—SHIPS TO WHICH THE TONNAGE MEASUREMENT CONVENTION DOES NOT APPLY

8.10 Requirement for ship to be measured for tonnage

The owner of every Fiji ship to which this part applies shall ensure that—

(a) the ship is measured and the net and gross tonnage of the ship calculated by a Surveyor—

(i) prior to registration of the ship in accordance with section 5 of the Ship Registration Decree; and

(ii) on completion of the initial construction of the ship; and

(iii) after any alteration to the characteristics of the ship in accordance with regulation 8.6 of Part 2 of this paragraph ; and

(b) the ship has a Fiji Tonnage Certificate issued in accordance to regulation 8.17.

8.11 Determination of tonnage

8.11.1 Every surveyor measuring a ship and calculating its gross and net tonnage shall do so in accordance with this part.

8.11.2 The owner and the master of a ship to be measured shall make the ship and all necessary facilities for the inspection and measurement available to the surveyor.

8.11.3 The owner and the master shall produce for the surveyor's use, and retention if required, such plans, drawings, specifications and other documents relating to the ship that the surveyor may require to enable him or her to calculate the gross and net tonnages of the ship.

8.12 Ships to which the Tonnage Measurement Convention does not apply shall have their tonnage determined according to that Convention, subject to the following:

8.12.1 Ships of less than 24 meters length shall have their gross tonnage determined according to the formula:

$$\text{Gross tonnage} = 0.24\ (0.6\ LBD + VgA)$$

Where:

L = Length in Meters on upperdeck from stem to rear stern profiles;

B = Maximum breadth in Meters measured to the outer surface of the hull;

D = Moulded depth in Meters at half of the length measured from the top of the keel up to the underside of the upper-deck including round of beam at the middle plane;

VgA = Volume in Cubic Meters of closed structures, deckhouses and other main bodies.

8.13 Ships of less than 15 meters length shall not be required to have their tonnage determined, but when the owner so requests, a tonnage may be determined in accordance with this Part.

8.14 In respect of existing ships Article 3 of the Convention shall apply. The Convention came into force in respect of Fiji on 18th July 1982.Paragraph (2) *(d)* of Article 3 of the Convention shall come into effect in respect of Fiji on 18th July 1994.

8.15 Change of tonnage

The owner of a Fiji ship to which this part applies shall ensure that when any characteristics of the ship such as—

(a) the arrangement; or

(b) the construction; or

(c) the capacity; or

(d) the use of spaces; or

(e) the total number of passengers the ship is permitted to carry (as indicated in the ship's passenger certificate); or

(f) the assigned load line; or

(g) the permitted draught;

are altered resulting in an increase in the ship's tonnage, details of the alterations are forwarded within 14 days of the completion of those alterations to a surveyor to allow the surveyor to re-measure the ship and re-calculate the new gross and net tonnages.

8.16 Measurement and calculation

Every surveyor calculating the gross and net tonnages of a ship for the purposes of this part shall—

8.16.1 measure all volumes

(a) to the inner side of the shell or structural boundary plating in ships constructed of metal (irrespective of the fitting of insulation or the like); and

(b) to the outer surface of the shell or to the inner side of structural boundary surfaces in ships constructed of any other material; and

8.16.2 shall include in the calculation of total volume the volumes of appendages; and

8.16.3 may exclude from the total volume the volumes of spaces open to the sea; and

8.16.4 shall take to 2 decimal places all measurements used in the calculation of volumes; and

8.16.5 shall calculate the volumes by mathematical and computational methods acceptable to the Chief Executive Officer.

8.17 Issue of certificates

8.17.1 If the owner of a Fiji ship to which this part applies makes an application under section 23 of the Decree for a Fiji Tonnage Certificate (1969) in respect of the ship, and the Chief Executive Officer to whom application is made is satisfied that a surveyor has measured the ship and calculated the gross and net tonnages in accordance with the requirements of this Tonnage Convention and the provisions of this Part, the Chief Executive Officer to whom application is made shall issue a Fiji Tonnage Certificate in respect of the ship, in the Form TM2 as prescribed in Part 4 of this paragraph.

8.17.2 When there is a decrease or increase in the net tonnage of a ship to which this paragraph applies due to—

(a) an alteration or modification in the characteristics of the ship; or

(b) an alteration to the load line because of a change in trade;

a new Fiji Tonnage Certificate shall be issued by the Chief Executive Officer to the ship when the Chief Executive Officer is satisfied that a surveyor has re-measured the ship and re-calculated the gross and net tonnages in accordance with the requirements of the Tonnage Convention and the provisions of this Part.

8.17.3 The Chief Executive Officer may issue a new Fiji Tonnage Certificate to a ship if—

(a) the ship is transferred to the Fiji flag; or

(b) the ship undergoes alterations or modifications considered by the Chief Executive Officer to be major changes.

PART 4—TONNAGE CERTIFICATES

8.18. The following forms are the certificates which shall be issued:

Form TM1—INTERNATIONAL TONNAGE CERTIFICATE (1969) to ships to which the Tonnage Convention applies;

Form TM2—FIJI TONNAGE CERTIFICATE to ships to which the Tonnage Convention does not apply.

CERTIFICATE
INTERNATIONAL
TONNAGE
CERTIFICATE (1969)

FORM TM1

Issued under the provisions of the International Convention on Tonnage Measurement of Ships, 1969, under the authority of the Government of FIJI for which the Convention came into force on 18th JULY, 1982 by the Maritime Safety Authority of Fiji or recognised classification society.

Name of Ship	Distinctive Number or Letters	Port of Registry	*Date

* Date on which the keel was laid or the ship was at a similar stage of construction (Article 2(6)), or date on which the ship underwent alterations or modifications of a major character (Article 3(2)*(b)*) as appropriate.

MAIN DIMENSIONS

Length (Article 2(8))	Breadth (Regulation 2(3))	Moulded Depth amidships to Upper Deck (Regulation 2(2))

THE TONNAGES OF THE SHIP ARE:

GROSS TONNAGE_____

NET TONNAGE _____

The Government of Fiji certifies that the tonnages of this ship have been determined in accordance with the provisions of the International Convention of Tonnage Measurement of Ships, 1969.

Issued at _____ _____ 20____
(place of issue of certificate) (date of issue)

_____
(signature of the Chief Executive Officer and/or authorised person)

If signed, the following paragraph is to be added:
The undersigned declares that he is duly authorized by the said Government to issue this certificate.

(Signature) _____ _____

SPACES INCLUDED IN TONNAGE					
GROSS TONNAGE			NET TONNAGE		
Name of Space	Location	Length	Name of space	Location	Length
Underdeck					
			NUMBER OF PASSENGERS (Regulation 4(1)) Number of passengers in cabins with not more than 8 berths _____ number of other passengers_____		

EXCLUDED SPACES (Regulation 2(5)) An asterisk (*) should be added to those spaces listed above which comprise both enclosed and excluded spaces.	MOULDED DRAUGHT (Regulation 4(2))
Date and place of original measurement _____	
Date and place of last previous measurement_____	
REMARKS:	

CERTIFICATE FORM TM2

FIJI TONNAGE CERTIFICATE (1969)

MARITIME SAFETY AUTHORITY OF FIJI

Issued under the provisions of Section 9 of the Ship Registration Decree, 2013.

Name of Ship	Distinctive Number or Letters	Port of Registry	*Date

* Date on which the keel was laid or the ship was at a similar stage of construction or date on which the ship underwent alterations or modifications of a major character as appropriate.

MAIN DIMENSIONS

Length	Breadth	Moulded Depth admiships to Upper Deck

THE TONNAGES OF THE SHIP ARE:

GROSS TONNAGE _____

NET TONNAGE _____

This is to certify that the tonnages of this ship have been determined in accordance with the provisions of Section 9 of the Ship Registration Decree, 2013.

Issued at _____ _____ 20_____
(place of issue of certificate) (date of issue)

_____
(signature of the Chief Executive Officer)

If signed, the following paragraph is to be added: The undersigned declares that he is duly authorized by the said Government to issue this certificate.

(Signature) _____

<table>
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<tr><td colspan="3">GROSS TONNAGE</td><td colspan="3">NET TONNAGE</td></tr>
<tr><td>Name of Space</td><td>Location</td><td>Length</td><td>Name of space</td><td>Location</td><td>Length</td></tr>
<tr><td rowspan="3">Underdeck</td><td rowspan="3"></td><td rowspan="3"></td><td></td><td></td><td></td></tr>
<tr><td colspan="3">NUMBER OF PASSENGERS
Number of passengers in cabins with not more than 8 berths _____</td></tr>
<tr><td colspan="3">Number of other passengers_____</td></tr>
<tr><td colspan="3">EXCLUDED SPACES

An asterisk (*) should be added to those spaces listed above which comprise both enclosed and excluded spaces.</td><td colspan="3">MOULDED DRAUGHT</td></tr>
<tr><td colspan="6">Date and place of original measurement _____
____</td></tr>
<tr><td colspan="6">Date and place of last previous measure-
ment_____</td></tr>
<tr><td colspan="6">REMARKS:</td></tr>
</table>

PARAGRAPH 9

ENGINEERING

———

PART 1—PRELIMINARY

Contents

9. 1 This paragraph is divided into Parts as follows:

Part 1 Preliminary

Part 2 General

Part 3 Machinery

Part 4 Electrical

Part 5 Liquid Petroleum Gas Installation

Part 6 Cargo Refrigeration

Part 7 Personnel Protection

9.2 This paragraph should be read in conjunction with the Introduction, Definitions and General requirements paragraph.

9.3 Application

9.3.1 Subject to sub paragraph 9.3.2 these requirements shall be applicable to all classes of ships less than 35m in length.

9.3.2 Ships of over 15m in registered length shall comply with Parts 2, 5 and 7 and paragraph 29 of Part 4 of this paragraph and shall otherwise be assessed under the rules of an approved Classification Society. Additionally SOLAS Ships shall comply with the SOLAS Convention.

9.3.3 In the case of a ship other than a SOLAS Ship that is an existing ship the Chief Executive Officer may permit such modifications to the requirements of this paragraph as the Chief Executive Officer thinks fit, having regard to:

(a) the Age of the ship;

(b) the ship's design and area of operation and

(c) the trade in which the ship is, or is about to be engaged.

PART 2—GENERAL

9.4 In this paragraph the following requirements shall apply:

9.4.1 Design-Corrosion and Abnormal Loadings

9.4.1.1 Where any item detailed in this paragraph is subject to rapid corrosion, other rapid form of deterioration or to abnormal loading, such an item shall be subject to special consideration.

9.4.1.2 In any pipe system provision shall be made to avoid excessive stress in any part due to expansion and contraction resulting from variation in temperature due to vibration and shall otherwise take account of the effects of corrosion and external mechanical damage.

9.4.2 Novel Design and Unusual Materials

Where any item detailed in this paragraph is novel in design, or involves the use of unusual materials, the owner or his agent shall submit full calculations and any other information required. He shall bear the cost of any special tests or examinations considered necessary by the Chief Executive Officer.

9.4.3 Astern Power

Where the shaft power available for propulsion exceeds 5kW, astern power shall be provided for adequate maneouverability under normal operating conditions.

9.4.4 Access to Machinery

The overall design of a machinery space shall be so arranged as to permit reasonable access to all items of the installation which may require attention in service.

9.4.5 Machinery Identification

9.4.5.1 All controls for operating the machinery, and all measuring devices, pumping systems, valves, cocks, air pipes, sounding pipes, switches etc. shall be permanently marked with appropriate inscriptions clearly showing their purpose. All hand-wheels for valves which are closed by turning anti-clockwise shall be marked to show the direction of turning for closure. Where pipes are marked by colours to indicate their purpose the colours shall be in accordance with Australian Standard AS 1345.

9.4.5.2 The provisions of this sub- paragraph need not apply if the surveyor considers it to be unnecessary owing to the simplicity of the installation.

9.4.6 Manufacturer's Recommendations

In all requirements of this paragraph due consideration shall be given to any specific recommendations of the manufacturer of any engine or item of ancillary equipment.

9.4.7 Other paragraphs

In addition to a requirement of this paragraph there may be associated requirements in the Load Lines, Construction, Fire Appliances, Life-saving Appliances and other paragraphs of these uniform requirements. Due regard shall therefore be given to these requirements.

9.4.8 Communication

A ship of over 15m shall be provided with a verbal means of communication between the wheelhouse and the machinery space except that this shall not

apply in the case of a ship having propulsion machinery which under normal operating conditions is started, controlled and stopped from the wheelhouse only.

9.4.9 Machinery Guard

All machinery is to be appropriately guarded to protect personnel from injury according to the Australia standards AS 4024.1 which provides guidance on the guarding of machinery.

9.4.10 OHS of Personnel

The machinery installation and systems in a ship shall be arranged to protect the health and safety of persons in the immediate vicinity from moving parts, excessive heat and other hazards.

9.4.11 Ship owner's obligation

A person intending to purchase ships of more than 15 meters in length shall ensure that the ship's machinery and its associated systems is designed and installed according to the provisions of this paragraph or according to designs of authorised classification societies or equivalent international standards approved by the Chief Executive Officer.

PART 3—MACHINERY

9.5 Main Engines

9.5.1 A ship shall be provided with a main engine or engines of a type designed and manufactured for marine use having regard to their intended purpose and shall operate on fuel having a closed flash point of not less than 60°C.

9.5.2 The means for distributing axial thrust transmitted by shafting into the ship's structure (most engines are not designed to withstand axial thrust).

9.5.3 The arrangement of the sump and lube oil system to cope with the mounting of the engine at an angle from the horizontal (due to the shaft angle or trim) and the rolling, pitching and other motions of the ship when operating at sea.

9.5.4 The arrangement of the engine cooling system and the suitability of the engine materials to the marine environment.

9.5.5 The provision of a gearbox suitable for marine use, and the incorporation of power take-offs (PTOs) that might be required.

9.5.6 Engines which operate on fuel having a closed flash point of less than 60°C may only be used on ships of less than 15 m in length using outboard engines in Classes 3D and 3E ships.

9.6 Machinery Seatings

9.6.1 General

Each item of machinery shall be securely bolted to a rigid seating. Fitted and/or clearance bolts may be used and suitable arrangements are to be provided

to prevent the bolts from becoming slack. Secure bolting is not limited to rigid bolting. Machinery may be bolted to the machinery seating via a resilient mount.

9.6.2 Wood and Glass Reinforced Polymer (GRP) or FRP

Where the machinery seatings are of wood or GRP the upper face of recesses to accommodate the nuts and washers of the holding down bolts are to be located at a depth, below the upper face of the seating, sufficient to ensure ample material in compression when the bolts are tightened.

9.6.3 Resilient Mountings

When resilient mountings are fitted the output shaft is to be connected to a flexible coupling. The distance from the gearbox coupling to the first bearing is to be less than 20 times the actual shaft diameter. Satisfactory arrangements are to be made to transmit thrust.

9.7 Instrumentation

9.7.1 Instruments—General

Instruments shall be suitable for marine use, capable of withstanding vibration and shock and be so installed and illuminated as to be readily visible.

9.7.2 Items Monitored

9.7.2.1 An engine essential for the safe operation of a ship of more than 15m in length shall be provided with an audible and visual warning device to indicate a dangerous condition associated with:

(a) engine lubricating oil pressure;

(b) engine jacket cooling water outlet temperature;

(c) engine gear box lubricating oil pressure;

(d) low cooling water pressure;

(e) low cooling sea water pressure; and

(f) charging rate of generator.

9.7.2.2 All engines essential for the safe operation of the ship shall, to the extent that the design and manufacture allows, be provided with instruments indicating the following:

(a) engine lubricating oil pressure;

(b) engine jacket cooling water outlet temperature;

(c) engine gear box lubricating oil pressure;

(d) lubricating oil temperature;

(e) cooling water pressure;

(f) cooling sea water pressure;

(g) fuel pressure and temperature;

(h) charging rate of generator; and

(i) in the case of propulsion machinery, the rotational speed or RPM.

9.7.3 Automatic shutdown devices fitted to propulsion machinery shall be provided with a manual override function that allows the operator of the ship to maintain control in critical situations.

9.7.4 Unmanned Machinery Space UMS requirements

In the case of an unmanned machinery space, the instruments as required by sub-paragraph 9.7.2.2*(a)(b)(c),(e)* and *(f)* shall be located as to be clearly visible at each steering position. The instruments required by sub-paragraph 9.7.2.2 *(e)* and *(f)* shall only be necessary at the position at which the ship is principally navigated.

9.8 Starting Arrangements

9.8.1 Methods

In all Class 1, 2A and 2B ships where the main engine or engines are not fitted with hand starting arrangements, provision shall be made for an alternative method of starting to be capable of being developed on board without external aid. If for this purpose—

(a) an electric generator or air compressor is required, the unit shall be power driven by a hand starting engine. A hand operated air compressor may be accepted and in the case of electric starting a standby set of batteries may be accepted.

(b) a hydraulic accumulator is required, then the accumulator shall be capable of being pressurized by hand.

9.8.2 Number of Starts

Air receivers or batteries used for starting main engines shall have sufficient capacity without recharging to provide-

(a) 6 consecutive starts for each non-reversible engine.

(b) 12 consecutive starts for each reversible engine.

9.8.3 Bars and Hand Cranks

9.8.3.1 Bars used on flywheels to turn machinery over by hand shall be so constructed as to facilitate easy withdrawal from the flywheel's recess if the engine should recoil. Hand cranks for engines shall be designed to disengage instantly when the engine starts.

9.8.3.2 All machinery incorporating a hand-starting arrangement shall be so located to provide sufficient space for hand-starting operations to be carried out.

9.9 Unfired Pressure Vessels

9.9.1 Unfired pressure vessels and their mountings shall be designed, constructed and tested in accordance with the requirements of Australian Standard AS 1210 or the requirements of a classification society.

9.10 Exhaust Systems

9.10.1 Height of Discharge

Exhaust pipe discharges which are led through the hull below deck level are to be installed as high above the load water line as practicable and shall not be installed at a height less than the height required by the Load Line or Construction paragraphs of these uniform requirements, as is applicable.

9.10.2 Gas Passage Area

No part of the exhaust gas passage shall have an area less than that of the outlet of the exhaust manifold. If the exhaust system is unusually long or the conditions require bend, the internal cross sectional area of the piping shall be increased to prevent an increase of back pressure at the engine.

9.10.3 Back Flooding

The exhaust system shall be so designed and installed as to prevent sea water or exhaust cooling water entering the engine manifold.

9.10.4 Protection of personnel from fumes

Exhaust gas shall not leak from the piping or any connections. An exhaust pipe that passes through an accommodation space shall be enclosed in a gas-tight trunk.

9.10.5 Location of discharge

Exhaust gases shall be discharged to the atmosphere clear of ventilators and other openings so as to minimise the possibility of exhaust gases passing back into the ship.

9.10.6 Separation of exhaust pipes

Exhaust pipes of several engines shall not be connected together, but shall run separately to the atmosphere to prevent any possibility of the exhaust gases returning to an idle engine.

9.10.7 Material

9.10.7.1 Exhaust pipes and silencers shall be constructed of material resistant to heat and exhaust products and suited to the application. Where exhaust pipes come into contact with seawater or sea spray, they shall also be of corrosion-resistant material or heavy-gauge construction.

9.10.7.2 Reinforced rubber hose may be used for exhaust pipes on engines having water-cooled exhausts, except where the exhaust is required to be enclosed in

gas-tight trunking under sub regulation 9.10.1. Reinforced rubber hose shall be secured at each end by at least two corrosion-resistant clips.

NOTE: Only certain grades of stainless steel are suitable for use in exhaust systems. Examples of suitable stainless steels are UNS S31254 and DIN 2.4856.

9.10.8 Layout and support

All of the exhaust system shall be arranged so as to be readily visible for inspection, except for those paragraphs required to be enclosed in gas-tight trunking, enclosed by a water jacket, or lagged with insulating material. Exhaust pipes shall be adequately supported and the number of bends and elbows minimized.

9.10.9 Silencer

All internal combustion engines shall be silenced to comply with applicable legislation. Figure 1 provides a typical layout of a dry exhaust system, which incorporates a silencer.

NOTE: State and Territory Occupational Health and Safety authorities and Environment Protection Authorities can advise on legislation covering permissible noise levels.

9.10.10 Cross-sectional area of exhaust pipes

No part of an exhaust pipe shall have a cross-sectional area less than that of the outlet of the exhaust manifold, unless otherwise specified by the engine manufacturer.

NOTE: Exhaust systems should be arranged and sized so as to prevent back-pressures higher than acceptable to the engine manufacturer. This may necessitate an increase in the cross-sectional area of the pipe above that at the outlet of the exhaust manifold if the exhaust system is very long or contains numerous bends.

9.10.11 Thermal protection

Exhaust piping and silencers shall be water-cooled, shielded or insulated. The exhaust system shall be installed to prevent any possibility of the transfer of heat from any part of the system to adjacent combustible materials. It shall be arranged and guarded as necessary to prevent personnel from accidentally coming into contact with hot surfaces.

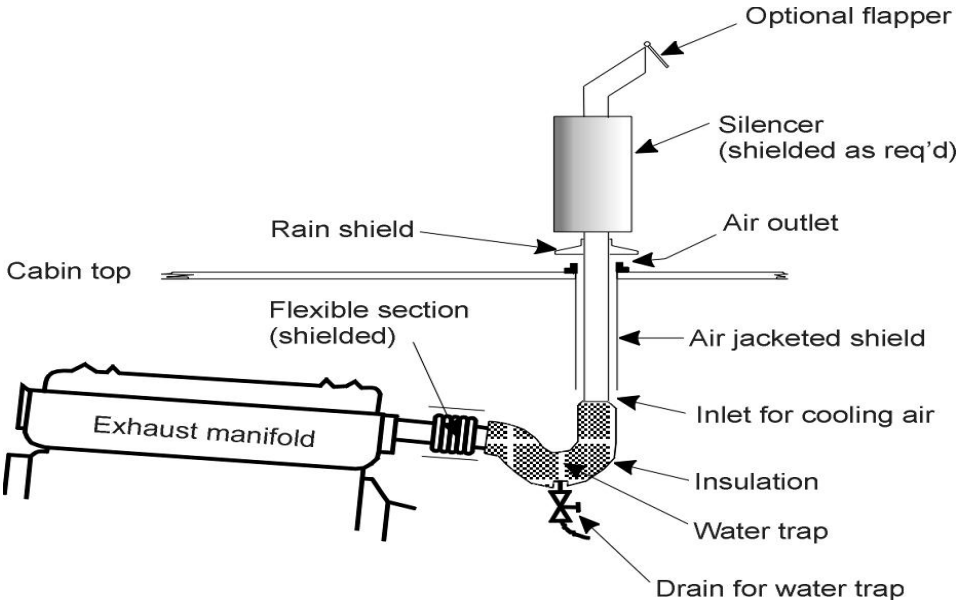


Figure 1 – Typical dry exhaust system

9.10.12 Through-hull exhaust discharges

Exhaust pipes that discharge through the hull of a ship should be water-cooled. Typical water-cooled exhaust installations are illustrated in Figure 2, Figure 3, and Figure 4. Exhaust pipe discharges should be installed as high as practicable above the deepest loaded waterline to reduce the potential for ingestion of sea water into the exhaust system through wave or wake action, either when the engine is operational or idle.

9.10.12.1 Dry exhaust discharges

If a dry exhaust is fitted that penetrates the hull, the discharge shall be installed so as to limit the transfer of heat into the hull structure.

NOTE: In addition to the potential fire hazard, prolonged exposure to heat may degrade the hull material.

9.10.12.2 Water-cooled (wet) exhausts

The design of a water-cooled exhaust system shall also be such that;

(a) water injected into the exhaust cannot enter the engine (refer to dimension 'a' in Figure 2, Figure 3, and Figure 4); and

(b) arrangements are in place to reduce back pressure.

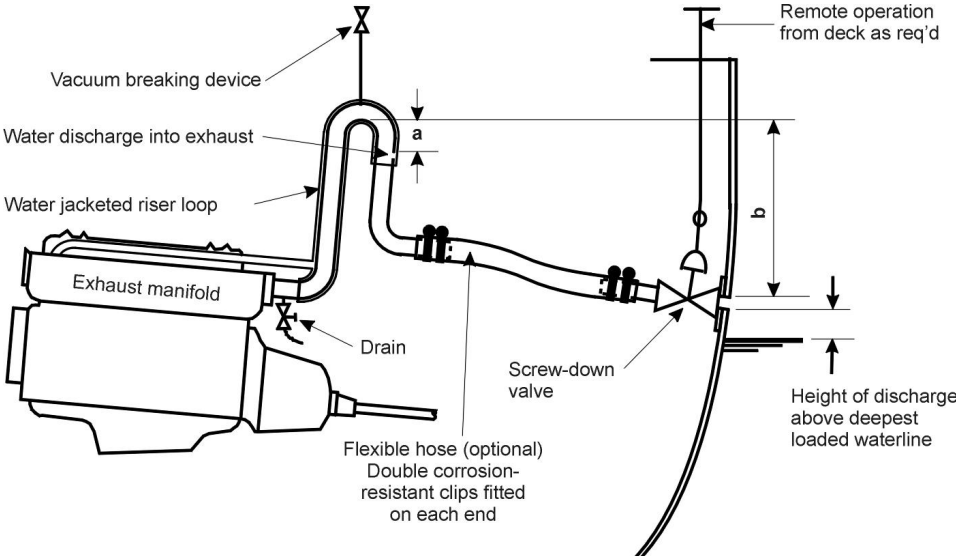


Figure 2 – Typical water-cooled exhaust incorporating a water jacketed riser loop and shut-off valve at the discharge

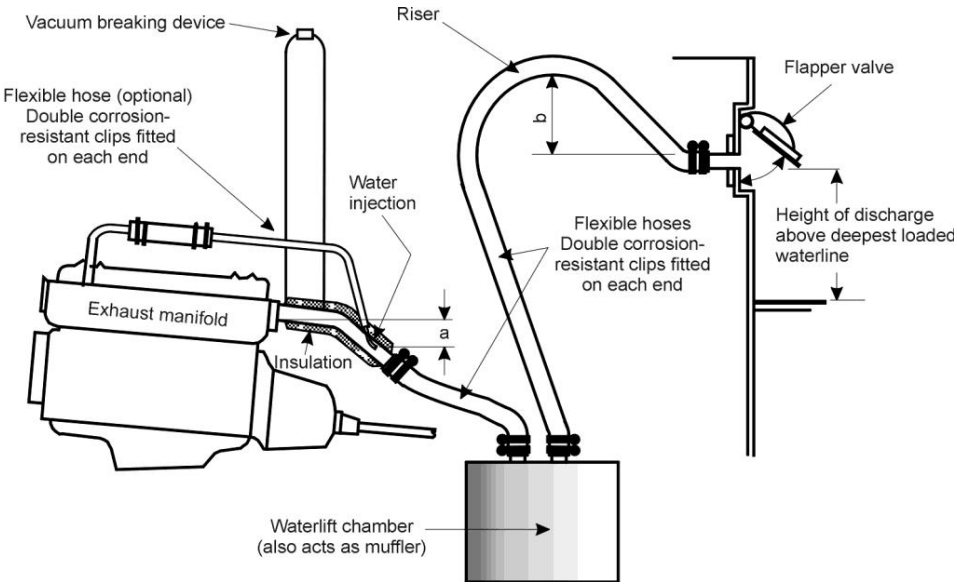


Figure 3 – Typical water-cooled exhaust incorporating a waterlift chamber, riser and flapper valve at the discharge

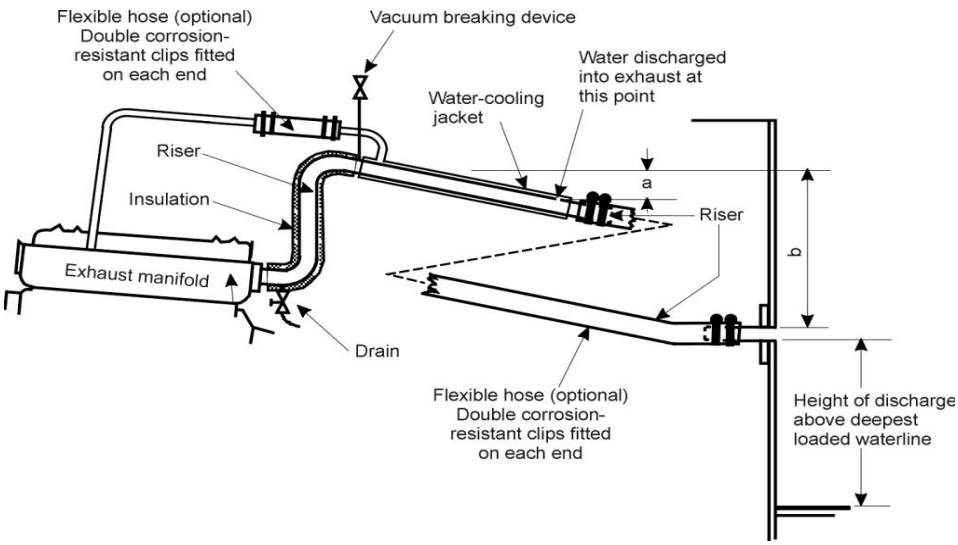


Figure 4 – Typical water-cooled exhaust incorporating a water cooling jacket, riser and no valve at the discharge

9.10.12.3 Arrangements to prevent back-flooding of machinery

Exhaust pipes that discharge below the freeboard deck shall incorporate a riser or other device to prevent water returning to the engine (refer to distance "b" in Figure 2, Figure 3, and Figure 4). Where the exhaust arrangement is such as to promote the accumulation of water between the engine and a riser or loop, then a drain cock or valve shall be fitted near the exhaust manifold to permit periodic drainage. A vacuum-breaking device shall be fitted to the top of risers where there is a risk of water being drawn into the engine as the system cools.

NOTE: A riser may incorporate a steady fall from the highest point of the exhaust, to the injection point, to the discharge as in Figure 4. The riser may also take the form of a loop, which acts as a dam as in Figure 2 and Figure 3. Alternatively, a loop may be introduced into the system to act as a water trap as illustrated in Figure 1. Where the loop acts as a trap, a means to release the trapped water from the loop should be fitted.

9.10.12.4 Waterlift exhaust system

A waterlift exhaust system may be used where the engine is very close to or below the deepest loaded waterline (see Figure 3).

NOTE: The waterlift exhaust system incorporates an accumulating chamber in which the cooling water collects before being expelled by exhaust gas via a riser. Engine manufacturers

should be consulted regarding any requirements they may have to avoid or limit exhaust pressures where the exhaust is discharged below water level.

9.10.12.5 Watertight integrity of exhaust pipe discharges

Exhaust pipe discharges shall be arranged such that a breach of the exhaust pipe (e.g.through corrosion or fatigue) will not result in flooding of the ship. They shall also comply with the following:

(a) Load Line Ships

Exhaust pipe discharges which penetrate the shell below the level of the freeboard deck shall comply with the Load Line conditions of assignment.

(b) Ships other than Load Line ships

Exhaust pipe discharges shall comply with the following:

(i) Discharges that penetrate the shell below the level of the weather deck, but at a height not less than 225 mm above the deepest loaded waterline, shall be fitted with a non-return valve, non-return flap or other similar arrangement as in Figure 3.

(ii) Discharges that penetrate the shell at a height less than 225 mm above the deepest loaded waterline shall be fitted with a shut-off valve as in Figure 2. If located within the machinery space, the shut-off valve may be controlled locally, provided it is fitted in an easily accessible position and, in the case of unmanned machinery spaces, a bilge level alarm is fitted. In all other cases, the shut-off valve shall be fitted with a positive means for closing the valve from a position above the weather deck.

NOTE: The term "weather deck" refers to the uppermost continuous deck or bulkhead deck.

9.10.12.6 Alternative arrangements for watertight integrity of exhaust pipe discharges

Where on a Class 3A, 3B, 3D or 3E ship less than 24 m in measured length it is found impracticable to meet the provisions in sub regulation 9.10.12.5*(b)*, exhaust pipe arranged as provided in Table 1 shall also be deemed to satisfy the required outcome.

9.10.12.7 Location of shut-off and non-return valves

Where shut-off or non-return valves are required on an exhaust discharge, they shall be located on or as close to the shell as practicable. Where a paragraph of exhaust pipe is provided between the hull and a shut-off or non-return valve, it shall have a minimum thickness 1.25 times that calculated for a hull of the same material, were the hull to be made of the same material as the paragraph of the exhaust.

9.10.12.8 Penetrations through watertight bulkheads

Exhaust pipe penetrations through watertight bulkheads shall be via a watertight fitting on the bulkhead. Such penetrations should be located as high on the bulkhead as possible and inboard from the ship sides.

Table 1—Alternative arrangements for watertight integrity of exhaust pipe discharges

Height of discharge above the deepest loaded waterline	Requirements
Less than 75 mm	Class 3D and 3E ships of length less than 12.5m - A non-return valve, non-return flap, one-way - "flapper valve" (see Figure 1), or similar device to prevent back-flooding by waves or wash may be fitted provided a level of safety equivalent to a one-compartment standard of subdivision is achieved in the event of the compartment containing the exhaust discharge becoming flooded. NOTE: No – "deemed to satisfy" solution is available for ships other than Class 3D and 3E ships of length less than 12.5m.
Between 75 and 225 mm	A non-return valve, non-return flap, one-way – "flapper valve" (see Figure 3) or similar device to limit the rate of flooding by waves or wash may be fitted provided- (a) a bilge level alarm is fitted in the compartment where the exhaust pipe discharge penetrates the hull; (b) that part of the exhaust system between the shell and the highest point of the loop or riser in the exhaust piping or the apparatus to prevent back-flooding of the engine is constructed of stainless steel or other material of equivalent corrosion resistance; and (c) the non-return valve, non-return flap, one-way – "flapper valve" or other device to limit the rate of flooding by waves or wash is resistant to corrosion due to the products of combustion and water, and to weathering.
Greater than 225 mm	No non-return valve or flap may be fitted (see Figure 4) provided- (a) a bilge level alarm is fitted in the compartment where the exhaust pipe discharge penetrates the hull; (b) the means provided to prevent back-flooding of the engine is capable of dealing with frequent water ingestion; and (c) that part of the exhaust system between the shell and the highest point of the loop or riser in the exhaust piping or the apparatus to prevent back-flooding of the engine is constructed of stainless steel or an equivalent corrosion-resistant material

9.11 Engine Cooling Systems

9.11.1 Air Cooling

In air cooled engines the cooling air discharge shall be separately trunked to the open air.

9.11.2 Water Cooling

9.11.2.1 In water cooled engines an adequate supply of sea water shall be provided for cooling purposes.

9.11.2.2 A cooling water pump may be driven by the engine it serves or be independently driven.

9.11.2.3 In ships propelled by a single main engine exceeding 400 kW brake power, provision is to be made for an emergency supply of cooling water from a separate power pump which may be driven by the engine.

9.11.2.4 For class 1 & 2 ships having water-cooled engines, a system of keel cooling for the engine jacket water may be installed as an alternative to a water circulating system.

9.11.2.5 The performance of keel cooling arrangements should be such as to maintain engine cooling water temperatures to within the engine manufacturer‘s specifications taking into account the likely range of ambient seawater temperature and the effects of marine growth and protective coatings.

9.12 Ventilation of Machinery Spaces

9.12.1 General Requirements

9.12.1.1 Each machinery space shall be fitted with a system of ventilation. All machinery space ventilators shall be fitted with closing devices to shut the space down in the event of a fire. At least one inlet duct shall extend down to the bottom of the machinery space to clear fumes from the bilge and promote the circulation of fresh air, and an air outlet shall be fitted at the top of the machinery space to remove hot air.

NOTES:

(1) Ventilation arrangements provide air for engine combustion, personnel requirements and the removal of heat from the machinery space.

(2) A further objective of machinery space ventilation is to maximize the performance of the machinery installation. A lower air intake temperature reduces the heat rejection to the engine coolant, thus increasing the efficiency and maximum available power.

9.12.1.2 Adequate ventilation shall be provided in the engine room and all other enclosed machinery spaces. The volume of air provided shall be not less than that necessary for the efficient aspiration and efficient operation of the main engines and other machinery. Such ventilation shall be obtained with all access openings closed.

9.12.2 Ventilator Sizes for Natural Ventilation

The engine room shall be furnished with an inlet and exhaust ventilator each of which is to have a minimum size as follows—

ships less than 10 m in length .	100 cm^2
ship of 10 m and over but less than 15 m in length .	160 cm^2
ship of 15 m and over but less than 20 m in length .	220 cm^2
ship of 20 m and over but less than 25 m in length .	280cm^2
ship of 25 m and over but less than 30 m in length .	340 cm^2
ship of 30 m and over but less than 35 m in length .	400 cm^2

9.12.3 Area of Cowls or Scoops

9.12.3.1 Where cowls or scoops, louvers or alternative arrangements are provided on any ventilator, the free area of the cowl or scoop shall be not less than twice-the required trunk area. Where the cowls or scoops are screened, the mouth area shall be increased to compensate for the area of the screen wire. Inlet and outlet openings shall not be located where the natural flow of air is obstructed. Outlet ventilators shall not discharge within one metre of a possible source of ignition. Ventilators shall be so located that exhaust air will not be taken into supply vents.

9.12.3.2 The air temperature inside a machinery space should not be more than 17ºC above the outside ambient air temperature. If natural ventilation alone fails to keep the temperature rise within such limits, forced ventilation should be considered so as to provide an equivalent solution.

9.12.4 Forced ventilation

Forced ventilation shall be installed if required by the engine manufacturer. Forced ventilation should also be installed in spaces containing machinery of high power, or where it is impractical to fit the area of ventilators required for natural ventilation. The size of the fan or fans for forced ventilation shall be determined by summing the requirement for air specified by the manufacturer of each engine within the space, taking into account the combustion air requirements and heat radiation of all main and auxiliary engines within the space. However, the inlet fan capacity shall not be less than the sum of combustion air required plus 50 per cent.

9.12.5 Location

Machinery space ventilator openings shall be located to—

(a) avoid obstructions on the decks which could restrict the flow of air into or out of the ventilator;

(b) avoid the possibility of exhaust air being drawn into an inlet ventilator; damage the machinery; and

(c) avoid the ingestion of large quantities of salt spray which could damage the machinery; and

(d) location of ventilators should ensure that the ambient temperature of the machinery space temperature is not more than 17 degrees above the outside ambient air temperature.

NOTE: As well as being required to meet minimum coaming height requirements, engine room air vents are frequently found to be the first point of down-flooding for the purposes of the ship's stability. Hence, these openings should be located near the centreline and/or as high above the waterline as practicable so as not to prematurely compromise the ship's stability.

9.13 Gear Boxes

9.13.1 Gear boxes shall be of the marine type and suitably matched to the prime mover with which they are to be used. When coupled to the engine it shall not be possible to exceed the limiting power, torque, speed or thrust of any component of the gear box. Maker's certificates covering design, material and manufacture may be accepted for this purpose.

9.14 Propeller and Intermediate Shafting

9.14.1 Shaft material

9.14.1.1 Shafts shall be manufactured from material having the following minimum required mechanical properties:

(a) Utility tensils strength (UTS) – 410 MPa

(b) Yeild Point – 230 MPa

(c) Elongation-Bronze: 25%, carbon Steel: 23%, Monel: 20%, Stainless steel 17%.

9.14.1.2 Where the shaft material is other than the materials specified in sub regulation 9.14.1.1 *(c)* above, the chemical composition and mechanical properties, including the corrosion fatigue strength in seawater, shall be equivalent.

NOTES:

(1) Sub regulation 9.14.2, 9.14.3, 9.14.4 and 9.14.5 are based upon the materials having the above values of elongation and a user-specified value of Ultimate Tensile Strength (UTS). Assumptions for shaft material characteristics that are incorrect can invalidate the factors of safety inherent in these paragraphs.

(2) The material characteristics of a particular shaft material can be determined by referring to the manufacturer's material data certificates, heat stamp identification details and other relevant test documentation. Such documentation is especially important where;

(a) any doubt exists as to the performance characteristics of the material;

(b) it is proposed to use carbon manganese steel having a specified UTS of greater than 510 MPa; or

(c) it is proposed to use a material having a UTS greater than 618 MPa.

9.14.2 Reference shaft diameter

The reference shaft diameter for use in sub regulation 9.14.3 to 9.14.5 shall be determined by the following formula:

$$d_r = ak \sqrt[3]{\frac{P}{N}}$$

Where;

d_r = reference shaft diameter, in millimeters

a = 1.108 for ships of Classes 3A, 3B and 1.053 for ships of Classes 3D and 3E

k = 89 for propulsion through reduction gears or flexible couplings

P = the maximum brake power (in kilowatts) that the engine will transmit, irrespective of the length of time nominated by the engine manufacturer for which the engine may be run at that power

N = shaft revolutions per minute

NOTES:

(1) Many of the formulae for shafting and shafting components contained within sub paragraph 9.14, 9.15, 9.16 and 9.19 are based on minimum required rather than as fitted diameters in order to provide minimum scantlings. Designing to the minimum scantlings may limit flexibility with regard to future modifications to the ship. In particular, this will be of concern if the ship is to be refitted with machinery of increased power.

(2) Values of coefficient k for direct-drive, in-line internal combustion engines may be obtained from the table below.

No. of cylinders	2 S.C. k	4 S.C. k
1&2	114	109
3	107	109
4	102	109
5	99	105
6	96.5	102
7	95	101
8	93	99
9	90	98
10	90	94
11 and more	90	90

9.14.3 Solid propeller shaft size

Refer to figure 5.

The diameter of the solid propeller shaft shall not be less than that determined by the following formula:

$$d_p = 1.14 d_r + \frac{D}{K} \quad f_p$$

Where;

d_p = minimum diameter of propeller shaft, in millimeters

d_r = reference diameter of shaft, in millimetres, calculated in accordance with sub regulation 9.14.2

D = propeller diameter, in millimeters

K = 144 for shafts protected against corrosion (see sub regulation 9.14.9)

f_p = material factor for propeller shaft, determined in accordance with the following formula:

$$f_p = \frac{410}{\sqrt[3]{UTS_{shaft}}}$$

Where;

UTS_{shaft} = ultimate tensile strength of the propeller shaft material, in megapascals (MPa).

NOTE: Certain high-tensile materials used for propeller shafting exhibit rapid deterioration in warm sea conditions, necessitating frequent withdrawal for inspection and possible replacement. Care should be taken to ensure that the shafting material chosen is suitable for the intended or likely area of operation.

9.14.4 Allowable reduction in propeller shaft diameter

The diameter of the part of the propeller shaft forward of the stern gland may be reduced from that calculated in sub regulation 9.14.3, provided that such reduction is as gradual as possible, and the diameter of the reduced part is calculated in accordance with the following formula:

$$d_{rp} = 1.14 \, d_r f_p$$

Where;

d_{rp} = minimum allowable diameter of reduced part of shaft, in millimeters

d_r = reference diameter of shaft in millimetres, calculated in accordance with sub regulation 9.14.2

f_p = the material factor used for calculating d_{rp} (see sub regulation 9.14.3).

9.14.5 Solid Intermediate shaft size

The diameter of solid intermediate shafting shall not be less than that determined by the following formula:

$$d_i = d_r f_i$$

Where;

d_i = minimum diameter of intermediate shaft in millimeters

d_r = reference diameter of shaft in millimetres, calculated in accordance with sub paragraph 9.14.2

f_i = material factor for intermediate shaft, determined in accordance with the following formula:

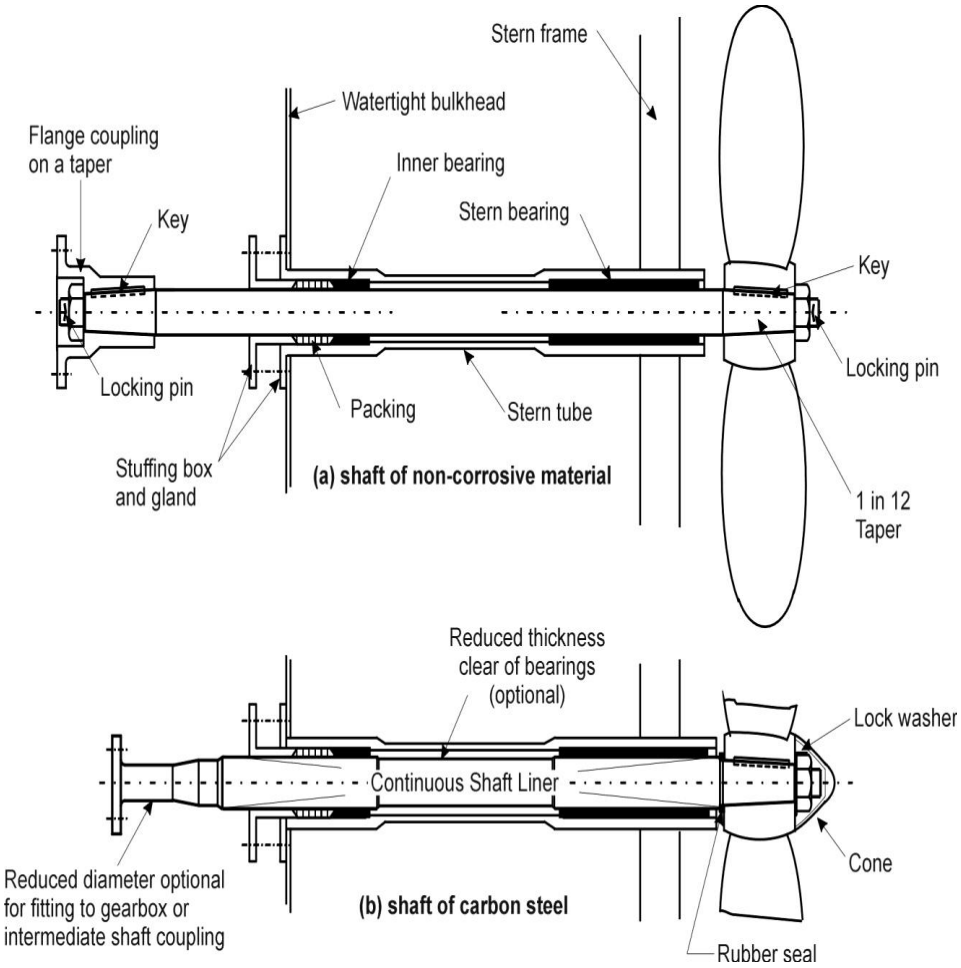


Figure 5 - Typical propeller shaft, stern tube, stern bearing and gland

410

$f_i = {}^3\ \mathrm{UTS}_{\mathrm{shaft}}$

Where;

UTS_{shaft} = ultimate tensile strength of the intermediate shaft material, in megapascals (MPa).

9.14.6 Hollow shafting

Shafting may be hollow provided that it is of equivalent strength to a solid shaft. The required outside diameter of the shaft can be calculated from the following formula:

$$d_1 = \frac{d_s}{\sqrt[3]{1 - y^4}}$$

Where;

d_1 = required outside diameter of hollow shaft, in millimetres

d_s = required diameter of solid shaft, in millimetres

y = a nominated ratio of $d2/d1$,

where;

$d2$ = the inside diameter of the hollow shaft.

9.14.7 Shaft support

Shafts shall be adequately supported. The maximum allowable distance between shaft supports shall be determined in accordance with the following formula:

$$S = 0.142 \sqrt[3]{d_f^2}$$

Where;

S = maximum allowable distance between centres of shaft supports, in metres

d_f = diameter of shaft fitted, in millimetres.

The forward-most bearing should be located at least 12 shaft diameters from the engine gearbox or thrust block flange.

9.14.8 Propeller Shaft Overhang

The overhang of the propeller shaft between the forward face of the propeller boss and the after face of the adjoining shaft bearing should not be more than the actual propeller shaft diameter. Where an overhang exceeds this, the bending stress due to the additional overhang shall be taken into account when calculating the required shaft diameter.

9.14.9 Protection of Propeller Shaft

Where exposure to water may corrode propeller shafts, they shall either be protected by a continuous, water–resistant liner complying with sub regulation 9.14.10 [see Figure 5 (b)], or the shaft shall run in an oil-lubricated stern tube

with a sealing gland at the aft end. Protective coatings may be applied in lieu of a liner on those parts of the propeller shaft that are visible when the craft is slipped.

9.14.10 Liners

Liners, where fitted, shall be of bronze or stainless steel. Liners shall be shrunk on to the shaft. Securing pins shall not be used. The thickness of liners fitted in way of the bearings shall not be less than that calculated in accordance with the following formula:

$$t = \frac{d_f}{32} + f$$

Where;

t = thickness of the liner, in millimetres

d_f = fitted diameter of the shaft within the liner, in millimeters

f = material factor, as follows:

(a) 230 for bronze

(b) 120 for stainless steel

The thickness of a continuous liner between bearings shall not be less than $0.75t$

9.14.11 Propeller shaft tapers

9.14.11.1 Propeller shafts shall be tapered to provide an accurate fit in the propeller boss, with particular attention given to the fit at the large end of the taper. The taper shall be between the limits of 1 in 12 and 1 in 16 on the diameter, except on shafts less than 50 mm diameter, where a taper as steep as 1 in 10 on the diameter may be used.

9.14.11.2 The contact area between the mating surfaces prior to final pull-up shall be at least 70 per cent.

9.14.11.3 The roughness of the mating surfaces should not exceed 3.5 m, and the forward edge at the bore of the boss should be well rounded.

NOTE: A taper of 1:12 on the diameter has been found to provide a good compromise between being shallow enough to ensure the propeller will remain secured on the taper, and being steep enough to facilitate removal of the propeller from the shaft.

9.15 Key and Keyways

9.15.1 *Keys*

9.15.1.1 Keys for propeller shafting shall be of the round ended or sled-runner type (see Figure 6 and Figure 7) and shall be of material compatible with the shaft

to which they are to be fitted. The bottom of the keyway in the boss and shaft shall be parallel to the taper cone of the shaft.

9.15.1.2 Keys of the sled-runner type shall incorporate means to prevent the key from sliding in the keyway.

9.15.1.3 Sled-runner keys shall have two screwed pins for securing the key in the keyway, and the forward pin should be at least one-third of the length of the key from the large end of the taper. The depth of the countersink for the screwed pins should not exceed the pin diameter, and the edges of the hole should be slightly bevelled.

9.15.2 Keyway-general

9.15.2.1 The distance between the large end of the taper and the commencement of the keyway shall not be less than 0.2 times the required diameter of the shaft. A keyway for a round-ended key shall be contained wholly within the length of the taper. A keyway for a sled-runner key may run through the small end of the taper provided the keyway remains clear of both the propeller or taper flange coupling nut thread and the groove or radius at the transition between the thread and taper.

9.15.2.2 The depth of the keyway shall be 0.5 times the required thickness of the key (see sub regulation 9.15.6). The keyway shall have smooth fillets at the bottom. Any sharp edges at the top shall be removed. The radius of the fillet shall be at least 0.0125 times the fitted diameter of the shaft.

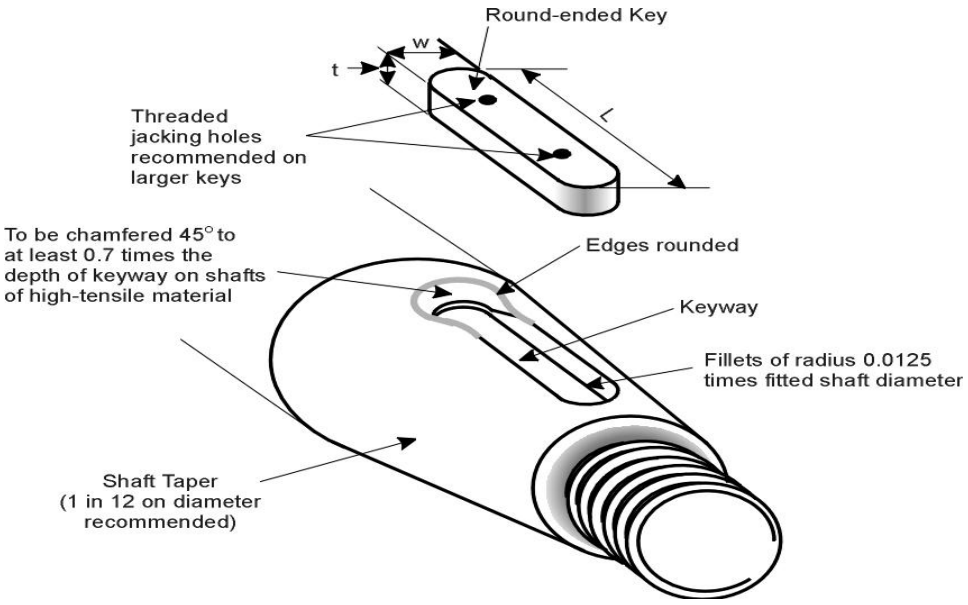


Figure 6 - Round-ended key and keyway (diagram shows arrangement suitable for a shaft of high-tensile material)

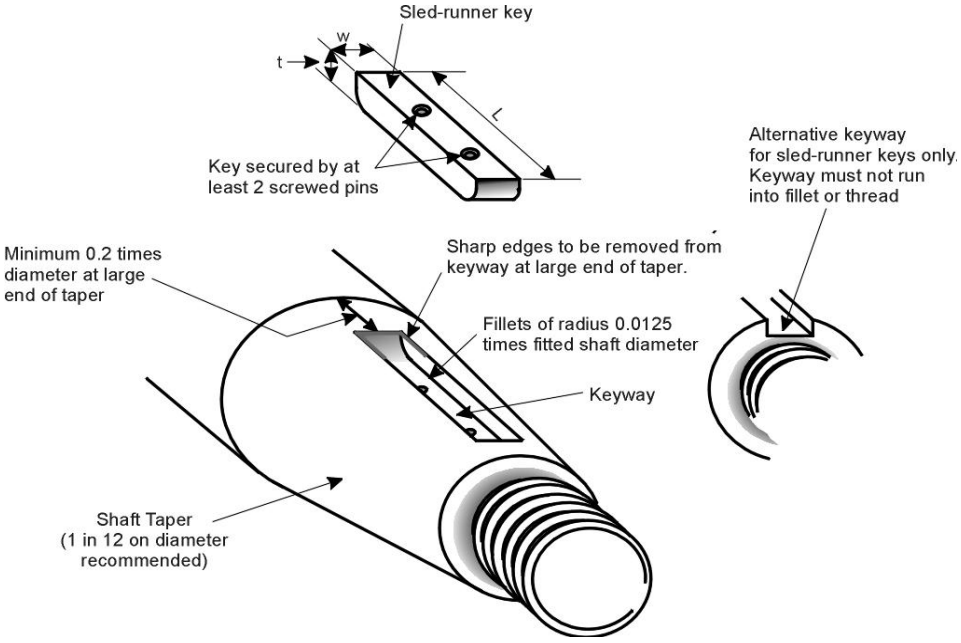


Figure 7 - Sled-runner key and keyway

9.15.3 Keyways- shafts of high-tensile material (UTS 800 MPa or greater)

The inward end of the keyway in shafts of high-tensile material shall be "relieved". On round-ended keyways the relieving shall be chamfered to an angle of 45º from side to side to a depth at least 0.7 times the keyway depth. The edges so formed shall be rounded. Refer to Figure 6.

9.15.4 Calculated key width

The calculated key width shall be determined in accordance with the following formula:

$$w = \frac{d}{4}$$

Where;

w = calculated width of key, in millimetres

d = required diameter of propeller shaft or intermediate shaft (calculated in accordance with sub-paragraph 9.14.3, and 9.14.4 or 9.14.5 respectively), in millimetres.

9.15.5 Calculated key length

The calculated key length shall be determined in accordance with the following formula:

$$l = 1.6\,d$$

Where;

l = calculated length of the key, in millimetres

d = required diameter of the propeller shaft or intermediate shaft (calculated in accordance with sub-regulation 9.14.3, and 9.14.4 or 9.14.5 respectively), in millimeters

9.15.6 Thickness of key

The thickness of a key shall be determined in accordance with the following formula:

(a) For shafts less than 150 mm diameter—

$$t=0.633w+0.94$$

(b) For shafts of 150 mm diameter and over—

$$t=\frac{w}{2}+6$$

Where;

t= required thickness of key, in millimetres

w= width of key, in millimetres, calculated in accordance with sub-regulation 9.15.4

9.15.7 Actual key width and length

The Actual width and length of a key shall comply with the following:

(a) The Actual key width w_a shall be within 15 per cent of the calculated key width w, and

$$l_a w_a \left(\frac{UTS_{key}}{UTS_{shaft}}\right) \geq 25d^2$$

Where;

l_a = Actual length of the key, in millimetres

w_a =Actual width of key in millimetres

d = required diameter of the propeller shaft or intermediate shaft (calculated in accordance with sub-paragraph 9.14.3, and 9.14.4 or 9.14.5 respectively), in millimetres

UTS_{key} = ultimate tensile strength of the key material, in megapascals (MPa)

UTS_{shaft} = ultimate tensile strength of the shaft material, in megapascals (MPa).

NOTE: The key material should have a UTS similar to that of the shaft material.

9.16 Propeller and shaft Couplings

9.16.1 Coupling Material

Couplings shall be manufactured from carbon steel or material of equivalent properties. Ordinary grades of cast iron shall not be used.

9.16.2 Coupling Types

Couplings shall be of the following types:

(a) Flange couplings, with flanges formed by upsetting the ends of a shaft [see Figure 5].

(b) Flange couplings, with flanges of fabricated construction. Such couplings shall be heat treated subsequent to welding and machining.

(c) Flange couplings fitted on a taper, keyed and held in place with a nut [see Figure 5 *(a)*].

(d) Flange couplings shrunk on a parallel shaft with or without a key, pin, dowel or similar item in way of the shrink fit (provided that the couplings are not subject to removal in service).

(e) Flange couplings of the split boss type, keyed and clamped to parallel shafts (see Figure 8).

(f) Oil injection couplings.

(g) Clamp couplings of split type, keyed and clamped to parallel shafts.

(h) Flexible couplings.

NOTE: Flange couplings frequently incorporate a spigot to facilitate correct alignment during assembly.

9.16.3 Flange couplings

9.16.3.1 Coupling flange dimensions

9.16.3.1.1 The minimum thickness of a coupling flange shall be the greater of those determined from the formulae in Items *(a)* and *(b)* below:

(a) $t_f = 0.2 d_r \left(\frac{410}{UTS_{coup}} \right)$

(b) $t_f = d_b \sqrt{\frac{UTS_{bolt}}{UTS_{coup}}}$

Where;

t_f = minimum flange thickness, in millimetres

d_r = reference shaft diameter (calculated in accordance with sub-regulation 9.14.2), in millimetres

d_b = diameter of bolts at joint (calculated in accordance with sub-regulation 9.16.3.3), in millimetres

UTS_{coup} = ultimate tensile strength of coupling flange material, in megapascals (MPa)

UTS_{bolt} = ultimate tensile strength of coupling bolts (of diameter calculated in accordance with sub-paragraph 9.16.3.3), in megapascals (Mpa).

9.16.3.1.2 The ligament thickness outside the coupling bolt holes shall not be less than 0.6 times the required coupling bolt diameter.

9.16.3.1.3 Proprietary couplings supplied by the manufacturer need not comply with the minimum ligament thickness requirement.

9.16.3.1.4 The fillet radius at the base of the flange shall not be less than 0.08 times the actual diameter of the shaft. Where the fillet radius is less than 0.125 times the actual diameter of the shaft, the surface finish of the fillet shall not be rougher than 1.6μm.

NOTE: The dimensions of couplings for propeller and intermediate shafts calculated in accordance with the required diameter may be incompatible with some pre-fitted gearbox flanges. Options to overcome this problem include—

(a) adopting a reduced diameter of propeller shaft in accordance with sub-paragraph 9.14.4;

(b) using a higher strength material for propeller and intermediate shafts;

(c) using a higher strength material for the coupling; or

(d) replacing the gearbox coupling.

9.16.3.2 Coupling flange boss

9.16.3.2.1 The minimum boss thickness (outside the keyway) of flange couplings fitted on a taper shall not be less than 1.5 times the required thickness of the key. The minimum thickness shall be measured at the large end of the taper.

9.16.3.2.2 The minimum thickness of a coupling flange boss on a parallel shaft should not be less than that calculated from the following formula:

$$t_b = 0.11d\left(0.9\left[\frac{UTS_{shaft}}{UTS_{coup}}\right] + 0.1\right) + 0.75\left[\frac{d+32}{120}\right]\left[\frac{618}{UTS_{coup}}\right] + \frac{t_k}{2}$$

Where;

t_b =minimum thickness of coupling flange boss, in millimetres

d = minimum required shaft diameter (calculated in accordance with sub-paragraph 9.14.3 and 9.14.4 or 9.14.5), in millimetres

UTS_{shaft} =ultimate tensile strength of shaft material, in megapascals (MPa)

UTS_{coup} = ultimate tensile strength of coupling material, in megapascals (MPa)

t_k = actual thickness of key, in millimetres.

9.16.3.2.3 The length of the boss shall not be less than 1.6 times the minimum required shaft diameter or the key length, whichever is the greater.

9.16.3.3 Flange coupling bolts

9.16.3.3.1 Fitting

Flange coupling bolts shall be machine finished and neat fitting. Non-fitted bolts may be used in couplings that incorporate a spigot provided the bolts are torqued to the coupling manufacturer's recommendations.

9.16.3.3.2 Diameter

Flange coupling bolts shall have a diameter not less than that calculated from the following formula:

$$d_b = \left[0.54 \sqrt{\frac{d^3_r}{N_r}} \right] \sqrt{\frac{410}{UTS_{bolt}}}$$

Where;

d_b = diameter of bolts at joint, in millimetres

N = number of bolts fitted in one coupling

r = pitch circle radius of bolts, in millimetres

d_r = reference shaft diameter (calculated in accordance with sub-paragraph 9.14.2), in millimetres

UTS_{bolt} = ultimate tensile strength of flange coupling bolt, in megapascals (MPa).

9.16.4 Propeller and taper flange couplings

9.16.4.1 Tapers

Tapers for taper flange couplings shall be as specified for propeller shaft tapers in sub -paragraph 9.14.11.

9.16.4.2 Propeller and taper flange coupling retaining nuts

Retaining nuts shall be manufactured from a material compatible with that of the propeller or shaft to which they are to be fitted. They shall also comply with the following:

(a) The outside diameter of the threads shall not be less than 0.75 times the diameter at the smaller end of the taper.

(b) The depth over which the nut is fully threaded shall not be less than 0.75 of the diameter of the thread.

(c) The width across the flats or the effective outside diameter of the nut shall not be less than 1.5 times the diameter of the thread.

(d) Nuts shall be fitted with locking devices. The propeller nuts fitted to carbon steel shafts shall be cap nuts.

9.16.4.3 Pitch of propeller retaining nut threads

The pitch of the thread for propeller retaining nuts shall be in accordance with an applicable and recognized national or international standard (e.g. ISO 4566), or the following:

(a) 2.5 mm pitch for thread diameters not exceeding 40 mm.

(b) 3.5 mm pitch for thread diameters of 40 mm and not exceeding 75 mm.

(c) 4 mm pitch for thread diameters of 75 mm and not exceeding 100 mm.

(d) 6 mm pitch for thread diameters exceeding 100 mm. The thread form should be metric.

NOTE: Threads for taper flange coupling retaining nuts are frequently made the same as for propeller retaining nuts to permit the propeller shaft to be turned end for end in the event of weardown in way of the stern bearings.

9.16.5 Split flange and clamp couplings

9.16.5.1 Clamping bolts

The diameter at the bottom of the threads of bolts in split flange and clamp couplings shall not be less than that determined by the following formula;

$$d_b = \left(0.33 \sqrt{\frac{d^3_r}{N_r}} \right) \sqrt{\frac{410}{UTS_{bolt}}}$$

Where;

d_b = diameter of bolts, in millimetres

N = number of clamp bolts at one of the shaft ends

r = distance, in millimetres, between the centre of the bolts and the centre line of the shaft

d_r = reference shaft diameter (calculated in accordance with paragraph 3.10.2), in millimetres

UTS_{bolt} = ultimate tensile strength of clamp coupling bolt, in megapascals (MPa).

9.16.5.2 Astern thrust

A minimum of two fitted cotter bolts per shaft end shall be let into the shaft between 0.25 times and 0.5 times their diameter to take the astern thrust (see Figure 8).

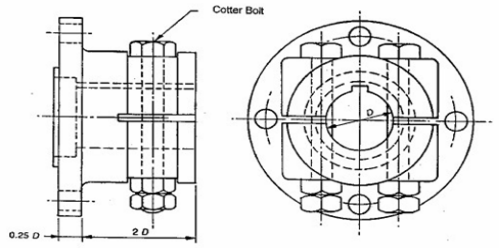


Figure 8 - Split flange coupling

9.16.6 Flexible couplings

9.16.6.1 Universal joint couplings

Universal joints may be incorporated in those parts of the propulsion shafting not subject to axial loading. Universal joint couplings shall be designed and constructed to withstand the maximum engine torque.

9.16.6.2 The installation shall be such as to minimise stressing due to cyclic irregularities.

9.16.6.3 Means shall be provided to prevent the possibility of personal injury or damage to the hull or structure of the ship due to a failure of the universal joint causing flailing of the shaft.

9.17 Stern Bearings

9.17.1 General

Stern bearings shall be of the grease, oil or water-lubricated type. Grease and oil-lubricated bearings shall be fitted with an oil seal. Water-lubricated bearings shall be lined with rubber compound or appropriate synthetic material.

9.17.2 Grease lubricated white metal bearings, or water lubricated bearings which are lined with rubber composition or appropriate synthetic material, shall not be less in length than four times the diameter of the propeller shaft or as the calculated length in sub-regulation 9.17.4.

9.17.3 Oil lubricated white metal bearings shall be provided with a satisfactory type of oil sealing gland. The length of the bearing is to be sufficient to ensure that the bearing pressure resulting from the mass of the propeller and propeller shafting* will not exceed 480 kPa. The length of the bearing shall not be less than 2 times the diameter of the propeller shaft or as the calculated length in sub-regulation 9.17.4.

9.17.4 Length of stern bearings

Plain water, grease, or oil-lubricated bearings shall have a length not less than that determined from the following formula:

$$l_s = k_b \, d_p$$

where

ls = length of stern bearing, in millimetres.

kb = factor of 4 for water or grease-lubricated bearings; or factor of 2 for oil-lubricated bearings.

dp = required diameter of propeller shaft (calculated in accordance with sub-regulation 9.14.3), in millimetres.

9.17.5 Propeller shaft stuffing box support bearings, if fitted, should be no less than 50 per cent the length of the stern bearing.

9.18 Stern Tubes atnd Stern Glands or Seals

9.18.1 Stern tubes

9.18.1.1 Stern tubes shall be rigid and shall be integrated into the structure of the ship. A stern tube shall be of a thickness sufficient to support any shaft bearings carried within the stern tube, and shall allow for a 25 per cent reduction in thickness due to corrosion and erosion. The thickness of the stern tube shall not be less than that of the hull shell to which it is attached.

9.18.1.2 The thickness of the stern tube shall be sufficient to allow for boring, support of bearings, welding and/or integration into the structure. The stern tube thickness is typically 1.5 times the equivalent hull shell thickness. The stern tube thickness in way of the housings of bearings is typically increased to 5 per cent of the shaft diameter plus 10 mm.

9.18.2 Stern gland or seal

The stern gland or seal at the forward end of the stern tube shall be accessible for inspection and adjustment.

9.18.3 Mechanical Seals

Mechanical seals may be fitted provided they are of a type approved by a Classification Society.

9.18.4 Flexible Stern Glands

In the case of a ship of less than 15 m in length, any Class 2 or any Class 3 ship in which the screw or tube shaft is not greater than 64 mm in diameter, a flexible stern gland may be fitted. The gland shall be connected to the stern tube by approved reinforced synthetic rubber hose and the hose shall be secured by two corrosion resistant clips at each end. Circular movements of the gland shall be limited by stops to not more than 5°either side of the mean position.

9.19 Propeller Shaft Brackets

9.19.1 General

Unless otherwise provided, reference to diameter of propeller shaft in this sub-paragraph shall mean the diameter of the propeller shaft as provided for the ship.

9.19.2 Boss length

The length of the boss is to be not less than four times the diameter of the propeller shaft. Boss length shall be sufficient to fully support the shaft bearing.

9.19.3 Boss thickness

The thickness of the boss is to be not less than one quarter of the diameter of the propeller shaft or as calculated using the formula below.

$$t_{boss} = 0.2 d_p \left[\frac{UTS_{shaft}}{UTS_{bracket}} \right]$$

where

t_{boss} = required minimum thickness of boss, in millimetres

dp = required diameter of propeller shaft (calculated in accordance with sub-regulation 9.14.3), in millimetres

UTS_{shaft} = ultimate tensile strength of shaft material, in megapascals (MPa)

$UTS_{bracket}$ = ultimate tensile strength of bracket material, in megapascals (MPa).

9.19.4 Brackets of 'V' Configuration

Refer to Figure 9 *(a)*

9.19.4.1 Included angle between legs

The included angle between the legs shall not be less than 45°.

NOTES:
1. Bracket leg angle should be carefully selected to prevent interaction between propeller blades and bracket legs. Aerofoil paragraphs require special attention.
2. The scantlings for V-brackets derived from the deemed to satisfy regulation in this part are based on legs having an included angle not less than 45°.

9.19.4.2 Calculated width

The calculated width of each solid streamlined leg shall be obtained from the following formula:

$$W = 2.27\, dp \sqrt[3]{\frac{UTSshaft}{UTSleg}}$$

where

W= calculated width of leg (major axis), in millimetres

dp= required diameter of propeller shaft (calculated in accordance with sub-regulation 9.14.3), in millimetres

UTS_{shaft} = ultimate tensile strength of shaft material, in megapascals (MPa)

UTS_{leg} = ultimate tensile strength of leg material, in megapascals (MPa)

9.19.4.3 Calculated thickness

The calculated thickness of each solid streamlined leg shall be obtained from the following formula:

$$t = 0.35\ dp \sqrt[3]{\frac{UTS\ shaft}{UTS\ leg}}$$

where

t= calculated thickness of leg (minor axis), in millimetres

dp= required diameter of propeller shaft (calculated in accordance with paragraph 9.14.3), in millimetres

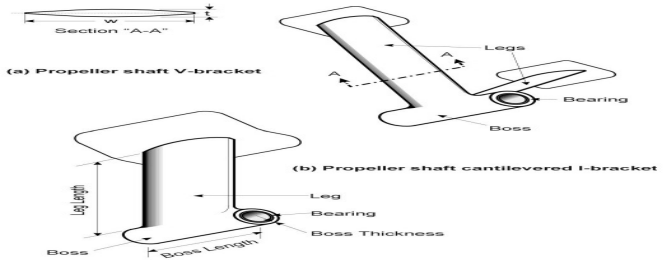
UTS_{shaft} = ultimate tensile strength of shaft material, in megapascals (MPa)

UTS_{leg} = ultimate tensile strength of leg material in megapascals (MPa).

9.19.5 Brackets of 'I' Configuration

Refer to Figure 9 *(b)*

Figure 9 – Propeller Shaft Brackets



9.19.5.1 Calculated width

The calculated width of the single solid streamlined leg shall be obtained from the following formula:

$$W_1 = 3.22\ dp \sqrt[3]{\frac{UTSshaft}{UTSleg}}$$

where

W1= calculated width of leg (major axis), in millimetres

dp = required diameter of propeller shaft (calculated in accordance with sub-regulation 9.14.3), in millimetres

UTS_{shaft} = ultimate tensile strength of shaft material, in mega pascals (MPa)

UTS_{leg} = ultimate tensile strength of leg material, in mega pascals (MPa).

9.19.5.2 Calculated thickness

The calculated thickness of the single solid streamlined leg shall be obtained from whichever of the following formulae is appropriate:

(a) Where the leg is a cantilever—

$$t = 0.515\ dp\ \sqrt[3]{\frac{UTSshaft}{UTSleg}}$$

(b) Where the lower end of the leg is attached to a shoe piece or skeg that offers lateral support, see sub-paragraph 9.25.6.7.2—

$$t = 0.36\ dp\ \sqrt[3]{\frac{UTSshaft}{UTSleg}}$$

where

t= calculated thickness of the leg (minor axis), in millimetres

dp= required diameter of propeller shaft (calculated in accordance with sub-paragraph 9.14.3), in millimetres

UTS_{shaft} = ultimate tensile strength of shaft material, in megapascals (MPa)

UTS_{leg} = ultimate tensile strength of leg material, in megapascals (MPa).

9.19.6 Additional provisions for bracket design

9.19.6.1 Stiffness

Where the bracket is a material other than carbon steel, the moment of inertia about the longitudinal axis shall not be less than that determined from the following formula:

$$I_l = \frac{wt^3}{250000}\left[\frac{UTS\ leg}{UTS\ shaft}\right]^{4/3}\left[\frac{207}{Eleg}\right]$$

where

I_l= required moment of inertia of the leg about the longitudinal axis, in cm^4

w= calculated width of leg as determined by sub-regulation 9.19.4.2 or 9.19.5.1 as appropriate, in millimetres

t = calculated thickness of leg as determined by sub-regulation 9.19.4.3 or 9.19.5.2 as appropriate, in millimetres

UTS_{shaft} = ultimate tensile strength of shaft material, in megapascals (MPa)

UTS_{leg} = ultimate tensile strength of leg material, in megapascals (MPa)

Eleg = modulus of elasticity of the leg material, in gigapascals (GPa).

9.19.6.2 Hollow section and non-streamlined brackets

Where the bracket is a hollow or non-streamlined section, the cross sectional area, inertia and section modulus of the leg about the longitudinal axis shall be maintained. For the purposes of such calculation, the section modulus shall not be less than that determined from the following formula:

$$Z_l = \frac{wt^2}{12500}$$

where

Z_l = required section modulus of the leg about the longitudinal axis, in cubic centimetres (cm^3)

w = calculated width of leg as determined by sub-regulation 9.19.4.2 or 9.19.5.1 as appropriate, in millimetres

t = calculated thickness of leg as determined by sub-regulation 9.19.4.3 or 9.19.5.2 as appropriate, in millimetres.

The area of the leg shall not be less than that determined from the following formula:

$$A = 0.0061\ wt \sqrt[3]{\frac{UTSshaft}{UTSleg}}$$

where

A = required area of the leg, in square centimetres (cm^2)

w = calculated width of leg as determined by sub-paragraph 9.19.4.2 or 9.19.5.1 as appropriate, in millimetres

t = calculated thickness of leg as determined by sub-paragraph 9.19.4.3 or 9.19.5.2 as appropriate, in millimetres

UTS_{shaft} = ultimate tensile strength of shaft material, in megapascals (MPa)

UTS_{leg} = ultimate tensile strength of leg material, in megapascals (MPa).

9.19.6.3 Leg length

The above formulas have been based on a given maximum length for the longer leg of a ”V” bracket or the leg of an ”I” bracket. The maximum assumed length, measured from the outside perimeter of the boss to the outside of the shell plating, shall be determined from the following formula:

$$l_{max} = 10.6\ dp \sqrt[3]{\frac{UTSshaft}{410}}$$

where

$lmax$ = maximum length of leg, in millimetres, for application of the formulae in sub-paragraph 9.19.2 to 9.19.3

dp = required diameter of propeller shaft (calculated in accordance with sub-paragraph 9.14.3), in millimetres

UTS_{shaft} = ultimate tensile strength of shaft material, in megapascals (MPa).

Where the leg length is less than lmax, the paragraph modulus of the leg may be reduced in proportion to the reduced length, provided the paragraph modulus is not less than 0.85 times the required paragraph modulus Z_l.

NOTE: Where the length l_{max} is exceeded, the scantlings of shaft brackets will need to be considered as an equivalent solution. The width and thickness of the legs or leg would normally increase to compensate for the increased bending loads and reduced buckling strength.

9.20 Fixed Nozzles

9.20.1 General

Fixed nozzles shall be watertight and tested to a head of water of 2.5 m or equivalent. A means for draining shall be incorporated in the nozzle.

9.20.2 Scantlings of fixed nozzles

The scantlings of fixed nozzles shall be calculated in accordance with sub-paragraph 9.25.8.2 to 9.25.8.8 for steering nozzles.

9.21 Stern drives, Azimuthing propellers, Water jets and other proprietary propulsion devices

9.21.1 General

Stern drives, azimuthing propellers, water jets and other proprietary propulsion devices may be fitted instead of conventional shafting provided the reliability of the propulsion system and the watertight integrity of the ships are maintained, refer also to sub -paragraph 9.21.2 to 9.21.4 below.

9.21.2 Rating

The manufacturer‘s specified rating for a proprietary propulsion device shall be appropriate for the intended nature and use of the ship. For ships 25 m and over in measured length, the proprietary propulsion device shall be of a design and construction approved by a classification society.

NOTE: Not all proprietary propulsion devices are intended for commercial service. Some are rated by the manufacturer for recreational service only. Others may be rated for only recreational and light duty commercial service.

9.21.3 Astern thrust and directional control

9.21.3.1 Subject to sub-paragraph 9.4.3, sufficient astern thrust and directional control mechanisms shall be provided to secure proper control of the craft in normal and abnormal circumstances. The means for reversing and directional control shall provide for operation at full power under all normal conditions of operation.

9.21.3.2 On Seagoing ships arrangements should be provided to permit the ship to return to a safe haven in the event of a steering failure.

NOTE: On twin-screw ships, this may involve the fitting of a locking device on each unit to maintain directional control.

9.21.4 Maintenance of watertight integrity

Where a proprietary propulsion device has features which have the potential to reduce the watertight integrity of the ship (e.g. a flexible seal at the point were a propulsion device penetrates the hull), measures shall be taken to control any risks associated with such features, to ensure a risk not greater than that of a conventional installation.

NOTE: Such measures might include periodic replacement of the seal, the fitting of bilge level indicators, isolation of the propulsion unit in a watertight compartment or a combination of these.

9.22 Fuel Systems

9.22.1 Containment of fuel

Fuel tanks and fuel systems shall be designed, constructed and installed to prevent the spillage of fuel in both normal and abnormal conditions of operation.

9.22.2 Minimising the risk of ignition

Fuel tanks and fuel systems shall be designed, constructed and installed to avoid potential sources of ignition arising from the proximity of machinery or other sources of ignition.

9.22.3 Minimising the risk of explosion

Fuel tanks and fuel systems for fuel of flashpoint less than 60ºC shall be designed, constructed and installed to prevent the build-up of explosive fumes and avoid potential sources of ignition that might ignite such fumes.

9.22.4 Compliance

For the purpose of this paragraph, the fuel system of a ship shall be deemed to have satisfied the required outcomes in sub-regulation 9.22.1 and 9.22.3 if it complies with sub-paragraph 9.22.5 to 9.22.8.

9.22.5 Fuel tanks

Fuel tanks are classified as portable or non-portable as follows:

(i) Non-portable fuel tanks-fuel tanks that are either—

(a) built-in fuel tanks-Fuel tanks that are integral to the ship‘s hull structure. The requirements for built-in fuel tanks are specified in sub-paragraph 9.22.5.1 and 9.22.5.2 (Further requirements for the fuel systems for such tanks are specified in sub-paragraph 9.22.7 or 9.22.8); or

(b) non-portable, freestanding fuel tanks-Fuel tanks that are not integral to the hull structure of the ship, but which are nevertheless fitted to or permanently located on the ship, and intended to be refilled *in situ*. The requirements for non-portable, free-standing fuel tanks are specified in sub-regulation 9.22.5.1 and 9.22.5.3. (Further requirements for the fuel systems of non-portable freestanding tanks are specified in sub-paragraph 9.22.7 or 9.22.8).

(ii) Portable fuel tanks—

Fuel tanks of 25 L capacity or less, and which are intended to be removed from the ship for filling. The requirements for portable fuel tanks are specified in sub-paragraph 9.22.5.4.

9.22.5.1 Common requirements for non-portable fuel tanks of both free-standing and built-in types

9.22.5.1.1 Location

Non-portable fuel tanks shall not be fitted in the following locations:

(a) Over stairways and ladders.

(b) Over hot surfaces.

(c) Over electrical equipment.

(d) In any location where fuel from the tank would leak directly on a source of ignition.

This requirement need not apply where the fuel tank is supplied as an integral part of an engine.

9.22.5.1.2 Pressure testing

9.22.5.1.2.1 A non-portable fuel tank shall be pressure tested to an equivalent of 2.5 m of fresh water above the top of the tank, or to the maximum head to which the tank may be subject to in service, whichever is the greater.

9.22.5.1.2.2 The distance from the top of the air pipe or filling pipe, whichever is the greater, shall be taken into account in determining the head.

9.22.5.1.2.3 Non-portable, free-standing fuel tanks shall be pressure tested prior to installation in the ship.

9.22.5.1.3 Venting

9.22.5.1.3.1 A non-portable fuel tank shall be vented to the open air. The size of the vent pipe shall be sufficient to prevent generation of pressure. Where the tank filling is effected by pumping through the filling line, the area of air escape shall not be less than 1.25 times the area of the filling pipe. Where more than one fuel tank is fitted, the vents shall be kept separate.

9.22.5.1.3.2 The pipe shall terminate in a gooseneck on the open deck.

9.22.5.1.3.3 Where the diameter of the pipe outlet exceeds 18 mm, a corrosion-resistant wire gauze screen shall be fitted. The open area of the screen shall be not less than the cross-section of the vent pipe.

9.22.5.1.3.4 A short flexible section of hose of length no more than 760 mm may be incorporated into the vent pipe for vibration damping

or to facilitate installation. The flexible section of hose shall be made of reinforced synthetic rubber of a type resistant to fuel, salt water and vibration.

9.22.5.1.3.5 The flexible section of hose shall be fastened to the rigid section of the vent with two corrosion-resistant clips at each end.

9.22.5.1.4 Inspection opening

Non-portable fuel tanks, unless they are of the freestanding type and less than 800 L capacity, shall be fitted with an inspection opening to facilitate cleaning and inspection.

9.22.5.1.5 Fuel shut-off

A fuel shut-off valve or cock shall be fitted in each tank outlet line. Non-metallic piping and fittings shall not be fitted in the line between the tank and this shut-off valve or cock. The fuel shut-off valve or cock shall be provided with a means of closing located outside a machinery space in a position not likely to be isolated by a fire in the machinery space. Where remote fuel shut-off arrangements lead from or pass through a machinery space, they shall be capable of operating when exposed to flame and heat from a fire within that space.

NOTE: Locating the fuel shut-off valve on or near the fuel tank reduces the risk of uncontrolled fuel spillage in the event of a rupture in the pipe between the shut-off valve and the tank.

9.22.5.1.6 Fuel filling stations

Fuel filling stations shall be located outside machinery spaces and shall be arranged to—

(a) prevent any possibility of overflow coming into contact with a hot surface; and

(b) prevent or minimise pollution of the environment by any possible overflow.

9.22.5.1.7 Filling pipes for non-portable fuel tanks.

9.22.5.1.7.1 Non-portable fuel tanks shall incorporate a permanent filling pipe. The filling pipe should extend from the open deck to the tank.

9.22.5.1.7.2 A short flexible section of hose of length no more than 760 mm may be incorporated into the filling pipe for vibration damping or to facilitate installation. The flexible section of hose shall be made of reinforced synthetic rubber of a type resistant to fuel, salt water and vibration and shall comply with a relevant national or international standard.

9.22.5.1.7.3 The flexible section of hose shall be fastened to the rigid section of the filling pipe with two corrosion-resistant clips at each end.

NOTES:

(1) The use of flexible sections of hose in filling pipes that are also used for sounding may prevent proper soundings being taken unless the pipe is straight and a sounding tape is not used.

(2) Electrical bonding similar to that mandated in sub-paragraph 9.22.8.10 for fuel systems of flashpoint less than 60ºC is considered to be good practice on ships having fuel of flashpoint 60ºC or more.

9.22.5.2 Specific requirements for built-in fuel tanks which are integral to the ship's hull structure

9.22.5.2.1 Arrangement

Fuel tanks shall not be located forward of the collision bulkhead. Built-in fuel tanks should be located to reduce the risk of spillage in the event of minor collisions or grounding.

NOTE: Cofferdams are used to separate fuel tanks from potable water tanks and ballast tanks.

9.22.5.2.2 Fuels having a flashpoint below 60°C

Built-in fuel tanks shall not be used to contain fuels having a flashpoint below 60°C.

9.22.5.2.3 Sandwich construction

Sandwich construction shall not be used in way of built-in fuel tanks.

9.22.5.2.4 Large built-in tanks

Deep tanks and double bottom tanks extending more than half the breadth of the ship shall be subdivided with a longitudinal division.

9.22.5.2.5 Baffles

Baffle plates shall be fitted in built-in fuel tanks to reduce the surging of the tank contents. Baffles should be fitted at intervals not more than 1 m along either the longitudinal or transverse axis of the tank. Access openings through baffles should be the minimum size required for inspection and cleaning in order to maintain their effectiveness as baffles.

NOTE: Baffles are usually fitted perpendicular to the axis of larger dimension. They are not normally provided along both axes.

9.22.5.3 Specific requirements for non-portable, free-standing fuel tanks

9.22.5.3.1 Construction

Non-portable, free-standing fuel tanks shall be constructed of carbon steel, stainless steel, copper, marine-grade aluminium alloy or FRP. No part of a metallic fuel tank shall depend on soft solder for tightness.

9.22.5.3.2 Location

Non-portable, free-standing fuel tanks should be located or arranged to permit inspection of the exterior of the tank and the hull and structure adjacent to the tank.

NOTE: Non-portable fuel tanks in machinery spaces are also required to comply with the fire rating requirements contained in Part C paragraph 4 (Fire Safety) of the NSCV.

9.22.5.3.3 Support and securing

Non-portable, free-standing fuel tanks shall be adequately supported and braced to prevent dislodging due to high accelerations that might arise through motions at sea or by a collision. The supports and braces shall be insulated from contact with the tank surfaces with a non-abrasive and non-absorbent material compatible with the tank material.

9.22.5.3.4 Baffles

Baffles shall be fitted in non-portable, free-standing fuel tanks at a spacing not greater than 1 m along the length of the tank (tank major axis), and shall have a thickness not less than that of the tank plating or tank shell laminate.

9.22.5.3.5 Minimum thickness-metallic tanks

The minimum thickness of metal used in the construction of a non-portable, free-standing fuel tank shall be the greater of the two values determined in accordance with Items *(a)* and *(b)* as follows:

(a) The thickness determined using the formulas in sub-paragraph 9.22.5.3.7, 9.22.5.3.8 or 9.22.5.3.9 as appropriate, based on the dimensions of the largest unsupported panel.

(b) The thickness determined from the following formula:

$$t_{min} = \sqrt[3]{\frac{410}{UTS_{tank}}}$$

where

t_{min} = minimum plate thickness of tank, in millimetres

UTS_{tank} = welded ultimate tensile strength of tank material, in megapascals (MPa).

NOTE: the minimum thickness determined by the formula in sub-paragraph 9.22.5.3.5*(b)* equates to 3mm for carbon steel, 2.4mm for 316 stainless steel and between 3.7mm and 4.7mm for aluminium depending upon the grade. Where material of the calculated thickness is not readily available, the preferred stock thickness of material in excess of that required is normally used.

9.22.5.3.6 Largest unsupported span-carbon steel tanks

When determining the largest unsupported panel for use in sub-paragraph 9.22.5.3.7 and 9.22.5.3.8, account shall be taken of the support afforded by the following items:

(a) Tank boundaries.

(b) Baffles, where the thickness of the baffle is not less than the thickness of the tank plating in way (see sub-paragraph 9.22.5.3.4).

(c) Stiffeners, where

(i) the thickness of the stiffener is not less than the thickness of the tank plating in way; and

(ii) the depth of the stiffener is not less than that determined from the following formula:

$$d = 12 + \frac{b}{10}$$

Where

d = depth of stiffener in carbon steel in millimetres

b = unsupported span of stiffener, in millimetres.

9.22.5.3.7 Carbon steel tank of depth not exceeding 2.5 m

Where the depth from the top of the filling pipe to the bottom of a non-portable, free- standing carbon steel fuel tank does not exceed 2.5 m, the minimum plate thickness of carbon steel shall be obtained from Figure 10, which is developed from the following formula:

$$t = 0.024ac$$

where

t = minimum carbon steel plate thickness, in millimetres

a = length of minor axis, in millimetres

c = corresponding numerical value for the ratio of length of major axis of panel l to length of minor axis of panel a, as given in Table 2

l = length of major axis, in millimetres.

9.22.5.3.8 Carbon steel tank of depth exceeding 2.5 m

Where the depth from the top of the filling pipe to the bottom of a non-portable, free standing carbon steel tank exceeds 2.5 m, the minimum plate thickness of carbon steel shall be calculated from the following formula:

$$t = 0.0024\ a\ c \sqrt{\frac{h}{2.5}}$$

where

t = minimum carbon steel plate thickness, in millimetres

a = length of minor axis, in millimetres

c = corresponding numerical value for the ratio of length of major axis of panel *l* to length of minor axis of panel *a*, as given in Table 2.

h = distance from top of filling pipe to bottom of tank, in metres

l = length of major axis, in millimetres.

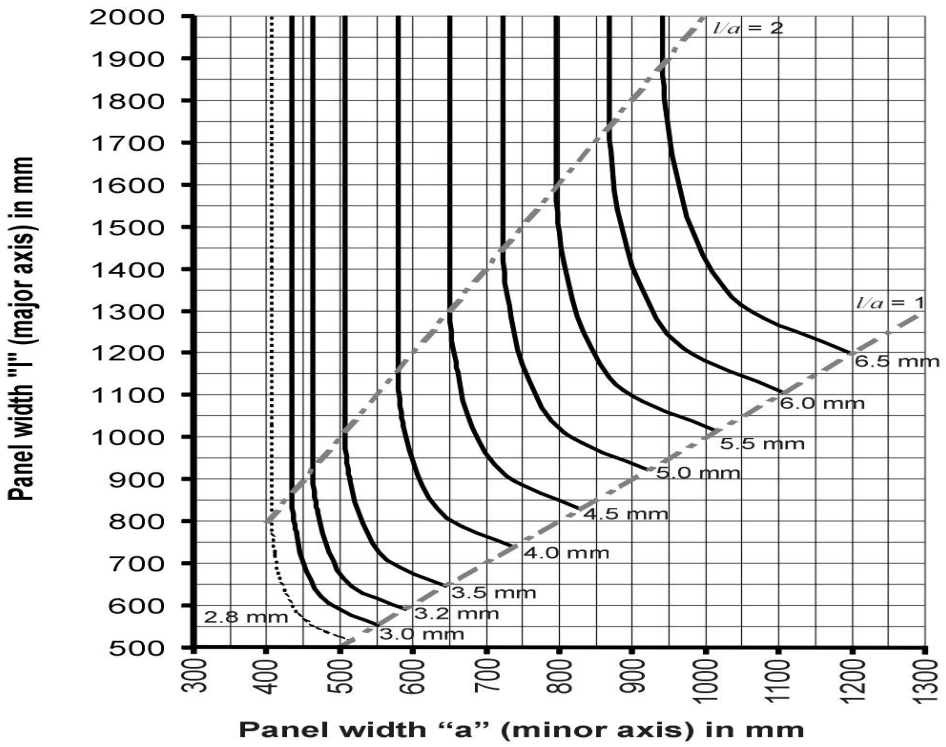


Figure 10 – Minimum thickness of fuel tanks plated in carbon steel for heads not exceeding 2.5m

9.22.5.3.9 Metallic tanks manufactured from metal other than carbon steel

Table 2 - Ratio of major/minor axes of panel (*l*/*a*)

l/*a*	1	1.25	1.5	1.75	2 and over
c	0.226	0.258	0.275	0.284	0.288

NOTE: Values for coefficient *c* corresponding to values of *l*/*a* between those shown in the table may be obtained by linear interpolation.

9.22.5.3.9.1 Where a fuel tank is manufactured from a metal other than carbon steel, the plate thickness shall be determined from the following formula:

$$T = t\sqrt{\frac{410}{UTS_{tank}}}$$

Where

T = minimum plate thickness of tank, in millimetres

t = minimum plate thickness in millimetres, for carbon steel, determined in accordance with sub-regulation 9.22.5.3.7 or 9.22.5.3.8 as appropriate

UTS_{tank} = ultimate tensile strength of tank material, in megapascals (MPa).

9.22.5.3.9.2 Where the stiffener material is a metal other than carbon steel, the minimum depth of stiffener referred to in sub-regulation 9.22.5.3.6 *(c)* shall be determined from the following formula:

$$D = d \sqrt[4]{\frac{410}{UTS_{tank}}}$$

Where

D = minimum depth of stiffener in metal other than carbon steel in millimetres

d = depth of stiffener for carbon steel, determined in accordance with sub-regulation 9.22.5.3.6*(c)*

UTS_{tank} = ultimate tensile strength of tank material, in megapascals (MPa).

9.22.5.3.10 FRP non-portable, free-standing fuel tanks-general

Sandwich construction shall not be employed in FRP free-standing fuel tanks. Scantlings for FRP free-standing fuel tanks shall be calculated in accordance with AS 4132.1 and AS 4132.3. Alternatively, the scantlings for FRP free-standing fuel tanks may be determined in accordance with sub-paragraph 9.22.5.3.11 and 9.22.5.3.12 below.

9.22.5.3.11 FRP non-portable, free-standing fuel tanks-basis for scantlings

The scantlings for FRP free-standing fuel tanks in sub-paragraph 9.22.5.3.12 are based on the following minimum requirements for mechanical properties:

(a) Tensile Strength-80 MPa

(b) Bending Strength-120 MPa

(c) Modulus of Elasticity:

(i) Tensile (Es)-7000 MPa

(ii) Bending (Eb)-7000 MPa

NOTE: A mass per square metre of reinforcement material of 430grams per square metre per millimetre ($g/m^2/mm$) of laminate thickness has been assumed.

9.22.5.3.12 FRP non-portable, free-standing fuel tanks-tank shell laminate and stiffener requirements

The scantlings of the shell laminate and stiffeners for non-portable, free-standing fuel tanks manufactured from FRP shall be in accordance with Table 3 and Table 4 respectively.

Table 3—Laminate for free-standing fuel tank shell

Depth of tank (m) [A]	Head (m) [B]			
	1.8	2.4	3.0	3.6
	Laminate Weight (g/m^2)[C]			
0.6 and less	4260	4760	5210	5660
0.9	4540	4980	5430	5825
1.2	4760	5210	5660	6050
1.5	4980	5430	5825	6220
1.8	5210	5660	6050	6380

Legend:

[A] The depth of the tank shall be measured from the lowest point of the tank panel to the crown of the tank.

[B] The head shall be measured from the crown of the tank to the top of the air or overflow pipe, whichever is greater, but cannot be less than 1.8m.

[C] The laminate weights are for stiffeners spaced 460mm apart. Where the spacing differs from 460mm, the laminate shall be modified in direct proportion.

Table 4 Stiffening of free-standing fuel tanks

Length of stiffeners(m)	Minimum head for vertical stiffeners (m) [A]	Head (m)			
		1.8	2.4	3.0	3.6
		Stiffener Section Modulus (cm^3) [B]			
0.9 and less	2.25	17.0	22.5	28.5	34.0
1.2	2.40	30.5	40.5	50.0	59.5
1.5	2.55	46.5	62.5	77.5	92.5
1.8	2.70	67.0	90.0	111.5	134.0

Legend:

[A] The head shall be measured from the centre of the span to the top of the air or overflow pipe, whichever is the greater, but shall not be less than the value given in the table for vertical stiffeners, 1.8m above the crown of the tank for horizontal stiffeners.

[B] The modulus values are for stiffeners spaced 460mm apart. Where the spacing differs from 460mm, the modulus shall be modified in direct proportion.

9.22.5.3.13 Internal structure and coatings for non-portable, free-standing fuel tanks constructed of FRP

The minimum laminate for internal baffles in non-portable, free-standing FRP fuel tanks shall not be less than 2400 g/m^2. A fuel-resistant flow-coat shall be applied to the internal surface, preferably over a heavy resin-rich (2.5:1) chopped strand mat layer using vinylester.

9.22.5.4 Portable fuel tanks

9.22.5.4.1 Design

Portable fuel tanks shall be designed to minimise the possibility of overturning and facilitate ease of handling and securing against movement.

9.22.5.4.2 Manufacture

Portable fuel tanks shall comply with the following:

(a) Unless part of the original engine manufacturer's equipment, the tank shall be manufactured from corrosion-resistant metal or shall be coated with a material to provide protection from corrosion.

(b) Where applicable, the tank shall have mated parts that are galvanically compatible.

(c) The tank shall have all service and vent openings above the full contents level.

(d) The tank shall be fitted with a fuel contents gauge.

(e) AS 2906, unless the tank is part of the original equipment as supplied by the engine manufacturer.

NOTE: AS 2906 specifies material, design, properties and marking requirements for refillable, portable fuel tanks of capacity up to 25 L.

9.22.5.4.3 Location

Where a ship is fitted with a flush or sealed deck, portable fuel tanks shall be situated above that deck in such a position as to prevent any fuel from draining to spaces below the deck in the event of a spillage.

9.22.5.4.4 Fuel lines

Fuel lines for portable fuel tanks shall be of heavy-duty synthetic rubber and shall be fitted with bayonet-type fittings at the tank or engine connection which, when disconnected, will automatically shut off fuel from the tank.

9.22.6 Safety arrangements for power-operated fuel pumps and motors

9.22.6.1 Relief valving

If the closed discharge pressure of a cargo oil pump, fuel transfer pump or fuel pressure pump exceeds the maximum design working pressure of the discharge system, a relief valve discharging back to the suction side of the pump shall be fitted.

9.22.6.2 Stop valves

Stop valves shall be fitted on the suction and discharge lines of cargo oil, fuel transfer and fuel pressure pumps.

9.22.6.3 Means of stopping

9.22.6.3.1 A fuel transfer pump or cargo oil pump shall be fitted with means to stop the pump from both inside and outside the space in which it is located.

9.22.6.3.2 The remote fuel transfer pump or cargo oil pump shut-down arrangements shall be capable of operating when exposed to flame and heat from a fire within the space containing the pump.

9.22.6.4 Fuel filters

9.22.6.4.1 Transparent filter casings of plastic or glass shall be resistant to both mechanical impact and thermal shock, and shall either be fitted with guards or located in protected positions.

9.22.6.4.2 Where fuel filters are not installed in positions such that any spillage is directed overboard, they shall be designed and installed such that their disassembly will result in minimum spillage.

NOTE: Fuel filters may be fitted at any position in the fuel system after the fuel shut-off valve or cock referred to in sub-paragraph 9.22.5.1.5.

9.22.7 Additional requirements for fuel systems in ships with non-portable fuel tanks and which operate on fuel with flashpoint more than 60ºc.

Refer to Figure 11.

NOTE: AS 3570 specifies 61.5ºC as the minimum flashpoint for diesel. Australian fuels meet the requirements of AS 3570. Some overseas standards specify a temperature less than 60ºC for the minimum flashpoint of diesel.

9.22.7.1 Fire risk

The fuel system of a ship shall be designed and installed so that failure of any part of the fuel system does not increase the risk of fire to unacceptable levels.

NOTE: Measures to reduce the risk of fire from a failure in the fuel system include separation from potential sources of ignition, sheathing of fuel piping, spray guarding, and the fitting of alarms.

9.22.7.2 Fuel tank contents measurement

9.22.7.2.1 Non-portable fuel tanks shall be fitted with a means for determining the amount of fuel contained in the tank. It shall not be possible for fuel to leak through the measurement device in the event of the tank being overfilled.

9.22.7.2.2 Where a level indicating gauge glass is fitted on a non-portable fuel tank, it shall be fitted with self-closing valves or cocks. Where the upper end of the gauge glass is connected to the tank through the top plating, only one such self-closing valve or cock at the lower end need be fitted.

9.22.7.2.3 Fuel tank sounding pipes should not terminate in accommodation spaces. Where such sounding pipes terminate in alleyways, flush deck screwed caps should be fitted.

9.22.7.3 Fuel tank drains

Non-portable fuel tanks shall be fitted with a drain valve or drain cock, the open end of which shall be blanked with a screwed plug. Alternatively, fuel tanks with a capacity less than 400 L may be provided with just a screwed drain plug.

9.22.7.4 Rigid Fuel piping

9.22.7.4.1 Unless provided for in sub-paragraph 9.22.7.5, fuel piping for non-portable fuel tanks shall be of seamless, heavy gauge metal. The piping shall be connected by flanged joints, metal to metal joints of the conical type or other suitable means. Such connections shall be kept to a minimum, and shall be readily visible and accessible.

9.22.7.4.2 Where cone nipples are used, they shall be welded. Olive-type compression fittings shall not be used.

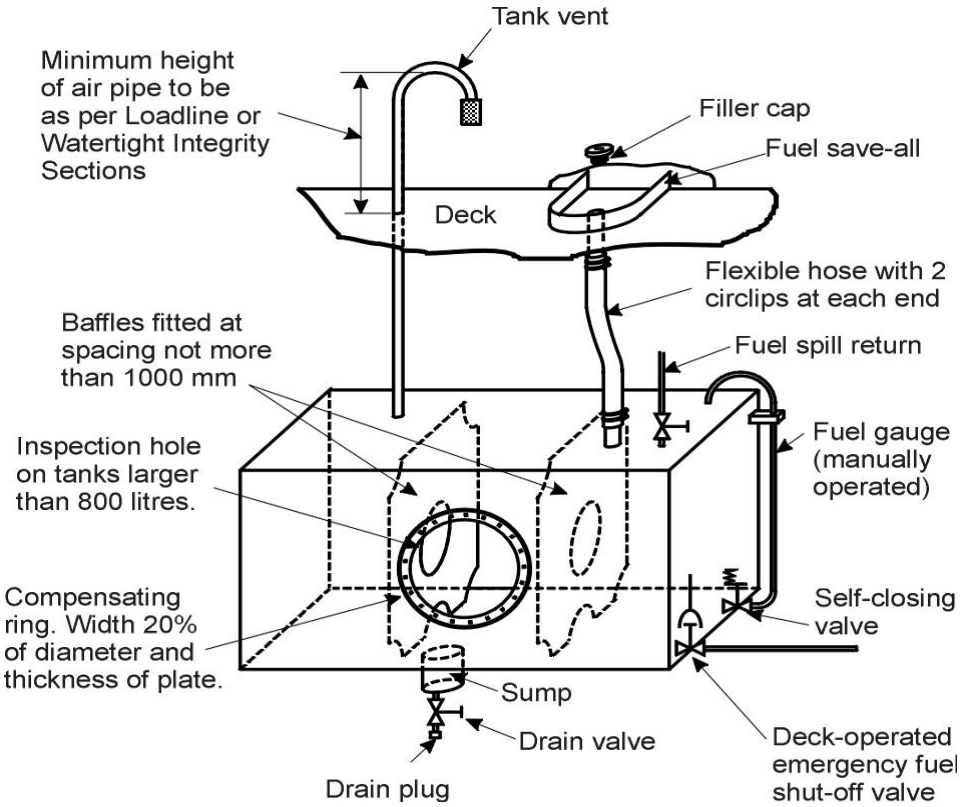


Figure 11- Example of a freestanding non-portable fuel tank installation for fuel over 60ºC flashpoint.

9.22.7.5 Flexible fuel piping

9.22.7.5.1 Flexible fuel piping may be used in fuel systems for non-portable fuel tanks only—

(a) between the fuel shut-off valve or cock specified in sub-paragraph 9.22.5.1.5 and the main or auxiliary engine; and

(b) to conduct any fuel bypass back to the top of the fuel tank.

9.22.7.5.2 Flexible piping shall have a synthetic rubber inner tube with metal braided reinforcement. It shall be resistant to heat, salt water, petroleum products and shall be a component supplied for the purpose by the engine manufacturer or shall comply with a relevant national or international standard. It shall be installed so as to be readily visible and clear of the bilge, and shall be secured to prevent chafing. Hose fittings shall be in accordance with particular application. Hose clamps should not be used.

9.22.7.5.3 Flexible piping should be located so as to permit regular inspection and periodic replacement.

NOTES:

1. Flexible fuel lines tend to degrade over time.
2. Compliance with relevant national or international standards include classification society approval, approval by a national maritime authority (e.g. AMSA, US Coast Guard), certified compliance with a relevant standard (such as SAE 30R9-Fuel Injection Hose Medium-Pressure Coupled and Uncoupled Synthetic Rubber Tube and Cover). Compliance is only valid if the application is the same as that envisaged by the particular standard or authority, especially supply pipes to fuel injection pumps which are subjected to dynamic pulsing. Fuel returns may also be subjected to dynamic pulsing.

9.22.8 Additional requirements for fuel systems in ships with non-portable fuel tanks and which operate on fuel with flashpoint less than 60ºc .

Refer to Figure 12 and Figure 13.

NOTE: Petrol (gasoline) and liquefied petroleum gas (LPG) both have a flashpoint less than 60ºC.

9.22.8.1 Application

The requirements of this regulation apply to fuel systems in ships with non-portable fuel tanks and which operate on fuel with a flashpoint less than 60ºC, with the exception of liquefied petroleum fuel systems. Liquefied petroleum fuel systems as prescribed in Part 5 of this paragraph.

9.22.8.2 Gravity feed fuel systems

Gravity feed fuel systems shall not be used on engines with non-portable fuel tanks of capacity exceeding 10 L.

9.22.8.3 Fuel tank capacity

Non-portable fuel tanks should be no larger than that necessary for the intended service of the ship, but should be of sufficient capacity to prevent them having to be filled while in service.

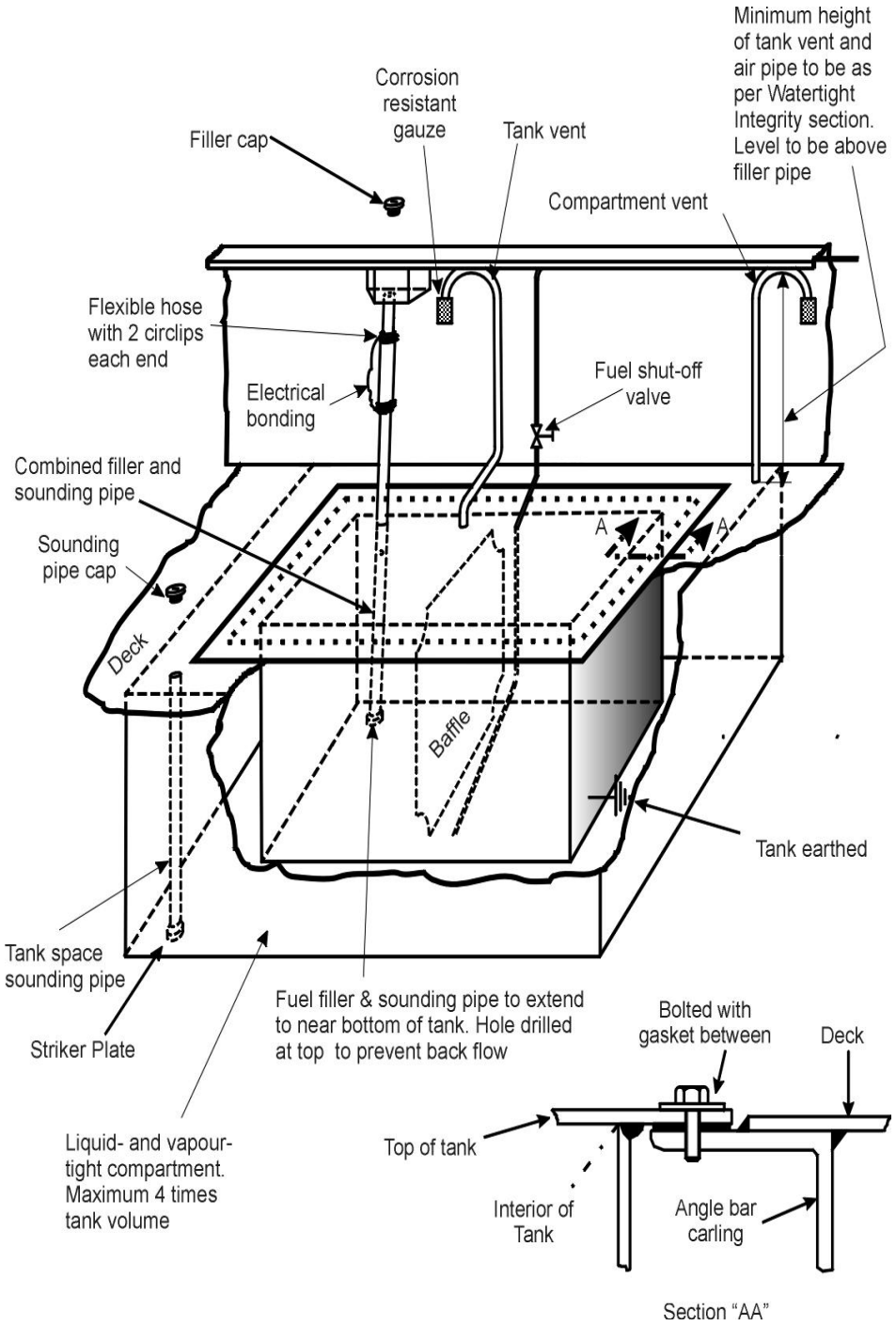


Figure 12 - Example of an under-floor fuel tank installation for fuel with the flashpoint less than 60ºC

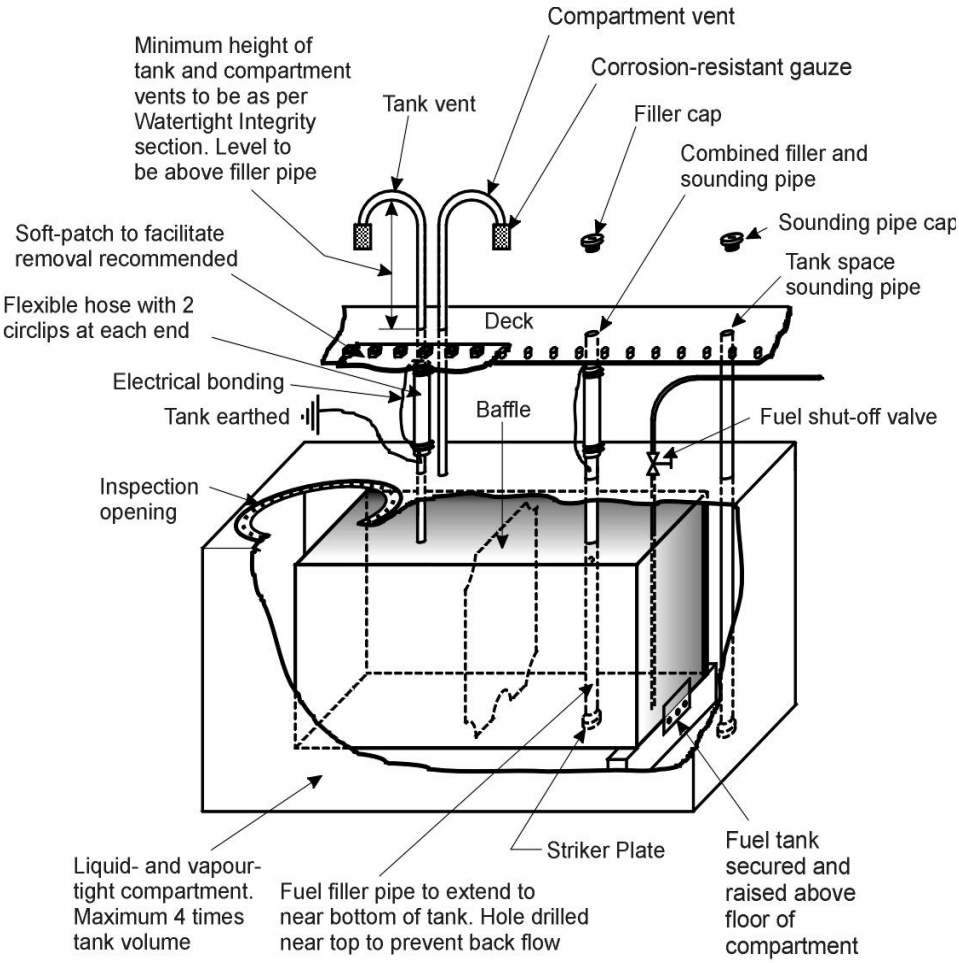


Figure 13 -Alternative example of an under-floor fuel tank installation for fuel less than 60ºC flashpoint.

9.22.8.4 Fuel tank contents measurement

Non-portable fuel tanks shall be fitted with a means for determining the amount of fuel contained in the tank. It shall not be possible for fuel to leak through the measurement device in the event of the tank being overfilled. The cap provided on the sounding pipe for the insertion of the sounding rod shall have a maximum clear opening of 15 mm diameter.

NOTE: The 15 mm limit on caps for sounding pipes is intended to prevent the risk of spillage where a sounding pipe not intended for use as a filling point is used for that purpose. It does not apply where the filling pipe is also designed for taking soundings.

9.22.8.5 Fuel tank location

9.22.8.5.1 Non-portable fuel tanks shall be securely installed in a location remote from the engine, exhaust pipes and other potential sources of ignition.

9.22.8.5.2 Fuel tanks located below the deck or within an enclosed space shall be in a compartment no greater than four times the volume of the tanks. The fuel tank compartment shall be liquid and vapour tight to all other compartments.

9.22.8.5.3 Such fuel tank compartments shall not be used for any purpose other than for housing the fuel tanks. Means to sound the fuel tank space shall be provided.

NOTE: The likelihood of fuel leaking from a tank is reduced when penetrations such as fuel take-offs, tank vents and inspection covers are arranged to pass through the top of the tank; e.g. refer to Figure 13 and Figure 14.

9.22.8.6 Fuel filler pipe

The fuel filler pipe for non-portable fuel tanks shall extend to a point close to the bottom of the tank.

NOTE: The purpose of this paragraph is to reduce the backflow of inflammable vapours through the filling pipe.

9.22.8.7 Inspection

Non-portable fuel tanks and associated fittings should be able to be inspected externally.

9.22.8.8 Ventilation

9.22.8.8.1 Spaces for non-portable fuel tanks that do not drain overboard shall be adequately ventilated. Venting shall be via a vent pipe to an open space where there is no risk of the escaping vapour igniting or posing any other hazard.

9.22.8.8.2 Each fuel tank shall also be fitted with a vent pipe, remote from the tank space vent, leading to a similar open space.

9.22.8.8.3 Vent pipes from tank spaces and fuel tanks shall be separate and non-communicating, and shall be fitted with spark arresters (e.g. wire gauze diaphragms).

NOTE: Additional ventilation of the fuel tank space may be provided by a flameproof fan. Alternatively, a gas detector may be fitted, having an audible or visual alarm located at the control position. Guidance for the fitting of flameproof fans is provided in AS 1799.3 Chapter 5.

9.22.8.9 Electrical connections

Unless required for establishing the amount of fuel in a non-portable fuel tank, electrical connections or wiring shall not be fitted anywhere within the tank space.

9.22.8.10 Electrical bonding

Electrical bonding shall be provided to protect against the possibility of a spark arising from static charge causing an explosion. Each non-portable metallic fuel tank and metal or metal-plated component of the fuel fill system that may come into contact with fuel shall be earthed so that resistance to earth is less than 10 ohms. When a fill or air pipe contains a non-conducting flexible paragraph, a conductor shall join the metallic paragraphs of the fill or air pipe to protect against a static charge arising during fuel filling.

9.22.8.11 Fuel piping

9.22.8.11.1 Unless provided for in sub-paragraph 9.22.8.12, piping in fuel systems for non-portable fuel tanks shall be of seamless heavy gauge metal. Pipe connections shall be made via flanged joints, metal to metal joints of the conical type or other suitable means, and shall be minimised. Pipe connections shall also be readily visible and accessible.

9.22.8.11.2 Where cone nipples are used, they shall be welded. Olive-type compression fittings shall not be used.

9.22.8.12 Flexible piping

9.22.8.12.1 A short length of flexible piping may be fitted in fuel systems for non-portable fuel tanks in the paragraph of line between the engine bed and the fuel lift pump.

9.22.8.12.2 Flexible piping shall have a synthetic rubber inner tube with metal braided reinforcement. It shall be resistant to heat, salt water, petroleum products and vibration and shall comply with a relevant national or international standard (SAE J 30 or equivalent). It shall be installed so as to be readily visible and clear of the bilge, and shall be secured to prevent chafing.

9.22.8.13 Carburettor trays

Carburettors in fuel systems for non-portable fuel tanks (other than down-draught type carburettors) that can flood or overflow shall be fitted with a flame trap and a drip tray. The drip tray should—

(a) be made of copper or brass;

(b) be fuel-tight;

(c) have a corrosion-resistant wire gauze screen sweated into it not less than 13 mm below its lip;

(d) be of a size sufficient to impound any leak from the carburettor; and

(e) be readily removable.

9.22.8.14 Engine covers

Engine covers that might be fitted to protect the engine from the weather or salt spray shall be provided with adequate ventilation to prevent the accumulation of explosive fumes.

9.23 Shipside Valves and Sea Water Piping

9.23.1 Watertight Integrity

Seawater and bilge systems shall be designed and constructed to maintain the watertight integrity of the hull in normal and abnormal conditions. Any reference to "sea" or "seawater" in this part also applies to ships operating in freshwater.

9.23.2 Reliability

Seawater and bilge systems essential to the safety of the ship shall provide a reliable means for fulfilling their specific functions.

9.23.3 Compliance

Discharges, inlets and seawater piping within a ship shall be deemed to have satisfied the Required Outcomes in sub-paragraphs 9.23.1 and 9.23.2 if they comply with sub-paragraph s 9.23.4 to 9.23.6.

9.23.4 Discharge and inlets

9.23.4.1 Seagoing ships of 24 m and more in measured length

All discharges, inlets and scuppers on seagoing ships that are required to be marked with a load line, shall comply with the load line conditions of assignment for discharges, inlets and scuppers.

9.23.4.2 Inlet and discharge valves

All sea inlet and overboard discharge pipes (including sanitary discharges) shall be fitted with valves or cocks unless required otherwise by sub-paragraphs 9.23.4.3 or 9.23.4.4.

9.23.4.3 Small discharges

A small discharge may not be fitted with a valve provided that:

(a) the internal diameter of the discharge does not exceed 50 mm; and

(b) the lowest point of the discharge is not less than 225 mm above the deepest loaded water line.

9.23.4.4 Scupper discharges

A scupper discharge which passes through the ship's side from a space above the bulkhead deck may be fitted with a non-return valve in lieu of a screw-down valve or cock.

9.23.4.5 Valves and cocks

Valves and cocks shall be manufactured from bronze, ductile cast steel or equivalent material. Where a valve with a screwed bonnet is a sea injection valve or a valve controlled by an extended spindle, the bonnet shall be secured so that it cannot slacken when the valve is operated.

9.23.4.5.1 Fitting

Valves and cocks shall be fitted such that they are readily accessible at all times. They shall be mounted on pads or flanges and secured to one of the following:

(a) The hull of the ship.
(b) Water boxes.
(c) Standpipes.

Where secured to standpipes, the standpipes shall be as short as practicable.

9.23.4.5.2 Types

Valves and cocks with a bore greater than 50 mm shall be of the flanged type. Those with bores 50 mm or less shall either be of the flanged type or the screwed type (see sub-paragraph 9.23.4.5.3).

9.23.4.5.3 Skin fittings and standpipes

Valves and cocks shall be secured to the hull of the ship by means of a metallic skin fitting or standpipe. The finished wall thickness of any such stand pipe shall be a minimum 1.25 times the calculated thickness for a hull of the same material as the standpipe.

9.23.4.5.4 Gratings

Gratings shall be fitted on the outside of the hull to all seawater inlets. The clear area through the grating shall be at least twice the area of the connected valve. Gratings should be removable to permit access.

9.23.5 Pipe materials

9.23.5.1 General characteristics

Material for seawater piping shall be suitable for its intended service taking into account the nature of fluid carried and the demands imposed by its location in the ship. All piping that may come into contact with seawater shall be corrosion-resistant.

NOTE: Other characteristics that are relevant for pipes used for seawater applications include resistance to internal pressure, vacuum and external pressure, axial strength, operating

temperature limitations, impact resistance, resistance to fatigue, ageing and erosion, fluid absorption, material compatibility, fire endurance and smoke generation upon combustion.

9.23.5.2 Metallic piping

9.23.5.2.1 Material

Metallic piping shall be copper, stainless steel, aluminium alloy of a grade suitable for long-term exposure to seawater or carbon steel which has been protected against corrosion (e.g. galvanising).

9.23.5.2.2 Thickness

The thickness of metallic piping shall be sufficient to withstand the likely maximum pressure with due allowance for corrosion and erosion that may occur. In any case, the thickness of metallic piping shall not be less than the following:

$$t_p = 0.012d_i + t_0$$

where

t_p = minimum pipe thickness, in millimetres

d_i = internal diameter, in millimetres

t_0 = 1.8mm for carbon steel or aluminium

1.1mm for copper

0.8mm for stainless steel or copper alloy

9.23.5.3 Rigid plastic piping

9.23.5.3.1 Application

Rigid plastic piping shall meet the requirements contained in IMO Resolution A.753(18) as amended by Resolution MSC. 313(88), or the requirements of a Classification Society.

NOTE: IMO Resolution A.753(18) as amended by Resolution MSC. 313(88), places limits on the extent to which rigid plastic piping can be used for essential services on board ship. In particular, fire endurance, reliability and the consequences of failure are important considerations.

9.23.5.3.2 Installation

9.23.5.3.2.1 Rigid plastic piping shall be arranged so that it is readily accessible for inspection and protected against mechanical damage and contact with hot surfaces.

9.23.5.3.2.2 Where acrylonitrile butadiene styrene (ABS) piping is used in pressure applications, it shall comply with AS 3518.1. Fittings for ABS piping shall comply with AS 3518.2.

NOTE: Plastic piping has a coefficient of linear expansion that is eight to ten times that of steel. Where plastic piping is used, design requirements over the range of service temperatures will have to be considered.

9.23.5.4 Flexible piping

9.23.5.4.1 General characteristics

Flexible piping shall be reinforced synthetic rubber. It shall comply with a relevant national or international standard and shall have the following performance characteristics:

(a) Resistance to water, petroleum products, heat and vibration.
(b) Capable of operation under suction without collapse and resultant reduction in effective cross-sectional area.
(c) Capable of withstanding internal pressure present within the system.

9.23.5.4.2 Application

Flexible piping shall be readily visible and located so as to prevent mechanical damage and contact with hot surfaces. Subject to paragraph 9.24.4.4, flexible piping shall only be used in the following applications:

(a) In short lengths of no more than 760 mm for vibration damping or to accommodate relative movement of machinery.
(b) In ships less than 12.5 m in length, provided that—

(i) the length of piping does not exceed half the beam of the ship;

(ii) the run of the piping is as direct as practicable; and

(iii) it is adequately supported.

9.23.5.4.3 Method of securing

9.23.5.4.3.1 The method of securing flexible piping to a rigid pipe or fitting shall be appropriate for the nature of fluid carried and the risks associated with leakage of that fluid.

9.23.5.4.3.2 Where clips are used to secure flexible piping of 25 mm internal diameter and above, at least two such clips shall be fitted at each end of the flexible pipe and the clips shall be of corrosion-resistant material.

9.23.5.5 Pipe fittings-material

Pipe fittings shall not be made of malleable iron.

9.23.6 Fish tank pumping systems

9.23.6.1 Piping for filling or discharging fish cargo tanks

Non-metallic piping may be used for filling or discharging fish cargo tanks provided that—

(a) the piping complies with sub-paragraph 9.23.5.3;
(b) bilge alarms are fitted in each compartment in which the piping is installed; and
(c) any penetration by the piping of a high fire risk space bulkhead, including the bulkhead of a machinery space, is via a valve.

9.23.6.2 Valves for fish tank pumping systems

A valve shall be provided at each connection to a fish tank. The valves shall either be readily accessible, or where not readily accessible the valves shall either be capable of being readily closed from a position above the bulkhead deck, or shall be non-return valves.

NOTE: Valves need not be provided on the pipe connections to a fish tank if a rupture of the pipe would not reduce the safety of the ship. Factors to be considered include the effect of discharging the tank contents into the bilge of the ship and the effect of the ruptured pipe on the ship's weather tight integrity.

9.24 Bilge Pumping Systems

9.24.1 Means for monitoring liquid levels

Means shall be provided for readily ascertaining the quantity of liquid within any tank or watertight compartment.

9.24.2 Compliance

For the purpose of this National Standard, the means for draining of spaces within the ship shall be deemed to have satisfied the Required Outcomes in sub-regulation 9.24.1 and 9.23.2 if it complies with sub-paragraph 9.24.3 to 9.24.10.

9.24.3 General

9.24.3.1 Capability of bilge pumping system

Unless otherwise provided for in sub-paragraph 9.24.3.2 or 9.24.3.3, a ship shall be fitted with a pumping system capable of pumping from and draining any bilge or watertight compartment in the ship.

NOTE: Fiji is a party to MARPOL Annex 1. The discharge of oil or other pollutants (including oily bilge water) overboard may be subject to the Marine (Pollution Prevention) Regulations 2014. For bilge systems, this may necessitate the fitting of oily bilge water holding tanks or oil separation equipment.

9.24.3.2 Alternative arrangements for small open ships

Open ships of measured length less than 10 m may be provided with bailing buckets in lieu of a bilge system, provided there is ready access to the bilge for bailing.

9.24.3.3 Alternative arrangements for small compartments

A watertight compartment less than 7 per cent of the total under deck volume may be drained into an adjacent compartment by means of a self-closing valve or cock. The adjacent compartment shall itself be served by the bilge system. The valve or cock shall be fitted outside the compartment to be drained, and shall be operable from a readily accessible position.

NOTE: Other bilge pumping arrangements for small compartments are possible but would need to be considered as equivalent solutions. For example, bilge pumping arrangements may not be needed on small ships having numerous small compartments where it can be shown that the safety of the ship is not materially reduced by the flooding of adjacent compartments. Key factors would include: the effectiveness of watertight boundaries; the flooded characteristics of the ship; the effect on systems essential to the safety of the ship; means for monitoring water levels within compartments; and arrangements to remove accumulated water in the bilge.

9.24.3.4 Location of bilge suctions

Bilge suctions shall be located to facilitate the drainage of water from within each compartment over a range of list not less than 5. Limber holes or other arrangements shall be provided to allow water to drain past structural members to the bilge suctions.

NOTE: Bilge suctions are normally located at the lowest point of a compartment or, where no lowest point can be identified, at the after end of the compartment. More than one suction is normally provided in long compartments and on ships with a flat bottom (rise of floor less than 5), arranged so as to ensure the bilge pump will not lose suction in the event of one suction drawing air.

9.24.3.5 Back-flooding

The bilge system shall be arranged to prevent water back-flooding from the sea into watertight compartments or machinery. The bilge connection to any pump that also draws from the sea shall be either a screw down non-return valve, or a cock that cannot be opened at the same time to the bilge and to the sea.

9.24.3.6 Watertight integrity of compartments

The bilge system shall also be arranged to prevent water passing from a flooded watertight compartment into other compartments. Bilge pipes should be located at a distance of at least 20 per cent of the breadth of the ship inboard of the ship sides to avoid damage in the event of a collision. Alternatively, bilge suction pipes may be provided with non-return valves or foot valves fitted within the space they serve.

9.24.3.7 Bilge distribution manifold

The bilge system in ships of 15 m measured length and over shall be provided with a bilge distribution manifold located in an accessible position. Valves in bilge distribution manifolds shall be of non-return type.

NOTE: Various configurations may be used for bilge systems. A bilge system may have branch suction pipes from each compartment running to a centrally located bilge distribution manifold. Alternatively the branch suction lines may run into a main bilge line, which in turn passes through compartments to connect with the bilge pumps. In general, the former is recommended, and is required on larger ships, because it allows for better control and monitoring of the bilge system.

9.24.3.8 Class 3A ships of 25 m and over

In Class 3A ships of 25 m in measured length and over, the bilge system shall permit pumping and draining from every space in the ship while any one watertight compartment is flooded. This provision need not apply to flooding of the machinery space.

NOTE: This may necessitate the fitting of a bilge distribution manifold on ships less than 25 m in measured length or the remote operation of bilge valves within compartments from a level above the bulkhead deck. While not mandatory, the locating of the two bilge pumps in two separate compartments is recommended.

9.24.4 Bilge pumps

9.24.4.1 Number and capacity of pumps

Ships shall be provided with bilge pumps in accordance with Table 5.

Table 5 – Bilge pump requirements

Measured length of ship (m)	Manual pumps		Powered pumps	
	Qty	Capacity per pump, as installed,in kL/h	Qty	Capacity per pump, as installed, in kL/h
Less than 7.5	1	4.0	N/A	N/A
7.5 and over but less than 10	2	4.0	N/A	N/A
10 and over but less than 12.5	1	5.5	1	5.5
12.5 and over but less than 17.5	1	5.5	1	11.0
17.5 and over but less than 20	1	8.0	1	11.0
20 and over but less than 25	N/A	N/A	2	11.0
25 and over but less than 35	N/A	N/A	2	15.0

NOTE: The installed capacity of a bilge pump is normally less than the nominal figure specified by the manufacturer due to the head of the discharge above the suction and losses through valves and piping.

9.24.4.2 Bilge pumping arrangements-general

The following bilge pumping arrangements apply to ships fitted with pumps in accordance with sub-paragraph 9.24.4.1:

(a) A powered bilge pump may be substituted for a manually operated pump.

(b) A bilge pump shall be self-priming or shall be provided with a priming device.

(c) A powered bilge pump shall be driven by a main engine, an auxiliary engine or a low or medium-voltage electric motor.

(d) Bilge pumps may be fitted additional to those specified in Table 5 provided the pump together with its piping and electrical systems are arranged to ensure that the safety of the ship is maintained.

NOTE: Sub-paragraph 9.24.4.2 *(d)* above applies to any extra-low voltage bilge pumps (under 50 V d.c) that may be fitted on a ship.

9.24.4.3 Bilge pumping arrangements-ships required to have two pumps

Where two pumps are required, the following shall apply:

(a) Each power pump shall not be dependent on the same source of power.

(b) The pumps and piping systems shall be arranged to enable simultaneous pumping of each machinery space bilge by both pumps on all ships of 20m and more in measured length.

(c) If both pumps are powered, the capacity of one pump may be less than that specified in sub-paragraph 9.24.4.1 by up to 20 per cent provided the total required pumping capacity is achieved.

(d) For ships other than Class 1 and 2 ships, one of the two pumps may be a portable pump provided it can be operated at full capacity within 5 minutes of flooding becoming known. Where a portable pump is fitted, the portable pump and its attachments shall be of a type suitable for connection and operation over the range of conditions likely to be encountered by the ship in normal and abnormal conditions. A means (e.g. lanyards) shall be provided for securing the portable pump when operating or when being relocated on ships of Classes 3A, 3B or 3D.

9.24.5 Bilge piping

9.24.5.1 Materials

Bilge piping shall comply with the requirements of sub-paragraph 9.23.5.

9.24.5.2 Protection from mechanical damage

Bilge piping shall be protected from mechanical damage arising from the stowage or working of cargo and stores or from other causes.

9.24.5.3 Rigid plastic bilge piping-application

Rigid plastic bilge piping may only be used as follows:

(a) Ships less than 12.5 m in measured length
In any location except where rigid plastic bilge piping passes through spaces which are high fire risk on ships relying on subdivision unless the watertight integrity of adjacent bulkheads can be maintained by fitting the affected bilge suction pipes with non-return valves.

(b) Ships 12.5 m and more in measured length
In low fire risk spaces such as voids, cofferdams and water tanks, the application of rigid plastic bilge piping in other locations shall be subject to meeting the fire endurance requirements contained in IMO Resolution A 753(18) or the requirements of a Classification Society.

NOTE: Alternative arrangements may be acceptable where part of the bilge system is duplicated.

9.24.5.4 Flexible suction hose bilge systems (wandering hoses).

9.24.5.4.1 A flexible suction hose bilge pumping system may be fitted to service compartments in Class 3B, 3D and 3E ships of measured length less than 12.5 metres. Subject to sub regulation 9.24.4.3 *(d)*, the pump or pumps shall be permanently mounted. The hose shall be of sufficient strength not to kink or collapse under suction. Compartments that are not void shall be fitted with a deck-mounted camlock fitting connected to a permanent bilge suction pipe within the compartment.

9.24.5.4.2 Where there is a risk of down flooding if hatches or other weathertight or watertight covers leading to a void compartment are opened, void compartments should also be provided with a deck-mounted camlock fitting connected to a suction pipe permanently mounted within the compartment.

9.24.6 Bilge pipe sizes

9.24.6.1 Ships under 10 m in measured length

The minimum diameter of bilge piping in ships less than 10 m in measured length shall not be less than 25 mm.

9.24.6.2 Ships of 10m measured length and over

The minimum diameters of bilge suction pipes in ships of 10 m and over in measured length, which shall in no case be less than 32 mm, shall be determined by the following formulas:

(a) For main bilge suction pipes (pipes serving more than one compartment)—

$$d_m = 25 + 1.68\sqrt{L\,(B_H + D)}$$

(b) For branch suction pipes (pipes serving just a single compartment)—

$$d_b = 25 + 2.16\sqrt{C\,(B_H + D)}$$

where

d_m = internal diameter of the main bilge suction pipe, in millimetres

d_b = internal diameter of branch suction pipes, in millimetres, but not greater than d_m

L = the measured length of the ship, in metres

B_H = the applicable breadth, in metres, as follows—

(a) for mono-hulled ships, the breadth of the ship

(b) for multi hulled ship—

(i) for the main bilge suction pipe in the case of multi-hulled ships having only a single main bilge line, the sum of the breadths of the hulls;

(ii) for the main bilge suction pipe in the case of multi-hulled ships having a dedicated main bilge line in each hull, the breadth of the applicable hull; or

(iii) for branch section lines, the breadth of the applicable hull.

D = depth of ship, in metres

C = length of compartment, in metres

9.24.7 Strainers

9.24.7.1 Ships of 20m in measured length and over

All bilge suctions shall be fitted with a mudbox, strum box or strainer that is accessible for cleaning. Each bilge suction in a machinery space shall be fitted with a mud box and metallic tail pipe.

9.24.7.2 Strainer holes

Strainer holes shall not be greater than 10 mm in diameter, and the aggregate area of the holes shall not be less than twice the area of the suction pipe.

9.24.8 Bilge level alarms

On decked ships, a bilge level alarm shall be fitted—

(a) in the propulsion machinery space; and

(b) in all other compartments that contain seawater pumping systems.

The alarm shall be clearly audible at a continuously manned control position with the machinery operating under full power conditions.

NOTE: Additional bilge alarms may be required on certain ships, see sub-paragraph 9.10.12.6 and 9.23.6.1.

9.24.8.1 Power Supply

The power supply for the bilge level alarm shall be available at all times there is a person on board.

9.24.9 Collision bulkhead piping

Where a pipe pierces a collision bulkhead, it shall be fitted with a suitable valve or cock at the bulkhead. The control mechanism for the valve or cock shall incorporate a means to indicate clearly whether the valve or cock is open or closed.

9.24.9.1 Means of control

Unless otherwise provided for in sub-paragraph 9.24.9.2, the valve or cock shall be controllable from the bulkhead deck.

9.24.9.2 Location and accessibility of collision bulkhead valve

Where the valve or cock is fitted on the after side of the bulkhead and is readily accessible at all times, it need not be controllable from the bulkhead deck.

NOTE: See paragraph 9.24.3.3.

9.24.10 Sounding arrangements

9.24.10.1 Means of sounding required

Sounding pipes or other means of readily determining the amount of liquid shall be provided for—

(a) any tank or watertight compartment that is not part of a machinery space, including a cofferdam and a double bottom tank; and

(b) any cofferdam or double bottom tank that is located in a machinery space.

9.24.10.2 Sounding pipes

Where a sounding pipe is fitted it shall comply with the following:

(a) If located outside of a machinery space, extend to a readily accessible position on deck.

(b) If located in a machinery space, extend either—

(i) to a readily accessible position on deck; or

(ii) to a lesser height provided the pipe is fitted with a cock (or ball valve) arranged for automatic closure when released. Cocks for such applications shall be of parallel plug type to provide ready movement. Handles shall be weighted or spring loaded and permanently secured.

(c) Terminate in such a position that there is no risk of overflow spillage onto hot surfaces or electrical equipment.

(d) Incorporate a means of closing to prevent the free entry of water.

(e) Wherever possible be straight, but if curved to suit the shape of the ship, the curvature shall be sufficient to permit the passage of a sounding rod or a sounding chain.

(f) Be protected against mechanical damage and, where it passes through refrigerated space, shall be thermally insulated.

(g) Be fitted with a striking plate under the lower end of a sounding pipe.

(h) Be of thickness not less than that determined in accordance with sub-paragraph 9.23.5.2.2.

(i) Be not less than 32 mm internal diameter.

9.25 0

9.25.1 Directional control

The steering system shall be capable of reliably altering the ship's heading at a rate appropriate for the navigational hazards that might be expected in normal and abnormal conditions. The steering system shall also be capable of reliably holding or returning the ship's head to a given course to counteract the effects of wind, currents and waves.

9.25.2 Strength

The rudder, steering nozzle or other directional control device shall have sufficient strength to meet the demands of service in both ahead and astern operation, and in normal and emergency situations. Consideration shall be given to peak, fatigue and shock loading.

9.25.3 Corrosion and erosion

The rudder, steering nozzle or other directional control device shall be designed and constructed to avoid or reduce the effects of corrosion and erosion.

NOTE: Erosion is caused by operation adjacent to a propeller or other propulsive device.

9.25.4 Compliance

The steering system shall be deemed to have satisfied the Required Outcomes in sub-paragraph 9.25.1 to 9.25.3 if it complies with paragraph 9.25.5 to 9.25.9.

9.25.5 General steering design criteria

9.25.5.1 Strength of steering gear

The steering gear shall be designed to withstand maximum helm at maximum ahead and astern speed. The rudderstock, rudder or steering nozzle and tiller arm or quadrant shall comply with paragraphs 9.25.6, 9.25.7, 9.25.8 and 9.25.9 below.

9.25.5.2 Steering arrangement

The steering arrangement shall be such that the person at the helm has a clear view ahead while at the normal steering position.

9.25.5.3 Secondary means of steering

All ships, except twin screw ships, shall be fitted with two independent means of steering unless steering is normally achieved via a hand tiller, in which case a second means of steering need not be provided. The secondary or emergency means of steering shall be capable of being brought speedily into action.

9.25.5.4 Rudder movement

Rudder movement shall be no less than 35° to port to 35° to starboard.

NOTE: The formulas specified in paragraphs 9.25.6, 9.25.7 and 9.25.9 are based on helm angles not exceeding 35°. Rudder movement in excess of 35° will require a change in the minimum diameter of the rudderstock and the scantlings of the rudder and tiller arm or quadrant.

9.25.5.5 Performance

In ships of 12.5 m measured length and over, the steering gear shall be capable of putting the rudder over from 35° on one side to 30° on the other in 30 seconds when the ship is at maximum ahead service speed with the rudder totally submerged. It shall be designed to prevent violent recoil of the steering wheel.

9.25.5.6 Helm movement direction

The trailing edge of a rudder blade of a ship shall move in the same direction as the top spokes of the steering wheel. Where any ship is not fitted with a conventional steering wheel, movement of the helm actuator to port or starboard shall cause the ship's

head to move in the same direction.

9.25.5.7 Rudder position indicator

A rudder position indicator shall be fitted on all ships of 15 m measured length and over which are fitted with power-operated steering gear. The rudder position indicator shall be in full view of the person at the helm while the person is at any steering position. This latter requirement need not apply to a person at the helm at the emergency steering position.

9.25.5.8 Steering component material

Components that transmit torque, tensile stresses or shock loads, including the tiller or quadrant, shall not be manufactured from ordinary grades of cast iron or other non-ductile material.

9.25.5.9 Hydraulic steering systems

Hydraulic steering systems shall comply with the following requirements:

(a) Means shall be provided to facilitate a quick change over from the primary to the secondary steering.
(b) A relief valve shall be installed in hydraulic systems that incorporate a power pump. The relief valve shall be set to prevent mechanical damage to the steering gear.
(c) Hydraulic hose and piping shall comply with paragraphs 9.28.3 and 9.28.4 and shall be located and arranged to minimise the possibility of mechanical, fire or other damage.

NOTE: Mechanical damage includes chafing, crushing and holing.

9.25.5.10 Mechanical transmission or actuator shaft bearings

Steering transmission or actuator shafts shall be adequately supported in bearings spaced apart not more than 70 times the diameter of the shaft. Bearing spacing adjacent to sprockets or gears shall be such that no undue bending load can be applied to the shaft.

9.25.6 Rudder stocks

9.25.6.1 Definitions

For the purposes of this part, the following definitions apply:

"Balanced rudder"—

a rudder having blade area forward of the rudder stock or pintles (see Figure 14 and Figure 15).

"Unbalanced rudder"—

a rudder having no blade area forward of the rudder stock or pintles (see Figure 16)

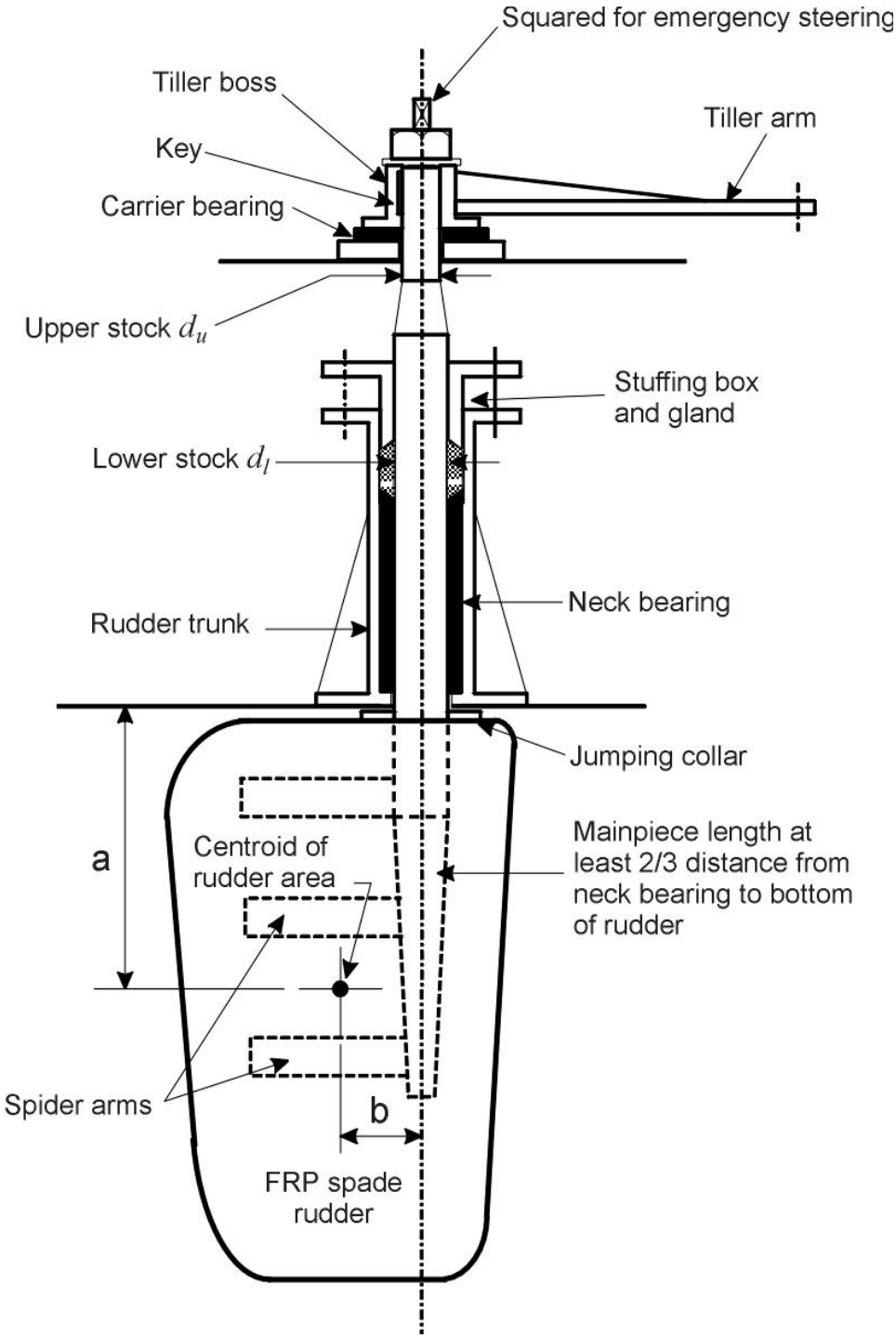


Figure 14 - Balanced spade rudder of FRP construction

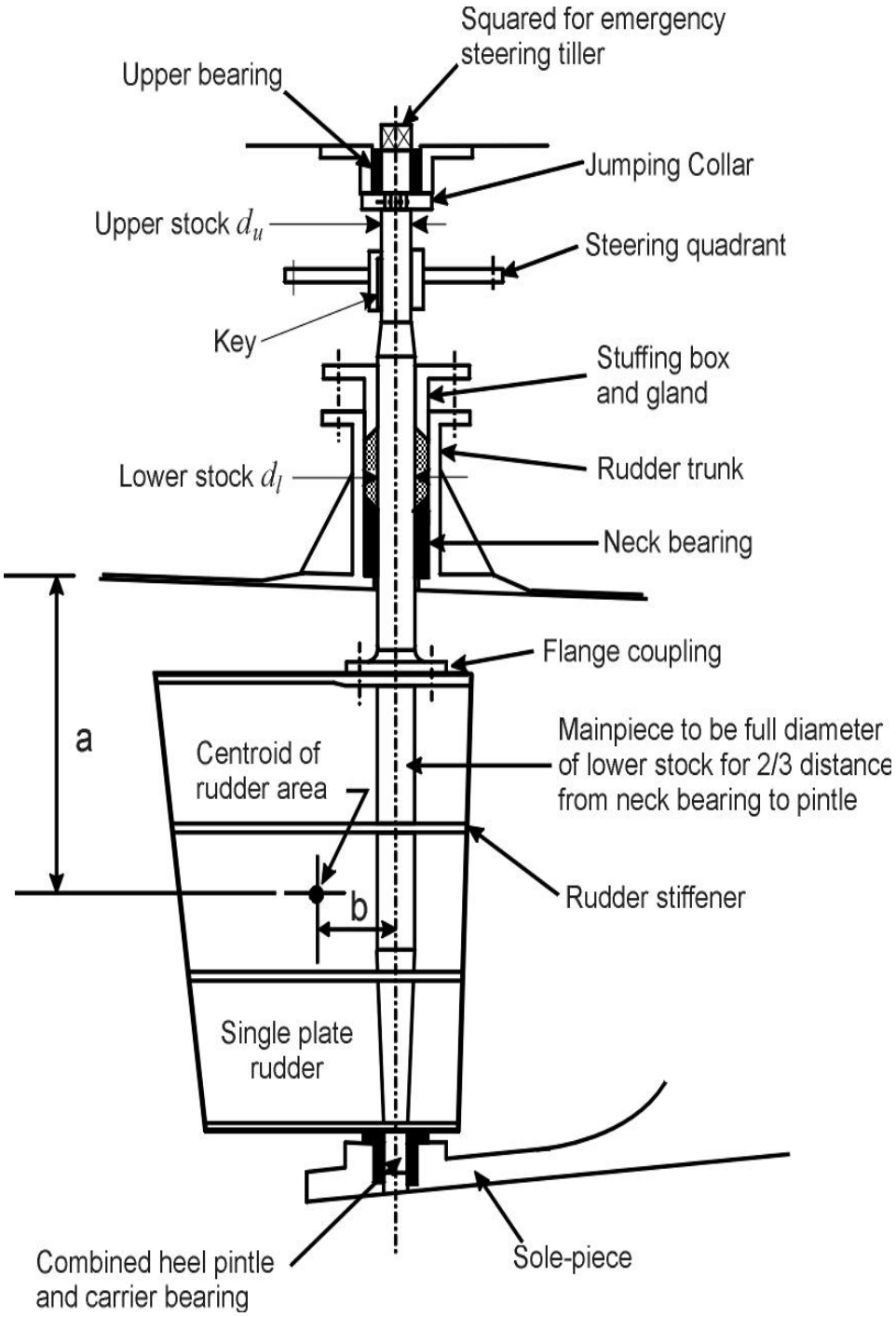


Figure 15 - Balanced rudder of single plate construction

9.25.6.2 Manufacture

Rudders shall be manufactured in accordance with one of the following methods, or by a means that can be demonstrated to be equivalent:

(a) The rudder blade shall be fabricated or cast, and shall incorporate either an integral flange that is secured to a flanged rudder stock with fitted bolts or shall be secured by means of a taper, key and retaining nut.

(b) The rudder blade shall be fabricated with an integral rudder stock.

NOTE: Special attention should be given to the attachment of the rudder stiffeners, pintles and rudder coupling to the main-piece of the rudder.

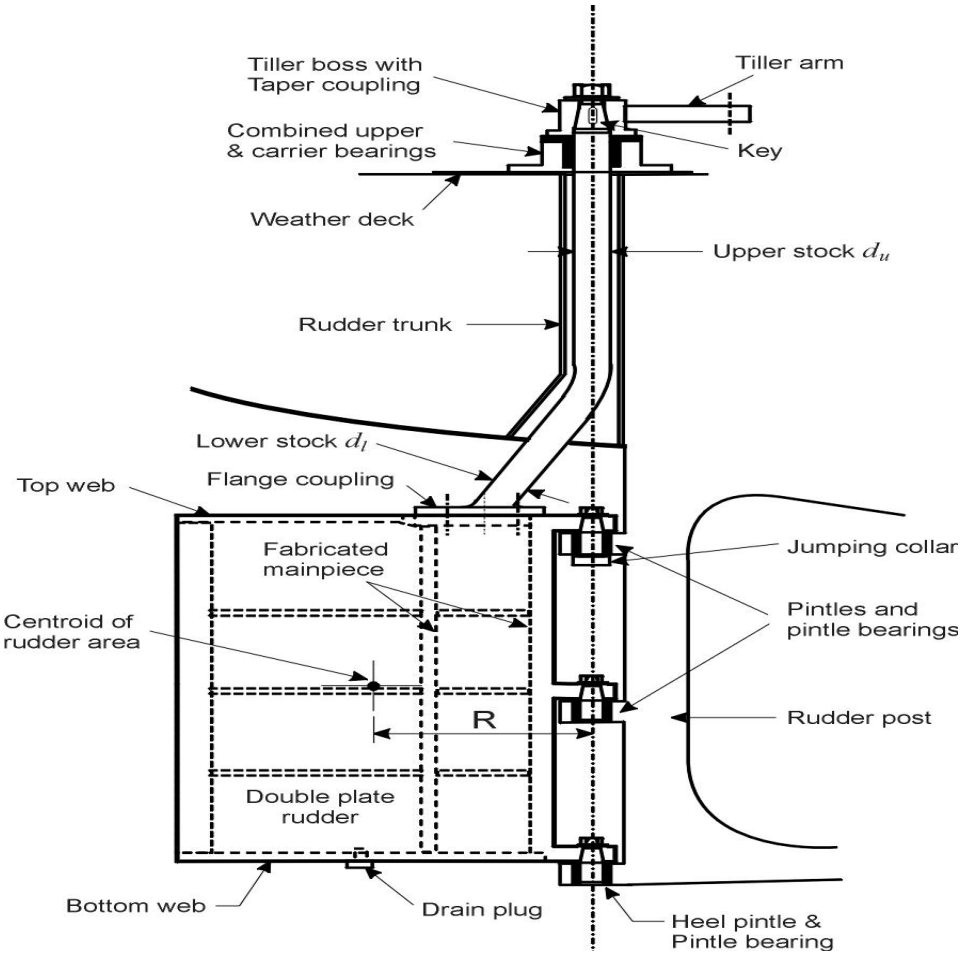


Figure 16 - Unbalanced rudder of double plate construction

9.25.6.3 Component materials

Unless otherwise permitted in this Chapter the following shall apply:

(a) Rudder stocks, couplings, coupling bolts, pintles and similar parts subject to dynamic stress shall be manufactured from materials having minimum mechanical properties as specified for shaft materials in paragraph 9.14.1. Other materials may be used where equivalence can be demonstrated.

(b) Cast rudder blades shall be manufactured from ductile material.

NOTE: Most of the formulae for rudder components contained within this Chapter are based on –"minimum required" rather than "as fitted" diameters in order to give minimum scantlings. Designing to the minimum required diameter may limit future flexibility in regard to rudder modification or alterations to the ship which result in an increase in speed.

9.25.6.4 Rudder stock and main-piece-unbalanced rudders

9.25.6.4.1 Arrangement of bearings

For the purposes of this regulation, unbalanced rudders are assumed to have at least one pintle (at the heel) with a neck bearing, or additional pintles, or both a neck bearing and additional pintles.

9.25.6.4.2 Upper stock size

A rudder stock at the tiller or quadrant for an unbalanced rudder shall not be less than that obtained from the following formula:

$$d_U = f_C f_N C \sqrt[3]{\frac{410\,R\,AV^2}{UTS_{stock}}}$$

where

d_U = minimum diameter of upper stock, in millimetres

R = distance from the centre line of stock to the centre of area of the rudder (see Figure 16), in metres

A = area of rudder, in square metres (m^2)

V = speed of ship in knots with-

(a) a minimum of 8 in ships less than 30m in measured length; and

(b) a minimum of 9 in ships of 30m in measured length and over.

UTS_{stock} = ultimate tensile strength of stock material, in megapascals (MPa).

C = the coefficient obtained from Table 6.

fc = rudder cross- section coefficient—

(a) 1 for normal cross-section rudders;

(b) 1.08 for hollow cross section rudders: e.g. whale-tail

(c) 1.19 for high lift rudders with active trailing edge.

f_N = nozzle coefficient—

(a) 1 for rudders behind an open propeller

(b) 1.09 for rudders behind a propeller in fixed nozzle.

Table 6 – Values of coefficient *C* for varying ships speed *V*

V (knots)	8	9	10	11	12	13	14	15 and over
C (Measured length of ships less than 30m)	21.66	21.25	20.84	20.43	20.02	19.61	19.20	19.20
C (Measured length of ship 30m and over)	N/A	21.66	21.25	20.84	20.43	20.02	19.61	19.20

NOTE: Values of coefficient *C* for ship speeds between those shown in the table may be obtained by applying the formulas $C = 24.94 – 0.41V$ for ships of measured length less than 30 m (and speed up to 14 knots) and $C = 25.35 – 0.41V$ for ships of measured length 30 m and over.

9.25.6.4.3 Lower stock size

The minimum required diameter of the lower stock d_l above the top pintle or in way of the neck bearing of an unbalanced rudder shall be the same as the minimum required diameter of the upper stock d_u.

9.25.6.4.4 Mainpiece size

The mainpiece of an unbalanced rudder may be gradually reduced from the minimum required diameter of the lower stock at the top of the rudder blade d_l (as calculated in sub-paragraph 9.25.6.5.2) to 0.75 d_l at the heel pintle.

9.25.6.5 Rudder stock and mainpiece - balanced rudders

9.25.6.5.1 Upper stock size

A rudder stock above the neck bearing for a balanced rudder shall not be less than that obtained from the following formula:

$$d_U = f_C f_N C \sqrt[3]{\frac{410\, b\, AV^2}{UTS_{stock}}}$$

where

d_U = minimum diameter of upper stock, in millimetres

b = horizontal distance, in metres, from the centre of the lower stock to the centre of area of total rudder area (see Figure 14 or Figure 15).

A = area of the rudder, in square metres (m^2)

V = speed of ship in knots with—

(a) a minimum of 8 knots in ship less than 30m in measured length; and

(b) a minimum of 9 knots in ships of 30m in measured length and over.

UTS_{stock} = ultimate utensile strength of stock material, in megapascals (MPa)

C = the coeffiecient obtained from Table 6

f_C = rudder cross section coefficient—

(a) 1 for normal cross- section rudders

(b) 1.08 for hollow cross-section rudders; e.g. whale-tail

(c) 1.19 for high lift rudders with active trailing edge.

f_N = nozzle coefficient—

(a) 1 for rudders behind and an open propeller

(b) 1.09 for rudders behind a propeller in a fixed nozzle.

9.25.6.5.2 Lower stock size

The stock in way of and below the neck bearing for a balanced rudder shall have a diameter not less than that determined from the following formula:

$$d_l = f_C f_N C \sqrt[3]{\frac{410\,R\,AV^2}{UTS_{stock}}}$$

where

d_l = minimum diameter of lower stock, in millimetres

$R = \left[0.25\ a + \sqrt{a^2 + 16b^2} \right]$ for rudders fitted with neck and heel pintle bearings;

or $a + \sqrt{a^2 + b^2}$ for rudders not fitted with a heel pintle bearing where (from Figure 14 and Figure 15)

a = vertical distance, in metres, from the bottom of the neck bearing to the centre of area of total rudder area; and

b = horizontal distance, in metres, from the centre of the lower stock to the centre of area of total rudder area.

A = total area of rudder in square metres (m^2)

V = speed of ship in knots with—

(a) a minimum of 8 in ships less than 30m in measured length; and

(b) a minimum of 9 in ships of 30m in measured length and over.

UTSstock =ultimate tensile strength of stock material, in megapascals (MPa)

C = the coefficient determined in accordance with either Item *(a)* or *(b)* as follows:

(a) where the speed of the ship is not greater than $4\sqrt{}$ LWL (LWL being the measured length of the ship, in metres, at the designed waterline), the value of C shall be obtained from Table 6.

(b) where the speed of the ship is greater than $4\sqrt{}$ LWL(LWL being the measured length of the ship, in metres, at the designed waterline), the value of C shall be 16.

f_C = rudder cross-section coefficient—

(a) 1 for normal cross-section rudders

(b) 1.08 for hollow cross- section rudders; e.g. whale-tail

(c) 1.19 for high lift rudders with active trailing edge.

f_N = nozzle coefficient—

(a) 1 for rudders behind an open propeller

(b) 1.09 for rudders behind a propeller in a fixed nozzle.

9.25.6.5.3 Main piece size (with heel pintle bearing)

The main piece of a balanced rudder having neck and heel pintle bearings (see Figure 15) shall be the full diameter of the lower stock d_1 for at least two-thirds of the distance from the neck bearing to the heel pintle bearing. The diameter may be gradually reduced below this point to $0.75d_1$ at the heel pintle.

9.25.6.5.4 Stock and main piece size (no heel pintle bearing)

The stock and main piece of a balanced spade rudder that has no heel pintle bearing (Figure 14) shall be the required diameter of the lower stock d_1 from the neck bearing to the underside of the top rudder arm if a single plate rudder, or to the top of the rudder if a built-up rudder. The diameter of the main piece may be gradually reduced below this point until it is $0.5d_1$. The length of main piece in way of the rudder shall not be less than two-thirds of the depth of the rudder at the centre line of the stock. The stock above the neck bearing may be gradually reduced from the required diameter of the lower stock d_1 to the required diameter of the upper stock d_{uf} at a point just below the upper bearing.

9.25.6.6 Non-circular sections

The width, depth, section modulus and torsional modulus of a main piece or stock of non-circular section shall not be less than those required for a circular main piece or stock. When calculating the section modulus of the main piece, the effective width of plating that may be included on each side of a web forming the main piece shall not be greater than the thickness of the rudder at the centre line of the stock. Where the material of the mainpiece differs from that of the stock, the section modulus of the mainpiece shall not be less than that determined from the following formula:

$$Zmpiece = \frac{\prod d_l^3}{32000}\left[\frac{UTS_{stock}}{UTS_{mpiece}}\right]$$

Where

Z_{mpiece} = minimum section modulus of mainpiece at the top of the rudder, in cubic centimetres (cm^3)

d_l = required diameter of the mainpiece, in millimetres, as determined in sub-regulations 9.25.6.4.4, 9.25.6.5.3 or 9.25.6.5.4

UTS_{stock} = ultimate tensile strength of stock material, in megapascals (MPa)

UTS_{mpiece} = ultimate tensile strength of mainpiece material, in megapascals (MPa).

9.25.6.7 Rudder bearings, pintles, gland and stops

9.25.6.7.1 Rudder support

9.25.6.7.1.1 Rudder bearings shall be adequately supported, and their housings shall be rigidly attached to the ship's structure.

9.25.6.7.1.2 The weight of a rudder shall be supported at a pintle bearing (normally the heel pintle) or a carrier bearing. The structure in way of the pintle or carrier bearing shall be strengthened for that purpose.

9.25.6.7.2 Sole-pieces

9.25.6.7.2.1 Ratio of width to depth

For the purposes of the formulas contained in sub-paragraph 9.25.6.7.2.2 to 9.25.6.7.2.4, the width to depth ratio of a sole-piece shall not be greater than 2.3 to 1 nor less than 1.8 to 1.

9.25.6.7.2.2 Section modulus

The section modulus of the sole-piece about the vertical axis at a distance l_S from the centreline of the rudder stock shall not be less than that determined from the following formula:

$$Z_S = C_S A V^2 l_S f_C \left[\frac{410}{UTS_S} \right]$$

Where

Z_S = required section modulus of the sole- piece about the vertical axis, in cubic centimetres (cm^3)

C_S = a coefficient varying with speed obtained from Table 7

A = total area of rudder, in square metres (m^2)

V= maximum speed of ship, in knots

l_S = horizontal distance from the centreline of rudder stock to the particular section of the sole-piece, in metres

UTS_S = ultimate tensile strength of sole-piece material, in megapascals (MPa)

f_C = rudder cross- section coefficient—

(a) 1 for normal cross-section rudders

(b) 1.08 for hollow cross-section rudders; e.g. whale-tail

(c) 1.19 for high lift rudders with active trailing edge.

Table 7—Values of coefficient C_S for varying ship speed V

V (knots)	10	11	12	13	14	15	16 and over
C_S for ships without an outer post	2.054	1.811	1.617	1.464	1.339	1.235	1.138
C_S for ships with an outer post	1.707	1.540	1.394	1.283	1.179	1.096	1.026

NOTE: Values of coefficient C_S for ships speeds between those shown in the table may be obtained by linear interpolation.

9.25.6.7.2.3 Stiffness

Where the sole-piece is a material other than carbon steel, the moment of inertia about the vertical axis at a distance l_S from the centreline of the rudder stock shall not be less than that determined from the following formula:

$$I_S = 1.1 Z_S^{1.333} \left[\frac{207}{E_S} \right]$$

where

I_S = required moment of inertia of the sole-piece about the vertical axis, in cm^4

Z_S = required section modulus of the sole-piece about the vertical axis as calculated in subsection 9.25.6.7.2.2, in cubic centimetres (cm^3)

E_S = modulus of elasticity of the sole-piece material, in gigapascals (GPa).

9.25.6.7.2.4 Area

Where the sole-piece is a material other than carbon steel, the cross-sectional area of the sole piece at a distance l_S from the centreline of the rudder stock shall not be less than that determined from the following formula:

$$A_S = 2.5 Z_S^{0.667} \left[\frac{410}{UTS_S} \right]$$

Where

A_S = required area of the sole-piece, in square centimetres (cm^2)

Z_S = required section modulus of the sole-piece about the vertical axis as calculated in sub-section 9.25.6.7.2.2, in cubic centimetres (cm^3)

UTS_S = ultimate tensile strength of sole-piece material, in megapascals (MPa).

9.25.6.7.3 Rudder stock neck bearing

Neck bearings for rudders shall incorporate bushes and shall be fitted as shown in Figure 15. The bush shall have a length not less than that determined from the following formula:

$$l_n = k_n d_l$$

where

l_n = required length of neck bearing, in millimetres

k_n = 4 for spade rudders without an upper bearing, or 1.5 for all other balanced rudders

d_l = minimum required diameter of lower stock, in millimetres

9.25.6.7.4 Spade rudder bearing pressure

9.25.6.7.4.1 High bearing loads are likely on the neck and upper bearings of a spade rudder (see Figure 14). Calculations shall be made to ensure that the pressure on the neck and upper bearings does not exceed that specified by the manufacturer of the bearings. Where allowable bearing pressure information is not available, then the maximum nominal bearing pressure shall not exceed 3.9 MPa.

NOTE: For the purposes of this calculation, a neck bearing of a rudder having no upper bearing as in Figure 14 may be modelled as two bearings (a neck bearing and an upper bearing) with a gap between the bearings of at least 1.0 times the required diameter of the lower stock d_l.

9.25.6.7.4.2 The nominal bearing pressure may be determined by first determining the rudder force from the following formula:

$$F_p = 196 A V^2$$

where

F_p = rudder force in newtons (N)

A = area of rudder, in square metres (m^2)

V = speed of ship, in knots

9.25.6.7.4.3 The nominal bearing pressure is then determined as follows—

$$P_B = \frac{F_P}{dl_B}$$

where

P_B = nominal bearing pressure, in megapascals (MPa)

F_P = rudder force from the above formula, in newtons (N)

d = actual diameter of rudder stock in way of the bearing, in millimetres

l_B = length of bearing, in millimetres

9.25.6.7.5 Rudder stock upper bearing

9.25.6.7.5.1 Upper rudder stock bearings, where fitted, shall have a length not less than the required upper stock diameter d_{uf} in way of the bearing. For spade rudders of the type shown in Figure 14 the upper bearing (not depicted in the figure) should have a length not less than that determined from the following formula:

$$l_u = \frac{h_n d_l l_n}{h_u d_{uf}}$$

where

l_u = length of upper bearing in millimetres

d_{uf} = fitted diameter of upper stock in way of upper bearing, in millimetres

h_u = height of centre of upper bearing above centre of rudder area, in millimetres

l_n = required length of neck bearing, in millimetres

d_l = required diameter of lower stock in way of neck bearing, in millimetres

h_n = height of centre of neck bearing above centre of rudder area in millimetres.

9.25.6.7.5.2 For the purposes of this calculation, the bottom of the upper bearing should be located no less than d_l from the top of the lower bearing.

9.25.6.7.6 Distance from tiller or quadrant boss to nearest bearing

The distance from the tiller or quadrant boss to the nearest upper or neck bearing; gland; or other support should not exceed 2.5 times the fitted diameter of the rudder stock in way of the boss.

9.25.6.7.7 Rudder pintle diameter

Where a single heel pintle (Figure 15), or multiple equidistant pintles (Figure 16) are fitted, the diameter of pintles shall not be less than that determined from the following formula:

$$d_{pi} = 0.75 \frac{d_l}{\sqrt{N - K_p}} \sqrt{\frac{UTS_{stock}}{UTS_{pintle}}}$$

Where

d_{pi} = required diameter of heel or intermediate pintle, in millimetres

d_l = minimum required diameter of rudder lower stock, in millimetres

N= number of pintles supporting the rudder inclusive of the heel pintle

K_p = 0 for rudders having a neck bearing, or 1 for rudders with no neck bearing

NOTE: Rudders with only a single pintle at the heel are required to have a neck bearing.

UTS_{stock} = ultimate tensile strength of stock material, in megapascals (MPa)

UTS_{pintle} = ultimate tensile strength of pintle material, in megapascals (MPa).

9.25.6.7.8 Rudder pintle bearings

Pintle bearings, if fitted, shall incorporate bushes. The length of pintle bearings shall not be less than that determined from the following formula:

$$l_p = k_p \, d_{pi}$$

where

l_p = required length of pintle bearing, in millimetres

k_p = a factor of 0.93 for balanced rudders having a bottom pintle bearing, or 1 for other rudders

d_{pi} = required diameter of pintle calculated in accordance with sub-regulation 9.25.6.7.7, in millimetres

9.25.6.7.9 Rudder stops

Rudders shall incorporate stops at the full over position to prevent the rudder coming into contact with the propeller or hull. Vertical movement shall also be limited by stops or jumping collars.

9.25.6.7.10 Rudder trunk and gland

9.25.6.7.10.1 The rudder trunk shall be of a thickness sufficient to support any rudder stock bearings carried within the trunk. For materials subject to corrosion, the thickness shall incorporate a 25 per cent allowance for corrosion. The thickness of the rudder trunk shall not be less than that of the hull shell thickness to which it is attached.

NOTE: The thickness of the rudder trunk is typically 25 per cent greater than that of the hull shell thickness to allow for boring, support of bearings, welding and/or integration into the structure.

9.25.6.7.10.2 The rudder trunk enclosing the rudderstock and neck bearing should extend above the fully loaded waterline. A gland shall be fitted to seal the rudder trunk if the trunk terminates below the level of the deck.

9.25.6.8 Rudder couplings

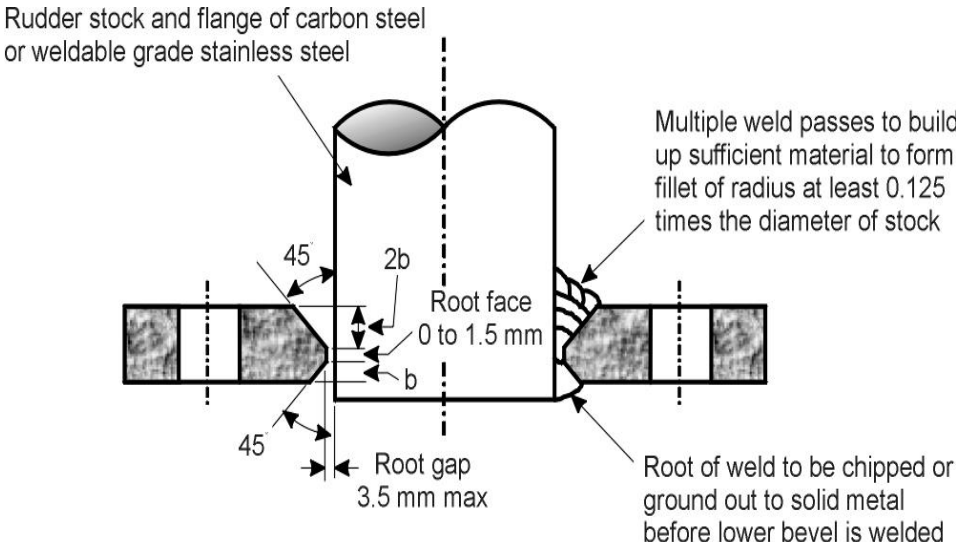


Figure 17—Flange couplings of fabricated construction

9.25.6.8.1 Coupling types

Rudder couplings shall be one of the following types:

(a) Flange couplings of fabricated construction, which have been stress relieved subsequent to welding (see Figure 17).

(b) Flange couplings formed by upsetting the end of the stock, provided that there is no necking or narrowing of the stock.

(c) Taper couplings, keyed and held in place by a nut. The taper coupling may be arranged to secure the boss of a flanged coupling or alternatively, to secure the stock directly into the mainpiece without the need of a flange coupling.

9.25.6.8.2 Flange coupling dimensions and bolting arrangements

9.25.6.8.2.1 The dimensions and bolting arrangements of rudder flange couplings shall be as follows:

(a) The minimum thickness of a coupling flange shall be the greater of those calculated in accordance with the following formulae—

$$t_f = k\, d_1 \sqrt{\frac{UTS_{stock}}{UTS_{coup}}} \quad \textit{or} \quad t_f = d_b \sqrt{\frac{UTS_{bolt}}{UTS_{coup}}}$$

where

t_f = minimum flange thickness, in millimetres

k = 0.25 for a rudder with one or more pintles, or 0.32 for a spade rudder

d_l = required diameter of the rudder stock in way of the coupling, in millimetres

d_b = required diameter of the coupling bolts, in millimetres, calculated in accordance with sub-regulation 9.25.6.8.2 *(e)*

UTS_{stock} = ultimate tensile strength of rudder stock material, in megapascals (MPa)

UTS_{coup} = ultimate tensile strength of coupling flange material, in megapascals (MPa)

UTS_{bolt} = ultimate tensile strength of coupling bolts of diameter calculated in accordance with sub-regulation 9.25.6.8.2 *(f)* below, in millimetres.

(b) The fillet radius at the base of the flange shall not be less than 0.125 times the actual diameter of the stock in way of the coupling.

(c) The ligament thickness outside the coupling bolt holes shall not be less than 0.6 times the required diameter of the coupling bolt.

(d) The pitch circle radius of bolts for couplings of the forged or welded flange type shall not be less than the required diameter of the rudder stock in way of the coupling, and for couplings keyed to the stock, shall be not less than 1.25 times the required diameter of the rudder stock.

(e) Where a rudderstock is 150 millimetres or more in diameter in way of the coupling, at least 6 bolts shall be used in each coupling flange. Where the diameter is less than 150 mm, at least 4 bolts shall be used in each coupling flange.

(f) The total area of bolts shall not be less than that determined from the following formula:

$$A = \frac{0.3\,d^3}{R}\sqrt{\frac{UTS_{stock}}{UTS_{bolt}}}$$

where

A= total bolt area at root of threads, in square millimetres (mm^2)

d = required diameter of stock in way of coupling, in millimetres, calculated in accordance with sub-regulation 9.25.6.4 or 9.25.6.5 as appropriate

R = pitch circle radius of bolts, in millimetres

UTS_{stock} = ultimate tensile strength of stock material, in megapascals (MPa)

UTS_{bolt} = ultimate tensile strength of bolt material, in megapascals (MPa).

9.25.6.8.2.2 Rudder coupling bolts shall be machine finished, neat fitting and the nuts shall be locked to prevent any possibility of backing off

while in service. Rudder coupling bolts need not be neat fitting on small rudders not being spade rudders and having a lower stock diameter of less than 75 mm, provided a key of dimensions complying with paragraph 9.15 is incorporated into the flange coupling.

9.25.6.8.3 Tapered couplings

The dimensions of tapers and taper retaining nuts for tapered couplings shall be in accordance with the requirements for shafting given in regulation 9.14.11 and 9.16.4, except that a taper as steep as 1 in 8 may by used. Keys for taper couplings shall comply with the relevant requirements of regulation 9.15 and shall be sized on the required upper stock diameter. The boss thickness of flange couplings fitted on a taper shall not be less than 1.5 times the required thickness of the key, and the boss length shall not be less than 1.6 times the required diameter of the rudder stock in way of the coupling.

9.25.7 Rudders

9.25.7.1 Single plate rudders

Refer to Figure 15.

9.25.7.1.1 Plate thickness

The minimum plate thickness for single plate rudders shall be the greater of those calculated in accordance with the following two formulas:

$$t = [2.5 + (0.0015Vh)]\sqrt{\frac{410}{UTS_{plate}}} \quad or \quad t = 10\sqrt{\frac{410}{UTS_{plate}}}$$

Where

t = thickness of plating, in millimetres

V = maximum service speed, in knots, that the ship is designed to maintain in a fully loaded condition

h = vertical distance between the centres of stiffeners, in millimetres

UTS_{plate} = ultimate tensile strength of plating material, in megapascals (MPa).

9.25.7.1.2 Distance between stiffeners

The distance between centres of single plate rudder stiffeners shall not exceed 1000 mm.

9.25.7.1.3 Section modulus of stiffeners

The section modulus of the stiffeners immediately forward and aft of the stock shall not be less than that determined from the following formula:

$$Z = 0.0005V^2 l h \left(\frac{410}{UTS\ stiffr}\right)$$

where

Z = section modulus of stiffeners, in cubic metres (cm^3)

V = maximum service speed, in knots, that the ship is designed to maintain in a fully loaded condition

l = horizontal distance from the aft edge of the rudder to the centre of the rudder stock, in metres

h = distance between centres of stiffeners, in millimetres

UTS_{stiffr} = ultimate tensile strength of stiffener material, in megapascals (MPa).

9.25.7.1.4 Tapering of stiffeners

The width of the stiffeners may be tapered forward and aft of the maximum widths required to satisfy the above section modulus. The minimum stiffener section modulus at the leading and trailing edges of the rudder shall not be less than that determined from the following formula:

$$Z_t = 1.7 \left[\frac{410}{UTS_{stiffr}} + 0.1Z \right]$$

Where

Z_t = section modulus stiffeners at the leading and trailing edges of the rudder, in cubic centimetres (cm^3)

Z = section modulus of stiffeners immediately forward and aft of the stock, in cubic centimetres (cm^3) (see sub-paragraph 9.25.7.1.3)

UTS_{stiffr} = ultimate tensile strength of stiffener material, in megapascals (MPa).

9.25.7.1.5 Attachment

The blade of a single plate rudder shall be attached to the mainpiece by a full penetration continuous weld. Stiffeners shall be attached to the mainpiece and blade by a double continuous fillet weld.

9.25.7.2 Double plate rudders

Refer to Figure 16

9.25.7.2.1 Arrangement and testing

Double plate rudders shall have horizontal internal webs. They shall be watertight and tested to a head of water of 2.5 m or equivalent. A means for draining shall be incorporated in the rudder.

9.25.7.2.2 Plating thickness–equivalent carbon steel rudder upper stock diameter less than 75mm

9.25.7.2.2.1 The thickness of carbon steel plating for a double plate rudder having a required equivalent carbon steel rudder upper stock less

than 75 mm diameter shall be as specified in Table 8. Horizontal and vertical webs in double plate rudders not replacing the mainpiece shall have the same thickness as the side plates. Plates forming the top and bottom of the rudders shall not be less than the thickness given in Table 8 for webs spaced at 600 mm.

NOTE: The equivalent carbon steel rudder upper stock diameter is determined by the following formula:

$$d_{ue} = d_u \sqrt[3]{\frac{UTS_{stock}}{410}}$$

Where

d_{ue} = equivalent carbon steel upper stock diameter, in millimetres

d_u = required upper stock diameter for the actual stock material, calculated in accordance with sub-regulation 9.25.6.4.2 or 9.25.6.5.1, in millimetres

UTS_{stock} = ultimate tensile strength of rudder stock material, in megapascals (MPa).

Table 8 – Carbon steel plate thickness for rudders— equivalent carbon steel rudder stock less than 75mm diameter

Required equivalent carbon steel diameter of upper stock, in millimetres, calculated in accordance with sub-regulation 9.25.6.4.2 or 9.25.6.5.1 as appropriate	Carbon steel plate thickness (mm)		
	Webs spaced 300mm or less	Webs spaced 450mm	Webs spaced 600mm
Less than 40	4.5	4.5	6.5
40 and over but less than 45	4.5	6.5	6.5
45 and over but less than 60	4.5	6.5	8.0
60 and over but less than 65	6.5	6.5	8.0
65 and over but less than 75	6.5	8.0	9.5

9.25.7.2.2.2 For plating material other than carbon steel, the required thickness of plating shall be determined by multiplying the tabular value by—

$$\sqrt{\frac{410}{UTS_{plate}}}$$

where

UTS_{plate} = ultimate tensile strength of the plating material, in megapascals (MPa).

9.25.7.2.3 Plating thickness-equivalent carbon steel rudder upper stock diameter 75 mm and over

9.25.7.2.3.1 Where the required equivalent carbon steel rudder upper stock diameter is 75 mm or over (see note to sub-regulation 9.25.7.2.2), the thickness of the rudder side plating and webs shall not be less than that determined as follows:

9.25.7.2.3.2 The thickness of rudder side plating and webs t_p shall be determined from a reference thickness t_r adjusted for the variation between the actual spacing of web centres and a reference spacing of web centres S_p.

9.25.7.2.3.3 The reference thickness shall be determined from the following formula:

$$t_r = (6.5 + 0.117\sqrt{A})\sqrt{\frac{410}{UTS_{plate}}}$$

Where

t_r = reference plate thickness, in millimetres

V = speed of ship in knots with-

(a) a minimum of 8 knots in ships less than 30 m in measured length; and

(b) a minimum of 9 knots in ships of 30 m in measured length and over.

A = total area of rudder, in square metres (m^2)

UTS_{plate} = ultimate tensile strength of plating material, in megapascals (MPa).

9.25.7.2.3.4 The thickness of the rudder side plating tp shall be determined from the following formula:

$$t_p = t_r + 0.015\,(S_a - S_p)\sqrt{\frac{410}{UTS_{plate}}}$$

where

t_p = required minimum thickness of rudder side plating, in millimetres

t_r = reference plate thickness, in millimetres

UTS_{plate} = ultimate tensile strength of plating material, in megapascals (MPa)

S_a = actual spacing of web centres, in millimetres

S_p = reference spacing of web centres, in millimetres calculated in accordance with the following formula:

$$585 + 2.41V\sqrt{A}$$

Where

V = speed of ship in knots with—

(a) a minimum of 8 knots in ships less than 30m in measured length; and

(b) a minimum of 9 knots in ships of 30m in measured length and over

A = total area of rudder, in square metres (m^2).

9.25.7.2.3.5 The minimum thickness of plates forming the top and bottom of the rudder shall be the greater of—

(a) the thickness of the rudder side plating t_p, calculated for the actual spacing of web centres; and

(b) the reference thickness t_r.

9.25.7.2.4 Attachment of stiffeners

Horizontal and vertical webs in double plate rudders shall be attached to the main-piece by continuous double fillet welds and to the plating by fillet welds consisting of 75 mm lengths, spaced 150 mm between their centres. Where the interior of the rudder is inaccessible for welding, the stiffeners shall be fitted with flat bars and the plating connected to these flat bars by continuous or slot welds.

9.25.7.3 Spade Rudders

Acceptable forms of spade rudder are as follows:

9.25.7.3.1 Fabricated or cast rudder blade with integral flange secured to a rudder stock with flange by fitted bolts. (With this type of rudder the sizes of the couplings and bolts are to be based on the required diameter of the lower rudder stock, but due regard shall also be given to the bending and tensile stresses to which they maybe subject arising from the forces on the rudder).

9.25.7.3.2 Fabricated or cast rudder blade attached to rudder stock by means of a taper with key and securing nut. (The length of the taper is not to be less than 1.5 times the required diameter on the lower rudder stock. The taper is to be between the limits of 1 in 12 and 1 in 16 on diameter, but should preferably be in 1 in 12).

9.25.7.3.3 Fabricated rudder blade integral with rudder stock.

9.25.7.3.4 Fabricated or cast rudder blade shrunk on to a parallel rudder stock and additionally secured with dowells.

9.25.7.3.5 Rudders with the blade cast on to the rudderstock are subject to the approval of the Chief Executive Officer. The approval will be dependent upon the design and construction method and may also be dependent on the result of proof load testing.

9.25.7.3.6 Cast rudder blades shall be of ductile material.

9.25.7.3.7 The pressure on the rudder bearings should, in general, not exceed 3.9 MPa. For bearings with efficient lubrication a pressure of 5.9 MPa may be accepted.

9.25.7.3.7.1 For the determination of the pressure on the bearings the rudder force may be calculated from the following formula:

$$F_p = 196AV^2$$

Where

A =area of rudder in m^2

V = speed of ship in knots

F_p = rudder force in N

9.25.7.4 Fibre- reinforced plastic (FRP) rudders

Refer to Figure 14

9.25.7.4.1 Construction

FRP rudders shall incorporate a substantial spider, formed by plate arms approximately half the rudder width in length and welded to the rudder mainpiece. The spider arms shall be perforated or otherwise arranged to facilitate a rigid connection between the mainpiece and the FRP blade. The mainpiece should be continuous through the rudder wherever possible or alternative arrangements should be made to ensure continuity of strength and alignment. The blade shall be manufactured from reinforced epoxy or polyester resins. The rudder should be filled with a suitable material such as a resin/glass dough, timber or a micro-balloon mixture.

NOTE: The formulae given in sub-paragraph 9.25.7.2 for double-plate rudders are not applicable to FRP rudders constructed with a spider and solid core. Typically the skins of FRP rudders have a minimum mass of reinforcement of 3000 g/m^2. Lighter laminates down to 2300 g/ m^2 may suffice on small sailing ships or where advanced composite materials are used.

9.25.7.5 Wooden rudders

The Chief Executive Officer may consider the use of other materials for the construction of rudders and special consideration is given for the construction and scantlings of such rudders.

9.25.8 Steering Nozzles

Refer to Figure 18

9.25.8.1 Testing

Steering nozzles shall be watertight and tested to a head of water of 2.5 m or equivalent. A means for draining shall be incorporated in the nozzle.

9.25.8.2 Shroud plating in way of propeller blade tips

The shroud plating in way of the propeller blade tips shall extend forward and aft of this position for a distance appropriate for the

limits of rotation of the nozzle. Shroud plating may be carbon or stainless steel. The thickness of this shroud plating shall be determined from the following formulae:

(a) If P × D is less than or equal to 6300—

$$t_s = (11 + 0.001PD)\sqrt{\frac{410}{UTS_S}}$$

(b) If P × D is greater than 6300—

$$t_s = (14 + 0.0005\ 2PD)\sqrt{\frac{410}{UTS_S}}$$

Where

t_s = thickness of shroud plating in way of propeller tips, in millimetres

P = power transmitted to the propeller, in kilowatts

D = propeller diameter, in metres

UTS_S = ultimate tensile strength (UTS) of the shroud plating in way of propeller tips, in megapascals (MPa).

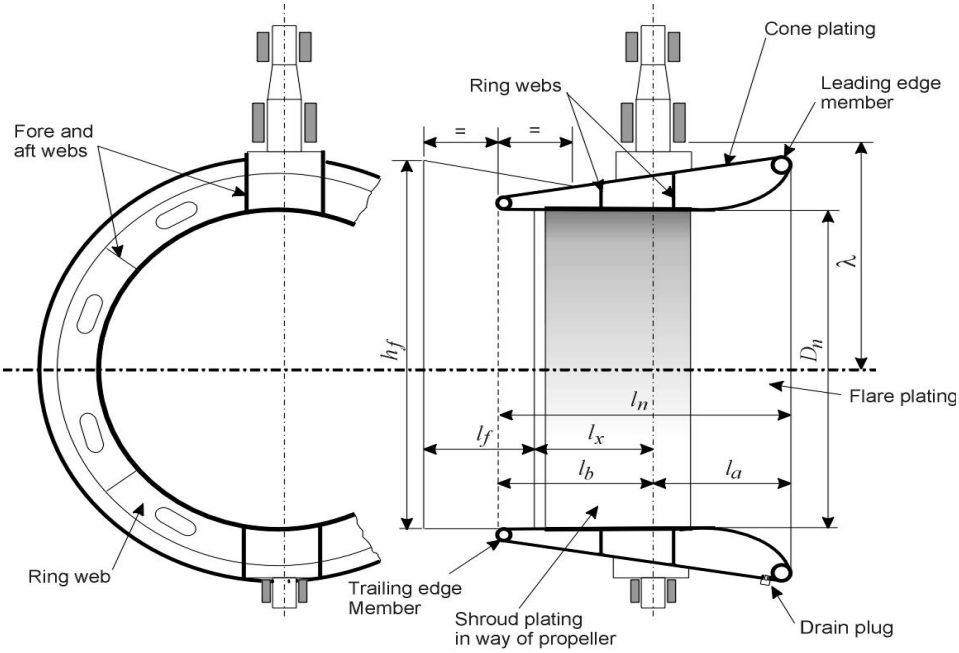


Figure 18 – Steering nozzles details and dimension

9.25.8.3 Flare plating, cone plating and shroud plating clear of propeller tips

The thickness of flare plating, cone plating and shroud plating clear of propeller blade tips (see Figure 18), which shall not be less than:

$$8\sqrt{\frac{410}{UTS_p}}\ mm,$$

shall be determined in accordance with the following formula:

$$t_p = t_s\left[7 - \sqrt{\frac{410}{UTS_S}}\right]\sqrt{\frac{UTS_S}{UTS_p}}$$

Where

t_p = thickness of shroud plating clear of propeller tips, flare and cone plating, in millimetres

t_s = required thickness of shroud plating in way of the propeller tips, in millimetres

UTS_p = ultimate tensile strength of the shroud plating clear of propeller tips (assumed to be the same material as the web plating), in megapascals (MPa)

UTS_S = ultimate tensile strength of the shroud plating in way of propeller tips, in megapascals (MPa).

9.25.8.4 Fore and aft webs

Fore and aft webs, which shall not be less than the thickness of shroud plating clear of propeller tips, shall be fitted between the inner and outer skins of the nozzle. Fore and aft webs in way of the head box and pintle support structure shall have their thickness increased in accordance with the following formula:

$$t_w = t_p + 4\sqrt{\frac{410}{UTS_p}}$$

Where

t_w = thickness of webs in way of head box and pintle support, in millimetres

t_p = thickness of shroud plating other than that in way of the propeller tips, in millimetres

UTS_p = ultimate tensile strength, in megapascals (MPa), of the shroud plating clear of propeller tips (assumed to be the same material as the web plating).

9.25.8.5 Ring webs

9.25.8.5.1 Ring webs, which shall not be less than the thickness of the shroud plating clear of the propeller blade tips, shall be fitted to maintain the transverse strength of the nozzle. A minimum of two such webs should be fitted.

9.25.8.5.2 The thickness of ring webs in way of the head box and pintle support shall be increased in accordance with the formula given in sub-paragraph 9.25.8.4, and this increased thickness shall be maintained to the adjacent fore and aft web.

9.25.8.6 Leading and trailing edge members

The wall thickness of leading and trailing edge members shall not be less than the required thickness of shroud plating clear of propeller blade tips.

9.25.8.7 Stiffening

9.25.8.7.1 Local stiffening shall be fitted in way of the top and bottom supports, which shall in turn be integrated with the fore and aft webs and the ring webs.

9.25.8.7.2 Continuity of bending strength shall be maintained in areas where stiffening is fitted.

9.25.8.8 Fins

Fabricated fins should be adequately reinforced. The plating thickness of double plate fins should not be less than that of the plating clear of propeller tips.

9.25.8.9 Nozzle stock, heel pintle, etc.

9.25.8.9.1 Scantlings

9.25.8.9.1.1 The diameter of the upper and lower nozzle stock shall be calculated in accordance with sub-regulation 9.25.6.5 for balanced rudders, assuming the steering nozzle has the geometric properties given in sub-paragraph 9.25.8.9.2 to 9.25.8.9.4 below (refer to Figure 18).

9.25.8.9.1.2 Scantlings for the heel pintle, keys, coupling bolts, etc., shall be determined from the required stock diameter as per the relevant paragraphs for rudders.

9.25.8.9.2 Equivalent area

The equivalent area of the nozzle and fin shall be determined from the following formula:

$$A = 2D_n l_n + 0.85\, h_f\ l_f$$

Where

A = equivalent area of nozzle and fin, in square metres (m^2)

D_n = inner diameter of the nozzle, in metres

L_n = nozzle length, in metres

h_f = mean height of fin, in metres

l_f = length of fin, in metres

9.25.8.9.3 Equivalent horizontal lever arm

The equivalent horizontal lever arm b shall be calculated as the greater of the absolute values of the following two formulae:

$$b = \frac{l_f h_f (lx = o.2l_f) - 1.5\, D_n l_n l_a)}{A} \quad or\ b = \frac{(l_f h_f (lx + l_f) + 1.5\, D_n l_n l_b)}{A} \left[\frac{0.45V + 2}{V + 2}\right]^2$$

Where

b = equivalent horizontal distance from centre of lower stock to the centre of area of total rudder area, in metres

A = equivalent area of nozzle and fin, in square metres (m^2)

D_n = inner diameter of the nozzle, in metres

l_n = nozzle length, in metres

l_a = distance from nozzle leading edge to stock axis, in metres

l_b = distance from nozzle trailing edge to stock axis, in metres

l_x = distance between stock axis and fin, in metres

h_f = mean height of fin, in metres

l_f = length of fin, in metres

V = speed of ship in knots with—

(a) a minimum of 8 knots in ships less than 30 m in measured length; and

(b) a minimum of 9 knots in ships of 30 m in measured length and over.

NOTE: Refer to Figure 18 for details of dimensions.

9.25.8.9.4 Equivalent vertical lever arm

The equivalent vertical lever arm a, in metres, shall be the vertical distance from the nozzle axis to the bottom of the nozzle stock neck bearing.

9.25.9 Tiller Arm Quadrant

9.25.9.1 Section modulus of tiller arms or quadrant clear of boss

9.25.9.1.1 The section modulus of a tiller arm just clear of the boss, or quadrant just clear of the boss, shall not be less than that determined from the following formula:

$$Z = \frac{0.15\, d_u^3\, (a-b)}{1000a} \left[\frac{UTS_{stock}}{UTS_{Arm}}\right]$$

Where

Z = required section modulus of quadrant or tiller about the vertical axis, in cubic centimetres (cm^3)

d_u = required diameter of the upper rudder stock, in millimetres, calculated in accordance with sub-paragraph 9.25.6.4.2 or 9.25.6. 5.1 as appropriate.

a = distance from the point of application of the steering force on the tiller or quadrant to the centre of the rudder stock, in millimetres.

b = distance between the section of tiller or quadrant just clear of the boss and centre of the rudder stock, in millimetres.

UTS_{stock} = ultimate tensile strength of stock material, in megapascals (MPa)

UTS_{Arm} = ultimate tensile strength of tiller arm or quadrant material, in megapascals (MPa).

9.25.9.1.2 The section modulus of tiller arm or quadrant just clear of the boss about the horizontal axis shall not be less than one-third times the required value of Z determined above.

9.25.9.2 Section modulus at point of application of load

The section modulus at the point of application of the load shall not be less than one-third times the required value of Z calculated in sub-paragraph 9.25.9.1.1.

9.25.9.3 Thickness of tiller boss or quadrant boss

The thickness of the tiller boss or quadrant boss should not be less than 0.4 times the required upper rudder stock diameter. The depth of the boss shall not be less than the key length determined in accordance with sub-paragraph 9.25.9.4.

9.25.9.4 Securing of tiller or quadrant boss on the rudderstock

The tiller or quadrant boss shall be securely affixed to the rudderstock by means of a key or other equivalent means. Where a key is fitted, the size of the key shall be determined in accordance with sub-paragraph 9.15 using the required diameter of the upper stock du in place of the shaft diameter d.

NOTE: Methods similar to those applied to attaching shaft couplings to shafting may provide a suitable means for securing the tiller or quadrant boss to the rudder stock. See sub-paragraph 9.16.2.

9.26 **Windlass**

9.26.1 A mechanical lifting device provided in a ship to meet the requirements of the Miscellaneous Equipment paragraph shall constitute a windlass of capstan. Cable stoppers, claws or similar fastenings shall be provided as necessary between the windlass or capstan and the hawse pipe. The windlass or capstan is to be designed for immediate dropping of the anchor and with an efficient brake.

9.26.2 For an anchor mass of less than 50 kg, the windlass or capstan may be hand operated provided that the applied efforts shall not exceed 155 N when lifting the anchor and total length of cable fitted.

9.26.3 For an anchor mass of 50 kg and above a power operated windlass or capstan shall be provided. It shall be capable of lifting one anchor and 35 m of its chain cable plus a 20 per cent overload at a speed of not less than 7.5m per minute.

9.27 Compressed Air Systems

A compressor for the supply of compressed air for purposes other than breathing apparatus shall be in accordance with the following.

9.27.1 Relief valves compressor

An air compressor shall be provided with one or more relief valves of such size and set that when the compressor discharge valve is closed and the compressor is running normally, the maximum accumulation pressure will not exceed the working pressure by 10 per cent.

9.27.2 Relief valve casing

The casing of an air cooler of an air compressor shall be fitted with a relief valve or a safety diaphragm to provide protection against an air tube bursting.

9.27.3 Drainage

An air compressor shall be provided with means for draining water and oil from the intermediate and final discharge stages.

9.27.4 Location of air intake

The air intake for a compressor shall be so located to minimise the induction of exhaust gases, oil vapours or other potentially hazardous fumes.

9.27.5 Delivered air temperature

An air compressor shall be designed and installed so that the temperature of the air delivered from the after cooler does not exceed 93 °C.

9.27.6 Pressure monitoring

A pressure gauge shall be fitted between the after cooler and the compressor discharge.

9.27.7 Pressure piping

Pressure piping shall meet the requirements specified in AS 4041.

9.28 Hydraulic Power Systems

9.28.1 Relief protection

Hydraulic pumps shall have pressure relief protection on the discharge side, which shall operate in a closed circuit.

9.28.2 Materials and hydraulic fluid

The materials of hydraulic pumps, motors and accessories shall be compatible with the hydraulic fluid. Hydraulic fluid shall be non-flammable or shall have a flash-point of 157°C or over.

9.28.3 Hydraulic hose and piping

Hydraulic hose shall comply with Australian Standard AS 3791. Installation and fittings shall be in accordance with the manufacturer's requirements.

9.28.4 Use of nylon tubing in hand hydraulic systems

Nylon tubing may be used in hand hydraulic applications on ships provided that—

(a) it meets the requirements of AS 3791 or an equivalent national or international standard;
(b) it is stabilised against degradation due to exposure to ultra-violet light;
(c) it is only used where suitable for the application;
(d) it has a pressure cycling resistance equivalent to that required for hoses complying with AS 3791; and
(e) it does not pass through a space designated as a high risk or machinery space, or alternatively, the tubing is adequately shielded from the effects of fire within such a space.

9.29 Pressure Pipes

9.29.1 General

9.29.1.1 Unless specified elsewhere in this paragraph the requirements of this paragraph shall apply to pipes the working pressure of which is 700 kPa and over.

9.29.1.2 The design of steel pipe work shall comply with Australian Standard CB18.

9.29.2 Copper

Copper and copper alloy pipes shall be of seamless construction. When pipes other than those of seamless construction are proposed, they will be specially considered by the Chief Executive Officer.

9.29.3 Copper Pipe Thickness

9.29.3.1 The minimum thickness of copper and copper alloy pipes shall be determined by the following formula:

$$t = \frac{WP \times d + c}{2000f - WP}$$

where

t = wall thickness in mm

WP = working pressure in kPa

d = oneside diameter of the tube in mm

f = maximum allowable stress in MPa at the appropriate working temperature (see Table 9).

c = 0.75 mm

9.29.3.2 Where copper and copper alloy pipes are to be bent, the thickness as obtained in paragraph 9.29.3.1 shall be increased by 10 per cent to allow for thinning at the bend. In no case shall the radius of the curvature at the centre line of the pipe be less than twice the external diameter of the pipe.

9.29.4 Copper Pipe Heat Treatment

Copper pipes shall be annealed and copper alloy pipes heat treated in accordance with the manufacturer's recommendation.

9.29.5 Reducing Valves

Where a pressure pipe or fitting may receive supply from any source at a higher pressure than that for which the pipe or fitting is designed, an efficient reducing valve shall be fitted. An efficient relief valve of sufficient size together with a pressure gauge shall be fitted on the low pressure side of the reducing valve.

TABLE 9

	Minimum tensile *strength MPa*	0.5% Proof *stress MPa*	Permissible stress MPa										
			50°	75°	100°	125°	150°	175°	200°	225°	250°	275°	300°
Copper	215	62	41	40.5	40	38	32.5	26.5	21.5				
Aluminium Brass	325	120	69	68.5	67	65	62	42.5	24				
Copper Nickel 95/5 & 90/10	275	135	69	68.5	67	65	63.5	60	56	50	43.5	38	
Copper Nickel 70/30	390	135	83	80.5	76	72.5	68.5	66	63.5	61.5	59	56.5	54

PART 4—ELECTRICAL SYSTEMS

9.30 Definitions

9.30.1 For the purposes of this Part, the definitions below and the definitions in AS/NZS 3000 shall apply.

9.30.2 Where there is any duplication in the terms defined in this Part and the definitions in AS/NZS 3000, the definitions in this Part shall apply.

"battery compartment"—

a room, locker or space used solely for the storage of batteries.

"earth"—

the conductive mass of earth, whose electric potential at any point is conventionally taken as equal to zero.

NOTE: A ship's earth is established by a conducting connection (intentional or accidental) with the earth, including any conductive part of the wetted surface of a hull.

"earth electrode"—

all earth connections, including a main earth connection, to the hull of a metal hulled ship and the connection(s) to the earth plate of a ship with a non-conductive hull. Earth electrodes include hull or earth plate connections for protective earthling, equipotential bonding, lightning protection, and/or communication systems.

"emergency switch board (ESB)"—

a switchboard supplied by the emergency source of power and from which the emergency electrical installation can be supplied.

"essential services"—

those services essential for safety of persons and safe navigation.

NOTE: This may include auxiliaries necessary for propulsion and power generation, steering gear, watertight doors, bilge and fire pumps, engine room ventilation, navigation lights, emergency lighting, communication equipment, navigation aids, and alarm systems.

"inverter"—

a device that uses semi-conductor devices to transfer power between a d.c. source or load and an a.c. source or load.

"isolated earth system"—

a system of distribution in which no point is normally connected to earth.

"licensed electrician"—

a person licensed or authorised by a state or territory electrical licensing authority to carry out electrical work in that state or territory.

"main switch board (MSB)"—

a switchboard directly supplied by the main source of electrical power and from which the whole electrical installation can be supplied.

"shore supply"—

a supply of electrical energy located onshore or at any other source external to the ship.

"voltage"—

the difference in potential between conductors and between conductors and earth as follows:

(a) extra-low voltage (ELV) – not exceeding 50 V a.c. or 120 V d.c.

(b) low voltage (LV) – exceeding extra-low voltage but not exceeding 1000 V a.c. or 1500 V d.c.

(c) high voltage (HV) – exceeding low voltage.

9.31 Abbreviations

ELV - Extra-low voltage

ESB - emergency switchboard

LV - Low voltage

HV - High voltage

MEN - multiple earthed neutral

MSB - main switchboard

RCD - residual current device

COMMON REQUIREMENTS FOR ALL ELETRICAL SYSTEMS

9.32 Scope

This part sets out the requirements for electrical equipment and electrical installations that are common to all electrical systems used in ships.

9.33 Safety protection

Protection shall be provided to prevent inadvertent contact by personnel and passengers with parts of the electrical installation that are live in normal service and those that may become live during fault conditions. Electrical equipment and installations shall minimise the risk of fire, damage and physical injury when a ship's electrical equipment is used with reasonable care. Minimisation shall include overcurrent protection, appropriate insulation, appropriate construction, fault indication, safety tips, and effective operational and maintenance procedures.

9.34 Functionality and reliability

A ship's electrical installation shall be designed, and electrical equipment selected and installed, so as to maintain the functionality and reliability of the

installation under operating conditions expected in the marine environment. The functionality and reliability of systems and equipment necessary for the safe operation of the ship shall be maintained during normal and emergency operations (e.g. avoidance of electromagnetic interference with navigation equipment). The ship's electrical installation shall be of a quality and standard that will limit the degradation of the installation from the extreme conditions expected in the marine environment (e.g. electrochemical corrosion).

9.35 Protection against overcurrent

Protection shall be provided against damage due to excessive temperature rise or electromechanical stresses caused by over-currents that may arise in conductors.

9.36 Watertight and fire integrity

Where a wiring system passes through a deck or bulkhead that is required to be of watertight or fire-rated construction the integrity of the construction shall be maintained. Where the routing of a wiring system requires the penetration of solid surfaces such as bulkheads or decks, the wiring system shall be effectively protected from mechanical damage.

9.37 Isolation

Electrical installations, and parts of installations, shall be provided with isolation devices to prevent or remove hazards associated with abnormal operation (e.g. faults such as short circuits) and to allow maintenance of electrical equipment.

9.38 Emergency supply

Electrical services essential for personal safety, the safety of the ship and the safety of navigation shall remain operational under emergency conditions.

9.39 Operation and maintenance

The electrical system of a ship shall be designed and installed to facilitate its identification, safe use, inspection and maintenance.

9.40 Batteries

Battery installations shall be designed and installed to eliminate or minimise risks associated with the emission of gases, corrosive fluids, electrochemical corrosion, movement, mechanical damage, and exposed terminals.

9.41 Compliance

9.41.1 The common requirements for an electrical installation shall be deemed-to-satisfy the required outcomes in paragraphs 9.33 to 9.40 if they comply with—

(a) AS/NZS 3000 Electrical installations; and
(b) sub-paragraphs 9.42 to 9.52 of this Chapter.

9.41.2 Where there is any conflict in the requirements in this sub-paragraph and the requirements in AS/NZS 3000 Electrical installations, the requirements in this sub-paragraph shall apply.

9.42 Isolation

9.42.1 Isolation devices shall operate in all active conductors but shall not interrupt a neutral conductor unless allowed for in AS/NZS 3000 or in this standard.

9.42.2 Isolation devices shall not interrupt an earthlings conductor.

9.43 Earthings and bonding

9.43.1 Earthing

9.43.1.1 General earthing arrangements shall comply with AS/NZS 3000 and the provisions in sub-paragraph 9.43.1.2 to 9.43.1.4 of this Chapter.

9.43.1.2 Earthing systems

9.43.1.2.1 Method of earthing

(a) The method of earthing for a.c. systems at voltages greater than 50 V shall be—

(i) a multiple earthed neutral (MEN) system; or

(ii) an isolated earth system.

(b) The method of earthing for d.c. systems shall be—

(i) a negative earth; or

(ii) an isolated earth.

NOTES:
1. AS/NZS 3000 provides guidance for earthing of ELV systems.
2. An installation may include mixed methods of earthing. Earthing systems should be mixed only after consideration of the possible fault currents in each system.

9.43.1.2.2 Main earth connection

9.43.1.2.2.1 In a ship with a hull constructed wholly of metal, the main earth conductor shall be taken from the earth terminal, bar, or link at the main switchboard to an earth electrode solidly connected to the hull.

9.43.1.2.2.2 In a ship with a hull not constructed wholly of metal, the main earth conductor shall be taken from the earth terminal, bar, or link at the main switchboard to an earth electrode solidly connected to an earth plate.

9.43.1.2.2.3 The main earth conductor shall run in as direct a manner as practicable and shall not be connected to any other appliance.

9.43.1.2.3 MEN earth systems

In a MEN earthing system the neutral to earth bond should be made at each generator.

NOTE: This avoids tripping of shore based RCDs. The MEN board is switched out of the system because the shore power/ship supply change over switch operates in all live conductors.

9.43.1.2.4 Isolated earthing systems

9.43.1.2.4.1 An electrical system isolated from earth shall employ an earth fault monitor or insulation resistance monitor.

Where earth lamps are used for this function, the lamps shall—

(a) be of a filament type;
(b) not exceed 30 W;
(c) be of the same colour;
(d) be placed not more than 125 mm apart; and
(e) have a lamp test capability.

9.43.1.2.4.2 Each generator in an isolated earth system shall have an earth fault monitor or insulation resistance monitor.

9.43.1.3 Earthing and bonding electrodes

9.43.1.3.1. All connections to the ship's hull or earth plate shall—

(a) be accessible for inspection;
(b) be secured by means of a screw or stud used for this purpose only with a diameter suited to the size of the earth conductor but not less than 6 mm;
(c) be protected against corrosion; and
(d) remain unpainted.

NOTE: Care should be taken to ensure bright metallic surfaces at the contact areas immediately before the nut or screw is tightened. The use of washers of a type that bite into the metal is recommended. To protect against electrolytic corrosion, care shall be taken in the choice of metals and methods used to make the connection. Where necessary the joint should be protected with anti-oxidation grease.

9.43.1.3.2 Earth electrodes used for the connection of lightning protection to a ship's hull or earth plate shall not be used for connection of protective earthing, equipotential bonding or communication equipment earthing.

9.43.1.4 Earth plates

9.43.1.4.1 All electrical installations on ships of non-metal hull construction shall incorporate an earth plate that complies with the following:

(a) The earth plate shall be—

(i) manufactured from copper or other material of equivalent mechanical and electrical properties; and

(ii) securely attached with non-corrodible fastenings to the hull of the ship.

(b) The earth plate shall be positioned so that it is immersed at all times during operation of the ship.

(c) The earth plate shall have an area of at least 0.25 m^2, and shall be at least 3.2 mm thick.

(d) Connections to the earth plate shall comply with sub-paragraph 9.43.1.3.

9.43.1.4.2 If more than one earth plate is used, all earth plates shall be equipotentially bonded (see sub-paragraph 9.43.2).

9.43.1.4.3 The same earth plate may be used for protective earthing, functional earthing of communications equipment, and lightning protection. Main earth (protective earth), functional earthing and lightning down conductors shall be run separately to the earth plate(s) and connected by separate electrodes to the earth plate(s).

9.43.2 Bonding

9.43.2.1 Equipotential bonding shall—

(a) have a resistance to earth of less than 0.5 ohm; and

(b) in non-metallic ships, be provided between all engine bedplates, generator frames, metallic elements of the fuel system, fixed metal objects with a surface area in excess of 0.4m^2, and the earth plate.

9.43.2.2 To help dissipate possible static build up and to minimise the effects of electrolytic corrosion it is recommended that metallic fittings, particularly those in contact with the sea, are bonded to the main earth system.

NOTE: For electrical bonding requirements relating to preventing static charges on fuel tanks and fuel systems see NSCV Part C sub-paragraph 5A.

9.44 Navigation lights and navigation equipment.

9.44.1 General

The provision of navigation lights, navigation equipment and their sources of power shall comply with the provisions of NSCV Part C paragraph 7 and sub-regulations 9.44.2 to 9.44.4 of this sub-paragraph.

9.44.2 Navigation lights

9.44.2.1 Each light shall be wired by a separate circuit to a—

(a) discrete paragraph of a distribution board; or

(b) panel dedicated to navigation lights.

9.44.2.2 The use of junction boxes in navigation light circuits shall be limited to those needed to connect the navigation lights to fixed wiring. Navigation light circuits shall not share wiring enclosures or junction boxes with other circuits.

9.44.2.3 Each light shall be—

(a) individually controlled; and
(b) protected in each insulated pole by a fuse or a circuit breaker, mounted on the navigation light distribution board or panel.

9.44.3 Navigation light distribution board

9.44.3.1 The navigation light distribution board or panel shall only be used for supplying power to the navigation lights. The board or panel shall be connected either directly, or through a transformer, to the main switchboard (MSB) and /or the emergency switchboard (ESB).

9.44.3.2 If a separate emergency supply is used then there shall be two separate supplies to the navigation light distribution board or panel, one from the MSB and one from the ESB.

9.44.3.3 Any alternate supply change over (i.e. from the main to the emergency supply), and any change over for alternate navigation lights, shall be operable from the wheel house or the helm position, and shall be easily accessible to the watchkeeper.

9.44.4 Indicators and alarms

9.44.4.1 If the navigation lights are not visible from the ship's deck then the lights shall be provided with an automatic indicator to give an audible or visual indication of lamp failure. The indicators shall be in the wheel house or at the helm position and placed to gain the attention of the watchkeeper.

9.44.4.2 If a visual indicator is connected in series with the navigation lamp then a means shall be provided to prevent failure of the navigation lamp in the case of failure of the indicator.

9.44.4.3 If an audible indicator is used, it shall be connected to a separate source of supply, and provision shall be made for testing this supply.

9.45 Cables and wiring systems

9.45.1 Wiring systems

The following shall apply in addition to the wiring system requirements of AS/NZS 3000.

(a) Wiring systems supplying steering machinery, navigation lights, navigation and communication equipment, wiring systems in machinery spaces and wiring systems nominated in the emergency systems provisions of AS/NZS 3000 shall be of a type that are capable of satisfying the AS/NZS 3000 wiring systems requirements for emergency systems.

Note: further guidance regarding wiring system classification and the fire performance of cables may be found in:

(i) The selection and installation of wiring systems and the emergency systems provisions of AS/NZS 3000;

(ii) AS/NZS 3013 Electrical installations – Classification of the fire and mechanical performance of wiring systems; and

(iii) AS/NZS 4507 Cables – Fire performance.

(b) In machinery spaces and on exposed decks cable fixing (i.e. saddles, clips, clamps, ties and straps) shall be of non-corrosive metal.

(c) Wiring systems and equipment onboard a ship shall be considered as 'likely to be disturbed'.

NOTE: AS/NZS 3000 provides the requirements for 'wiring systems likely to be disturbed'.

9.45.2 Stranded conductors

All conductors in cables, with the exception of mineral-insulated metal sheathed (MIMS) cables, shall be of stranded, annealed copper, constructed in accordance with AS/NZS 1125. MIMS cables shall meet the requirements of AS/NZS 3187.

NOTE: MIMS has limited application in the marine environment due to the risk of vibration and movement. Care should be taken to ensure that MIMS is used appropriately.

9.45.3 Connections

Cable connections and terminations shall be at fixed, enclosed terminals. All connections and terminations shall be accessible.

9.45.4 Penetration of bulkhead or deck

9.45.4.1 Where the routing of a cable requires the penetration of solid surfaces such as bulkheads or decks, the cable shall be effectively protected from mechanical damage.

9.45.4.2 Where the penetration is through a watertight or fire rated bulkhead or deck, the watertight and fire rated integrity of the bulkhead or deck shall be maintained.

9.45.4.3 Penetrations of refrigeration bulkheads or decks, or other insulated bulkheads or decks, shall be as close as practicable to perpendicular to the plane of the bulkhead or deck. Cable shall not be laid under thermal or sound insulation.

9.45.4.4 Glands and bushes used in bulkhead or deck penetrations shall be corrosion resistant.

9.45.5 Duplicate supply

Where a duplicate or alternative supply is required (e.g. alternative supplies for the navigation light panel), the two cables shall be routed separately so as to avoid the risk of concurrent damage to both cables.

9.46 Lightning protection

Ships with non-metallic hulls and/or non-metallic structures shall be provided with lightning protection. The minimum level of protection shall be to the requirements for the protection of boats in AS/NZS 1768 Lightning protection.

NOTES:

1. Surge suppression devices should be used for the protection of individual circuits and equipment that may contain sensitive components.
2. Information concerning the safety of personnel in electrical storm conditions should be maintained in the ship's documentation and also that information should be made available to personnel by way of safety signage.
3. Maintenance to the lightning protection system may be required, particularly after exposure to lightning.

9.47 Unacceptable components materials and methods

The following components, materials and methods are not suited to the marine environment and shall not be used:

(a) Re-wireable fuses.

(b) Hull return, except for cathodic protection systems.

(c) Aluminium conductors.

9.48 Engine room and cargo space ventilation

Each engine room and cargo space fan shall be supplied from a separate final sub-circuit. All ventilation systems shall be capable of being stopped from a readily accessible position outside the ventilated space.

9.49 Equipment and accessories in exposed locations

Electrically operated equipment and accessories with an IP Rating (International Protection Rating: see AS/NZS 60529) suitable for the location shall be used in exposed locations. No accessories shall be installed less than 0.3 m above the deck unless specifically made for the application, for example a foot switch windlass control.

9.50 Over current protection of essential services

9.50.1 Steering gear circuits shall have short circuit protection only and shall be equipped with overload and trip alarms at each helm position.

9.50.2 Other circuits deemed essential may have short circuit protection only, if equipped with an overload alarm.

9.51 Commissioning- inspection and testing

9.51.1 Tests

9.51.1.1 At the conclusion of construction, modification, or repairs the electrical system, equipment or part shall be inspected and tested in accordance with AS/NZS 3000. The functioning of each RCD shall be verified.

NOTE: Further information on inspection and testing is also available in AS/NZS 3017.

9.51.1.2 Commissioning tests shall include, as a minimum, the correct operation (i.e. in accordance with manufacturer's specifications and the objectives and requirements of this sub-paragraph) of the following equipment where fitted—

(a) generator operation including:

(i) engine governors;

(ii) parallel operation;

(iii) load sharing;

(iv) voltage regulator operation by instantaneous loading and unloading of generator; and

(v) safety devices, such as overspeed trips, reverse power trips, over current trips, load shedding, together with the associated controls and alarms.

(b) load testing of motors;

(c) overload alarm circuits of essential service motors;

(d) main engine safety alarms and trips;

(e) machinery and equipment that incorporates remote controls, remote stops and limit switches;

(f) emergency stop circuits;

(g) ship's alarm systems; and

(h) other systems and equipment installed in the ship.

9.51.2 Test results

9.51.2.1 All test results shall be recorded and the test results shall remain with the ship's documentation.

9.51.2.2 Test results should be dated, accurate, legible and retained for the life of the ship.

9.52 Design parameters

Unless otherwise specified, electrical equipment shall be designed for an ambient temperature of at least 45ºC.

EXTRA-LOW VOLTAGE SYSTEMS AND BATTERIES

NOTE: Extra-low voltage includes voltages up to 50 V a.c and 120 V d.c

9.53 Application

This regulation applies to those parts of a ship's electricity supply that do not exceed 50 V a.c and 120 V d.c.

NOTE: Requirements for the separation of ELV and LV electrical installations in ships that have both are covered in AS/NZS 3000.

9.54 Compliance

An extra-low voltage electrical installation shall be deemed to have satisfied the common requirements for all electrical systems given in sub-regulation 9.33 to 9.40 if it complies with sub-regulation 9.55 to 9.59 of this part and the relevant paragraphs of AS/NZS 3000.

9.55 Provisions of AS/NZS 3000 not to apply

The following provisions of AS/NZS 3000 shall not apply:

(a) The provision that states 'Protection against direct contact is not necessary for voltages of 25 V a.c. or 60 V d.c., or below, in dry indoor conditions'. It is deemed that dry indoor conditions do not occur in the marine environment.

(b) The provision that refers to 'electrical equipment used in dry locations'. It is deemed that dry locations do not occur in the marine environment.

(c) The provisions for ELV that allow switches to 'operate in one less conductor than the number of conductors in the circuit'.

9.56 Engine starting cables

9.56.1 Engine starting cables shall—

(a) be protected from mechanical damage;

(b) have their terminals protected from mechanical damage and from contact with conductive materials;

(c) be as short in length as is compatible with the stowage arrangements of the starter motor batteries;

(d) either be routed to avoid the possibility of coming into contact with petroleum products or be enclosed or sheathed with a material resistant to the effects of petroleum products;

(e) be of adequate size for the expected cranking current and to minimise voltage drop;

(f) be connected directly to the starter via the starting relay contacts; and

(g) be suitably sealed at terminals in such a manner as to reduce corrosion.

NOTE: Starter motor manufacturers specifications should be used for cable size.

9.56.2 The starting motor relay shall be mounted either directly on the starter or adjacent to it.

9.57 Switches and circuit protection

In isolated systems, switches and circuit protection shall interrupt all active conductors i.e. double pole switches are to be used.

9.58 Batteries and battery installations

9.58.1 General

9.58.1.1 Battery provisions can be found in Australian and New Zealand standards AS/NZS 3000 and guidance on batteries can be found in AS 2676 and AS 3011. These standards cover batteries with voltages in excess of 24 V. However, the guidance offered is sound for battery installations under 24 V.

9.58.1.2 Paragraph 9.58, shall not apply to batteries integral to particular equipment when those batteries do not feed into a ship's distribution system.

NOTE: These batteries may include those used in hand held and portable equipment, internal back up batteries for electronic navigation devices, fire detector back up batteries and batteries for stand-alone emergency lighting units.

9.58.2 Isolation of batteries

9.58.2.1 All batteries shall be controlled by an isolation switch operating in all active conductors. Isolation switches shall be located as close as practicable to the battery, and cables between the battery and isolating switch shall be double insulated or installed in a wiring enclosure throughout their entire length.

9.58.2.2 Certain circuits may be required when the main distribution system is isolated (for example, automatic bilge pumps and solar battery charging circuits). These circuits shall be fitted with individual isolation switches and protection devices located as close as practical to the battery.

9.58.3 Change over and paralleling switch

Systems involving multiple battery installations shall be provided with switching to allow the paralleling and/or changeover of

batteries used for engine starting. Where such arrangements are provided the isolation capability and overcurrent protection for each battery shall be maintained.

9.58.4 Location and mounting of batteries

9.58.4.1 Location of starting batteries

To limit voltage drop in cables, starting batteries should be located as close as practicable to the engines they serve while minimising the risk of hydrogen released by the battery being ignited by a spark from the starter motor.

9.58.4.2 Mechanical protection

Batteries shall be located and mounted in—

(a) a suitably sized and well secured battery box with fitted lid and adequate ventilation that complies with sub-regulation 9.58.4.3; or

(b) a dedicated battery compartment or room that complies with sub-regulation 9.58.4.4.

NOTE: This is to ensure a high level of protection against mechanical damage, exposure to moisture, and the possibility of short circuit caused by accidental contact with loose metal tools and other conductive articles.

9.58.4.3 Battery boxes

Battery boxes shall be—

(a) of a chemically resistant material, capable of containing the whole volume of electrolyte; and

(b) mounted and arranged to prevent movement of the battery due to the motion of the ship.

9.58.4.4 Battery compartments

9.58.4.4.1 In dedicated battery compartments or rooms, batteries shall be mounted in drip trays or containers of a chemically resistant material that are capable of containing the total volume of electrolyte.

9.58.4.4.2 Mounting arrangements for the containers and the batteries within the containers shall prevent movement of the batteries due to the motion of the ship.

9.58.4.5 Housing of batteries

9.58.4.5.1 Batteries, or sets of batteries, charged by chargers where the sum of all chargers is greater than 2 kW in total shall be housed in a compartment dedicated to batteries only. Battery compartments shall be well ventilated to the open deck (refer to sub-regulation 9.59). Cable entries to battery compartments shall be gas tight.

9.58.4.5.2 Lead acid batteries and alkaline batteries shall not be housed in the same compartment or container, or in close vicinity to each other.

NOTE: Alkaline electrolytes and acids react violently and noxious fumes may be generated, even in sealed cells.

9.58.4.5.3 Batteries shall not be housed in accommodation spaces unless they are in a container sealed from the accommodation space and vented to the open deck.

9.58.4.6 Switches in battery compartments

Switches and other circuit interrupting devices shall not be housed in battery boxes, battery compartments or dedicated battery rooms. These devices shall be mounted as close as practicable, but external to, these housings.

9.58.5 Battery charging

9.58.5.1 Charging capacity shall be such that fully discharged batteries can be charged to 80 per cent of full charge within 10 hours while maintaining essential services and without exceeding a safe charge rate.

9.58.5.2 To avoid damage to batteries and their charging systems, battery chargers shall incorporate devices for—

(a) regulation of charging current commensurate with the capacity of the battery and/or the manufacturer's recommendations;

(b) protection against overcharge, over voltage and reversal of charging current;

(c) charge rate indication; and

(d) circuit isolation and protection.

9.58.5.3 Battery charging systems shall incorporate regulators designed to suit the particular power input or inputs used (e.g. LV, engine driven generator, wind generator, solar power).

9.58.6 Battery protection

9.58.6.1 Battery terminals shall be protected from mechanical damage and from contact with conductive materials.

9.58.6.2 Batteries supplying essential services, excluding engine starting batteries, shall have short circuit protection as a minimum protection for overcurrent.

9.58.6.3 Engine starting batteries shall have either:

(a) short circuit protection; or

(b) mechanical protection of the starting cables.

9.58.6.4 For all other battery circuits, short circuit and overload protection shall be provided.

9.58.6.5 Short circuit and overload protection shall comply with the manufacturer's specifications. If manufacturer's information on prospective short circuit currents and fault current capacity is not available, for the purposes of providing protective devices the prospective fault current at the terminals shall be considered to be—

(i) for vented cells - 20 times the nominal battery capacity at the 3 hour rate; and

(ii) for sealed cells - 35 times the nominal battery capacity at the 3 hour rate.

9.59 Ventilation of batteries and battery compartments

9.59.1 General

To avoid the potential for an explosion or fire, battery compartments, rooms and boxes shall be well ventilated to free air so that hazardous gases cannot accumulate.

9.59.2 Minimum exhaust rate

The minimum exhaust ventilation rate required to maintain the concentration of hazardous gases below 2 per cent is calculated by the following formula:

$q_v = 0.006\ n\ l$

where

q_v = the minimum exhaust ventilation rate, in litres per second

n = the number of battery cells

l = the charging current, in amperes

9.59.3 Natural ventilation

For natural ventilation, the minimum size of inlet and outlet vents is given by:

$A = 100q_v$

where

A = the minimum area of vent, in square centimetres

q_v = the minimum exhaust ventilation rate, in litres per second.

9.59.4 Mechanical ventilation

Where mechanical ventilation is used to meet the minimum exhaust rate (q_v) the following shall apply

(a) exhaust air shall be discharged outside the ship's structure;

(b) fans shall not be located within a duct (i.e. best mounted at discharge end of duct);

(c) exhaust ducting shall have a positive gradient over the full length of the duct and shall not connect to other ductwork;

(d) non sparking material shall be used for fan blade and fan housing;

(e) controls for the fan shall be external to the compartment being ventilated; and

(f) air flow shall be monitored and an audio/visual flow alarm fitted.

LOW VOLTAGE SYSTEMS

NOTE: Low voltage exceeds 50 V a.c. and 120 V d.c but is less than 1000 V a.c. and 1500 V d.c.

9.60 Application

This regulation applies to ships having an electricity supply that exceeds 50 V a.c. and 120 V d.c but is less than 1000 V a.c. and 1500 V d.c.

NOTE:

1. Ships with an LV system may also have an ELV supply.
2. AS/NZS 3000 contains provisions regarding the segregation of circuits of different voltage.

9.61 Compliance

A low voltage electrical system shall be deemed to satisfy the common requirements for all electrical systems required outcomes in regulations 9.33 to 9.40 if it complies with regulations 9.62 to 9.65 of this Chapter and the relevant paragraphs of AS/NZS 3000 relating to low voltage installations.

9.62 Multiple earthed neutral (men) systems

Where the ship uses a MEN system the ship's MEN link shall be made at each generator.

NOTE: This avoids nuisance tripping of shore side RCDs. The ship's MEN point is switched out of the circuit by the shore supply change over switch.

9.63 Shore supply

9.63.1 General

9.63.1.1 Where electricity is to be supplied to a ship from a shore supply the shipboard shore power facility shall include:

(a) a circuit breaker operating in all live conductors of the supply, including neutral, fitted adjacent to the shore supply inlet on the ship;

(b) a test device, connected on the supply side of the ship's shore supply circuit breaker to check, and visually indicate, the polarity of the shore supply in relation to the ship's system;

(c) an interlocking circuit to ensure the shore power cannot be connected unless the polarity is correct or a polarity reversal arrangement incorporating interlocking circuitry is installed;

(d) in three phase supplies:

(i) a means of checking the phase sequence in relation to the ship's system; and

(ii) appropriate switchgear to facilitate the reversal of phase sequence.

9.63.1.2 The polarity of plugs, socket outlets and couplers used for a ship's shore power supply equipment shall be in accordance with AS/NZS 3112 and AS/NZS 3123.

NOTE: Where necessary, repairs may be required to correct the polarity of the shore supply connection. Electrical safety regulations may require that low voltage work be carried out by licensed electricians.

9.63.1.3 Fixed wiring shall be used between the shore connection circuit breaker and the changeover switch.

9.63.1.4 At the main switchboard or adjacent to the changeover switch, there shall be a means of indicating for each phase when the shore supply is energised.

9.63.2 Shore supply cable

The ship's shore supply connecting cable shall—

(a) be a heavy duty flexible cord or flexible cable;

(b) have a minimum current capacity of 15 A;

(*c*) comply with AS/NZS 3191; AS/NZS 5000.1 and/or AS/NZS 3008.1.1 as applicable;

(d) be arranged to allow for the movement of the ship at the berth without imposing tension on the cable or connections, or exposing the cable to mechanical stress or damage; and

(e) have a length that will ensure the voltage drop for the ship's electrical installation is kept within the requirements of AS/NZS 3000 relating to voltage drop; i.e. the voltage drop at any point of the electrical installation shall not exceed 5 per cent of the nominal voltage.

9.63.3 Changeover switch

The changeover switch or device for the ship supply/shore supply shall operate simultaneously in all live conductors and neutral. Except where the changeover switch is direct acting (i.e. a mechanical switch), the control circuit of any change over arrangement shall include, in addition to any mechanical interlocks, electrical interlocks on contactors, circuit breakers or other switching devices.

9.63.4 Earth

Earth continuity between the ship's earth and the shore earth shall be maintained through the appropriate pin in a plug/socket shore power connection or by a dedicated earth terminal in a shore supply connection that uses terminals.

9.63.5 Notices

A notice containing the following information shall be provided at the shore connection facility on the ship:

(a) supply voltage;

(b) frequency of the ship's a.c. system;

(c) the procedure for carrying out the connection.

9.63.6 Supply inlet plug

A means to prevent stress on terminal connections or the accidental removal of the supply inlet plug shall be provided on the shore connection facility on the ship.

NOTE: Suitable arrangements include, but are not limited to, the screw cap of plug/socket units, or a lanyard between the cable and a stout attachment on the ship to relieve stress on the 0.5 to 1.0 m of cable closest to the shore connection.

9.63.7 Arrangement of shore connection

Guidance regarding possible configurations for the ship's shore connection may be found in AS/NZS 3004.

9.64 Generators- control and instrumentation

9.64.1 Control

9.64.1.1 Overcurrent

9.64.1.1.1 Overload and short circuit protection for each generator shall be provided by a circuit breaker. The generator manufacturer's specifications should be adhered to for circuit breaker ratings and time delay settings. If the manufacturer's specifications are unavailable, for the purpose of providing overload and short circuit protection the following settings shall apply:

(a) 110 per cent of rated output current - 15 min;

(b) up to 150 per cent of rated output current - 2 min;

(c) 150 per cent or greater of rated output current - instantaneous.

9.64.1.1.2 Consideration should be given to providing an alarm warning for overloads of less than 110 per cent of rated output current.

9.64.1.2 Load shedding

Where essential and non-essential services are separated, consideration should be given to the provision of load shedding of non-essential services when one or more generators become overloaded.

9.64.2 Instruments

9.64.2.1 General

Instruments shall be provided that indicate the operational conditions of voltage, frequency and load and any variation from the limits of safe operation of the ship's electrical system.

9.64.2.2 Minimum requirements

Each generator shall have as a minimum—

(a) a voltmeter;

(b) a means of detecting earth leakage;

(c) either an ammeter in each phase, or an ammeter with a selection switch to enable the current in each phase to be measured;

(d) for a.c. generators, a frequency meter located on the supply side of the main switch or main circuit breaker; and

(e) for generators above 50 kW, a wattmeter.

9.64.2.3 Generators operated in parallel

9.64.2.3.1 For generators operated in parallel, in addition to the instruments specified under sub-regulation 9.64.2.2 each generator shall have:

(a) a wattmeter;

(b) reverse power protection, operating with time delay and in the range 2 per cent to 15 per cent of rated power. A 50 per cent fall of applied voltage shall not render the reverse power protection inoperative.

9.64.2.3.2 To facilitate the paralleling operation, the following instrumentation shall be the minimum provided:

(i) Two voltmeters.

(ii) Two frequency meters.

(iii) A synchroscope, synchronising lamps, or an equivalent arrangement.

9.64.2.3.3 One voltmeter and one frequency meter shall be connected to the bus bars, the other voltmeter and frequency meter may be either those dedicated to each generator or shall be switched to enable the voltage and frequency of any generator to be measured.

9.64.2.4 Range of instruments

9.64.2.4.1 Voltmeters

The upper limit of the range of a voltmeter shall be 120 ± 5 per cent of the nominal voltage of the circuit in which it is installed. The nominal voltage of the circuit shall be clearly indicated on the voltmeter.

9.64.2.4.2 Ammeters

The upper limit of the range of an ammeter shall be 130 ± 5 per cent of the rated full load current of the circuit in which it is installed. Rated full load current shall be clearly indicated on the ammeter.

9.64.2.4.3 Wattmeters

Wattmeters used on generators that may be operated in parallel shall be capable of indicating 15 per cent reverse power.

9.65 Inverters

9.65.1 General

Where applicable, inverters used on board ships shall comply with AS/NZS 61558 Part 2.16.2.

9.65.2 Inverters with outputs isolated from other electrical systems

Inverters supplying individual or multiple outlets isolated from other supply systems shall comply with the provisions of AS/NZS 3000 relating to protection by electrical separation, including the provisions applying to protective earthing. Circuit protection for inverter output shall be double pole. Switching at outlets shall be double pole.

9.65.3 Inverters used to supply the ship's power system

Inverters used to supply a ship's LV system shall comply with the requirements for generators (sub-paragraph 9.64). Inverters shall have the capability to monitor, give alarm, and disconnect when 'out of specification' values of voltage, frequency and current

are detected. Disconnection shall occur in all live conductors, including the neutral. There shall be enough output capacity to operate the required systems. Supply to the ship's distribution system shall be controlled by an appropriate interlocking changeover switch, or equivalent device, operating in all live conductors including neutral.

NOTE: Inverters with variable output or unusual arrangements of metering and controls should meet safety and operational needs. Power and supply management systems are now in use and the technology in this field is advancing rapidly. Without restricting the progress of this technology, the basic tenets of electrical safety shall be addressed before any other installation design elements are considered.

EMERGENCY ELECTRICAL INSTALLATIONS

9.66 Application

This part applies to all ships installed with emergency electrical systems to ensure a source of power is available in the event of failure of the main electrical system.

9.67 General

The common requirements for all electrical systems given in regulations 9.33 to 9.40 apply to this part.

9.68 Function of essential services to be maintained

The electrical system shall be designed and installed so that, in the event of a failure in the main electrical system, power can be supplied and maintained to all services essential for safety.

9.69 Period of operation

Essential services shall be maintained during emergency situations for a period sufficient for the emergency to be overcome or for evacuation of the ship to be completed.

9.70 Emergency lighting

In the event of a failure in the main electrical system, sufficient emergency lighting shall be provided to facilitate the initiation, undertaking and completion of appropriate emergency responses.

9.71 Compliance

An emergency electrical installation shall be deemed-to-satisfy the required outcomes in paragraphs 9.67 to 9.70 if it complies within—

(a) paragraphs 9.72 to 9.77 of this part;

(b) the common requirements for all electrical systems, requirements for extra low voltage systems and batteries and requirements for low voltage systems; and

(c) the relevant paragraphs of AS/NZS 3000.

9.72 General

9.72.1 Design and location

An emergency source of electrical power shall be self-contained. Unless otherwise provided for in paragraph 9.73.3, the emergency source of electrical power, including any fuel required to supply that source, shall comply with the following:

(a) It shall not be located forward of the collision bulkhead.

(b) It shall be located above the weather tight deck, or where there is no weather tight deck then above the water line, and shall be accessible from the open deck.

(c) It shall be located so that a fire or other unplanned occurrence in the propulsion machinery space will not interfere with the supply or distribution of emergency power outside that space.

(d) The space in which it is located shall be—

(i) protected from exposure to moisture; and

(ii) provided with ventilation sufficient to enable the emergency power source to operate at full power.

9.72.2 Operation

The emergency generator and its engine, and any emergency battery, shall be capable of operating at full power when the ship is—

(a) upright;

(b) rolling up to an angle of 22.5° either way and simultaneously pitching 10° by bow or stern; or

(c) in any combination of angles within those limits.

9.72.3 Duplication of main source of electrical power

Where a ship is designed with two, non-contiguous machinery spaces having separate electrical installations with separate distribution systems, each installation may be considered as the emergency source of electrical power for the other.

9.73 Power source

9.73.1 Type of power source

An emergency source of electrical power shall be:

(a) a battery complying with paragraph 9.73.2; or

(b) a generator driven by a diesel engine complying with paragraph 9.73.3.

9.73.2 Battery

9.73.2.1 The emergency accumulator battery shall be capable of carrying the total emergency load in accordance with Table 1.

9.73.2.2 Where a ship has an emergency source of power from a battery only, the emergency lighting system shall automatically come into operation upon failure of the main electrical supply.

9.73.2.3 The emergency source of electrical power for ships engaged in unlimited and near coastal voyage shall not be the normal starting batteries.

9.73.2.4 Class 3B, 3D & 3E ships may use the normal starting batteries provided those batteries are located in accordance with paragraph 9.72.1.

9.73.3 Diesel engines

9.73.3.1 General

Where a generator driven by a diesel engine provides the emergency source of power, the engine shall be capable of being easily started in its cold condition at a temperature of 0°C.

9.73.3.2 Fuel

Fuel for an emergency generator engine shall have a flashpoint of not less than 60°C.

9.73.3.3 Starting arrangements

Where an engine is not designed to be started manually, the following requirements apply:

(a) The starting equipment shall be capable of providing 3 consecutive starts.

NOTE: Starting methods can be electrical from batteries, compressed air, hydraulic, or other forms of stored energy.

(b) A second source of energy capable of providing an additional 3 starts within a 30 minute period shall be provided.

(c) Where compressed air is used as the sole means of starting an engine, a manually started, mechanically driven air compressor shall be provided.

(d) Where an air receiver for an emergency generator is supplied from the main or auxiliary compressed air system, the air supply line shall be fitted with a non-return valve which shall be located in the emergency generator space.

(e) Where a hydraulic starter is used it should have both an engine driven and a manual pump for charging the accumulator.

9.73.3.4 Location of starting arrangements

The starting arrangements specified in sub-regulation 9.73.3.3 shall not be situated in any of the following locations:

(a) Below the bulkhead deck in the case of a Category 1 ship or below the weathertight deck in the case of a Category 2 ship.

(b) Forward of the collision bulkhead.

(c) In the space containing the main source of electrical power.

(d) In a space that would be rendered inaccessible or uninhabitable by a fire or other incident in the space containing the main source of electrical power.

9.73.4 Temporary source of emergency power

Unless an emergency generator is designed to start and come on load automatically, all Class 3A, 3B ships and all ships of 25 m and over in measured length that carry berthed passengers shall be provided with a temporary source of emergency power. This temporary source of emergency power shall consist of a battery of sufficient capacity to—

(a) supply emergency lighting continuously for 30 minutes;

(b) close electrically-operated watertight doors; and

(c) operate any electronic alarms and indicators associated with the watertight doors.

NOTE: All electrically operated watertight doors need not be closed simultaneously.

9.74 Emergency switchboard

9.74.1 General

An emergency switchboard may be supplied from the main switchboard in normal operation, and shall be supplied from an emergency supply in situations where the main supply has failed.

9.74.2 Location

Unless otherwise provided for in paragraph 9.74.3 and 9.74.4, an emergency switchboard forming part of the emergency electrical installation shall be installed adjacent to, or as near as possible to, the emergency source of electrical power.

9.74.3 Generators driven by diesel engines

Where the emergency source of electrical power is a generator driven by a diesel engine, the emergency switchboard shall be located in the same space as the generator, except where the operation of the emergency switchboard would be impaired by such a location.

9.74.4 Batteries

Where the emergency source of electrical power is a battery, the emergency switchboard shall not be installed in the same space as the battery.

9.75 Equipment required to be supplied with emergency power

The electrically operated equipment required to be supplied with emergency power shall be as follows:

(a) The following equipment for fire safety:

(i) Fire alarms.

(ii) Emergency fire pumps.

(iii) Fixed fire-extinguishing systems.

(iv) Remote stops.

(v) Communications equipment other than radios (e.g. PA systems).

(b) Mustering alarm.

(c) Signalling lamp.

(d) Electronic navigational aids, navigation lights and sound signals

(e) Watertight doors and their associated indicators and alarms.

(f) Emergency lighting in accordance with paragraph 9.77.

(g) Any bilge pump relying on the emergency power source as its alternative power supply.

9.76 Capacity of emergency power supply

The emergency power supply for each Class of ship shall be capable of operating continuously and simultaneously all equipment required to be supplied with emergency power for the periods specified in paragraph 10 of this schedule.

9.77 Emergency lighting

For ships specified in paragraph 10 of this schedule, emergency lighting shall be situated to illuminate the following:

(a) Service alleys, accommodation alleyways, stairways, exits and personnel lift cars.

(b) The machinery spaces and main generating stations, including their control positions.

(c) Control stations and all machinery control rooms.

(d) The stowage positions for fire-fighting equipment.

(e) The steering gear.

(f) Pumps for fixed fire extinguishing systems, emergency fire pumps and any bilge pump relying on the emergency power source as its alternative power supply.

(g) The starting positions for the motors of the pumps specified in paragraph 9.77 *(f)*.

(h) Public spaces, evacuation routes, exits and mustering areas.

(i) Lifeboat stations on deck.

(j) Stowage positions of life rafts for which launching devices are not provided.

(k) Life rafts and their launching devices during mustering and launching.

(l) The area of water into which life rafts are launched, for the period of time required for launching to be completed.

PART 5—LIQUEFIED PETROLEUM GAS INSTALLATION

9.78 General

9.78.1 This part specifies requirements for the design, manufacture, installation and operation of liquid withdrawal systems on commercial ships for main and auxiliary internal combustion engines using liquefied petroleum gas (LPG) as the source of fuel.

9.78.2 It does not apply to LPG systems for appliances (vapour withdrawal) or to systems employing fuel substitution.

9.79 Definitions

For the purposes of this part, the definitions provided shall apply;

"automatic fill limiter" (AFL)—

a device in the filling system for a container, which automatically terminates the filling operation when a predetermined liquid level in the container has been reached.

"capacity"—

the total internal volume of a container.

"container"—

any pressure ship, cylinder or tank designed for the storage of LPG to be used as fuel for outboard internal combustion engines.

"contents gauge"—

a gauge providing a visual indication of the liquid contents of the container.

"double non-return valve'—

two non-return valves arranged in series for the purpose of providing dual security against backflow.

"excess-flow valve"—

a valve that closes automatically when flow in a specified direction exceeds a predetermined limit.

"fixed liquid level gauge"—

a gauge indicating the maximum permitted liquid level in the fuel container.

"fuel service line"—

piping or hose used for the conveyance of LPG from the filling connection to the container or from the container to the vaporiser.

"gas-air mixer"—

a device for mixing air and gaseous fuel.

"internal" (components)—

a fitting or component constructed with its significant working parts within the container perimeter (i.e. inside the sub-compartment), so that any damage to exposed portions will not prevent the safe operation of the fitting or component.

"liquefied petroleum gas" (LPG)—

a hydrocarbon fluid composed predominantly of any of the following hydrocarbons, or mixtures of all or any of them:

(a) Propane.

(b) Propylene.

(c) Butane.

(d) Butylene.

Unless specifically stated otherwise, any reference to propane, propylene, butane or butylene means the commercial grade of that product.

"locker"—

a structure enclosing the whole of the fuel container and its fittings for the purposes of—

(a) collecting leaked LPG; and

(b) facilitating the safe discharge of the leaked LPG to the atmosphere.

"maximum permitted filling level"—

the level of the liquid in a container when the liquid contents are 80 percent of the total available internal volume of the container.

"non-return valve"—

a valve which permits fuel flow in one direction only.

"pressure"—

gauge pressure (as opposed to absolute pressure).

"Pressure regulator"—

a device that reduces fuel pressure to a level appropriate for delivery to the vaporiser.

"relief valve"—

a valve which, upon activation, automatically discharges fluid to atmosphere or to a reduced pressure system so as to prevent a predetermined pressure in the system being exceeded.

"safety valve"—

a valve which automatically discharges vapour to atmosphere so as to prevent a predetermined pressure being exceeded.

"service valve"—

a manually operated shut-off valve which is fitted to the container and which, when closed, isolates the LPG supply from the rest of the installation.

"sub-compartment"—

a structure attached to the container, which encloses the container fittings and is designed to collect any leakage of LPG from those fittings, which facilitates the discharge of the leaked LPG to the atmosphere.

NOTE: Although a sub-compartment may also protect the fittings from mechanical damage, its primary function is the collection and discharge of leaked LPG.

"vaporizer"—

a device that vaporises LPG liquid for delivery to the gas-air mixer.

9.80 Abbreviations

LPG — liquefied petroleum gas

AFL — automatic fill limiter

SYSTEM DESIGN AND INSTALLATION

9.81 Scope

This part sets out the requirements to ensure that the system design, installation, components and accessories for liquefied petroleum gas (LPG) systems for engines are suitable for their intended service.

9.82 Operation and maintenance

LPG systems for engines shall be designed, constructed and installed to facilitate their identification, safe use, inspection and maintenance.

9.83 Reliability

LPG systems for engines shall be designed, constructed and arranged to provide a level of reliability appropriate for their intended purpose.

9.84 Containment of fuel

LPG containers and distribution systems shall be designed, constructed and installed to prevent the leakage of gas in both normal and abnormal conditions of operation.

9.85 Minimising the risk of ignition

LPG systems for engines shall be designed, constructed and installed to prevent the build-up of explosive gases and to avoid potential sources of ignition.

9.86 Compliance

The general design and manufacture of an LPG system for engines shall be deemed to have satisfied the required outcomes in paragraph 9.82 to 9.85 if it complies with paragraph 9.87 to 9.91.

9.87 Design and manufacture

9.87.1 General

All components in the installation shall be designed and manufactured to withstand the stress imposed by fitting and tightening the connections and to withstand the conditions encountered in a marine environment. Components shall either be manufactured from material that is resistant to corrosion, or they shall undergo a corrosion-inhibiting process prior to installation.

NOTE: The usual system configuration is that fuel is drawn from the container in the liquid phase, passing in succession through a water-heated vaporiser and pressure regulators, thus providing gaseous fuel at atmospheric pressure to be induced by the engine through the gas-air mixer.

9.87.2 Pressure rating and component suitability

The design pressure for components subjected to container pressure shall be 2.55 MPa. The suitability of such components shall be determined either by strength calculations in accordance with normal pressure ship procedures, or by the ability to withstand a hydrostatic pressure of not less than 10.2 MPa applied for at least 1 minute. Component acceptance testing shall be in accordance with Annex A.

9.87.3 Modification of components

Modifications to any component shall not be made without the approval of the manufacturer of the component. The modified component shall be tested in accordance with Annex A prior to being put back into service.

9.87.4 Metals

9.87.4.1 The metals used in the manufacture of container valves shall be in accordance with AS 2473.

9.87.4.2 Piping and pipe fittings shall not be manufactured from aluminium alloys.

9.87.4.3 Metallic materials having a melting point lower than 500°C shall not be used in any application where failure of the component may result in the escape of gas.

9.87.5 Testing

Testing of all components and the complete installation shall be conducted in accordance with Annex A. The testing and commissioning procedures specified in Annex A shall also be carried out where second- hand equipment is being reinstalled or transferred to another ship.

9.87.6 Modification and repairs

A modification or repair to an installation shall be inspected and tested in accordance with Annex A.

9.87.7 Inspection

Prior to testing and commissioning of the installation, an initial inspection of the LPG system and its components shall be carried out by or under the supervision of an authorized person. Subsequent inspection of the installation shall be in accordance with Annex A.

9.87.8 Certification

On completion of an installation, the installer shall supply the owner of the ship with a certificate of compliance, which shall specify the installation date and the fuel container serial number.

9.87.9 Compliance plate

9.87.9.1 A compliance plate for each LPG installation shall be securely attached to the ship's structure in a clearly visible location.

9.87.9.2 Where a container is changed or re-tested, it shall be fitted with a new compliance plate.

9.88 Container sub-assembly

9.88.1 Container

9.88.1.1 Design and construction

A fuel container shall comply with one of the following requirements:

(a) AS /NZS 3509.

(b) AS 1210 (for a design pressure of 2.55 MPa).

9.88.1.2 Installation

Containers shall be installed in accordance with the manufacturer's instructions and the following:

(a) Containers shall be installed within a locker, or on the open deck or deckhouse top at a distance of not less than 1 m from any openings that would allow LPG into the ship.

(b) Containers shall be fixed (i.e. non-portable) and shall not be installed in the following locations:

(i) Inside a deckhouse.

(ii) Below deck.

(iii) Outside the hull contours.

(c) Containers shall be installed such that the accuracy of the contents gauge, fixed liquid level gauge, safety valve and automatic fill limiter is not impaired.

(d) The service valve shall be operable at all times. The valve may be located such that it can be operated manually from outside the locker, provided that the sealing on the locker is maintained by one of the following means:

(i) If a valve-actuating device passes through the locker casing, a gas-tight seal shall be fitted;

(ii) If the actuating handle is located wholly within the locker, access shall be via a gas-tight captive hatch. The gas-tight captive hatch shall be capable of being operated without the need for tools.

(e) The container shall be attached securely to the ship in accordance with the following:

(i) The method of attachment shall not cause undue stress in the container shell, nor shall it be a potential cause of deterioration of the container shell.

(ii) Clamping bands shall be flat, round or square paragraphs. Wire cables or material likely to localise loading shall not be used.

(iii) The clamping bands shall be metallurgically compatible with the container shell.

NOTE: Galvanised bands should not contact stainless steel containers.

(iv) The risk of corrosion of the container shall be minimized by avoiding entrapment of moisture in non-draining features.

(v) Any welding of components and fittings to the container (e.g. fixing lugs and brackets) shall take place only during manufacture of the container.

(f) The force necessary to separate the container from the ship shall be not less than 20 times the weight of the full container. This requirement applies for any direction in which the force may be applied.

(g) The container and its associated attachments shall be located (and protected if necessary) to minimise the risk of damage in the event of impact.

(h) Where the thickness of the cylindrical portion of the container shell is less than 2.2 mm, the container shall be installed in a locker or in a protected zone.

(i) A container should be installed in a location remote from the engine exhaust system. The distance from the container to the exhaust system shall not be less than 150 mm. Where there is a possibility of heat from the exhaust system raising the temperature of the container, a heat shield shall be fitted to protect the container, and the exhaust shall be lagged.

9.88.2 Components for containers

9.88.2.1 A container shall not be fitted with components other than those specified by the manufacturer as suitable for use with that particular container. A container shall incorporate the following components:

(a) Filler connection.

(b) Filler cap.

(c) Filler non-return valve.

(d) Automatic fill limiter.

(e) Service valve.

(f) Excess-flow valve.

(g) Safety valve.

(h) Automatic fuel shut-off device.

9.88.2.2 Components may be combined into multifunction units, provided that the requirements for each individual function have been satisfied.

9.88.3 Filling connection

The container filling connection shall be a 1¾-inch male Acme thread in accordance with AS 1425. A remote filling connection shall incorporate means to prevent it from rotating when the mating dispenser nozzle is connected or disconnected.

9.88.4 Filler non-return valve system

9.88.4.1 General

The filler non-return valve system shall incorporate a fill line with a nominal internal diameter not less than 8 mm, and shall be in accordance with sub-paragraph 9.88.4.2 to sub-regulation 9.88.4.6. The number of elbows in the fill line shall be minimised.

9.88.4.2 Direct filling system

Where the filling connection is on the container, it shall incorporate a double non-return valve to ensure a gas-tight condition.

9.88.4.3 Remote filling system

Where the filling connection is remote from the container, the backflow prevention system shall be one of the following:

(a) A single gas-tight non-return valve at the filler connection and a double non-return valve at the container, of which at least one element shall be gas-tight.

(b) A gas-tight non-return valve at the container, plus a double non- return valve at the filler connection, of which at least one element shall be gas-tight.

(c) A double non-return valve at both the container and the filling connection, of which at least one element of each valve shall be gas-tight.

(d) A single gas-tight non-return valve at the filler connection, plus a manual shut-off valve together with a gas-tight non-return valve at the container.

9.88.4.4 Internal non-return valve

At least one of the non-return valves in the backflow prevention system shall be installed such that the valve shall be operable in the event of damage to the assembly external to the container.

9.88.4.5 Filler cap

The filler cap shall be captive, and shall either be capable of withstanding the design pressure (2.55 MPa) or shall be designed to prevent the accumulation of pressure.

9.88.4.6 Location of filling connection

The filling connection shall not be installed on any impact surfaces on the sponsor, and shall be located such that—

(a) it can be supervised from the open deck of the ship; and

(b) it is protected by its location.

9.88.5 Automatic fill limiter (AFL)

9.88.5.1 Design

The design of an AFL shall be such that—

(a) the operation of the shut-off action shall not depend on a bleed of LPG to the atmosphere;

(b) it shall not be possible to alter the setting of the AFL from outside the container after installation;

(c) an AFL that depends on correct radial orientation for its accuracy (e.g. a screw-in type) shall incorporate a means to correct its setting or position; and

(d) where the installation has more than one container, an AFL shall be incorporated in each container.

9.88.5.2 Performance

Subsequent to the testing specified in Annex A, the performance of an AFL shall be as follows:

(a) Filling shall be shut off before the maximum permitted filling level has been exceeded.

(b) The filling shut-off function shall be operable at any pressure differential between 70 kPa and 1000 kPa across it.

NOTE: For this requirement, any adjacent or in-built non-return valve is not considered to be part of the AFL.

(c) The rate of leakage into the container after shut-off shall be such that the liquid volume does not increase by more than 5 per cent of the total container volume within 8 minutes.

9.88.5.3 Fixed liquid level gauge

A fixed liquid level gauge shall comply with the following:

(a) The design of the gauge shall be such that either—

(i) it incorporates a tube arranged with its open end located at the liquid level, so that gaseous discharge changes to liquid discharge as the liquid surface reaches the level;

(ii) or it incorporates a sight glass of the circular window type, marked at the level.

(b) It shall indicate when the liquid level is at the maximum permitted filling level.

(c) It shall be accessible to facilitate periodic checking of the AFL.

(d) The arrangement shall be such that any discharge occurring during checking can be directed away from both the deckhouse and below the deck of the ship.

NOTE: Temporary extension tubing may be used to facilitate this discharge requirement.

(e) Any opening communicating between the gauge and the interior of the container shall be restricted by an orifice with an internal diameter not greater than 1.4 mm.

9.88.6 Contents gauge

An electrically operated contents gauge shall be designed for use in a Zone 2 area, as defined in AS 2430.1.

9.88.7 Excess-flow valve

An excess-flow valve shall be located upstream of the service valve, and shall comply with the following:

(a) The valve shall be internal.

(b) The nominal closing flow rate shall not exceed 215 mL/s of LPG.

(c) When the valve is shut, the bypass flow rate shall not exceed 3.3 ml/s of LPG at 350 kPa differential pressure.

(d) The valve shall reopen automatically when the excess flow condition has ceased.

NOTE: The excess-flow valve is usually attached directly to the service valve.

9.88.8 Service valve

A service valve shall be manufactured in accordance with AS 2473.

9.88.9 Automatic fuel shut-off valve (container)

9.88.9.1 Provided the valve is located in a protected position, the automatic fuel shut off valve at the container shall be fitted between the filter and the inlet of the first stage of the regulator, and shall act automatically to prevent the flow of LPG to the fuel service line at all times other than when both the ignition is on and the engine is running.

9.88.9.2 The following requirements also apply for the automatic fuel shut-off valve:

(a) The valve may open for a period of up to 3 seconds when the ignition is first turned on to allow priming of the fuel system. In the event of the engine stalling (as opposed to the engine being switched off), the valve may similarly remain open for a period not exceeding 3 seconds.

(b) The valve shall have a reflux (backflow opening) pressure not greater than 0.275 MPa, and a filter shall be installed upstream of the valve.

NOTE: Care should be taken when fitting the valve to ensure correct direction of flow.

(c) Where the valve is fitted within a locker or sub-compartment of a container, it shall be of the electrically encapsulated type, with electrical terminals located outside of the locker or sub-compartment.

(d) Wiring circuits, electronics and terminals provided for activation of the valve shall be protected so as to minimize the possibility of the safety shutdown feature being overridden. This protection shall be achieved by routing the wiring clear of any potential voltage sources, or by the incorporation of back-feed protection in the circuitry.

NOTE: This requirement does not preclude the use of combination modules comprising dual fuel selector/safety switch/fuel gauge units.

(e) The valve shall not be activated by switching to earth.

NOTE: The valve may be connected to the service valve by means of a fitting.

9.88.10 Fuel filter

A fuel filter capable of removing all matter from the fuel that could cause malfunction of the system shall be fitted on the high-pressure side.

9.88.11 Safety valve

9.88.11.1 General

The safety valve shall be internal. The safety valve and its installation shall be in accordance with sub-regulations 9.88.11.2 to 9.88.11.5.

9.88.11.2 Design and manufacture

The safety valve shall comply with the requirements appropriate to the type of container to which it is fitted as follows:

(a) AS 2613 for a gas cylinder or an automotive fuel container.

(b) AS 1210 for a pressure ship.

9.88.11.3 Start-to-discharge setting

The start-to-discharge setting of the safety valve shall be 2.55 MPa.

9.88.11.4 Discharge from safety valve

The discharge from the safety valve shall be such that there is no possibility of gaseous LPG discharging—

(a) on the container;

(b) towards any person in the vicinity;

(c) on adjacent ships; or

(d) towards or directly into the deckhouse or below deck.

9.88.11.5 Discharge arrangements

The following arrangements shall be considered as fulfilling the discharge requirements specified in sub-paragraph 9.88.11.4:

(a) The discharge is directed into a sub-compartment or locker.

(b) The discharge line to the point of discharge is rigid piping complying with all of the following:

(i) The size of piping and fittings and the general arrangement of the piping shall be such that the overall discharge capacity of the safety valve and the piping is not less than that specified by the manufacturer of the container.

(ii) The maximum length of the discharge line shall be 3 m, which shall be reduced by 0.5 m for each right-angle fitting, and 0.3 m for each short-radius bend or sweep bend of radius less than three times the outside diameter of the pipe.

(iii) The piping shall have a pressure rating appropriate for the pressure of discharging gas.

(iv) Any connecting fitting attached to the safety valve outlet shall not interfere with the operation of the valve.

(v) The type of piping and the general design of the system shall be such that it cannot cause the safety valve to be damaged under normal conditions of ship operation or in an accident.

(vi) The piping system shall be arranged, and protected if necessary, to minimize the possibility of mechanical damage.

(vii) The point of discharge shall be fitted with a device to prevent the ingress of water and dirt.

(viii) The direction of discharge shall be upwards, at an angle of not greater than 45 degrees from the vertical.

(c) Provided that the manufacturer has confirmed that the flow rate remains adequate for the installation, an externally mounted container having no sub-compartment or locker may be fitted with a short discharge pipe, directional guide or baffle having an equivalent effect, to reduce the velocity of the discharge or direct it safely.

NOTE: Fittings, piping attachments or deflectors that are attached to the outlet of the safety valve can interfere with the action of the valve or with gas flow so as to reduce the discharge flow rate.

9.88.12 Lockers

The design, construction and installation of a locker shall be in accordance with the following:

(a) A locker shall be vapour-tight to the interior of the ship, and shall be located above the waterline. It shall not be installed inside a deckhouse or below deck.

(b) A locker shall provide adequate protection for the container under accident and impact conditions.

(c) A locker shall be accessible from the top only and shall be fitted with a vapour tight cover. The vapour-tight cover

shall be of such design as to enable it to be readily opened to facilitate operation of container valves and testing of the system for leakage.

(d) A locker shall be vented at the bottom by a pipe of at least 25 mm inside diameter, which shall be routed directly overboard through the hull to a point lower than the container but not closer than 230 mm to the designed waterline in the loaded condition.

(e) A locker shall not have electrical connections or wiring within it unless any electrical equipment or components inside the locker are suitable for use within a Zone 2 area, as defined in AS 2430.1.

(f) A locker shall not be used for any purpose other than housing containers and associated equipment.

(g) For sailing ships, the drain outlet of a locker shall be located 230 mm above the anticipated sustained heeled waterline.

9.89 Fuel service lines

9.89.1 General

9.89.1.1 LPG fuel service lines that are subjected to container pressure shall be manufactured from one of the following:

(a) Copper-brazed steel tubing complying with AS 1751 or ASTM A254, terne-coated.

(b) Seamless stainless steel tubing complying with ASTM A269.

(c) Hose or a hose assembly complying with AS /NZS 1869.

9.89.1.2 LPG fuel service lines and their fittings shall comply with paragraph 9.89.2 to paragraph 9.89.8

9.89.2 Copper and copper alloy tubing

9.89.2.1 Size of tubing

The tubing shall have a nominal wall thickness not less than 0.91 mm if under 10 mm diameter, or not less than 1.02 mm if 10 mm or larger, and shall be no larger than that required to satisfy the maximum requirements of the engine. In no case shall the tubing be less than 6 mm outside diameter.

9.89.2.2 Configuration

9.89.2.2.1 Tubing joints and connections shall comply with regulation 9.89.4. The number of joints and connections in a fuel service line shall be minimized. Tubing joints and connections manufactured by the installer shall be restricted to the connection of essential components.

9.89.2.2.2 Tubing shall not be used between parts that can move in relation to each other (e.g. between the ship and the engine).

9.89.3 Hose and hose assembly

Where a fuel service line is manufactured from hose, the hose and hose assembly shall be of a class suitable for the pressure and temperature of the application, in accordance with relevant national and/or international standards.

9.89.4 Joints and connections

Olive-or ferrule-type fittings shall not be used in any joint or connection subjected to container pressure. Joints used for connecting or mounting tubing, hose assemblies or components subjected to container pressure shall be one of the following:

(a) For tubing, the joint shall be a 90° double-flared connection in accordance with AS D26 or SAE J533.

NOTE: Care should be taken to use the correct flaring tool. Using a flaring tool of an incorrect size can result in a reduction of tubing wall thickness.

(b) A flanged joint.

(c) A welded or brazed joint, provided that such joints are limited to components assembled during manufacture.

(d) A screwed joint provided that when the thread is used as a seal, only taper to-taper threads are used.

(e) A ground-face union.

9.89.5 Installation

Fuel service lines shall be installed in accordance with the following:

(a) They shall be routed such that they are protected against mechanical damage by the ship's structure in the event of impact or collision. They should follow the shortest practicable route.

(b) Any tubing likely to be subjected to corrosion shall be adequately protected.

NOTE: Clear plastic tubing is not suitable for providing protection from corrosion as the marine environment causes it to change colour, thus impairing visibility for inspection.

(c) They shall be secured to the ship's structure by metallic clips. Such clips shall be spaced at intervals not exceeding 600 mm. In order to prevent the possibility of fretting, corrosion or erosion of the fuel service lines, cushioning

shall be provided to protect them from the ship's structure and the clips themselves. Grommets shall be fitted where the fuel service line passes through the ship's structure.

(d) Where a fuel service line (including any of its joints or connections) or any connected component or fitting is subjected to container pressure, and is located within 150 mm of an object at a temperature above the normal water jacket temperature of the engine, a heat shield shall be fitted.

NOTE: Such heat sources include parts of the exhaust system, turbochargers and compressors.

9.89.6 Multiple container installations

9.89.6.1 Where there is more than one container in an installation, and the liquid spaces in the containers are connected to a common fuel service line—

(a) a spring-loaded non-return valve shall be installed between each container and the common fuel service line; and

(b) a relief valve complying with regulation 9.89.7 shall be fitted to the common fuel service line.

9.89.6.2 Manifolds used in multi-container installations shall be installed in a protected location.

9.89.7 Relief valve

A relief valve shall be set to operate at 3.1 MPa, and shall be installed in accordance with the following:

(a) The discharge shall be directed away from enclosed spaces and sources of ignition.

(b) The valve shall be protected from mechanical damage and shall be accessible for inspection and service.

9.89.8 Fuel service lines for applications under 100 kPa

Fuel service lines for applications under 100 kPa shall comply with the following:

(a) Hose shall comply with the Class B requirement of AS/NZS 1869, and shall be of sufficient length and flexibility to accommodate engine movement.

(b) Joints and connections shall be capable of sustaining a pressure 5 times the maximum pressure likely to be encountered in service. They shall comply with sub-paragraph 9.89.2.2 and 9.89.4. Pipework for safety valve discharges in applications less than 100 kPa shall comply with paragraph 9.88.11.5 *(b)*.

9.90 Fuel control equipment

9.90.1 General

Fuel control equipment shall comply with the requirements specified in paragraph 9.90.2 to 9.90.6. Any alterations made to the original equipment shall not adversely affect the performance of the equipment, the safety of the installation or the exhaust emission levels.

9.90.2 Components comprising LPG fuel control equipment

The LPG fuel control equipment shall incorporate all equipment necessary to convert LPG at high pressure at the fuel service line to the gas-air mixture supplied to the engine, and shall comprise the following components:

(a) An internal fuel filter, arranged to protect the automatic fuel shut-off device.

(b) An automatic fuel shut-off device (lock off).

(c) A vaporiser.

(d) A pressure regulator.

(e) A fuel selector, where a dual-fuel system is employed.

(f) A gas-air mixer.

9.90.3 Vaporiser and pressure regulator

9.90.3.1 Performance

A vaporiser and pressure regulator assembly shall incorporate a safety device that prevents the passage of vapour after the engine has stopped running, irrespective of whether the ignition is on or off.

9.90.3.2 Installation

The vaporiser and pressure regulator assembly shall be securely mounted and installed in accordance with the following:

(a) It is accessible for routine maintenance, adjustment, and inspection.

(b) It is mounted adjacent to or near the engine inlet.

(c) It is protected from impact in the event of a collision.

(d) It is either connected directly to, or adjacent to, the automatic fuel shut-off device.

(e) The length of any vapour pipe between the converter and the engine shall be minimized, and in no case shall be more than 500 mm.

(f) It allows sufficient free movement of fuel and water hoses.

9.90.3.3 Marking

Each vaporiser shall be legibly and permanently marked with the following information:

(a) The manufacturer's name and trademark.

(b) A definitive model, make, or series identification.

(c) The serial number, month and year of manufacture.

9.90.4 Water circulation system

The water circulation system shall be connected such that no flow-control valve in the system (e.g. thermostat or heater control) is capable of shutting off the flow of hot water.

9.90.5 Gas-air mixer

9.90.5.1 The gas-air mixer shall be mounted securely and, when fitted remotely, shall be capable of supporting its own weight and any forces applied under normal conditions of operation.

9.90.5.2 Air filter elements shall not be fitted downstream of the gas-air mixer.

9.90.6 Electrical wiring

9.90.6.1 General

The cross-sectional area (determined by current flow) and the insulation (determined by temperature) of wiring cable shall comply with appropriate national and international standards. The conductors in the wiring cable shall be tinned.

9.90.6.2 Securing of wiring cable

All wiring shall be taped, clipped or contained in a loom along its length.

9.90.6.3 Connectors and terminals

Connectors and terminals shall have soldered joints and shall be insulated to prevent accidental earthing during operation or routine servicing.

9.91 Markings and instructions

Any gas-tight hatch providing access to a sub-compartment or locker shall be legibly and permanently marked with the following warning:

WARNING: KEEP CLOSED AND GAS-TIGHT EXCEPT WHEN THE SERVICE VALVE SHALL BE OPERATED

9.91.1 Operating instructions

The installer shall provide a set of operating instructions for the ship, which shall include (but need not be limited to) the following information:

(a) Refueling procedures.

(b) Operation of the fuel system.

(c) Procedures to follow in the event of various faults or emergency situations.

ANNEX A - TESTING, COMMISSIONING AND INSPECTION

A1.0 Pre – installation component acceptance testing

A1.1 General

The components in an LPG installation shall undergo the following acceptance tests:

(a) Non- metallic materials

Non- metallic, synthetic materials used in seals or diaphragms in contact with LPG shall not-

(i) show visible evidence of deterioration after exposure to oxygen at 2 MPa and 20°C for 96 hours; and

(ii) change volume or mass in excess of that shown in Table 1 after immersion in hexane or pentane at a temperature of 20°C for 70 hours.

Table 1—Immersion test limits

Nature of change	Maximum permissible change (%)	
	Diaphragms	Other parts
Volumetric swelling	25	25
Volumetric shrinking	10	1
Loss of mass	15	10

(b) Cyclic pressure test

Each component shall not suffer damage sufficient to cause leakage or malfunction after being subjected to a cyclic pressure test comprising 10,000 applications of a hydrostatic pressure of 5 MPa. Connections to the components under test, methods of mounting and means of blanking openings shall be representative of actual

installation fittings, and shall not provide additional stiffening or support for the component under test.

(c) Moving parts test

Components having moving parts shall not leak or suffer loss of performance when subjected to repeated cycles or operation specified in Table 2.

Table 2—Moving parts cycle test

Component	Cycles
Non- return valve	6 000
Bleed valve (of a fixed liquid level gauge)	6 000
Service valve	6 000
Excess flow valve	6 000
Automatic fill limiter(valve function only)	6 000
Liquid level sensor, whether a part of a filling shut-off valve or of another contents gauge	100 000
Safety valve and relief valve	6 000
Automatic fuel shut-off device	100 000
Pressure regulator	100 000
Filling connection	6 000

A2.0 Leak Detection Tests

A2.1 Container leak test

Every container sub-assembly shall be subjected to a leak test by the manufacturer with air or an inert gas. A container that has previously contained LPG shall be purged thoroughly prior to using pressurized air for the leak test. The leak test shall be in accordance with the following procedure:

(a) Close the service valve and the fixed liquid level gauge valve (if fitted).

(b) Pressurise the container to an internal pressure of 2.3 ± 0.05 MPa.

(c) Remove the pressurising attachment.

(d) Check all joints between the container and the components for leaks.

(e) Check the filler valve, fixed liquid level gauge valve (if fitted) and the service valve for leakage through the valve seal.

(f) With the service valve outlet plugged or capped and the valve opened, check for leaks at the valve stem seal of any valve that is normally open in service.

WARNING: OXYGEN SHALL NOT BE USED FOR PRESSURING THE CONTAINER

A2.1.1 Acceptance criteria

All leaks found shall be rectified and the area re-tested, or the item under test shall be discarded and replaced. Any leakage test shall be invalidated if the joint tested is subsequently dismantled, and a repeat test shall be carried out on the reassembled joint.

A2.2 Installation tests

A2.2.1 General

The installer shall carry out the following installation tests. All air shall be purged from the container with inert gas prior to commencing the LPG installation testing.

A2.2.2 Leak testing of gas system

After all connections have been made, the LPG system shall be tested for leaks in accordance with the following procedure:

(a) Ensure the container and all liquid lines are full of liquid propane.

WARNING: IT IS IMPORTANT THAT PROPANE (AS OPPOSED TO BUTANE) IS USED FOR THIS TEST BECAUSE IT HAS A RELATIVELY HIGH VAPOUR PRESSURE AT LOWER TEMPERATURES. IF THE PRESSURE GAUGE ON THE CONTAINER INDICATES A PRESSURE BELOW 450 KPA, THEN TESTING SHOULD BE POSTPONED. UNDER NO CIRCUMSTANCES SHOULD THE CONTAINER BE HEATED TO RAISE THE PRESSURE.

(b) Test all pipe and component connections, including those on remote filling and remote ullage gauge lines, and test the filler non-return valve.

(c) Where a leak is indicated, rectify the fault by remaking the joint, and retest the area.

A2.2.3 Testing of automatic fill limiter (AFL)

The accuracy of the shut-off function of the AFL shall be checked in accordance with the following procedure with the ship on even trim and without any list:

(a) Ensure all LPG is emptied from the container.

(b) Fill the container via a pump-meter unit. The meter reading at which the AFL cuts off shall be within ± 2 per cent of the maximum permitted filling volume.

(c) The cyclic pressure test specified in regulation A1.1 *(b)* shall be carried out using either air or water at a pressure of

700 kPa. The liquid level sensor may be operated either by a mechanical device or by changing the liquid level.

(d) The liquid level sensor shall move through its full available travel, with acceleration and deceleration of the ship not exceeding 1g.

(e) The complete unit shall be subjected to vertical vibrations at 17 Hz and 6 mm amplitude for 200 hours. The unit shall be mounted in its working attitude with the liquid level sensor unrestrained for this test.

(f) The liquid level sensor shall be subjected to an external LPG liquid pressure of not less than 1.1 times the design pressure (i.e. 2.8 MPa for 30 minutes). It shall then be subjected to LPG vapour pressure at ambient temperature for a further 30 minutes.

A2.2.4 Test of fuel control device

A test shall be carried out to ensure that the automatic shut-off device functions correctly.

A2.2.5 Water system test

The water circulation system supplying hot water to the vaporiser shall be tested for leaks.

A2.2.6 Excess flow valve test

A2.2.6.1 The excess flow valve shall be tested to ensure that it closes and reopens, by opening then closing the service valve while the container remains under pressure.

A2.2.6.2 Where an automatic fuel shut-off device is integral with the excess flow valve and service valve, downstream of this assembly may be removed for the excess flow valve test.

A2.2.6.3 Where multiple containers are installed, each excess flow valve shall be tested separately.

A2.2.7 Non-return valve

The function of each non-return valve shall be tested by pressurising the valve and testing for leaks.

A2.3. Inspection

The following checks and tests shall be carried out annually:

(a) Container life-the date stamp on the container shall be checked. Renewal of certification is generally required after a period of 10 years, and is conditional on re-examination for deterioration. The fuel tank may need to be removed to facilitate proper examination.

The examination shall be made in accordance with AS 2337.2 by an authorised test station, licensed under the terms of that Standard.

(b) Leakage test

(c) Container damage

(d) Container corrosion

(e) Container attachments

(f) Automatic fill limiter

(g) Fuel containment system [i.e. the automatic fuel shut-off device (container) and the excess flow valve].

(h) All manual valves

(i) Relief valves and safety valves

(j) Filler connection

(k) Filters

(l) Container locker (if fitted)

ANNEX B METHODS OF LEAK DETECTION

B1.0 Combustible—Gas Detector

1.1 Combustible-gas detectors are suitable for testing for leaks after fuel gas has been introduced to the system, and are particularly useful for checking assembly joints after installation. Care in interpretation is necessary, as the detectors can respond to the presence of any of several vapours that are combustible, some of which may not be LPG (e.g. oil smears, jointing compound, etc.). They may also detect residual LPG vapour that is present for reasons other than leakage, and which shall be cleared before a valid test for leakage can be made. If a leak is present, a detector will signal its existence, but not its size, and will indicate a general location, but may not be able to locate it exactly, so a follow-up or proving check with foam is recommended.

1.2 The combustion-gas detector is capable of detecting 25 parts per million (ppm) of LPG in air. Exhaust gas analysers are not suitable for leak detectors.

1.3 It is important to keep the sensing element in contact with the surface of the part being tested, and that the test be carried out under still air conditions.

B2.0 Trace- Gas Detectors

2.1 Trace-gas detectors are suitable for checking the gas-tightness of the construction joints in a locker, conduit connections and similar, particularly where it is impracticable to apply internal pressure.

2.2 The basic method is to plug or blank off openings such as vents, and inject a trace gas under pressure. The gas used may be any convenient gas for which a suitable gas detector is obtainable (e.g. halogenated

hydrocarbons, carbon dioxide or similar). The gas detector should be capable of detecting 25 ppm in air and should be of the continuous sample-aspiration type.

B3.0 Foaming Agents

3.1 Foaming agents are more effective for detection of small leaks, as large leaks tend to blow the solution away from the leak without forming a bubble. Care in applying the solution slowly with a brush will provide easier detection of large leaks.

3.2 The foaming agent should be a proprietary leak test solution, formulated specifically for the purpose. It is essential that fresh solution be used, that the whole of the surface to be tested is coated and that time be allowed for bubbles to foam. All areas under test should be able to be observed during the test.

B4.0 Total Immersion

Total immersion may not always indicate very small leaks, or leaks which may be inhibited by the head of water. Good illumination and an ability to manipulate the item submerged are important. A wetting agent is desirable, provided that foaming does not result.

B5.0 Visual Inspection

Leaking LPG will often cause a frost to form on the surrounding surface, even when the rate of leakage is too small to be readily detectable by immersion or foam method. Visual checks for signs of frost patches are particularly appropriate for the welded seams of containers.

PART 6—CARGO

REFRIGERATION SYSTEMS

9.92 Cargo Refrigeration Systems

9.92.1 General

9.92.1.1 Refrigeration units should be of the ammonia or freon compression type. Where it is proposed to use other refrigerants full details shall be submitted. Methyl Chloride shall not be used as a refrigerant. Ammonia shall not be used as a refrigerant on Class 1 ships; and

9.92.1.2 A freon plant may be installed in a manned or unmanned machinery space. An ammonia plant shall not be installed in a manned machinery space; and

9.92.1.3 Gas used in a refrigeration system shall be selected in accordance with AS/NZS 1677.1.

NOTES:

1. For additional guidance, refer to the Refrigerant Selection Guide, published by the Australian Institute of Refrigeration Air Conditioning and Heating (Inc).

2. The Fiji Government is a signatory to the Montreal Protocol, which sets out a mandatory timetable for the phase-out of ozone-depleting substances and urges additional action to minimise damage to the ozone layer. The Refrigerant Selection Guide includes information on the Protocol and on alternatives to CFC refrigerants.

9.92.1.4 A refrigerated space which a person may be required to enter shall be provided with:

(a) a manually activated alarm which is audible outside the space and which can only be activated and cancelled from within the space;

(b) means inside the space for locating the exit door, should lights in the space be switched off or fail; and

(c) means to open every door from both outside and inside the space.

9.92.2 Cargo Refrigeration

9.92.2.1 Proximity to accommodation space

Where a refrigeration machinery space has a boundary common with sleeping accommodation the boundary shall be permanently gastight. Piping shall be arranged so that there can be no direct leakage of refrigerant into an accommodation space.

9.92.2.2 Ventilation

Each space containing refrigeration machinery shall be provided with ventilation to the outside air either by natural or mechanical means.

Where natural ventilation is used the free opening area shall be determined as follows:

$$F = 0.14 \sqrt{G}$$

where

F = Free opening area in (m^3)

G = Mass of the refrigerant charge (in Kg)

where mechanical ventilation is used, the rate of air removal shall be determined as follows:

$$Q = 13.9 \sqrt[3]{G}$$

where

Q = the airflow (in litres per second)

G = Mass of the refrigerant charge (in Kg)

9.92.2.3 Respiratory breathing apparatus

Unless a ship with a refrigeration installation carries a breathing apparatus in accordance with the Fire Appliances paragraph and the apparatus is located in a position unlikely to become inaccessible in the event of leakage of gas, the ship shall comply with the following sub-paragraphs.

NOTE: AS 1677.1 provides a classification system for the toxicity and flammability of gases.

9.92.2.3.1 A ship of 25m in length and over in which refrigeration machinery is installed shall be provided with a breathing apparatus which complies with the requirements of the Fire Appliances paragraph and the apparatus shall be placed in a convenient position not likely to become inaccessible in the event of leakage of gas.

9.92.2.3.2 A ship of less than 25m in length in which ammonia refrigeration machinery is installed shall be provided with a canister respirator which complies with the requirements of AS/NZ 18 and the respirator shall be placed in a convenient position not likely to become inaccessible in the event of leakage of gas.

9.92.2.4 System design, construction and testing

Unless otherwise specified in this Part a refrigeration system shall be designed, constructed and tested in accordance with the appropriate provisions of Australian and New Zealand Standard AS/NZS 1677.1 and AS/NZS 1677.2.

NOTE: AS/NZS 1677.1 classifies refrigerants on a risk basis (i.e. toxic/non-toxic, flammable/non-flammable) and contains some basic technical information on their physical properties. The most important criteria is the practical limit of the refrigerant which forms the basis of AS/NZS 1677.2, which covers safety requirements for fixed refrigeration systems.

9.92.2.5 The tests required by sub regulation 9.92.2.4 shall be carried out to the satisfaction of a person recognized by the Chief Executive Officer.

9.92.2.6 In addition to the requirements of Australian Standard AS 1210 with regard to pressure vessel supports, no pressure vessel is to be used as a support for other pressure vessels and/or machinery or piping, except with the approval of the Chief Executive Officer.

9.92.2.7 An ammonia refrigeration installation shall comply with the following sub-paragraphs.

9.92.2.7.1 All electrical equipment on or adjacent to the installation shall conform to the requirements prescribed in Australia Standard AS3000, Part 1 for electrical installations in hazardous locations.

9.92.2.7.2 Flame producing devices and hot surfaces above 400° C shall be located as remotely as practicable from the installation.

9.92.2.7.3 Unless the space containing the refrigeration installation is protected in accordance with the provisions of Australian Standard AS1482, equipment shall be surrounded by fixed water sprays directed at all potential leak sources such as pipe connections, flanges and compressors. Supply of water to the sprays shall be controllable from outside the space containing the equipment.

9.92.2.7.4 A purge valve shall be fitted which is operable from outside the machinery space and discharges to the sea.

Part 7—Personnel Protection

9.93. Machinery Space Safeguards

9.93.1 General

Machinery shall be so arranged and protected as to safeguard personnel from hazard.

9.93.2 Passage Widths

In the engine room of a ship of 20m in length and over, passages of not less than 600 mm, should be provided between engines and auxiliary machinery or switchboards.

9.93.3 Gratings and Floor Plates

9.93.3.1 Gratings in a machinery space shall be provided with a handrail and guard rail where necessary. The boards approximately 60 mm high should be fixed to the edge of all gratings where appropriate. Floor plates shall be properly fitted and screwed or bolted in place and have a non-slip surface.

9.93.3.2 Openings to machinery space bilges shall be guarded where necessary.

9.93.4 Ladders

Machinery space ladders shall be fitted with rungs or non-slip treads and have adequate hand rails.

9.93.5 Moving Machinery Guarding

Engines, electric motors, gearing, chain and belt drives, friction clutches and shafting which may cause injury to personnel shall be fitted with guards where necessary.

9.93.6 Thermal Protection

Exhaust piping and other hot surfaces shall be properly insulated or otherwise protected where necessary.

PARAGRAPH 10

LIFE SAVING APPLIANCES

CONTENTS

This paragraph is divided into Parts as follows:

PART 1—PRELIMINARY

This paragraph should be read in conjunction with the Introduction and General Requirements paragraph 1of this schedule.

PART 2—GENERAL PROVISIONS

10.1 Master's and owner's obligation

10.1.1 Scales of lifesaving appliances

The owner and master of a ship of more than 15 meters in length shall ensure that the scales of lifesaving appliances required for their class of ship as detailed in Part 3 of this paragraph is always provided on the ship and is kept in good condition.

10.1.2 Maintenance of lifesaving appliances

The owner and master of a ship of more than 15 meters in length shall ensure that—

(a) instructions are kept onboard the ship for on board maintenance of life-saving appliances that are easily understood, illustrated wherever possible, and, as appropriate, include the following items for each appliance:

(i) a checklist for carrying out the inspections required by sub-regulation 10.1.4(a); and

(ii) maintenance and repair instructions; and

(iii) a schedule of periodic maintenance; and

(iv) a diagram of lubrication points with the recommended lubricants; and

(v) a list of replaceable parts; and

(vi) a list of sources of spare parts; and

(vii) a log for records of inspections and maintenance; and

(b) maintenance is carried out in accordance with the instructions required by sub-regulation 10.1.2*(a)*; and

(c) falls used in launching any required life-saving appliance are turned end-for end at intervals of not more than 30 months and renewed when necessary due to deterioration of the falls or at intervals of not more than five years, whichever is the earlier.

10.1.3 Spares and repair equipment for lifesaving appliances

The owner and the master of a ship more than 15 meters in length shall ensure that spare parts and repair equipment are provided for any lifesaving appliances, and components of those appliances, that are subject to heavy wear or consumption and need to be replaced regularly.

10.1.4 Weekly test and inspections

The owner and the master of a ship of more than 15 meters in length shall ensure that the following tests and inspections are carried out at intervals of not more than one week:

(a) visually inspect all survival craft, rescue boats and launching appliances to ensure that they are ready for use; and

(b) except as provided for in sub-regulation 10.1. 4*(c)* in respect of the special characteristics of outboard motors of rescue boats, run ahead and astern each engine in each lifeboat and each rescue boat for a total period of not less than three minutes; and

(c) run ahead and astern each outboard motor of each rescue boat for a total period prescribed by the manufacturer whenever the special characteristics of the motor do not permit it to be run other than with its propeller submerged for a period of three minutes; and

(d) test the general emergency alarm.

10.1.5 Monthly test and inspections

The owner and the master of a ship more than 15 meters in length shall ensure that—

(a) an inspection of life-saving appliances and lifeboat equipment, is carried out at intervals of not more than one month, using the checklist required by sub-paragraph (10.1.2)*(a)*(i) to ensure that the appliances are complete and are in good order; and

(b) a report of the inspection is entered in the official logbook or in any logbook maintained as part of the ship's safe ship management system.

10.1.6 Survey and Servicing of liferafts

10.1.6.1 The owner and the master of a ship shall ensure that any inflatable liferaft is surveyed and serviced at intervals of not more than twelve months, subject to paragraph 10.1.6.4.

10.1.6.2 Survey and servicing of life rafts to be carried out at the life raft service centre approved by the Chief Executive Officer.

10.1.6.3 A certificate of service shall be issued by the approved service centre.

10.1.6.4 The Chief Executive Officer may extend the survey and servicing interval to not more than three months, if the Chief Executive Officer is satisfied that the extension is reasonable:—

(a) because there is no servicing centre in the vicinity of the ship's location; or

(b) to coincide with the periodic survey; or

(c) where such an arrangement is impracticable.

10.1.7 Servicing of hydrostatic release units

10.1.7.1 The owner and the master of a ship shall ensure that—

(a) any hydrostatic release unit of any required life-saving appliance is serviced at intervals of not more than twelve months, except as may be provided for in sub-paragraph 10.1.7*(b)* and is serviced at an approved servicing centre. A certificate of service shall be issued by the approved service centre.

(b) any disposable type hydrostatic release is replaced on its expiry date. A disposable type hydrostatic release need not be serviced annually.

10.1.7.2 The Chief Executive Officer may extend the servicing interval to not more than three months, if the Chief Executive Officer is satisfied that the extension is reasonable:—

(a) because there is no servicing centre in the vicinity of the ship's location; or

(b) to coincide with the periodic survey; or

(c) where such an arrangement is impracticable.

10.1.7.3 The requirements for sub-paragraphs 10.1.6 and 10.1.7 applies to the Maritime (Fiji Small Craft Code) Regulation.

10.2. Scales of Life-saving Appliances:

10.2.1 Except as otherwise provided in this paragraph, any life-saving appliance shall meet the requirements set out in paragraphs 1.2.2.1 to 1.2.2.8, and paragraph 1.2.2.10 of paragraph 1.2 of the International Life-Saving Appliance Code.

10.2.2 The scale of lifesaving appliance or equipment to be provided in each class of ship shall comply with the requirements detailed in Part 3 of this paragraph.

10.3. Approval of life-saving appliances

10.3.1 The Chief Executive Officer or a surveyor recognized and appointed by the Chief Executive Officer, shall approve life-saving appliances that meet the requirements of this paragraph, where such approval is required by this section or by the International Life-Saving Appliance Code.

10.3.2 Any life-saving appliance that is carried on a ship that is subject to deterioration with age shall be specified clearly on the LSA by the manufacturer within the period of acceptability—

(a) that is provided in the manufacturer's recommendations; or

(b) as prescribed by the Chief Executive Officer whichever is the lesser period.

10.3.3 For the purposes of marking SOLAS life-saving appliances, as required by the provisions of the International Life-Saving Appliance Code the approving authority is—

(a) the Chief Executive Officer; or

(b) a surveyor recognised by the Chief Executive Officer for that purpose; or

(c) the maritime administration of a country other than Fiji recognised by the Chief Executive Officer for that purpose.

10.4. Approval of life raft servicing centres

10.4.1 No person may operate a life raft servicing centre in Fiji to service life rafts used on board Fiji registered ships unless that person holds or is employed by the holder of an approved service centre certificate.

10.4.2 An applicant is entitled to an approved servicing centre certificate if—

(a) the applicant makes an application under section 23 of the Decree; and

(b) the Chief Executive Officer is satisfied that the requirements specified in sub-paragraph 10.4.3 and paragraph 24 of the Decree is complied with in respect of that certificate.

10.4.3 An applicant for an approved servicing centre certificate shall provide evidence satisfactory to the Chief Executive Officer that the facility complies with IMO Resolution A.761(18) as amended by Resolution MSC. 55(66) entitled Amendments to the Recommendation on Conditions for the Approval of Servicing Centres for the Inflatable Life rafts.

10.4.4 The Chief Executive Officer may issue an approved servicing centre certificate for a period not exceeding 3 years and subject to any conditions that the Chief Executive Officer considers necessary in the interest of maritime safety when the Chief Executive Officer is satisfied that:—

(a) an initial audit has been carried out by a surveyor on the facility; and

(b) subsequent annual verification audits have been carried out by a surveyor to ensure continued compliance with IMO resolution A.761(18) as amended by Resolution MSC. 55(66).

10.4.5 It is a condition of every approved life raft servicing centre certificate that any person who services a life raft shall be trained by a person approved by the manufacturer of that life raft.

10.5 Types of Life-saving Appliances:

All items of equipment listed in Part 3 are subject to the approval of the Chief Executive Officer and shall conform to the standards detailed in the Appendices to this paragraph.

10.6. Survival craft and rescue boats

10. 6.1 Lifeboats – general requirements

Any required lifeboat shall comply with the requirements of paragraph 4.4 of the International Life-Saving Appliance Code in respect of construction, carrying capacity, access into lifeboats, buoyancy, freeboard, stability, propulsion, fittings, equipment, and markings.

10.6.2 Lifeboats – additional requirements

For partially and totally enclosed lifeboats, free fall lifeboats, lifeboats with self-contained air support systems, and fire-protected lifeboats. In addition to the requirements of sub paragraph 10.6.1, any required lifeboat shall meet the requirements of the following paragraphs of the International Life-Saving Appliance Code where these paragraphs apply to that type of lifeboat-

(a) paragraph 4.5 in respect of a partially enclosed lifeboat:

(b) paragraph 4.6 in respect of a totally enclosed lifeboat:

(c) paragraph 4.7 in respect of a free-fall lifeboat:

(d) paragraph 4.8 in respect of a lifeboat with self-contained air support system:

(e) paragraph 4.9 in respect of a fire-protected lifeboat.

10.6.3 SOLAS life rafts – general requirements

Any required SOLAS life raft, other than canopied reversible life raft, shall meet the requirements of paragraph 4.1 of the International Life-Saving Appliance Code in respect of construction, minimum carrying capacity and mass, fittings, davit launching arrangements, equipment, float-free arrangements, and hydrostatic release units.

10.6.4 SOLAS life rafts – additional requirements for inflatable and rigid life rafts.

In addition to the requirements of paragraph 10.6.3, any required SOLAS life raft, other than canopied reversible life rafts, shall meet the requirements of the following paragraphs of the International Life-Saving Appliance Code where those paragraphs apply to that type of life raft—

(a) paragraph 4.2, in respect of an inflatable life raft; and

(b) paragraph 4.3, in respect of a rigid life raft.

10.6.5 SOLAS life rafts – canopied reversible life rafts and automatically self-righting life rafts on ro-ro passenger ships.

All canopied reversible life rafts and automatically self-righting life rafts on ro-ro passenger ships shall comply with the requirements of the International Maritime Organization's Maritime Safety Committee Circular MSC/Circ.809 Recommendation for Canopied Reversible Life rafts, Automatically Self-Righting Life rafts and Fast Rescue Boats, Including Testing, on Ro-Ro Passenger Ships adopted at its 68th session, 1997.

10.6.6 SOLAS rescue boats

10. 6. 6. 1 Except as provided in sub-paragraph 10.6.6.2, any required SOLAS rescue boat shall meet the requirements of paragraph 5.1 of the International Life-Saving Appliance Code in respect of construction, propulsion, and equipment.

10. 6. 6.2 Any fast rescue boat on a ro-ro passenger ship shall comply with the requirements of the IMO's Maritime Safety Committee Circular MSC/Circ.809 Recommendation for Canopied Reversible Life rafts, Automatically Self-Righting Life rafts and Fast Rescue Boats, Including Testing, on Ro-Ro Passenger Ships adopted at its 68th session, 1997.

10.6.7 **SOLAS lifebuoys**

Any required SOLAS lifebuoy shall meet the requirements of paragraph 2.1 of the International Life-Saving Appliance Code in respect of lifebuoy specification, self-igniting lights, self-activating smoke signals and buoyant lifelines.

10.6.8 **SOLAS lifejackets**

Any required SOLAS lifejacket shall meet the requirements of paragraph 2.2 of the International Life-Saving Appliance Code in respect of lifejacket construction, performance, marking, and the performance of lifejacket lights.

10.6.9 **Approved Boat:**

10.6.9.1 The name, port of registry and carrying capacity of an approved boat shall be clearly and permanently marked on each side of the bow in figures not less than 75mm in height.

10.6.9.2 An approved boat shall be stowed so that the boat will not impede the rapid handling of any lifeboat, life raft, buoyancy apparatus or other approved boat.

10.6.9.3 Means shall be provided for illuminating the stowage and launching position of an approved boat.

10.6.9.4 Approved boats shall not be stowed or launched from any of the following positions:

(a) Forward of the collision bulkhead;

(b) Where damage from the elements may occur;

(c) On or above slop tanks, cargo tanks on tankers or other tanks containing explosive or hazardous cargoes;

(d) Near the steeply overhanging portion of the hull aft;

(e) away from the vicinity of the ship's propeller or other propulsive devices.

10.6.9.5 Launching timeframe

Approved boats should be capable of being safely deployed within 5 minutes with a ship trim of 10º and a list of 20º either way.

10.6.10 **Non SOLAS Life rafts: general requirements**

10.6.10.1 Except as provided in this part, any required non-SOLAS life raft shall meet the requirements of paragraph 4.1 of the International Life-Saving Appliance Code in respect of construction, minimum carrying capacity and mass, and equipment.

10.6.10.2 The life raft shall be so constructed that if it is dropped into the water from a height of 6 metres or from its stowed position, whichever is the greater, neither the life raft nor its equipment will be damaged.

10.6.10.3 The means of insulating the floor of the life raft against cold need not be provided.

10.6.10.4 The life raft shall be capable of operating through temperature range of 66 degrees C to -18 degrees.

10.6.10.5 The life raft shall be fitted with a painter and shall have a line securely becketed around the outside, and a life-line fitted around the inside.

10.6.10.6 The minimum carrying capacity of any life raft onboard a ship is not to be less than four persons.

10.6.10.7 The semi-rigid boarding ramp or ramps need not be fitted.

10.6.10.8 Each inflatable life raft shall be clearly and permanently marked with a serial number and the manufacturer's name.

10.6.10.9 The carrying capacity of an inflatable life raft shall be clearly and permanently marked on the life raft and on the valise or other container in which the life raft is contained.

10.6.11 **Life rafts shall be carried in such a manner that:**

(a) the life rafts can be put in the water safely in less than 5 minutes, even when the trim of the ship is 10 degrees and the ship is listed 20 degrees either way;

(b) will enable the life rafts that are not attached to launching devices to float free in the event of the ship sinking;

(c) will not impede the rapid handling of another life raft, lifeboat, approved boat or buoyant apparatus; and

(d) will not impede the marshaling of passengers to their smaller stations and their embarkation into lifesaving appliances.

10.6.12 **Parent ship identification**

10.6.12.1 A service certificate shall be attached to the life raft consisting of the following information, the parent ship identification including ship's name, call sign, ship's number, life raft manufacturer, type, capacity and serial number, servicing date, expiry date.

10.6.12.2 The life raft serial number, the carrying capacity, servicing date, expiry date and type of emergency pack shall be permanently marked on the life raft or on the valise or container in which the life raft is contained.

10.6.13 **Launching timeframe**

Lifeboats or approved boats should be capable of being safely deployed within 5 minutes with a ship trim of 10º and a list of 20º either way.

10.6.14 **Stowage**

Life rafts shall not be stowed or launched from any of the following positions:

(a) Forward of the collision bulkhead;

(b) Where damage from the elements may occur;

(c) On or above slop tanks, cargo tanks on tankers or other tanks containing explosive or hazardous cargoes;

(d) Near the steeply overhanging portion of the hull aft;

(e) away from the vicinity of the ship's propeller or other propulsive devices.

10.6.15 **Illumination**

Means of illumination shall be provided to ensure that life rafts and the area of water into which they may be deployed shall be sufficiently illuminated during launching and retrieval.

10. 6.16 **Non-SOLAS life rafts–Additional requirements for inflatable and rigid life rafts.**

10.6.16.1 In addition to the requirements of regulation 10.6.9, any required non-SOLAS life rafts, other than open reversible life raft, shall meet the requirements of the following paragraphs of the International Life-Saving Appliance Code:

(a) paragraph 4.2 in respect of an inflatable life raft, except as provided for in sub-paragraph 10.6.15.1; and

(b) paragraph 4.3 in respect of a rigid life raft, except as provided for in sub-paragraph 10.6.16.3.

10.6.16.2 The container of any required non-SOLAS inflatable life raft shall be marked with—

(a) NON-SOLAS in lieu of the marking required by subparagraph 4 of paragraph 4.2.6.3 of the International Life-Saving Appliance Code; and

(b) the type of emergency pack enclosed, which shall be indicated by the words—

(i) MSAF A Pack, in the case of a life raft equipped in accordance with Appendix C 3.1 for ships trading in Fiji territorial waters categorized as Class 3B ships; and

(ii) MSAF B Pack, in the case of a life raft equipped in accordance with Appendix C 3.2 for ships trading in inshore and sheltered waters categorized as Class 3D and 3E respectively; and

10.6.16.3 Any required non-SOLAS rigid life raft shall be marked with—

(a) NON-SOLAS in lieu of the marking required by subparagraph .6 of paragraph 4.3 of the International Life-Saving Appliance Code; and

(b) the type of emergency pack enclosed, which shall be indicated by the words—

(i) MSAF A Pack, in the case of a life raft equipped in accordance with Appendix C 3.1; and

(ii) MSAF B C Pack, in the case of a life raft equipped in accordance with Appendix C 3.2.

10.6.17 Non-SOLAS rescue boats

10.6.17.1 Except as provided in sub-paragraph 10.6.17.2, any required non-SOLAS rescue boat shall meet the requirements of paragraph 5.1 of the International Life-Saving Appliance Code in respect of construction, propulsion, and equipment.

10. 6.17.2 The requirements of sub-paragraph 10.6.17.1 are modified as follows:

(a) the minimum carrying capacity referred to in sub-paragraph .2 of paragraph 5.1.1.3 of the International Life-Saving Appliance Code is reduced to three seated persons and one person lying down on a stretcher;

(b) the minimum period for maintaining the manoeuvering speed referred to in paragraph 5.1.1.6 of the International Life-Saving Appliance Code is reduced to two hours;

(c) the mass of full complement of persons and equipment used for the loading tests referred to in sub-paragraphs .2 and .3 of paragraph 5.1.3.2 of the International Life-Saving Appliance Code is reduced to the mass of the equipment and a crew of four persons;

(d) the conditions under which positive freeboard shall be maintained in a damaged condition referred to in sub-paragraphs .1 and .2 of paragraph 5.1.3.5 of the International Life-Saving Appliance Code is reduced to circumstances where any one of the buoyancy compartments is damaged;

(e) the searchlight referred to in sub-paragraph .11 of paragraph 5.1.2.2 of the International Life-Saving Appliance Code need not be provided;

(f) the radar reflector referred to in sub-paragraph .12 of paragraph 5.1.2.2 of the International Life-Saving Appliance Code need not be provided.

10.6.17.3 In addition to the requirements of paragraph 10.6.17, any required non-SOLAS rescue boat shall—

(a) be fitted with a protective stowage cover and kept covered at all times when the boat is not in use. The cover shall be arranged for quick removal in an emergency;

(b) when inverted in the water, be capable of being righted by not more than two persons;

(c) only be marked with materials of a type that are compatible with the boat's coated fabric and approved by the boat manufacturer.

10.6.18 General Requirements for life boats, approved boats and Non SOLAS rescue boats

10.6.18.1 Parent ship identification

Life boats or approved boats and Non SOLAS rescue boats shall have the parent ship's identification legibly and permanently marked on each side of the bow in figures not less than 75mm in height.

10.6.18.2 Launching timeframe

Lifeboats or approved boats and Non SOLAS rescue boats should be capable of being safely deployed within 5 minutes with a ship trim of 10º and a list of 20º either way.

10.6.18.3 Stowage

Lifeboats or approved boats and Non SOLAS rescue boats shall not be stowed or launched from any of the following positions:

(a) Forward of the collision bulkhead;

(b) Where damage from the elements may occur;

(c) On or above slop tanks, cargo tanks on tankers or other tanks containing explosive or hazoudous cargoes;

(d) Near the steeply overhanging portion of the hull aft;

(e) away from the vicinity of the ship's propeller or other propulsive devices.

10.6.18.4 Illumination

Means of illumination shall be provided to ensure that lifeboats, approved boats and rescue boats, their associated launching devices, and the area of water into which they may be deployed shall be sufficiently illuminated during assembly, embarkation, launching and retrieval.

10.6.18.5 Operating Instructions

Posters or signs shall be provided on, or in the vicinity of the lifeboats, rescue boats, their launching controls and shall-

(a) illustrate the purpose of controls and the procedures for operating the appliance and give relevant instructions or warnings; and

(b) be easily seen under emergency lighting conditions.

Note: Symbols used to conform to IMO Resolution A.760(18) as amended by Resolution MSC. 82(70)

10.6.18.6 Engine room Discharge:

(a) Life Boats, life rafts and rescue boats are to be positioned away from engine room discharges;

(b) A ship shall be furnished with means, capable of being controlled from outside the engine room, to prevent any discharge of water into lifeboats when being launched; and life rafts when being launched from fixed launching device.

10.6.19 Non SOLAS lifebuoys

10.6.19.1 Except as provided in 10.6.19.2, any required non-SOLAS lifebuoy shall meet the requirements of paragraph 2.1 of the International Life-Saving Appliance Code in respect of requirements of paragraph 2.1 of the International Life-Saving Appliance Code in respect of lifebuoy specification, self-igniting lights, self-activating smoke signals and buoyant lifelines.

10.6.19.2 The requirements of sub-paragraph 10.6.19.1 are modified as follows:

(a) the height of 30 metres referred to in subparagraph .6 of paragraph 2.1.1 of the International Life-Saving Appliance Code is reduced to not less than 6 metres;

(b) the 9.5 mm diameter of the grab line referred to in subparagraph .8 of paragraph2.1.1 of the International Life-Saving Appliance Code is reduced to not less than 6 mm; and

(c) to be read in conjunction with appendix G of this paragraph.

10.6.19.3 Charter yachts and sailing training ships that are less than 15 metres in length overall may be provided with horseshoe shaped lifebuoys in lieu of lifebuoys complying with sub-paragraphs 10.6.19.1 & 10.6.19.2. Horseshoe shaped lifebuoys shall—

(a) have a minimum buoyancy of 100 Newtons;

(b) have a strap or line with clip to close the gap;

(c) have attached a drogue, a pealess whistle and a self-igniting light; and

(d) be brightly coloured and fitted with reflective tape.

10.6.19.4 The name and port of registry of the ship shall be clearly painted on a lifebuoy.

10.6.19.5 A lifebuoy shall be stowed:

(a) in such a manner that it is not permanently secured in any way;

(b) so as to be readily accessible to all persons on board; and

(c) so as to be rapidly or easily deployed.

10.6.19.6 Where practicable, two lifebuoys with self-igniting lights and smoke signals attached shall be stowed so as to be capable of quick release from the operating position.

10.6.19.7 Parent ship identification

The identification of the ship upon which the lifebuoys is stowed shall be legibly and permanently marked in figures not less than 75 mm in height and contrasting colours.

10.6.20 Non-SOLAS lifejackets

10.6.20.1 Any required non-SOLAS lifejacket shall, as appropriate, meet the requirements of—

(a) Recognised Australian and New Zealand standards or equivalent standards for

(i) coastal lifejacket (AS 4758 level 150);

(ii) sheltered waters lifejacket (AS 4758 level 100); or

(iii) inland waters personal floatation device (AS 4758 level 100 or level 50).

10.6.20.2 Lifejackets shall be marked as prescribed in Appendices H and I of this paragraph.

10.6.20.3 Lifejackets shall be stowed in clearly marked, easily located, and readily accessible stowage areas. The stowage areas shall be dry and protected from weather and excessive heat.

10.6.20.4 On ships of over 50m length additional lifejackets shall be stowed in or adjacent to service and machinery spaces where persons are required to remain on duty in an emergency.

10.6.20.5 Parent ship marking

In addition to the requirements for marking contained in Appendices H & I, the lifejacket shall have the parent ship‘s identification, including the ship’s name and port of registry legibly and permanently marked on the jacket in figures not less than 12 mm in height in contrasting colours.

10.6.21 Buoyancy vests

Any required buoyancy vest shall meet the requirements of recognised Australian and New Zealand standards or equivalent standards approved by the Chief Executive Officer.

10.6.22 Marine safety harnesses and safety lines

Any required marine safety harness and safety line shall meet the requirements of recognised Australian and New Zealand standards or equivalent standards approved by the Chief Executive Officer.

10.6.23 Visual Signals (Pyrotechnic and Smoke Signals):

10.6.23. Distress flares – rocket parachute

Any required rocket parachute flare shall meet the requirements of paragraph 3.1 of the International Life-Saving Appliance Code.

10.6.23.2 Distress flares – hand flare

Any required hand flare shall meet the requirements of paragraph 3.2 of the International Life Saving Appliance Code.

10.6.23.3 Buoyant smoke signals

Any required buoyant smoke signal shall meet the requirements of paragraph 3.3 of the International Life-Saving Appliance Code.

10.6.23.4 Stowage and marking

Pyrotechnic and smoke signals shall be stowed in a buoyant watertight container, fitted with a handle or lanyard. The container shall be clearly and permanently marked as to its contents, and be readily accessible to crew.

10.6.23.5 Subject to the above requirement, pyrotechnic and smoke signals may be accepted as complying with the requirements of this paragraph for the following periods:

(a) Calcium Carbide Lifebuoy Lights-2 years from date of manufacture;

(b) Ship and Lifeboat/Life raft Pyrotechnics-3 years from date of manufacture;

(c) Lifebuoy Smoke Signals -3 years from date of manufacture; and

(d) Lifeboat buoyant smoke signals may be accepted for an indefinite period provided that they remain in good and satisfactory condition.

10.6.24 Personal protection

10.6.24.1 Immersion suits

Any required immersion suit shall meet the requirements of paragraph 2.3 of the International Life-Saving Appliance Code.

10.6.24.2 Anti-exposure suits

Any required anti-exposure suit shall meet the requirements of paragraph 2.4 of the International Life-Saving Appliance Code.

10.6.24.3 Thermal protective aids

Any required thermal protective aid shall meet the requirements of paragraph 2.5 of the International Life-Saving Appliance Code.

10.6.25. Launching and embarkation appliances

10.6.25.1 Any required launching appliance and any required embarkation appliance shall meet the requirements of paragraph 6.1 of the International Life-Saving Appliance Code.

10.6.25.2 Embarkation Ladders:

10.6.25.2.1 In addition to sub-paragraph 6.1.6 of the International Life-Saving Appliance Code, a ship shall be furnished at each set of lifeboat davits with a ladder which is long enough to reach the lifeboats when afloat at the ship's lightest sea-going draught. Additional ladders to facilitate embarkation into the life rafts when afloat shall also be provided. (The Chief Executive Officer may exempt any ship from the requirements of this paragraph where it is satisfied that to require compliance therewith would be unreasonable on account of the freeboard of the ship concerned or the stowage position of the lifeboats or life rafts).

10.6.26 Marine evacuation systems

Any required marine evacuation system shall meet the requirements of paragraph 6.2 of the International Life-Saving Appliance Code.

10.6.27 Line throwing appliances

Any required line throwing appliance shall meet the requirements of paragraph 7.1 of the International Life- Saving Appliance Code.

10.6.28 Buoyant apparatus

10.6.28.1 Any required buoyant apparatus shall—

(a) be constructed of inherently buoyant material;

(b) not sustain burning or continue melting after being totally enveloped in a fire for period of 2 seconds;

(c) 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 not less than 6 metres, whichever is the greater, without impairing either its operating capability or that of its attached components;

(d) be fitted with grab lines that are—

(i) not less than 7 mm in diameter;

(ii) secured to the apparatus at centres not more than 460 mm and not less than 300mm apart;

(iii) interlaced to prevent movement and form loops when wet or not more than 200mm and not less than 150mm apart; and

(iv) secured by fastenings strong enough to permit the apparatus to be lifted by those grab lines; and

(e) be clearly and permanently marked, on both of the largest faces of the apparatus in legible and permanently marked figures not less than 75 mm in height and contrasting colours, with—

(i) the name and port of registry of the ship on which it is carried; and

(ii) the number of persons it is designed to support.

10.6.28.2 The number of persons that the apparatus is fit to support shall be equal to the lesser number of either—

(a) the number of grab line loops; or

(b) the greatest whole number obtained by the equation:

N = 70 (V – W/1000)

where

N = number of persons

V = volume in cubic metres

W = mass of apparatus in kgs

10.6.28.3 A buoyant apparatus shall be carried in such a manner that the apparatus can be safely deployed from a ship with up to 10 degrees trim of the ship and the ship is listed 20 degrees either way.

10.6.28.4 A buoyant apparatus shall be stowed so that the apparatus will not impede the rapid handling of any lifeboat, approved boat, life raft or other buoyant apparatus.

10.6.28.5 A buoyant apparatus shall float free if the ship capsizes or sinks.

10.6.28.6 Means shall be provided for illuminating the stowage position of buoyant apparatus and the area of water into which they will be deployed shall be sufficiently illuminated during launching and retrieval.

10.6.29 Portable VHF Radio:

Portable VHF radio equipment shall be stowed in such a place that the equipment is readily accessible from the wheel house and is ready to be moved into a lifeboat, life raft and or open boat in the event of an emergency.

10.6.30 General alarm system

Any required general alarm system shall meet the requirements of paragraph 7.2 of the International Life-Saving Appliance Code.

Part 3- Scales of Life-Saving Appliances

Class 1 — ALL PASSENGER SHIPS ENGAGED IN INTERNATIONAL VOYAGES

(Note: The following scales apply to all ships carrying 12 passengers or more)

Measured Length	LSA requirement
Ships of 50 meters of length or more Ships of less than 50 meters	**SURVIVAL CRAFT & RESCUE BOAT** Partially or totally enclosed lifeboat for 50% of the ships compliment; plus inflatable or rigid liferafts for 75% of the ships compliment served by launching appliances equally distributed on each side of the ship. Inflatable or rigid life raft(s) for 100% total ships compliment. If sideways transfers of life rafts are not possible, additional life rafts are to be provided on each side adding to a total of 150% of ships compliment. Plus an approved rescue boat.
All lengths	**PORTABLE RADIO EQUIPMENT** (to be used in the survival craft & rescue boat) At least three two-way VHF radio telephone stored on the bridge. One 406MHz EPIRB carried onboard the ship
All lengths	**RADAR TRANSPONDER (SART)** 2 radar transponders one on each side of the ship

240 meters and over	**LIFEBUOYS** 30 Lifebuoys – 2 with self-igniting lights and self-activating MOB smoke signal located on each side of the navigation bridge capable of quick release. The remaining 13 lifebuoys with lights, 2 with buoyant life lines and 13 without either fittings to be equally distributed throughout the ship.
Under 240 meters to 180 meters	24 lifebuoys - 2 with self-igniting lights and self-activating MOB smoke signal located each side of the navigation bridge capable of quick release. The remaining 10 lifebuoys with lights, 2 with buoyant life lines and 10 without either fittings to be equally distributed throughout the ship.
Under 180 meters to 120 meters	18 lifebuoys - 2 with self-igniting lights and self-activating MOB smoke signal located on each side of the navigation bridge capable of quick release. The remaining 7 lifebuoys with lights, 2 with buoyant life lines and 7 without either fittings to be equally distributed throughout the ship.
under 120 meters to 60 meters	12 lifebuoys - 2 with self-igniting lights and self-activating MOB smoke signal located on each side of the navigation bridge capable of quick release. The remaining 6 lifebuoys with lights, 2 with buoyant life lines and 2 without either fittings to be equally distributed throughout the ship.
under 60 meters to 30 meters	8 lifebuoys - 2 with lights and MOB smoke signals. 2 with buoyant lines and 4 without either fitting to be equally distributed throughout the ship.
under 30 meters to 15 meters	4 lifebuoys – 2 with lights and MOB smoke signals remaining lifebuoys to be fitted with buoyant lines

All lengths	**LIFEJACKETS** (1) A SOLAS lifejacket fitted with a whistle and flashing light suitable for each person that the ship is certified to carry, to be stowed in the vicinity of the smaller station and control stations; plus (2) 5 % additional SOLAS lifejackets with self-igniting lights and whistles of which a sufficient number shall be placed in or adjacent to service and machinery spaces; plus (3) SOLAS lifejackets for children equal to 10% of the total number of passengers onboard stowed in the vicinity of the smaller station and clearly marked.
All lengths	**LINE THROWING APPLIANCES** One line throwing appliance capable of throwing 4 projectiles and 4 lines
All lengths	**DISTRESS SIGNALS** 6 parachute distress rockets 4 red hand flares 2 bouyant orange smoke signals
All lengths	**GENERAL EMERGENCY ALARM-SYSTEM** Electrically operated alarm system controlled from the normal navigating position and other strategic positions for summoning passengers (if any) and crew to their smaller-stations
50 metres and over 15 meters and over but less than 50 metres	**EMERGENCY ELECTRICAL INSTALLATION/ EQUIPMENT** A self-contained emergency electrical installation (either a emergency generator set or an emergency battery bank), in addition to the main generating set, able to simultaneously operate emergency lighting, alarm signals, navigation lights and communications equipment and capable of continuous operation for 28 hours: (1) number of electric torches as determined by the Chief Executive Officer; (2) an emergency electric installation capable of operating navigation lights (where they are solely electric) for 14 hours, and (3) an emergency electric installation capable of operating signaling lamps (where they are normally operated from main electric power source) and communication equipment for 14 hours.

All lengths	**PROVISION OF PAIN-KILLING DRUGS** There shall be carried in the ship a quantity of pain-killing drugs for use in lifeboats and/or life rafts which shall be additional to any drugs carried pursuant to the Miscellaneous Equipment paragraph. The quantity to be carried shall be as follows: For each 15 persons or part thereof on board the ship one pack containing: *(a)* 5 doses of Morphine Sulphate injection 15 mg in lml disposable syringes; *(b)* 5 doses of Morphine Sulphate injection 15 mg in lml together with one suitable sterile disposable syringes complete with needle; or *(c)* 6 doses of Omnopon Tubunic 30 mg. The drugs shall be stowed in a secure manner in an accessible position in the space from which the ship is normally navigated. There shall be included on the Emergency Station Muster List provision for a responsible member of the crew to remove the pain-killing drugs to the lifeboats and/or liferafts. The distribution of the drugs shall be at the discretion of the Master.
All lengths	One copy of the Rescue Signal Table

CLASS 2A & 2B—NON PASSENGER SHIPS
ENGAGED IN INTERNATIONAL VOYAGES
(EXCEPT GAS, CHEMICAL AND OIL TANKERS)

(Note: The following scales apply to ships other than SOLAS Ships).

Measured Length	L.S.A. Requirements
85 metres and over	**SURVIVAL CRAFT & RESCUE BOAT** Shall meet the requirements of SOLAS regulation 31, paragraph 1, sub-paragraphs 1.1, parts .1 and .2, sub-paragraph 1.2 parts .1 and .2, sub paragraph 1.3 parts .1, .2, .3, and .4, sub-paragraph 1.4, sub-paragraph 1.5, paragraph 2, paragraph 3, sub-paragraph 3.1 & 3.2.
Less than 85 metres but more than 50 metres	(1) SOLAS inflatable or rigid liferafts for a total aggregate capacity of 100% complement having a mass of less than 185kg and is capable of side transfer on a single open deck level, plus an approved rescue boat; or (2) If the SOLAS inflatable or rigid lferaft(s) for 100% complement having a mass of more than 185kg and not capable of side transfer on a single open deck level; than additional liferaft shall be provided on each side for 150% compliment, plus an approved rescue boat
15 metres but not more than 50 metres	(1) SOLAS lifeboat for 100% compliment capable of being launched from either side, plus a SOLAS liferaft for 100% complement; or (2) SOLAS liferaft(s) for 100% complement, plus, an approved boat for 100%compliment
Less than 15 metres	(3) SOLAS liferaft(s) for 100% complement

Measured Length	L.S.A. Requirements
All non-passenger ships of 50 metres in length or more (500grt and over)	**PORTABLE RADIO EQUIPMENT (for use in survival craft & rescue boat)** Three two-way VHF radio telephone stowed in the navigation bridge
Less than 50 metres but more than 15 metres (300grt -500grt)	Two two-way VHF radio telephone for each survival craft stowed in the navigation bridge
All lengths	One 406MHz EPIRB carried onboard the ship
50 metres or more (500grt and upwards)	**RADAR TRANSPONDER (SART)** 2 radar transponder one on each side of the ship
Less than 50 metres but more than 15 metres (300- 500grt)	1 radar transponder

	LIFEBUOYS
200 metres and over	14 Lifebuoys – 2 with self-igniting lights and self-activating MOB smoke signal located each side of the navigation bridge capable of quick release. The remaining 5 lifebuoys with lights, 2 with buoyant life lines and 5 without either fittings to be equally distributed throughout the ship.
200 metres to 150 metres	12 lifebouys - 2 with self-igniting lights and self-activating MOB smoke signal located on each side of the navigation bridge capable of quick release. The remaining 4 lifebuoys with lights, 2 with buoyant life lines and 4 without either fittings to be equally distributed throughout the ship.
100 metres to 150 metres	10 lifebouys - 2 with self-igniting lights and self-activating MOB smoke signal located on each side of the navigation bridge capable of quick release. The remaining 3 lifebuoys with lights, 2 with buoyant life lines and 3 without either fittings to be equally distributed throughout the ship.
Less 100 metres to 50 metres	8 lifebuoys - 2 with self-igniting lights and self-activating MOB smoke signal located on each side of the navigation bridge capable of quick release. The remaining 2 lifebuoys with lights, 2 with buoyant life lines and 2 without either fittings to be equally distributed throughout the ship.
less than 50 metres to 30 metres	6 lifebuoys - 2 with lights and MOB smoke signals. 2 with buoyant lines and 2 without either fitting to be equally distributed throughout the ship.
less than 30 metres	4 lifebouys – 2 with lights and MOB smoke signals remaining lifebuoys to be fitted with bouyant lines.
15 metres and over but less than 30 metres	2 lifebuoys - 1with self-igniting light and MOB signal and 1 to befitted with buoyant lines.

All lengths	**LIFEJACKETS** (1) SOLAS lifejackets fitted with a whistle and flashing light suitable for each person that the ship is certified to carry, to be stowed in the vicinity of the muster station and control stations
All lengths	**LINE THROWING APPLIANCES** One line throwing appliance capable of throwing 4 projectiles and 4 lines
All lengths	**DISTRESS SIGNALS** -6 parachute distress rockets -4 red hand flares -2 buoyant orange smoke signals

Measured Length	L.S.A. Requirements
All lengths	**GENERAL EMERGENCY ALARM-SYSTEM** Electrically operated alarm system controlled from the normal navigating position and other strategic positions for summoning passengers (if any) and crew to their muster-stations.
50 metres and over	**EMERGENCY ELECTRICAL INSTALLATION/ EQUIPMENT** A self-contained emergency electrical installation, in addition to the main generating set, able to simultaneously operate emergency lighting, alarm signals, navigation lights and communications equipment and capable of continuous operation for 18 hours—
15 metres and over but less than 50 metres	(1) number of electric torches as determined by the Chief Executive Officer; (2) an emergency installation capable of operating navigation lights (where they are solely electric) for 12 hours; and (3) an emergency installation capable of operating signaling lamps (where they are normally operated from main electric power source) and communication equipment for 12 hours.

Measured Length	L.S.A. Requirements
All lengths	**PROVISION OF PAIN-KILLING DRUGS** There shall be carried in the ship a quantity of pain-killing drugs for use in lifeboats and/or liferafts which shall be additional to any drugs carried pursuant to the Miscellaneous Equipment paragraph. The quantity to be carried shall be as follows: For each 15 persons or part thereof on board the ship one pack containing: *(a)* 5 doses of Morphine Sulphate injection 15 mg in lml disposable syringes; or *(b)* 5 doses of Morphine Sulphate injection 15 mg in lml together with one suitable sterile disposable syringes complete with needle; or *(c)* 6 doses of Omnopon Tubunic 30 mg. The drugs shall be stowed in a secure manner in an accessible position in the space from which the ship is normally navigated. There shall be included on the Emergency Station Muster List provision for a responsible member of the crew to remove the pain-killing drugs to the lifeboats and/or life rafts. The distribution of the drugs shall be at the discretion of the Master.
All lengths	One copy of the Rescue Signal Table

CLASS 3A

SHIPS ENGAGED IN NEAR COASTAL TRADE

Measured Length	**L.SA. Requirements**	
All lengths	**LIFEBOATS, APPROVED BOATS AND LIFERAFTS** Either: (1) SOLAS lifeboats for 100% complement on each side of ship, plus SOLAS life-rafts for 25 % complement, (2) Approved boat(s) and SOLAS liferafts for 100% complement, or (3) SOLAS liferafts for 100% complement.	
All lengths	**PORTABLE RADIO EQUIPMENT** One portable VHF radio suitable for use in lifeboats or liferafts One 406MHz EPIRB	
70 metres and over	14	**LIFEBUOYS** at least 2 to have self-igniting lights and MOB smoke and four to be fitted with buoyant lines
50 metres and over but less than 70 metres	12	at least 2 with self-igniting light and one with MOB smoke, and 4 to be fitted with buoyant lines
30 and over but less than 50 meters	8	at least 1 with self-igniting light and one with MOB smoke, and 2 to be fitted with buoyant lines
15 and over but less than 30 meters	4	at least 1 to have self-igniting lights and MOB smoke and 2 with buoyant lines

All lengths	**LIFEJACKETS** (1) A SOLAS lifejacket with a whistle suitable for each person of mass of 32 kg and over that the ship is certified to carry, to be stowed in the vicinity of the muster station and control stations; plus (2) A SOLAS lifejacket for children equal to 10% of the total number of passengers onboard stowed in the vicinity of the muster station and the location clearly marked; plus (3) Additional 5% SOLAS lifejackets with whistles of which a sufficient number shall be placed in or adjacent to service and machinery spaces.

Measured length	**L.S.A requirements**
50 metres and over	**LINE THROWING APPLIANCES** One line throwing appliance capable of throwing 4 projectiles and 4 lines
	DISTRESS SIGNALS
30 metres and over	6 parachute distress rockets 4 red hand flares 2 orange smoke signals
Less than 30 metres	3 parachute distress signals 2 red hand flares 1 orange smoke signal
30 metres and over	**GENERAL EMERGENCY ALARM SYSTEM** Electrically operated alarm system controlled from the normal navigating position and other strategic positions for summoning passengers (if any) and crew to their muster stations

All lengths	**EMERGENCY ELECTRICAL INSTALLATION** A self-contained emergency electrical installation, in addition to main generating set, able to simultaneously operate emergency bile pump (where electrically operated), watertight doors (where electrically operated), indicators and sound signals for power-operated doors, fire protection system, emergency lighting, emergency signals, navigation lights and communications equipment and capable of providing continuous operation for 18 hours
All lengths	One copy of the Rescue Signal Table

CLASS 3B

FIJI TRADE (Territorial waters voyage)

Measured length	**L.S.A. Requirements**
All lengths	**LIFEBOATS, INFLATABLE LIFERAFTS AND APPROVED BOATS.** Either: (1) Life boats for 100% complement; (2) Life raft for 100% complement; (3) Buoyant apparatus for up to 20% complement to a maximum of 20 persons, and liferafts for the remaining 80%; or (4) Approved boats for 100% complement.
70 metres and over	14 at least 2 to have self-igniting lights and MOB smoke and four to be fitted with buoyant lines
50 metres and over but less than 70 metres	12 at least 1 with self-igniting light and one with MOB smoke, and 4 to be fitted with buoyant lines
30 metres and over but less than 50 metres	8 at least 1 with self-igniting light and one with MOB smoke, and 2 to be fitted with buoyant lines
15 metres and over but less than 30 metres	4 at least 1 to have self-igniting lights and MOB smoke and 2 with buoyant lines

All lengths	**LIFEJACKETS** (1) A Coastal lifejacket with a whistle suitable for each person of mass of 32 kg and over that the ship is certified to carry, to be stowed in the vicinity of the muster station and control stations; plus (2) A Coastal lifejacket for children equal to 10% of the total number of passengers onboard stowed in the vicinity of the muster station and clearly marked; plus (3) Additional Coastal lifejacket lifejackets with whistles of which a sufficient number shall be placed in or adjacent to service and machinery spaces.

Measured length	**L.S.A. Requirements**
30 metres and over	**DISTRESS SIGNALS** 6 parachute distress rockets 4 red hand flares 2 hand held orange smoke signals
Less than 30 metres	3 parachute distress rockets 2 red hand flares 1 hand held orange smoke signal
50 metres and over	**LINE THROWING APPLIANCE** One line throwing appliance capable of throwing 4 projectiles and 4 lines
30 metres and over	**GENERAL EMERGENCY ALARM-SYSTEM** Electrically operated alarm system controlled from the normal navigating position and other strategic positions for summoning passengers (if any) and crew to their smaller-stations.
15 metres and over	Electrically operated alarm system controlled from the normal navigating position and other strategic positions for summoning passengers (if any) and crew to their smaller-stations. Or Public Address system and efficient muster ing carried out by voice.

30 meters and over	**EMERGENCY ELECTRICAL INSTALLATION** A self-contained emergency electrical installation, in addition to main generating set, able to simultaneously operate emergency bilge pump (where electrically operated), watertight doors (where electrically operated), indicators and sound signals for power operated doors, fire protection system, emergency lighting, emergency signals, navigation lights and communications equipment and capable of providing continuous operation for 12 hours.
15 meters and over	A self-contained emergency electrical installation, in addition to main generating set, able to simultaneously operate emergency bilge pump (where electrically operated), watertight doors (where electrically operated), indicators and sound signals for power operated doors, fire protection system, emergency lighting, emergency signals, navigation lights and communications equipment and capable of providing continuous operation for 8 hours.
All lengths	One copy of the Rescue Signal Table

CLASS 3D

INSHORE TRADE

Measured length	**L.S.A. Requirements**
All lengths	**APPROVED BOATS, INFLATABLE LIFERAFTS AND RIGID BUOYANT APPARATUS** (1) lifeboats for 100% complement; (2) Approved life rafts of 100% complement; (3) Rigid Buoyant apparatus for up to 20% complement to a maximum of 20 persons, and approved life rafts for the remainder; or (4) Approved boats for 100% complement.

70 metres and over 50 metres and over but less than 70 metres 30 metres and over but less than 50 meters 15 metres and over but not more than 30 meters	**Lifebuoys** 14 lifebuoys at least 2 to have self-igniting lights, and one with MOB and four to be fitted with buoyant lines 12 at least 1 with self-igniting light and one with MOB smoke, and 4 to be fitted with buoyant lines 8 at least 1 with self-igniting light and one with MOB smoke, and 2 to be fitted with buoyant lines 4 at least 1 to have self-igniting lights and MOB smoke and 2 with buoyant lines
All lengths	**LIFEJACKETS** (1) A Coastal Lifejacket suitable for each person the Ship is certified to carry. (2) Coastal lifejackets for children equal to 10% of the total number of the passengers on board stowed in the vicinity of the smaller station and location clearly marked.
All lengths	**DISTRESS SIGNALS** 2 parachute distress rockets 2 red hand flares 1 orange smoke signal (A reduction in distress signals may be permitted by the Chief Executive Officer consistent with this area of operations allocated to the ship)
30 metres and over	**ELECTRICAL ALARM SIGNAL** Electric alarm signal for muster ing crew and passengers (where sufficient muster ing cannot be carried out by voice)
All lengths	**EMERGENCY ELECTRICAL EQUIPMENT** A number of electric torches or hand lamps as determined by the Chief Executive Officer
All lengths	One copy of the Rescue Signal Table

CLASS 3E

SHELTERED WATERS TRADE

Measured length	**L.S.A. Requirements**
All lengths	**INFLATABLE LIFERAFTS** for 50% AND RIGID **BUOYANT APPARATUS** for 50% (1) An inflatable life raft for 50% complement and rigid buoyant apparatus for 50% complement. (2) An inflatable life raft may be substituted for the buoyant apparatus. (3) Subject to surveyor's discretion.
All lengths	**LIFEBUOYS** 2 lifebuoys, 1 with light and 1 with line
All lengths	**DISTRESS SIGNALS** 2 hand flares
All lengths	**EMERGENCY ELECTRICAL EQUIPMENT** Electric torches as determined by the Chief Executive Officer
All lengths	**LIFEJACKETS** (1) A Sheltered Waters Lifejacket suitable for each person the ship is certified to carry. (2) Sheltered lifejacket for children equal to 10% of the total number of the passengers onboard stowed in the vicinity of the muster station and location clearly marked.

CLASS 3F

INLAND WATERS TRADE

Measured length	**L.S.A. Requirements**
All lengths	**INFLATABLE LIFERAFTS OR RIGID BUOYANT APPARATUS** (1) An inflatable liferaft for 100% complement or rigid buoyant apparatus for 100% complement. Subject to surveyor's discretion.
All lengths	**LIFEBUOYS** (1) 2 lifebuoys, 1 with light and 1 with line. Subject to surveyor's discretion.
All lengths	**DISTRESS SIGNALS** 2 hand flares. Subject to surveyor's discretion.
All lengths	**EMERGENCY ELECTRICAL EQUIPMENT** Electric torches as determined by the Chief Executive Officer. Subject to surveyor's discretion.
All lengths	**LIFEJACKETS** (1) A Sheltered Waters Lifejacket or personal flotation device suitable for each person the ship is certified to carry. (2) Sheltered lifejacket for children equal to 10% of the total number of the passengers onboard stowed in the vicinity of the muster station and location clearly marked.

PART 4—TYPES OF LIFESAVING APPLIANCES

Appendices:A-N

Appendix

A. SOLAS lifeboats & Approved Boats. Construction, Capacity and Equipment
B. Davits and Launching Arrangements for Approved Boats
C. Coastal Liferafts (inflatable)-Construction, Capacity and Equipment
D. Buoyant Appliances. Construction and Capacity
E. Inflatable Buoyant Apparatus. Construction roved Boats
F. Internal Buoyancy in Small Ships
G. Lifebuoys—Self-igniting Lights, Smoke Signals and Buoyant Lines
H. Coastal Lifejackets
I. Sheltered Waters Lifejackets
J. In-field Check for Buoyancy of Lifejackets
K. Portable Radio Equipment for Lifecraft
L. Line Throwing Appliances
M. Pyrotechnic Distress Signals
N. Rescue Signals Table

Appendix A

Approved Boats

A1.0 Construction and Capacity:

A1.1 Every approved boat shall be an open boat constructed with rigid sides, or an inflatable boat of a design type approved by the Chief Executive Officer.

A1.2 The boat shall be of such form and proportions that it shall have ample stability in a seaway and sufficient freeboard when loaded with its equipment and the number of persons it is licenced to carry.

A1.3 The maximum number of persons the boat is certified to carry shall be calculated as follows:

$$\text{No.} = A / 0.372$$

Where

A is the surface area in the boat available to persons sitting no higher than the thwarts;

OR,

The number of persons for which the boat is successfully swamp tested according to sub-paragraph 3A, whichever is the less number.

A1.4 The length of the boat shall be not less than 3.0 metres, nor more than 6.0 metres.

A1.5 All thwart and side seats in the boat shall be fitted as low in the boat as practicable, and bottom boards shall be fitted in rigid boats.

A1.6 The boat may be square-stemed and shall have a mean sheer at least equal to five percent of its length.

A1.7 The boat shall be fitted with internal buoyancy appliances which shall be so placed as to secure stability when the boat is fully laden under adverse weather conditions.

A1.8 Every boat shall be fitted with internal buoyancy appliances which shall consist either of air cases or of buoyant material or inflatable tubes of an approved design such that damage to one tube, will not prevent the boat from maintaining the minimum buoyancy and stability required.

A19 The total volume of the internal buoyancy appliances shall be such that it will float the boat, its total personnel and its full equipment when the boat is flooded and open to the sea so that the top of the gunwale amidships is not submerged.

A1.10 The centre of mass of the buoyancy shall be situated above the flooded centre of Gravity of the boat.

A2.0 Equipment:

An approved boat shall be equipped with;

A2.1 A single complement of buoyant oars and one spare buoyant oar provided that there shall never be less than three oars; one set of crutches attached to the boat by lanyard or chain.

A2..2 Two plugs for each plug hole (except where proper automatic valves are fitted) attached to the boat by lanyards or chains; a bailer; one anchor and 20 metres of anchor line.

A2.3 A painter of sufficient length and size secured to the forward end of the boat.

A2.4 A line becketed to the gunwale to enable persons to cling to the boat if upturned or upright.

A2.5 One litre of fresh water for each person in the carrying capacity of the lifeboat.

A2.6 Three rocket parachutes flares, two red hand held flares and one hand held orange smoke signal

A2.7 Retro-reflective tapes of an approved type (each tape being not less than 300 millimetres long not less than 50 millimetres wide), fitted on top of the gunwale of the boat and on the outside of the boat as near to the gunwale as possible and spaced so that the distance between the centre of a tape and the centre of the tape next in line is not greater than 500 millimetres.

NOTE: The small items of equipment including water, flares and smoke signal shall be kept in a buoyant container which should be stowed in a suitable position in the ship.

A3.0 Swamp Test:

A3.1 Every approved boat, or type of boat shall undergo a swamp test which shall consist of completely swamping the boat in seawater with the full complement of adults and all equipment on board.

A3.2 The boat shall maintain its stability in this condition with its gunwale above the water and all personnel's mouths above water when sitting upright on the bottom of the boat.

A4.0 Launching arrangements:

A4.1 The boat shall either:

(a) have davits of such construction as specified in Appendix B, that the boat can be lowered safely into the water with its full complement of persons and equipment on board; or

(b) be of such light construction and carried at a sufficiently low point in the ship that it can be launched safely and upright by hand, or, subject to the Chief Executive Officer, be towed astern of the ship.

Appendix B

Davits and launching arrangements for approved boats

B1.0 Type and Construction of davits:

B1.1 Davits may be luffing type; or where placed at the stern of the ship, may be fixed rigidly, with the boat situated outboard.

B1.2 The davits shall be so constructed and placed that the boat when equipped and manned with its complement of launching crew and equipment can be turned out and lowered to the embarkation level; and can be fully lowered to the water with its full complement of persons and equipment when the ship has a list or trim of up to 25 degrees either way.

B2.0 Stresses:

B2.1 All parts of the davits and their equipment shall be capable of withstanding a static load test of not less than 2.5 the maximum load. For this purpose each person shall be deemed to have a weight of 74 kg.

B3. 0 Falls:

B3.1 Falls may be constructed of wire rope such that they will run freely through the blocks under the minimum weight of the boat.

B3.2 The breaking strain of the falls shall be not less than 6 times the maximum load when lowering or hoisting.

B3.3 Stowage for falls shall be provided, to keep them ready for use and protected from deterioration.

B3.4 Bollards or cleats shall be provided for the falls where rope is used.

B3.5 Falls shall be long enough for the fully loaded boat to reach the water when the ship has a list of 20 degrees either way or a trim of 10 degrees.

B3.6 The lower block of the falls shall be so designed that the falls may be speedily disengaged or engaged from the lifting hook of the boat.

B4.0 Hoisting facilities:

B4.1 There shall be provided safe means for hoisting the boat in its falls with its full equipment and a minimum of 2 persons onboard. Means of hositing of the lifeboat should be powered electrically or by hydraulics.

B5.0 Embarkation level:

B5.1 The outturn of the davits shall be such that the boat rests, or may be easily bowsed in to the ships hull to give safe access at embarkation level.

Appendix C

Coastal liferafts (inflatable)

C1.0 Construction:

C1.1 The life raft shall be so constructed that, when fully inflated and floating with the cover uppermost, it shall be stable in a seaway.

C1.2 The life raft shall be so constructed that if it is dropped into the water from a height of 6 metres or from its stowed position, whichever is the greater, neither the life raft nor its equipment will be damaged.

C1.3 The construction of the life raft shall include a cover of a highly visible colour. This cover shall be capable of protecting the occupants against injury from exposure. The top and the inside of the cover shall be fitted with a lamp which derives its power from a sea-activated cell.

C1.4 The life raft shall be capable of being readily righted by one person if it inflates in an inverted position.

C1.5 The life raft shall be fitted at each opening with efficient means to enable persons in the water to climb on board.

C1.6 The life raft shall be contained in a valise or other container so constructed as to be capable or withstanding hard wear under conditions met with at sea. The life raft in such valise or container shall be inherently buoyant.

C1.7 The buoyancy of the life raft shall be divided into an even number of compartments, so arranged that either half of the total number of compartments is capable of supporting out of the water the number of persons in the carrying capacity of the life raft.

C1.8 The total weight of the life raft and its equipment, contained in a valise or other container, shall not exceed 180 kg.

C1.9 The floor of the liferaft shall be waterproof.

C1.10 The liferaft shall be inflated by a gas which is not injurious to the occupants, and inflation shall take place automatically either on the pulling of a line, or by some other equally simple and efficient method. Provision shall be made for maintaining pressure with a topping-up pump or bellows.

C1.11 The liferaft shall be of suitable material and construction, and shall be so constructed as to be capable of withstanding exposure for 30 days afloat in all sea conditions.

C1.12 Every liferaft which is designed for use with a launching appliance shall be properly constructed for that purpose, and shall be of sufficient strength to permit it to be safely lowered into the water when loaded with its full complement of persons and equipment.

C1.13 Retro-reflective tape of an approved type (and being not less than 50 millimetres in width) shall be fitted to the underside of the floor of a liferaft in such a way that the tape forms a cross at the centre of the floor. The length of the tapes shall be:

(a) for a circular liferaft-not less than half the diameter of the liferaft; and

(b) for other liferafts-not less than half the width and length respectively, of the liferaft.

C1.14 Retro-reflective tape of an approved type (each tape being not less than 300 millimetres in length and not less than 50 millimetres in width) shall be spaced around the cover, or each of the covers, with the liferaft in such a way that:

(a) the distance between the centre of one tape and the centre of the tape next in line is not greater than 500 millimetres; and

(b) the distance between the lower edge of the tape and the lower edge of the cover is not less than half the height of the cover; and

C1.15 Two retro-reflective tapes of an approved type (and being not less than 50 millimetres in width) shall be placed at the centre of the top of a liferaft cover in the form of a cross. The lengths of the tapes shall be:

(a) for a circular liferaft-not less than half the diameter of the liferaft; and

(b) for other liferafts-not less than half the width and length, respectively, of the liferaft.

C2.0 Capacity:

C2.1 The carrying capacity of an inflatable coastal liferaft shall be the largest whole number obtained from:

(a) V/0.096

Where

V=volume of buoyancy tubes, excluding thwarts or arches, in cubic meters when liferaft inflated.

OR

(b) A/0.372

Where

A=surface area of floor of life raft, including thwarts, if any, in cubic meters when life raft inflated.

Whichever is the less subject to the provisions of paragraph C2.2 below.

C2.2 The carrying capacity of an inflatable coastal life raft shall not be less than four persons nor more than twenty five persons.

C3.0 Equipment:

C3.1 The liferaft equipment required to be carried on board ships within Fiji's archipelagic and territorial waters need will include the items specified below:

C3.1.1 one buoyant rescue quiot, attached to not less than 30m of buoyant line;

C3.1.2 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 shall be provided with a second knife which need not be of the non-folding type;

C3.1.3 one buoyant bailer for a liferaft which is permitted to accommodate not more than 12 persons. Two buoyant bailers for a liferaft which is permitted to accommodate 13 persons or more;

C3.1.4 two sponges;

C3.1.5 two sea-anchors each with a shock-resistant hawser and tripping line if fitted, 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;

C3.1.6 two buoyant paddles;

C3.1.7 three tin openers and a pair of scissors. Safety knives containing special tin opener blades are satisfactory for this requirement;

C3.1.8 one first aid kit in a water proof case;

C3.1.9 one whistle or equivalent sound signal;

C3.1.10 two rocket parachute flares;

C3.1.11 two hand flares;

C3.1.12 one buoyant smoke flare;

C3.1.13 one water proof electric torch for morse signaling, together with a spare set of batteries and one spare bulb in a water proof container;

C3.1.14 a radar reflector;

C3.1.15 one daylight signaling mirror with instructions on its use for signaling to ships and aircraft;

C3.1.16 one copy of life saving signal;

C3.1.17 one set of fishing tackle;

C3.1.18 food ration for each person the liferaft is permitted to carry;

C3.1.19 1L of fresh water for each person the liferaft is permitted to accommodate.

C3.1.20 one rustproof graduated drinking ship;

C3.1.21 anti sea-sickness medicine sufficient for at least 48hours and one sea-sickness bag for each person the liferaft is permitted to accommodate;

C3.1.22 instructions on how to survive;

C3.1.23 instructions for immediate action;

C3.1.24 one repair kit capable of repairing punctures in buoyancy compartments; and

C3.1.25 one topping up pump or bellows.

C3.2 The liferaft equipment required to be carried on board ships within inshore water and sheltered waters will include the items specified below:

C3.2.1 one sea-anchor each with a shock-resistant hawser and tripping line if fitted, 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;

C3.2.2 one buoyant rescue quiot, attached to not less than 30m of buoyant line;

C3.2.3 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 shall be provided with a second knife which need not be of the non-folding type;

C3.2.4 two buoyant paddles;

C3.2.5 two sponges;

C3.2.6 one topping up pump or bellows;

C3.2.7 one buoyant bailer for a liferaft which is permitted to accommodate not more than 12 persons. Two buoyant bailers for a liferaft which is permitted to accommodate 13 persons or more;

C3.2.8 two hand flares;

C3.2.9 one repair kit capable of repairing puntures in buoyancy compartments;

C3.2.10 one water proof electric torch for morse signaling, together with a spare set of batteries and one spare bulb in a water proof container;

C3.2.11 one whistle or equivalent sound signals;

C3.2.12 one first aid kit in a water proof case;

C3.2.13 instructions for immediate action;

C3.2.14 anti-sea-sickness medicine sufficient for at least 48hours and one sea-sickness bag for each person the liferaft is permitted to accommodate.

APPENDIX D

BUOYANT APPLIANCES

D1.0 Construction and capacity:

D1.1 A buoyant appliance shall be manufactured from buoyant material having the properties detailed in item 1, Appendix F.

D1. 2 The encasing material shall be a material which:

D1.2.1 retains its shape and strength when subject to the range of temperature which may be encountered in service and is durable in sea water.

D1.2.2 protects the buoyancy material from ultra violet light and physical damage;

D1.2.3 is fire retardant or it shall be painted with an approved fire retarding paint.

D1.3 A buoyant appliance shall be capable of withstanding a drop test, the height of which shall be equivalent to that of the deck on which it is stowed above the ship's light waterline but in no case shall be less than 6 metres.

D1.4 A buoyant appliance shall be effective and stable and when floating either way up and shall not require adjustment before use.

D1.5 Buoyant grab lines shall be fitted all round the appliance. The grab lines shall be secured to the appliance at not more than 460 mm centres nor less than 300 mm centres and interlaced to prevent movement. The depth of the loop when wet shall not be less than 150 mm and not more than 200 mm. The grab lines shall be of rope not less than 7mm diameter. The fastenings securing the grab lines to the appliance shall be strong enough to permit the appliance being lifted by the grab lines.

D1.6 The number of persons that the appliance shall be deemed fit to support shall be equal to:.

D1.6.1 the greatest whole number obtained by the equation:

No. = 70 (V - W)

Where

No. = Number of persons

V = Volume in cubic metres v (1000)

W = Weight of appliance in kgs

D1.6.2 the number of grab line loops whichever number shall be less.

D1.7 A buoyant appliance shall be coloured a highly visible colour.

D1.8 A buoyant appliance shall not exceed 180 kg in weight unless suitable means are provided to enable it to be launched and, where the weight of the appliance exceeds 136 kg but does not exceed 180 kg in weight, suitable handles or rings shall be fitted to enable it to be launched by hand.

D1. 9 The buoyant appliance shall be fitted with retro-reflective tapes of an approved tape (each tape being not less than 300 millimetres long and not less than 50 millimetres wide) on the top and bottom of the buoyant appliance, spaced around the perimeter of the appliance so that the distance between the centre of a tape and the centre of the tape next in line is not greater than 500 millimetres.

APPENDIX E

INFLATABLE BUOYANT APPARATUS

E1.0 Construction

E1.1 The Apparatus shall be so constructed that, when fully inflated it shall be stable in a seaway.

E1.2 The Apparatus shall be so constructed that if it is dropped into the water from a height of 6 metres or from its stowed position, whichever is the greater, neither the Apparatus or its equipment will be damaged.

E1.3 The Apparatus shall be fitted with a painter and shall have a buoyant grabline securely bucketed round the outside at not more than 460 mm centres nor less than 300mm centres and interlaced to prevent movement. The depth of the loops shall be not less than 150 mm and not more than 200 mm, and so placed that they will support a person in the water when the apparatus is either way up.

E1.3.1 The fastenings shall be strong enough to permit the apparatus to be lifted by the grablines.

E1.4 There shall be similar grablines fitted round the inside of the apparatus floatation chambers on each side of the floor.

E1.5 The Apparatus shall be fitted with efficient means to enable persons in the water to climb on board.

E1.6 The Apparatus shall be contained in a valise or other container so constructed as to be capable of withstanding wear and tear under conditions at sea. The apparatus in such valise or container shall be inherently buoyant.

E1.7 The buoyancy of the apparatus shall be divided into an even number of compartments, so arranged that either half of the total number of compartments is capable of supporting the number of persons in the carrying capacity of the apparatus.

E1. 8 The total weight of the apparatus, contained in a valise or other container, shall not exceed 180 kg.

E1.9 The floor of the apparatus shall be waterproof.

E1.10 The Apparatus shall be inflated by a gas which is not injurious to the occupants, and inflation shall take automatically either on the pulling of a line, or by some other equally simple and efficient method. Provision shall be made for maintaining pressure with a topping up pump or bellows.

E1.11 The Apparatus shall be of a suitable material and construction, and shall be so constructed as to be capable of withstanding exposure for 30 days afloat in all sea conditions. The material shall be of a highly visible colour.

E1.12 The Apparatus shall be suitable for its purpose when floating either way up and shall not require adjustment before use.

E2.0 Capacity:

E2.1 The apparatus shall be designed to contain at least 25% of the total persons it is designed to support within the apparatus, and supported out of the water by its floor. It shall provide adequate floating for the remaining persons it is designed to support, externally in the water.

E2.2 The carrying capacity of the apparatus shall be the largest whole number obtained from:

(a) $\dfrac{(\ V\ )}{(\ 0.035\ )}$ Where V= volume of buoyancy tubes in cubic metres when inflated

OR

(b) $\dfrac{(\ A\ )}{(\ 0.372\ )} + \dfrac{(\ C\ )}{0.3}$ Where A= surface are of floor of apparatus in square metres when inflated

C= circumference of apparatus in metres when inflated

Whichever is less, subject to the provisions of paragraph 2.3 below.

E2.3 The carrying capacity of an inflatable buoyant apparatus shall not be less than 10 persons nor more than 55 persons.

E3.0 Equipment:

The equipment to be provided in every Inflatable Buoyant Apparatus shall be as follows:

E3.1 one topping-up pump or bellows;

E3.2 one sea-anchor permanently attached to the apparatus;

E3.3 one buoyant rescue quoit with 30 m line;

E3.4 one repair outfit;

E3.5 one safety knife;

E3.6 one instruction handbook.

APPENDIX F

INTERNAL BUOYANCY IN SMALL SHIPS

F1.0 The material shall have the following properties:

F1.1 Density-32 kg/m^3 minimum.

F1.2 Compressive Strength (at 10 percent strain)-2.4 kgcm^2 minimum.

F1.3 Closed Cell Content-92 per cent minimum.

F1.4 Water Uptake-400 cc/m^2 maximum.

F1.5 Dimensional Stability-(original linear dimensions=.00).

F1.5.1 Temperature Cycling -15 degrees C to +70 degrees C.

F1.5.2 14 days under 100 mm head of kerosene, toluene (conforming to ASTM/D841/1977), xylene (conforming to ASTM/D843/1977) or distillate (90 minimum).

F1.6 Self-extinguishing to A.S.T.M. D-1692/68-Burning rate maximum 10 cm per minute.

F1.7 High resistance to kerosene, petrol, distillate and oils.

F2.0 The required quantity of material in cubic metres shall be calculated by:

2.1 Wooden Vessels $\dfrac{1.2xF}{1000-D}$

2.2 Other Vessels $\dfrac{1.2\,(MK+F)}{1000-D}$

where

M=dry mass of hull material in kgs

K=density of hull material—density of fresh water / density of hull material kg/cubic metres

F=total dry mass of fittings and equipment including machinery installation, if fitted, in kgs

D=density of buoyancy material in kg/cubic metres kg/cubic metres

Note: Unless otherwise determined by the Chief Executive Officer, K may be taken as:

Aluminium	0.62
G.R.P.	0.375
Steel	0.87

F3.0 The material shall not be sprayed in, in situ, but shall be manufactured in slab form under controlled conditions, cut to the required size and fitted into the ship.

F4.0 Before fitting into position, each slab of the material shall be coated on all surfaces with an approved fire retardant paint or fire retardant resin.

F5.0 The material shall be fitted into the ship so that:

F5.1 the centre of mass of the material is above the flooded centre of gravity of the ship;

F5.2 it is protected from physical damage;

F5.3 it is protected from direct sunlight;

F5.4 it is at least 0.5 metres away from any dry exhaust line or other source of heat;

F5.5 it is secured to the satisfaction of the Surveyor.

APPENDIX G

LIFEBUOYS; SELF-IGNITING LIGHTS, SMOKE SIGNALS AND BUOYANT LINES

G1.0 Lifebuoys:

G1.1 General Specification.

G1.1.1 A lifebuoy shall be of an approved type.

G1.1.2 A lifebuoy shall be constructed of solid cork evenly formed, or of other equally efficient buoyant material not affected by oil or oil products.

G1.1.3 Where a lifebuoy is made of plastic of other synthetic compounds, the lifebuoy shall be capable of retaining its buoyant properties and durability when exposed to all weathers on board ship and when in the water.

G1.1.4 A lifebuoy shall be capable of floating in fresh water for not less than twenty four hours with 14.5 kg of iron suspended from it.

G1.1.5 The inside diameter of a lifebuoy shall be 450 mm and the outside diameter 750 mm with:

(a) the major axis of the paragraph being 150 mm; and

(b) the minor axis of the paragraph being 100 mm.

G1.1.6 The buoyant material shall be covered with good quality material.

G1.1.7 The lifebuoy shall be covered with a material of or painted a highly visible colour.

G1.1.8 The grab lines shall be of good quality unsinkable lines, well secured to the cover at four equidistant points, and shall provide four loops of line each not less than 700 mm long.

G1.1.9 The weight of a lifebuoy shall not be less than 2.5 kg. and shall not exceed 6.0 kg.

G1.1.10 A lifebuoy shall not be fitted with rushes, cork shavings, granulated cork or other loose granulated material or depend for its buoyancy upon air compartments requiring inflation.

G1.1.11 A lifebuoy shall be fitted with retro-reflective tapes of an approved type (each tape being not less than 50 millimetres wide) around or on both sides of, the lifebuoy at four equidistant points.

G1.2 Material Other Than Cork:

For lifebuoys constructed of foam buoyancy materials, see the material requirements detailed in Appendix H.

G1.3 For lifebuoys constructed of other buoyancy materials the manufacturer shall consult with the Authority regarding the applicable test requirements.

G2.0 Lifebuoys self-igniting lights:

A self-igniting light attached to a lifebuoy:

(a) shall be so constructed that it is not extinguishable by water;

(b) shall be capable of burning for a period of at least two hours; and

(c) shall have a luminous intensity of not less than 2 candelas in all directions of the upper hemisphere; or

(d) flashing at a rate of not less than 50 flashes and not more than 70 flashes per minute.

G3.0 Lifebuoys smoke signals:

A smoke signal attached to a lifebuoy shall comply with the requirements of Appendix M.

G4.0 Lifebuoy buoyant lines:

A life-line fitted to a lifebuoy shall be of a buoyant material, and shall be of at least 30 metres in length.

APPENDIX H

COASTAL LIFEJACKET

H1.0 Specifications for a Coastal Lifejacket:

H1.1 General conditions:

The Chief Executive Officer shall not approve any lifejacket type unless it complies with Australia and New Zealand standards or a life jacket type that has been successfully tested by a Maritime Administration of the Government of the country in which the lifejacket was manufactured, or a Standards Institute recognized by that Government.

H1.2 A lifejacket shall not sustain burning or continue melting after being totally enveloped in a fire for a period of 2s.

H1.3 A lifejacket shall be so constructed that:

H1.3.1 a person can correctly don it within one minute without assistance; its ties and fastenings should be few and simple;

H1.3.2 it is capable of being worn in only one way and cannot be donned incorrectly;

H1.3.3 it is comfortable to wear; and

H1.3.4 it allows the wearer to jump from a height of at least 4.5m into the water without injury and without dislodging or damaging the lifejackets;

H1.3.5 it allows the wearer to swim a short distance and board a liferaft.

H1.4 A lifejacket shall have sufficient buoyancy and stability in calm fresh water to:

H1.4.1 lift the mouth of an exhausted or unconscious person not less than 120mm with the body inclined backwards at an angle not less than 20 degrees from the vertical;

H1.4.2 turn the body of an unconscious person in the water from any position to one where the mouth is clear of the water within 5s.

H1. 5 A lifejacket should be of a conspicuous orange colour and be fitted with retro reflective tape on the exposed part of the jacket.

H1. 6 A lifejacket shall be marked with the following:

(a) Coastal lifejacket;

(b) The license or Specification number;

(c) Clear instructions for donning.

H1.7 The lifejacket shall be fitted with retro-reflective tapes placed as high up on the lifejacket as possible in not less than six places on the side and six places on the outside of the lifejacket, each tape being not less than 100 mm long and not less than 50 mm wide, so that not less than six tapes are always visible whichever way the lifejacket is worn.

H1.8 The buoyancy of the lifejacket should not be reduced by more than 5% after 24 hours submersion in fresh water.

H1.9 The buoyancy material shall be chemically stable and of low flammability and be free from shrinkage.

H1.10 A Coastal child's lifejacket shall be marked with:

(a) the height and weight for which the lifejacket has been tested by the maritime safety administration.

(b) child symbol adopted by the IMO.

APPENDIX I

SHELTERED WATERS LIFEJACKETS

I1.0. Specifications for a Sheltered Waters Lifejacket:

I1.1 General Conditions:

The Chief Executive Officer shall not approve any lifejacket type unless it complies with Australia and New Zealand standards or a life jacket type that has been successfully tested by a Maritime Administration of the Government of the country in which the lifejacket was manufactured, or a Standards Institute recognised by that Government.

I1.2 A lifejacket shall not sustain burning or continue melting after being totally enveloped in a fire for a period of 2s.

I1.3 A lifejacket shall be so constructed that:

I1.3.1 a person can correctly wear it within one minute without assistance; its ties and fastenings should be few and simple;

I1.3.2 it is capable of being worn in only one way and cannot be donned incorrectly;

I1.3.3 it is comfortable to wear;

I1.3.4 it allows the wearer to jump from a height of at least 4.5m into the water without injury and without dislodging or damaging the lifejacket.

I1.4 A lifejacket shall have sufficient buoyancy and stability in calm freshwater to:

I1.4.1 lift the mouth of an exhausted or unconscious person not less than 120 mm with the body inclined backwards at an angle not less than 20 degrees from the vertical.

I1.4.2 turn the body of an unconscious person in the water from any position to one where the mouth is clear of the water within 8s.

I1.5 A lifejacket should be of a conspicuous orange or yellow colour and be fitted with retro-reflective tape on the exposed part of the jacket.

I1.6 A lifejacket shall be marked with the following:

(a) Sheltered waters only;

(b) The licence or Specification number;

(c) Any cautionary note concerning deterioration of the buoyancy or other material, the words "FRONT" and "BACK" where there may be any doubt;

(d) Clear instructions for donning.

I1.7 A Coastal child's lifejacket shall be marked with:

(a) The height and weight for which the lifejacket has been tested.

(b) Child symbol adopted by the IMO.

APPENDIX J

IN-FIELD CHECK FOR BUOYANCY OF LIFEJACKETS.

J1. The procedure shall be as follows:

(a) Fill with fresh water a tank large enough to hold the wire basket required in *(b)*.

(b) From an accurate set of scales suspend a wire basket with lead or iron ballast not less than 8 kg securely attached.

(c) Lower the basket into the tank again until submerged at least 50 mm and read the weight "A".

(d) Remove the basket and weight and secure the lifejacket inside the basket.

(e) Immerse the basket in the water tank and read the weight "B".

(f) Deduct the weight "A" from the weight "B". The difference is the buoyancy which should be equal to or greater than the minimum buoyancy rating of the lifejacket.

(g) The lifejacket should be left submerged for a further 24 hours and the buoyancy tested again. The loss in buoyancy over 24 hours should not exceed 5%.

Note: Care should be taken to squeeze out all trapped air as this will affect the buoyancy reading.

APPENDIX K

PORTABLE VHF RADIO EQUIPMENT FOR LIFERAFT

Portable VHF radio equipment for liferaft shall be designed, constructed and equipped to comply with the requirements of the SOLAS Convention.

APPENDIX L

LINE THROWING APPARATUS

Line throwing Apparatus shall be designed, constructed and equipped to comply with the requirements of the SOLAS Convention.

APPENDIX M

PYROTECHNIC: DISTRESS SIGNALS

Pyrotechnic Distress Signals shall be designed, constructed and equipped to comply with the requirements of the SOLAS Convention.

APPENDIX N

RESCUE SIGNAL TABLE

The following signals shall be used by life-saving stations and maritime rescue units when communicating with ships or persons in distress and by ships or persons in distress when communicating with life-saving stations and maritime rescue units. The signals used by aircraft engaged in search and rescue operations to direct ships are indicated in sub-paragraph *(d)* below. An illustrated table describing the signals listed below shall be readily available to the deck watch keeper of every ship to which this paragraph applies.

(a) Replies from life-saving stations or maritime rescue units to distress signals made by a ship or person;

By day ..... Orange smoke signal or combined light and sound signal (thunderlight) consisting of three signals which are fired at intervals of approximately one minute. By night ..... White star rocket consisting of three single signals which are fired at intervals of approximately one minute.	You are seen ..... assistance will be given as soon as possible. (Reception of such signals shall have the same meaning).

If necessary the day signals may be given at night or the night signals by day.

(b) Leading signals for the guidance of small ships with crews or persons in distress:

Signal	*Signification*
By day ..... Vertical motion of a white flag or the arms or firing of a green star-signal or signalling the code letter 'K' (_._) given by light or sound-signal apparatus.	
By night-Vertical motion of a white light or flare, or firing of a green star-signal or signalling the code letter 'K' (_._) given by light or sound-signal apparatus. A range (indication of direction) may be given by placing a steady white light or flare at a lower level and in line with the observer.	This is the best place to land'.

By day---- Horizontal motion of a white flag or arms extended horizontally or firing of a red star-signal or signalling the code letter 'S' (...) given by light or sound-signal apparatus.	
By night... Horizontal motion of a white, light or flare or firing of a red-star signal or signalling the code letter 'S' (...) given by light or sound-signal apparatus.	'Landing here highly dangerous'.
By day Horizontal motion of a white flag, followed by the placing of the white flag in the ground and the carrying of another white flag in the direction to be indicated or firing of a red-star signal vertically and a white star-signal in the direction towards the better landing place or signalling the code 'S' (...) followed by the code letter 'R' (.—.) if a better landing place for the ship in distress is located more to the right in the direction of approach or the code letter 'U (.—..) if a better landing place for the ship in distress is located more to the left in the direction of approach.	
By night... Horizontal motion of a white light or flare, followed by the placing of the white light or flare on the ground and the carrying of another white light or flare in direction to be indicated or firing of a red star-signal vertically and a white star-signal in the direction towards the better landing place or signaling the code letter 'S' (...) followed by the code 'R' (.—.) if a better landing place for the ship in distress is located more to the right in the direction of approach or the code letter 'L' (.—..) if a better landing place for the ship in distress is located more to the left in the direction of approach.	'Landing here highly dangerous. A more favourable location for landing is in the direction indicated',

(c) Signals to be employed in connection with the use of shore life-saving apparatus:

Signal	*Signification*
By day .....Vertically motion of a white flag or the arms or firing of a green star-signal.	In general: 'Affirmative. Specifically: 'Rocket line is held.'
By night .....Vertically motion of a white light or flare or firing of a green star-signal.	'Tail block is made fast' 'Hawser is made fast.' 'Man is in the breeches buoy.' 'Haul away.'

By day .....Horizontal motion of a white flag or arms extended horizontally or firing of a red star-signal.	In general: 'Negative.' Specifically: 'Slack away.' 'Avast hauling.'

(d) Signals used by aircraft engaged in search and rescue operations to direct ships towards an aircraft, ship or person in distress:

(i) The following procedures performed in sequence by an aircraft mean that the aircraft is directing a ship towards an aircraft or a ship in distress:

(1) circling the ship at least once;

(2) crossing the projected course of the ship close ahead at a low altitude, opening and closing the throttle or changing the propeller pitch;

(3) heading in the direction in which the ship is to be directed.

Repetition of such procedure has the same meaning.

(ii) The following procedure performed by an aircraft means that the assistance of the ship to which the signal is directed is no longer required:

crossing the wake of the ship close astern at a low altitude, opening and closing the throttle or changing the propeller pitch.

PARAGRAPH 11

FIRE APPLIANCES

Contents

This paragraph is divided into Parts as follows:

Appendix H Fireman's Outfit
Appendix I Breathing Apparatus
Appendix J International Shore Connection
Appendix K Fire Buckets
Appendix L Portable Foam Applicator Equipment
Appendix M Fire Control Plan
Appendix N Signage
Appendix O Maintenance and operational instructions
Appendix P Standards

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PART 1

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PRELIMINARY

This paragraph should be read in conjunction with the Introduction and General Requirements paragraph.

11.1 Fire appliances shall be maintained in good order, kept fully charged and available for immediate use at all times. All portable fire appliances, other than firemen's outfits, carried in compliance with this paragraph shall be stowed where they are readily accessible for a space in which they are intended to be used. The portable fire extinguishers intended for use in a space shall be suitable for dealing with the possible fire hazard and may be stowed near the entrance to and outside of the space.

11.2 Where any non-passenger ship to which this paragraph applies carries prescribed explosives in a compartment, that compartment and the adjoining cargo compartments shall be provided with a fire detection system complying with the requirements of Appendix A of this paragraph or a smoke detection system. Steam shall not be used for fire smothering purposes in any compartment containing explosives.

11.3 For the purpose of this paragraph:

11.3.1 prescribed explosive means more than nine kilograms of explosives, more than one ton of distress signals for use in ships or aircraft, or fireworks that are likely to explode violently; and

11.3.2 compartment means all spaces contained between two adjacent permanent bulkheads and includes the lower hold and all cargo spaces above it. The whole of any shelter deck space not subdivided by steel bulkheads the openings in which can be closed by steel closing plates shall for the purpose of this paragraph be considered as a single space. Where steel bulkheads with openings closed by steel closing plates are fitted, the enclosed spaces in the shelter deck shall be considered as part of the compartment or compartments below.

11.4 This cause shall apply to all ships. There shall be provided means for stopping ventilating fans serving machinery, accommodation, service and cargo spaces. For machinery and cargo spaces there shall be provided means for closing all skylights, doorways, ventilators, annular spaces around funnels and other openings to such spaces. Such means shall be capable of being operated from positions outside the said spaces which would not be made inaccessible by a fire within such spaces.

11.5 Machinery driving forced and induced draught fans, oil fuel, lubricating oil and hydraulic oil pumps and separators shall be fitted with remote controls situated outside the spaces in which such machinery or pumps are situated. Such controls shall be capable of stopping such machinery or pumps in the event of fire in the said spaces.

11.6 This paragraph shall apply to all ships. Every pipe connected to any oil fuel storage, settling, or daily service tank, not being a double bottom tank, which if damaged would permit discharge of the contents so as to cause a fire hazard shall be fitted with a valve or cock which shall be secured to the tank to which it is connected. The valve or cock shall be capable of being closed from a readily accessible position outside the space in which the tank is situated, provided that in the case of any inlet pipe to such a tank a non-return valve similarly secured to the tank may be substituted. In the case of an oil fuel deep that passing by any shaft or pipe tunnel, a valve shall be fitted on the tank but an additional valve or valves maybe fitted on the pipe line or lines outside the tunnel or tunnels to enable control to be exercised in the event of fire.

11.7 Owners and Masters Obligation

11.7.1 Scales of fire appliances

The owner and master of a ship shall ensure that the scales of firefighting appliances required for their class of ship as detailed in Part 2 of this paragraph is always provided on the ship and is kept in good working condition.

11.7.2 Inspections of fire appliances

The owner and master of a ship shall ensure that a checklist for carrying out the inspections required by sub- paragraph 11.7.4 *(a)* and a log for records of inspections are kept onboard the ship.

11.7.3 The owner and master of a Fiji ship engaged in international voyage or a foreign ship in Fiji waters shall ensure that instructions concerning the maintenance and operation of all the firefighting appliance are kept onboard the ship at all times in accordance with appendix O.

11.7.4 Monthly inspections and testing of fire appliances

The owner and the master of a ship shall ensure that the following inspections are carried out at intervals of not more than one month;—

(a) visually inspect all firefighting equipment using the checklist required by sub paragraph 11.7.2 to ensure that portable and

fixed firefighting installations are ready for use and are in good order; and

(b) test the fire alarms, fire detection units and fixed firefighting installations alarms; and

(c) a report of the inspection is entered in the official logbook or in any logbook maintained as part of the ship's safe ship management system.

11.7.5 Servicing of fire appliances

The owner and the master of a ship shall ensure that portable fire extinguishers are serviced at intervals specified in appendix G and the servicing is carried out at a service centre approved by the Chief Executive Officer in consultation with the National Fire Authority. A certificate of service shall be issued by the approved firefighting appliance service centre.

11.8. Exemptions

11.8.1 The owner of a ship may apply to the Chief Executive Officer for an exemption of his or her ship from a particular requirement of this paragraph.

11.8.2 The Chief Executive Officer may give an exemption only if he or she is satisfied that compliance with the requirement would be unnecessary or unreasonable having regard to the ship, its equipment and its intended voyage and the exemption would not contravene SOLAS.

11.9. Approval of firefighting appliances service centres

11.9.1 No person may operate a firefighting appliances servicing centre in Fiji to service and maintain Firefighting appliances unless that person holds or is employed by the holder of an approved firefighting appliances service station certificate.

11.9.2 An applicant is entitled to an approved firefighting appliances servicing station certificate if the applicant makes an application under section 23 of the Decree and the Chief Executive Officer is satisfied that the requirements specified in sub paragraph 11.9.3 are complied with in respect of that certificate.

11.9.3 An applicant for an approved firefighting appliances servicing station certificate shall provide evidence satisfactory to the Chief Executive Officer that firefighting appliances serviced and maintained under the facility for use onboard ships and offshore installations complies with the provision of Chapter II/2 of the SOLAS 74 as amended and relevant provision of the FSS Code and applicable IMO Assembly Resolution.

11.9.4 The Chief Executive Officer may issue an approved servicing station certificate for a period not exceeding 3 years and subject to any conditions that the Chief Executive Officer considers necessary in

the interest of maritime safety when the Chief Executive Officer is satisfied that—

(a) an initial audit of the firefighting appliances service centre has being completed by a surveyor;

(b) subsequent annual verification audits have being carried out to ensure continued compliance.

11.9.5 It is a condition of every approved firefighting appliances servicing centre, that any person who services firefighting appliances used onboard ships or offshore installation shall be trained by a person approved by the manufacturer of those firefighting appliances.

DEFINITIONS

The following definitions apply specifically to this paragraph:

"A Class divisions" means those divisions formed by bulkheads and decks that are:

(a) constructed of steel or other equivalent material; and

(b) suitably stiffened; and

(c) constructed so as to be capable of preventing the passage of smoke and flame to the end of the one-hour standard fire test; and

(d) insulated with non-combustible materials, with the effect that—

(i) the average temperature of the unexposed side will not rise above the original temperature by more than 139° C; and

(ii) the temperature, at any one point, including any joint, will not rise above the original temperature by more than 180° C, within the times listed below:

Class "A-60"	60 min
Class "A-30"	30 min
Class "A-15"	15 min
Class "A-0"	0 min

"B Class divisions" means those divisions formed by bulkheads, decks, ceilings or linings that:

(a) are constructed so as to be capable of preventing the passage of flame to the end of the first one-half hour of the standard fire test; and

(b) have an insulation value such that—

(i) the average temperature of the unexposed side will not rise more than 139°C above the original temperature; and

(ii) the temperature, at any one point, including any joint, will not rise more than 225° C above the original temperature, within the time listed below:

Class "B-15"	15min
Class "B-0"	0min; and

(c) are constructed of non-combustible materials, including all materials used in the construction and erection of "B" class divisions, with the exception that combustible coatings veneers may be permitted by a surveyor, provided the surveyor is satisfied that the use of a combustible coating veneer does not compromise the requirements of sub-paragraphs 1 and 2 of the Fire Protection provisions of Part 40D;

"accommodation spaces" means those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, hairdressers, pantries containing no cooking appliances and similar spaces;

"cargo area" means that part of the ship that contains—

(a) cargo tanks, slop tanks and cargo pump-rooms, including pump-rooms, cofferdams, ballast and void spaces adjacent to cargo tanks; and

(b) deck areas throughout the entire length and breadth of the part of the ship over the above-mentioned spaces;

"cargo spaces" are all spaces used for cargo (including cargo oil tanks) and trunks to such spaces;

"control stations" are those spaces in which the ship's radio or main navigation equipment or the emergency source of power is located, or where the fire recording or fire control equipment is centralised;

"fire appliance" means any device, arrangement, apparatus or thing intended to provide protection against fire;

"machinery spaces" means those machinery spaces of Category A and all other spaces containing propulsion machinery, boilers, fuel oil units, steam and internal combustion engines, generators, steering gear, major electrical machinery, oil filling stations, refrigerating, stabilising, ventilating and air conditioning machinery and similar spaces, and trunks to such spaces;

" machinery spaces of Category A" means those spaces and trunks to such spaces that contain—

(a) internal combustion machinery used for main propulsion; or

(b) internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate total power output of not less than 375 kW; or

(c) any oil-fired boiler or oil fuel unit;

"open ro-ro cargo spaces" mean ro-ro cargo spaces either open at both ends, or open at one end and provided with adequate natural ventilation effective over their entire length through permanent openings in the side plating or deck head to the satisfaction of the Chief Executive Officer or a surveyor;

"passenger space" means space provided for the use of passengers;

"ro-ro cargo spaces" mean spaces not normally subdivided in any way and extending to either a substantial length or the entire length of the ship in which goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction;

"service spaces" are those spaces used for galleys, pantries containing cooking appliances, lockers and store-rooms, workshops other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces;

"special category A spaces" mean those enclosed spaces above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access.

PART 2—SCALES OF FIRE FIGHTING EQUIPMENT

The following scales is applicable to Ships other than SOLAS Ships (Class 1- Passenger, 2A- Non Passenger and Tankers)

Ship owners of a Class 1- passenger ships, Class 2A- non passenger ships and tankers shall ensure that their ships comply with applicable requirements of Chapter II-2 of SOLAS – Fire protection, fire detection, and fire extinction.

Scales of Fire Fighting Equipment

SHIPS OF CLASS 2B

Size	*Requirements*
25 metres and over	*Main Fire Pumps* Two independently driven fire pumps each capable of delivering simultaneously one jet from each of any 2 fire hydrants whilst maintaining a pressure of 200 kpa. One can be a general service ballast pump or other pumps connected to the fire main.
15 metres and over but less than 25 metres	At least one independently driven fire pump capable of delivering one jet of water from any hydrant, hose or nozzle with which the ship is supplied in compliance with this paragraph whilst maintaining a pressure of 200 kpa.

Emergency fire pumps shall comply with Appendix C	*Emergency Fire Pumps* If a fire in the machinery space puts all the main fire pumps out of action, the ship shall be provided with an independently driven power operated emergency fire pump located in a position outside the machinery space but not forward of the collision bulkhead.
SHIPS OF CLASS 2B (cont'd)	
Size	*Requirements*
. 25 metres and over Less than 25 metres but over 10 metres All ships	*Firemain, Water Service Pipes, Hydrants (other than hydrants to boiler and machinery spaces) and Jets of Water* Shall comply with Appendix D and provide two jets of water in accordance with sub-item D1.3 of that Appendix. Shall comply with Appendix D and provide one jet of water in accordance with sub-item D1.4 of that Appendix. Hydrants in Boiler room and Machinery Spaces. One hydrant together with hose and fittings in each space containing oil-fired boiler or internal combustion type propelling machinery.
Hoses Fire hoses together with their fittings shall comply with Appendix D and be provided as follows:	
Size	*Requirements*
25 metres and over 15 metres and over but less than 25 metres	A minimum of two hoses and jet/spray nozzles. In any case, a hose and jet/spray nozzle shall be provided for every fire hydrant on the ship. A spare hose shall be provided in addition to such hoses. One hose and jet/spray nozzle for every hydrant fitted on the ship.
The hoses required above shall be in addition to any hoses required in the machinery space.	

SHIPS OF CLASS 2B (cont'd)

Size	*Requirements*
25 metres and over	The enclosed accommodation and service spaces shall be provided with a fixed fire extinguishing installation in accordance with Regulation 12 of the Safety Convention. The Chief Executive Officer may exempt a ship from this requirement where additional fire extinguishers are provided which in the opinion of the Chief Executive Officer provides an equivalent standard of protection as the fixed installation.
25 metres and over 15 metres and over but less than 25 metres	*Fixed Fire Extinguishing Installation-Machinery Space and boiler firing space* There shall be provided for the protection of any space containing: *(a)* any oil-fired boiler, oil fuel settling tank or oil fuel unit; or *(b)* internal combustion type machinery used for main propulsion, or having in the aggregate a total brake power of not less than 750 kW for auxiliary purposes; one of the fixed fire extinguishing installations detailed in Appendix E. A ship fitted with oil fired boilers or internal combustion type machinery used for main propulsion and decked in the way of the machinery space shall be provided with a fixed fire extinguishing installation complying with Appendix E. The Chief Executive Officer may exempt a ship from this requirement where additional fire extinguishers are provided which in the opinion of the Chief Executive Officer provide an equivalent standard of protection.

Portable Fire Extinguisher

Portable fire extinguishers shall comply with Appendix G and be provided as follows:

25 metres and over	*(a)* on each deck, in sufficient numbers that at least 2 portable fire extinguishers are readily available for use in every accommodation and service space between watertight bulkheads. In enclosed accommodation and service spaces above the bulkhead deck, at least one portable fire extinguisher shall be available for use on each side of the deck; and *(b)* at least one portable fire extinguisher in each galley of 45 m^2 deck area or less, and 2 in larger galleys; and *(c)* at least one portable fire extinguisher in each control station; and *(d)* at least 2 portable fire extinguishers, suitable for extinguishing an oil fire, in each boiler room and each space containing any part of any oil fuel installation; and

Less than 25 metres	*(e)* at least 2 portable fire extinguishers in every machinery space containing internal combustion machinery, but sufficient in number and so located that no portable fire extinguisher is more than 10 metres walking distance from any point in the space. The extinguishers shall be suitable for extinguishing oil fires; and *(f)* In each space which is continually manned at sea and which contains internal combustion type machinery used for main propulsion: (i) a foam fire extinguisher of 45 litres capacity or a carbon dioxide fire extinguisher of 15 kilograms capacity together with two portable fire extinguishers; or (ii) a fixed fire extinguishing installation complying with Appendix E together with two portable-fire extinguishers. One for each internal combustion engine, but not less than two. *(g)* Any space containing an oil-fired boiler shall be provided with at least one foam extinguisher of at least 135 litres capacity, or one CO_2 extinguisher of at least 45 kg capacity. *(h)* The extinguishers shall be sufficient in number and so positioned as to be readily available in the event of a fire and shall be capable of directing foam or CO_2 onto any part of a boiler firing space containing oil fuel installations and onto any part of the pressure lubrication system or any part of the casings enclosing pressure lubricated parts of engines, or associated gearing. Portable fire extinguishers shall be provided as follows— *(a)* at least one for each passenger space and each crew space on each deck; and *(b)* at least one in each galley; and *(c)* at least 2 suitable for extinguishing oil fires in each space containing propelling machinery. For every two extinguishers of the same type, one spare charge or replacement extinguisher of the same type shall be provided.
All lengths	Switchboards One portable fire extinguisher suitable for extinguishing electrical fires at each main and emergency electrical switchboard.

SHIPS OF CLASS 2B (cont'd)

Size	*Requirements*
25 metres and over	*Sand* Each boiler firing space shall be provided with the following: *(a)* 0.25 cubic metres of sand or other dry material suitable for quenching oil fires. A scoop shall be provided for distribution; or *(b)* An additional portable fire extinguisher suitable for extinguishing oil fires.
25 metres and over Less than 25 metres 25 metres and over	*Fire Smothering Blankets* Each galley shall be provided with one fire smothering blanket where the galley deck area is less than 15 square metres and two in larger galleys. Each galley shall be provided with one fire smothering blanket and a Fire Bucket with lanyard. For open boats without a galley a fire blanket and a fire bucket with lanyard At least one fire axe and one safety lamp.
25 metres and over	*Fire Patrol* A fire watch (fire rounds) shall be maintained, that is capable of promptly detecting the outbreak of any fire. Each member of the fire watch shall be trained to be familiar with the arrangements of the ship as well as the location and operation of any fire equipment he or she may be called upon to use. Each member of the patrol shall have access to an effective means of two-way communication.
25 metres and over	*Fire control plans* Fire control plans should be clearly exhibited on board the ship, for the guidance of the master and crew
25 metres and over	*Alarm and communication Systems* 1. manual alarms fitted in the accommodation and service spaces where the ship is required to have a fire watch that will enable that patrol to give an alarm immediately to the navigating bridge or fire control station; and 2. a fixed fire detection and alarm system, as applicable, in the accommodation and service spaces of ships not required to have a patrol system, and in such spaces to which a patrol does not have access; and 3. a special alarm, that is operated from the navigation bridge or fire control station, to summon the crew. This alarm may be part of the ship's general alarm system but it shall be capable of being sounded independently of the alarm to the passenger spaces; and 4. a public address system or other effective means of communication that is available throughout the accommodation, service spaces and control stations.

25 metres and over	*Fire crew outfits* shall carry at least 2 fire crew outfits and a breathing apparatus for each fire crew outfit. One of the breathing apparatus may be of the air hose type and one of self-contained type complying with appendix I.
Less than 25 metres	One fire axe and one safety lamp.
All ship length	*Sign* Signs identifying fire fighting appliances and their location shall be provided.

Scales of Firefighting Equipment

SHIPS OF CLASS 3

Size	*Requirements*
25 metres and over	**Fire control Plan** Shall carry a fire control plan
25 metres and over	**Alarm System** 1. shall be provided with a fixed fire detection and alarm system, as applicable, in all accommodation and service spaces other than sanitary spaces and other spaces that, in the opinion of a surveyor, afford no substantial fire risk. 2. shall be provided with a public address system or other effective means of communication that is available throughout the accommodation and service spaces and any control station. **Fire patrol** A fire watch (fire rounds) shall be maintained, that is capable of promptly detecting the outbreak of any fire
1000 tons and over	**Main Fire Pumps** Two fire pumps, complying with Appendix B, each capable of delivering simultaneously one jet of water from each of any two fire hydrants.
500 tons and over but less than 1000 tons	Two fire pumps, complying with Appendix B, each capable of delivering one jet of water from any fire hydrant.
Less than 500 tons but 25 metres and over	One fire pump, complying with Appendix B, capable of delivering one jet of water from any fire hydrant.
Less than 25 metres	One power driving fire pump capable of delivering one jet of water from any hydrant, hose or nozzle with which the ship is supplied in compliance with this paragraph whilst maintaining a pressure of 150 kilo-pascals.

SHIPS OF CLASS 3 (cont'd)

	Emergency Fire pump Emergency Fire pumps shall comply with Appendix C and be provided as follows:
500 tons and over	If a fire in any one compartment could put all the fire pumps out of action a fixed independently driven power operated emergency fire pump, in a position outside that compartment and provided that in any ship of less than 1000 tons an emergency fire pump may be a portable power driven fire pump.
Less than 500 tons but 25 metres and over	If the main fire pump and its source of power and sea connection are not situated outside the machinery space, a power driven or manually operated emergency fire pump in a position outside that compartment.
	Fire, Water service pipes, Hydrants (other than hydrants and boiler and machinery spaces) and Jets of Water
1000 tons and over	Shall comply with Appendix D and provide at least two jets of water in accordance with sub-item 1.3 of that Appendix.
Less than 1000 tons but 25 metres and over	Shall comply with Appendix D and provide two jets of water in accordance with sub-item 1.3 of that Appendix.
Less than 25 meters	Shall comply with Appendix D and provide one jet of water in accordance with sub-item 1.4 of that Appendix.
500 tons and over	**Hydrants in Boiler and Machinery Spaces** Two hydrants together with hoses and fittings in each space containing oil-fired boiler or internal combustion machinery-one on the port side and one on the starboard side. Where there is access to the space by shaft tunnel one hydrant shall be provided in the end of the tunnel adjacent to that space and supply to the hydrant shall be from a source outside of the space and the supply line shall not pass through that space.

SHIPS OF CLASS 3 (cont'd)

Size	*Requirements*
1000 tons and over	**Hoses** Fire hoses together with their fittings shall comply with Appendix D and be provided as follows: One for each 30 metres length of ship, but in any case not less than five. The total length of the hoses shall be at least 60 percent of the length of the ship. A spare hose shall be provided in addition to such hoses.
Less than 1000 tons but 25 metres and over	Two, the total length of which shall be at least 50 per cent of the length of the ship. A spare hose shall be provided in addition to such hoses.
Less than 25 metres	One hose All hose connections shall be inter-connectable.
50 metres and over	**Fire hydrants** Machinery space is to be provided with 2 fire hydrants, 1 port and 1 starboard; and Where there is access to a machinery space from a shaft tunnel, 1 fire hydrant provided in the shaft tunnel at the entrance to the machinery space.
25 metres and over but less than 50 metes	Machinery space is to be provided with 1 hydrant

2000 tons and over	**Fixed Fire Extinguishing Installation-Cargo Space** There shall be provided a fixed fire smothering installation complying with Appendix E which shall be so arranged as to protect every cargo space. Provided that in any tanker, a fixed installation discharging foam externally and through suitable mobile sprayers internally to the liquid cargo tanks complies with Appendix E it may be substituted for the fixed fire smothering gas installation required by the above. The Chief Executive Officer may exempt any ship from the requirements to provide a fixed fire smothering installation in the cargo holds of a ship, not being the tanks of a tanker, if it is satisfied that- The holds are provided with steel hatch covers and effective means of closing all ventilators and other openings to the holds, or coal, grain or such other cargo as the Chief Executive Officer may consider to be of equivalent low hazard, or To require compliance would be unreasonable on account of the short duration of the voyages on which the ship is engaged.
25 metres and over 15 metres and over but less than 25 metres	**Fixed Fire Extinguishing Installation- Machinery Space** There shall be provided for the protection of any space containing: *(a)* any oil-fired boiler, oil fuel settling tank or oil fuel unit; or *(b)* internal combustion machinery used for main propulsion; one of the fixed fire extinguishing installations detailed in Appendix E. A ship fitted with oil-fired boilers or internal combustion machinery used for main propulsion shall be provided with a fixed fire extinguishing installation complying with Appendix E. When such a system is installed means shall also be provided for detecting the products of combustion prior to or resulting from an outbreak of fire in the machinery space. The Chief Executive Officer may exempt a ship of less than 25 metres length from this requirement where alternative equivalent means of fire extinction, such as additional fire extinguishers are provided, to the satisfaction of the Chief Executive Officer.

SHIPS OF CLASS 3 (cont'd)

Size	*Requirements*
500 tons and over	**Non-Portable Foam and CO_2 Extinguishers** *(a)* In each boiler room one foam fire extinguisher of 135 litres capacity or a carbon dioxide fire extinguisher of 45 kilograms capacity. *(b)* In any space containing internal combustion machinery used for main propulsion there shall be provided a foam fire extinguisher of 45 litres capacity of a CO_2 fire extinguisher of 15 kilograms capacity. *(c)* There shall be provided in each space containing steam turbines or enclosed pressure lubricated steam engines used either for main propulsion, foam fire extinguishers of 45 litres capacity or carbon dioxide fire extinguishers of 15 kilograms capacity. The extinguishers shall be of such number and so positioned as to enable foam or carbon dioxide to be directed on to any part of the pressure lubrication system and on to any part of the casings enclosing pressure lubricated parts of the turbines, engines or associated gearing if any. Provided that such extinguishers shall not be required if equivalent protection is provided in such spaces by a fixed fire extinguishing installation fitted in compliance with Appendix E.
Portable Fire Extinguisher Portable fire extinguishers shall comply with Appendix G and be provided as follows:	
500 tons and over	*(a)* on each deck, in sufficient numbers that at least 2 portable fire extinguishers are readily available for use in every accommodation and service space between watertight bulkheads. In enclosed accommodation and service spaces above the bulkhead deck, at least one portable fire extinguisher shall be available for use on each side of the deck; and *(b)* at least one portable fire extinguisher in each crew area; and *(c)* at least one in a galley where the overall deck area is less than 15 square metres and two in larger galleys. *(d)* at least one in each control station. *(e)* at least two in each space containing internal combustion machinery used for main propulsion. The extinguishers shall be suitable for extinguishing oil fires.

	(f) at least two in each space containing steam turbines or enclosed pressure lubricated steam engines used for main propulsion. The extinguishers shall be additional to any provided in compliance with *(d)* above.
	(g) at least two, suitable for extinguishing oil fires, in each firing space and each space containing any part of any oil fuel installation. These shall be in addition to any furnished in lieu of a non-portable foam or CO_2 extinguisher.
25 metres and over but less than 500 tons	*(a)* A sufficient number but not less than two to ensure that one will be readily available for use in any part of the accommodation service spaces, or
	(b) Two, suitable for extinguishing oil fires, in each firing space and each space containing any part of oil fuel installation.
	(c) One in each control station.
	(d) at least two in each unmanned machinery space which contains internal combustion machinery used for main propulsion, The extinguishers shall be suitable for extinguishing oil fires.
	(e) a sufficient number but not less than two to cover manned machinery space which contains internal combustion machinery used for main propulsion and not provided with:
	(i) a foam fire extinguisher of 45 litres capacity or a carbon dioxide fire extinguisher of 15 kilograms capacity together with two portable fire extinguishers; or
	(ii) a fixed fire extinguishing installation com-plying with Appendix E together with two portable fire extinguishers—
15 meters and over but less than 25 meters	1. at least one portable fire extinguisher in each passenger area on each deck; and
	2. at least one portable fire extinguisher for each crew area on each deck; and
	3. at least one portable fire extinguisher in each galley; and
	4. at least 2 portable fire extinguishers that are suitable for extinguishing oil fires, in each space containing propelling machinery
Less than 15 metres	1. at least three, one suitable for extinguishing oil fires for use in the machinery space, one in galley, and one in the accommodation space.

SHIPS OF CLASS 3 (cont'd)

Size	*Requirements*
	Switchboards One portable extinguisher suitable for extinguishing electrical fires, at each main or emergency electrical switchboard.
1000 tons and over	**Sand** Each boiler firing space shall be provided with the following: *(a)* 0.25 cubic metres of sand or other dry material suitable for quenching oil fires. A scoop shall be provided for distribution; or *(b)* An additional portable fire extinguisher suitable for extinguishing oil fires
25 meters and over but less than 1000 tons	*(a)* 0.15 cubic metres of sand or other dry material suitable for quenching oil fires. A scoop shall be provided for distribution; or *(b)* An additional portable fire extinguisher suitable for extinguishing oil fires.
25 meters and over	**Fire Smothering Blankets** One in galley where the overall deck area is less than 15 square metres and two in larger galleys.
	Fireman's Outfits Firemen's outfits shall comply with Appendix H and be provided as follows:
4000 tons and over	at least 3 outfits, with Breathing Apparatus, one of the air hose type and two self-contained type.
2500 tons and over but less than 4000 tons	at least 2 outfits with Breathing Apparatus, one of air hose type and one self-contained type.
500 tons and over but less than 2500 tons	at least one outfit to include a breathing apparatus of the self-contained type.
500 tons and over	**International Shore Connection** One complying with Appendix J
Less than 25 metres	**Fire Buckets** 2 with lanyards
Less than 500 tons but 25 metres and over	**Fireman's Axe** At least one

PART 3—TYPES OF FIRE FIGHTING EQUIPMENT

Appendix	Title
A	Fire Detection Systems
B	Power Operated Fire Pumps
C	Emergency Fire Pumps
D	Fireman's, Water Service Pipes, Hydrants, Hoses and Nozzles
E	Fixed Fire Extinguishing Installations
F	Fire Extinguishers
G	Fireman's Outfits
H	Breathing Apparatus
I	International Shore Connection
J	Fire Buckets
K	Portable Foam Applicator Equipment
L	Fire Control Plan
M	Signage
N	Maintenance and operation instructions
O	Standards

APPENDIX A

FIRE ALARM AND FIRE DETECTION SYSTEM

A1.0 General

A1.1 Every fire detection system fitted in compliance with this paragraph shall be capable of automatically indicating the presence of smoke or fire and its location. The indicators shall be centralized either on the navigating bridge or at other control stations which are provided with direct communication with the navigating bridge provided that the Marine Board may in any ship permit the indicators to be distributed among several stations if they are satisfied that such arrangements are at least as effective as if the indicators were so centralised.

A1.2 In any passenger ship, electrical equipment used in the operation of any fire detection system fitted in compliance with this paragraph shall be capable of being supplied from two sources of electric power, one of which shall be an emergency source of power.

A1.3 The indicating systems of any fire detection system fitted in compliance with this paragraph shall operate both audible and visible alarms at the stations referred to in item 1.

A1.4 A fixed fire detection and fire alarm system with manually operated emergency buttons/switches call points shall be capable of immediate operation at all times.

A1.5 Power supplies and electrical circuits necessary for the operation of such a system shall be monitored for loss of power or fault conditions as appropriate. Occurrence of a fault condition shall initiate a visual and audible fault signal at the control panel. The fault signals shall be distinct from the ship's fire signals.

A1.6 There shall be at least two sources of power supply for the electrical equipment used in the operation of the system, one of which shall be from the emergency source of power required by maritime regulations. Separate feeders reserved solely for that purpose shall provide the supply. Such feeders shall run to an automatic change-over switch within or adjacent to the control panel for the fire detection system.

A1.7 Detectors and manually operated call points shall be grouped into paragraphs. The activation of any detector or manually operated emergency button/switch shall initiate a visual and audible fire signal at the control panel and indicating units. If the signals have not received attention within two minutes, an audible alarm shall be automatically sounded throughout the crew accommodation spaces and service spaces, control stations and machinery spaces of Category A.

A1.8 The control panel shall be located on the navigation bridge or in the main fire control Station.

A1.9 Indicating units shall denote the paragraph in which a detector or manually operated call point has operated. At least one unit shall be located so that it is easily accessible to a responsible member of the crew at all times when at sea or in port, except when the ship is out of service. One indicating unit shall be located on the navigation bridge if the control panel is located in the main fire control station.

A1.10 Clear information shall be displayed on or adjacent to each indicating unit about the spaces covered and the location of each paragraph.

A1.11 If a paragraph of detectors in the system does not incorporate means of remotely identifying each detector individually, that paragraph shall not serve:

(a) more than one deck within accommodation spaces, service spaces and control stations, except in the case of an enclosed stairway; and

(b) more than 50 enclosed spaces; and

(c) in the case of a passenger ship, both sides of the ship or more than one main vertical zone.

A1.12 If the system incorporates the means of remotely identifying each detector individually in a passenger ship, a paragraph shall not serve more than one main vertical zone.

A1.13 A paragraph of fire detectors that covers a control station, a service space, or an accommodation space shall not include a machinery space of Category A.

A1.14 Detectors shall be operated by heat, smoke, or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be accepted by the Chief Executive Officer or a surveyor, provided that they are no less sensitive than such detectors. Flame detectors shall only be used in addition to smoke or heat detectors.

A1.15 Instructions and component spares for testing and maintenance of the system shall be provided to the satisfaction of the surveyor.

A1.16 The function of the system shall be periodically checked and tested annually to the satisfaction of a surveyor by means of-

(a) equipment producing hot air at the appropriate temperature; or

(b) smoke or aerosol particles having the appropriate range of density or particle size; or

(c) other phenomena associated with incipient fires to which the detector is designed to respond.

The detectors referred to in sub paragraph (A1.11) shall be able to be tested for correct operation and restored to normal working order without the renewal of any component.

A1.17 The system shall not be used for any purpose other than for that which it is designed, except that closing of fire doors and similar functions may be permitted at the control panel.

A1.18 Any system with a zone address identification capability shall be so arranged that—

(a) a loop cannot be damaged at more than one point by a fire; and

(b) means are provided to ensure that any fault (for example, a power break, short circuit, or earth) occurring in the loop will not render the whole loop ineffective; and

(c) the initial configuration of the system is restored in the event of failure (electrical electronic, informatic); and

(d) the first initiated fire alarm will not prevent any other detector from initiating further fire alarms.

A1.19 A fixed fire detection and fire alarm system shall comply with paragraph A2 to paragraph A5.

A2.0 Installation

A2.1 Manually operated call points shall be installed throughout the accommodation spaces, service spaces, and control stations. One manually operated emergency button/switch shall be located at each exit. Manually operated emergency button/switch call points shall be readily accessible in the corridors of each deck so that no part of the corridor is more than 20 metres from a manually operated emergency button/switch call point.

A2.2 Smoke detectors shall be installed in all stairways, corridors and escape routes within accommodation spaces.[1]

A2.3 Where a fixed fire detection system and fire alarm system is required by maritime regulations for the protection of spaces other than those specified in sub paragraph A 2.2, at least one detector complying with sub paragraph A1.14 shall be installed in each such space.

A2.4 Detectors shall be located—

(a) for optimum performance; and

(b) so as to avoid positions—

(i) near beams and ventilation ducts or other positions where patterns of air flow could adversely affect performance; and

(ii) where impact or physical damage is likely.

Detectors which are located in overhead positions shall be at least 0.5 metres away from bulkheads.

A2.5 The maximum spacing of detectors shall be in accordance with the table below.

[1] *consideration should be given to the installation of special purpose smoke detectors within ventilation trunks.*

Type of Detector	Maximum floor area per detector	Maximum distance apart between centres	Maximum distance away from bulkheads
Heat	37m^2	9m	4.5m
Smoke	74m^2	11m	5.5m

A2.6 The Chief Executive Officer or the Manager Ships Inspection may require or permit other spacing based on test data which demonstrate the characteristics of the detectors or according to manufacturer's specification.

A2.7 Electrical wiring which forms part of the system shall be so arranged as to avoid galleys, machinery spaces, and other enclosed spaces of high fire risk, except where it is necessary to provide for fire detection or fire alarm in such spaces or to connect to the appropriate power supply.

A2.8 The system shall be maintained in accordance with the applicable requirements of New Zealand standard NZS 4512:1997 Fire Alarm Systems in Buildings.

A3.0 Design requirements

A3.1 Any fixed fire detection and fire alarm system and its equipment shall be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact, and corrosion normally encountered in ships.

A3.2 The Smoke detectors required by sub paragraph A2.2 shall be certified-

(a) to operate before the smoke density exceeds 12.5 percent obscuration per metre; and

(b) not to operate until the smoke density exceeds 2 percent obscuration per metre.

Smoke detectors installed in other spaces shall operate within sensitivity limits to the satisfaction of the Chief Executive Officer or a surveyor, having regard to the avoidance of detector insensitivity or oversensitivity.

A3.3 Heat detectors shall be certified-

(a) to operate before the temperature exceeds 78°C; and

(b) not to operate until the temperature exceeds 54°C, when the temperature is raised to those limits at a rate less than 1°C per minute. At higher rates of temperature rise, the heat detector shall operate within the temperature limits to the satisfaction of the Chief Executive Officer or a surveyor, having regard to the avoidance of detector insensitivity or oversensitivity.

A3.4 The permissible temperature of operation of heat detectors may be increased to 30°C above the maximum deck head temperature in drying rooms and similar spaces of normal high ambient temperature.

A4.0 Special requirements for periodically unattended machinery spaces

A4.1 In addition to the requirements of sub paragraphs A1.1- A3.4, a fixed fire detection and fire alarm system for periodically unattended machinery spaces shall be so designed, and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces under-

(a) any normal conditions of operation of the machinery; and

(b) any variations in ventilation as required by the possible range of ambient temperatures.

A4.2 Detection systems using only thermal detectors are not permitted, except in spaces of restricted height and in other spaces where a surveyor considers their use is especially appropriate.

A4.3 The detection system shall initiate audible and visual alarms, distinct in both respects from the alarms of any other system on the ship not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the navigation bridge by a responsible engineer officer. When the navigation bridge is unmanned, the alarm shall sound in a place where a responsible member of the crew is on duty.

A4.4 After installation, the system shall be tested under varying conditions of engine operation and ventilation.

A5.0 Special requirements for cargo spaces

A5.1 In addition to the requirements of sub paragraphs A1.1- A3.4, any fixed fire detection and fire alarm system for cargo spaces shall comply with the following requirements:

(a) detectors shall be grouped into separate paragraphs, with each paragraph–

(i) covering no more than one cargo space; and

(ii) containing no more than 100 detectors:

(b) the type, number, and spacing of detectors shall be to the satisfaction of the Chief Executive Officer or a surveyor taking into account the conditions of ventilation and other factors prevailing in the space in which the detectors are installed:

(c) in special Category A spaces and ro-ro cargo spaces, the system shall be capable of rapidly detecting the onset of fire. After being installed, the system shall be tested under normal ventilation conditions and shall give an overall response time to the satisfaction of the Chief Executive Officer or a surveyor.

A6.0 Exemptions

A6.1 The Chief Executive Officer may exempt any ship from the requirements of this Appendix if the Chief Executive Officer is satisfied that to require compliance would be unreasonable on account of the short duration of the voyage on which the ship is engaged.

APPENDIX B

POWER OPERATED FIRE PUMPS

B1.0 Each pump required under this paragraph shall be capable of delivering at least one jet simultaneously from each of any two hydrants, or one jet from any hydrant, whichever the case may be, through the hoses and nozzles provided in the ship and shall comply with the requirements of items 2 and 3 of this Appendix.

B2.0 In a passenger ship to which this paragraph applies which is required by this paragraph to be provided with fire pumps operated by power, such fire pumps (other than any emergency fire pump) shall together be capable of delivering for firefighting purposes a quantity of water, under the conditions and at the pressure specified in Appendix D of this paragraph of not less than two thirds of the quantity required to be dealt with by the bilge pumps.

B3.0 In a ship, other than a passenger ship, to which this paragraph applies which is required by this paragraph to be provided with fire pumps operated by power, such fire pumps (other than any emergency fire pump) shall together be capable of delivering for firefighting purposes a quantity of water under the conditions and at the pressure specified in Appendix D which shall not be less than the quantity obtained from the following formula:

$$\text{Quantity of water in tonnes per hour} = Cd^2$$

Where:

(a) $C = 7.66 \times 10^{-3}$ for ships required to be provided with more than one fire pump (excluding any emergency fire pump) and $C = 3.83 \times 10^{-3}$ for ships required to be provided with only one fire pump, and

(b) $d = 25 + 1.68\sqrt{L(B+D)}$ to the nearest millimetre where:

L=length of the ship in metres

B=greatest moulded breadth of the ship in metres

D= moulded depth of ship to bulkhead deck in metres.

Provided that in no cargo ship need the total required capacity of the fire pumps exceed 180 cubic metres per hour.

B4.0 Every fire pump required by this paragraph to be operated by power shall, except as expressly provided otherwise, be operated by a means other than the ship main engines. Fire pumps complying with this Appendix maybe sanitary, ballast, bilge or general service pumps provided that they are not normally used for pumping oil and that if they are subject to occasional duty for the transfer or pumping of oil, suitable change-over arrangements are fitted that are acceptable to the Chief Executive Officer or a surveyor and operating instructions are conspicuously displayed at the changeover position.

B4.1 In a ship to which this paragraph applies which is required to be provided with more than one fire pump operated by power (other than any emergency pump), every such fire pump shall have a capacity of not less than 80 per cent of the total capacity of the fire pumps required by items 2 and 3 divided by the number; of fire pumps required by this paragraph provided that when more fire pumps operated by power than are required by this paragraph are provided in any ship, the Chief Executive Officer may permit the capacity of any such additional fire pumps to be less than 80 per cent.

B4.2 Every fire pump required by this paragraph which is operated by power shall be capable of producing from any fire hydrant or hydrants in the ship at least the minimum number of jets of water as appropriate to the size and class of ship, while maintaining the pressure required by Appendix D.

B5.0 Relief valves shall be provided in conjunction with all fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of the fire main, water service pipes, hydrants and hoses. Such valves shall be so placed and adjusted as to prevent excessive pressure in any part of the fire main system.

B6.0 Every centrifugal pump which is connected to the firemain shall be fitted with a non-return valve.

———

APPENDIX C

C1.0 Emergency Fire Pumps

The emergency fire pump shall be—

C1.1 **A fixed independently driven power operated pump**.

C1.1.1 The sea suction valve, suction pipeline, and delivery pipeline shall not be located in or pass through the machinery space housing the main fire pump.

C1.1.2 The pump shall be capable of producing at least one jet of water from any hydrant, hose and nozzle with which the ship is supplied in compliance with this paragraph while maintaining a pressure of at least 200 kilopascals at any hydrant in the ship.

C1.1.3 The capacity of the pump shall be—

(i) at least 40 percent of the total fire pump capacity; and

(ii) at least 25 cubic metres per hour.

C1.1.4 Any diesel driven power source for the pump shall be capable of being readily started by hand cranking in its cold condition down to a temperature of 0°C. If hand (manual) starting is impracticable, the Chief Executive Officer or a surveyor may permit other means of starting.

C1.1.5 Other means of starting shall be such as to enable the diesel driven power source to be started at least –

(i) six times within a period of 30 minutes; and

(ii) twice within the first 10 minutes.

C1.1.6 Any service fuel tank shall contain sufficient fuel to enable the pump to run on full load for at least three hours. In addition, sufficient reserves of fuel shall be available outside the main machinery space to enable the pump to be run on full load for an additional 15 hours.

C1.2 **a portable independently driven power operated pump**.

The sea suction shall be by means of a portable hose of such length and so fitted and weighted that under all conditions of loading and trim of the ship, and under weather conditions liable to be encountered in service, the suction end of the hose will remain submerged.

C1.2.1 The material of the suction hose shall be suitable for use in a sea water environment and the construction shall be such that the hose will not collapse under the effect of the pump suction. The suction hose and its connections shall be of sufficient strength to withstand any forces imposed when the pump is operating under any conditions likely to be encountered in service.

C1.2.2 The unit shall be of robust construction, designed for pumping sea water and for operation in a marine environment.

C1.2.3 The prime mover shall be a compression ignition engine and the fuel tank shall have a capacity sufficient for a minimum for 3 hours operation at full load.

C1.2.4 The complete unit shall be portable and be capable of being handled by two persons. The pump shall be self-priming and the strength of construction and fitting shall be sufficient to withstand any forces which may be imposed when the pump is operating.

C1.2.5 The pump shall be stowed in a position where it is readily available for use.

C1.2.6 The pump shall be capable of producing at least one jet of water from any hose and nozzle with which the ship is supplied, in compliance with this paragraph while maintaining a pressure of at least 300 kilopascals at the pump outlet.

C1.3 **a fixed manually operated pump with a fixed sea suction line**.

C1.3.1 The sea suction valve, suction pipeline and delivery pipeline shall not be located in or pass through the machinery space housing the main fire pumps.

C1.3.2 the unit shall be of robust construction, designed for pumping sea water and for operation in a marine environment. It shall be full rotary, horizontal reciprocating or diaphragm type and shall be capable of delivering the required jet of water when operating at not more than 60 turns per minute in the case of a double acting horizontal reciprocating or diaphragm pump, or 60 double strokes per minute in the case of a single acting horizontal reciprocating or diaphragm pump.

C1.3.3 When fitted in the ship, the pump shall be capable of delivering the required jet of water from any fire hose and nozzle with which the ship is furnished, when the hose and nozzle are coupled to any deck fire hydrant which may discharge water delivered by that pump.

C1.4 **a fixed or portable manually operated pump with a portable sea suction line.**

C1.4.1 The sea suction shall be means of a portable hose of such length and so fitted* and weighted that under all conditions of loading and trim of the ship, and under weather conditions liable to be encountered in service the suction end of the hose will remain submerged.

C1.4.2 The material of the suction hose shall be suitable for use in a sea water environment and the construction shall be such that the hose will not be collapsed under the effect of the pump suction. The suction hose and its connections shall be of sufficient strength to withstand any forces imposed when the pump is operating under any conditions likely to be encountered in service.

C1.4.3 The unit shall be of robust construction, designed for pumping sea water and for operation in a marine environment. It shall be full rotary, horizontal reciprocating diaphragm type and shall be capable of delivering the required jet of water when operating at not more than 60 turns per minute in the case of a rotary pump 80 single strokes per minute in the case of double acting horizontal reciprocating or diaphragm pump, or 60 double strokes per minute in the case of a single acting horizontal reciprocating or diaphragm pump.

C1.4.4 When fitted in the ship the pump shall be capable of delivering the required jet of water from any fire hose and nozzle with which the ship is furnished, when the hose and nozzle are coupled to any deck fire hydrant which may discharge water delivered by that pump, provided that the nozzle of any hose for use with a manually operated pump shall have a diameter of 9.5 millimetres and reference to a required jet of water in paragraph

C1.4.5 and this paragraph shall mean a jet delivered from the 9.5 millimetres diameter nozzle held horizontally three feet above the deck, the discharged water striking the deck at a distance of not less than 6 metres from the nozzle.

APPENDIX D

FIREMAINS, WATER SERVICE PIPES, HYDRANTS, HOSES AND NOZZLES

D1.0 Fire mains, water service pipes and hydrants

D1.1 In every ship which is required by this paragraph to be provided with fire pumps operated by power, the diameter of the firemain and of the water service pipes connecting the hydrants hereto shall be sufficient for the effective distribution of the maximum discharge required by this paragraph from—

D1.1.1 where only one pump is required that pump;

D1.1.2 where two such pumps are so required, both pumps operating simultaneously; or

D1.1.3 where more than two such pumps are so required, the two largest of such pumps operating simultaneously provided that in any ship other than a passenger ship the diameter of the fireman and of the water service pipes shall be required to be sufficient only for the discharge of 140 cubic metres per hour.

D12 Where the fire pumps required by this paragraph are discharging the quantity of water required by paragraph D1.1 through adjacent fire hydrants in any part of the ship to which are coupled fire hoses fitted with nozzles of sizes specified in item paragraph D2.0 of this Appendix the following minimum pressure shall be capable of being maintained at any hydrant;

D12.1 In any passenger ship—

(a) of 4000 tons and over-310 kpa; or

(b) of 1000 tons and over but less than 4000 tons-275 kpa; or

(c) of less than 1000 tons-200 kpa.

D1.2.2 In any ship other than a passenger ship—

(a) of 6000 tons and over-275 kpa; or

(b) of 1000 tons and over but less than 6000 tons-255 kpa; or

(c) of less than 1000 tons-200 kpa.

D1.3 Where any ship is required by this paragraph to provide two jets of water under the conditions required by this paragraph, hydrants sufficient in number shall be so positioned as to enable at least two jets of water not emanating from the same hydrant, one of which shall be from a single length of hose to reach any part of the ship normally accessible to the passengers or crew while the ship is being navigated and to any store room and any part of any cargo space when empty.

D1.4 Where any ship is required by this paragraph to provide one jet of water under the conditions required by this paragraph, hydrants sufficient in number shall be so positioned as to enable one jet of water from a single length of hose to reach any

part of the ship normally accessible to the passengers or crew while the ship is being navigated, and any store room and any part of any cargo space when empty.

D1.5 The firemain shall have no connections other than those necessary for fire-fighting, washing down including anchor wash.

D1.6 Materials readily rendered ineffective by heat shall not be used for fire mains unless adequately protected. The pipes and fire hydrants shall be so placed that the fire hoses may be easily coupled to them and operated without kinking.

D1.7 In ships which may carry deck cargo, the fire hydrants shall be so placed that they are always readily accessible and the pipes shall be so arranged as far as practicable to avoid risk of damage by such cargo. Unless there is provided one fire hose and nozzle for each fire hydrant in the ship there shall be complete interchangeability of fire hose couplings and nozzles.

D1.8 Valves of the screw lift type or cocks shall be fitted in such positions on the pipes that any of the fire hoses may be removed while the fire pumps are at work.

D1.9 The water pipes shall not be made of cast iron and if made of iron or steel shall be galvanised.

D1.10 Where wash deck lines are not self-draining, suitable drain cocks acceptable to the Chief Executive Officer or a surveyor shall be fitted to avoid damage by frost.

D1.11 When a fire pump required by this paragraph is delivering water through one of the holes and nozzles provided the pressure at any hydrant in the ship shall not exceed 690 kilopascals.

D1.12 In any tanker, isolation valves shall be fitted in the fire main at poop front in a protected position and on the tank deck at intervals of not more than 40 metres to preserve the integrity of the fire main system in case of fire or explosion.

D1.13 In any ship—

(a) isolating valves shall be fitted in an easily accessible position outside the machinery spaces to separate the paragraph of the fire main within the machinery space containing the main fire pump or pumps from the rest of the fire main; and

(b) the fire main shall be so arranged that when the isolating valves are shut all the hydrants on the ship, except those in the machinery space referred to above, can be supplied with water by a fire pump not located in that machinery space through pipes which do not enter that space; and

(c) the Chief Executive Officer or a surveyor may permit short lengths of the emergency fire pump suction and discharge piping to penetrate the machinery space if it is impracticable to route it externally, provided that the integrity of the fire main is maintained by the enclosure of the piping in a substantial steel casing.

D2.0 Hoses and nozzles

D2.1 Fire hoses provided in compliance with this paragraph shall not exceed 18 metres in length except that in ships having a breadth of 27 metres or more the length of the fire hoses for exterior locations and for cargo spaces shall not exceed 27 metres in length. The fire hoses shall be provided with couplings, branch pipes, plain nozzles and other necessary fittings. Fire hoses furnished in boiler and machinery spaces shall in addition be provided with spray nozzles.

D2.2 Fire hoses provided to a Class 1 ship and a Class 2A ship shall be made of closely woven flax, canvas or synthetic material approved by the surveyor.

D2.3 Fire hoses provided to a Class 2B ship shall have a minimum internal diameter of 19 mm which is suitable for a working pressure up to and including 1035 kilopascals.

D2.4 Every fire hose provided in compliance with this paragraph, together with the tools and fittings necessary for its use, shall be kept in a conspicuous position near the hydrants or connections with which it is intended to be used.

D2.5 In ships of Classes 1 and 2, fire hoses provided in compliance with this paragraph shall not be used for any purpose other than extinguishing fire or testing with fire appliances.

D2.5.1 Every ship which is required by this paragraph to be provided with fire pumps operated by power shall be provided with nozzles of 12 mm, 16 mm or 19 mm in diameter or as near thereto in diameter as possible.

D2.5.2 Nozzles are to be of the Jet/spray type capable of producing alternatively, as required, either-

(a) a water spray that is suitable for extinguishing oil fires; or

(b) a plain water jet; and

(c) shall incorporate a shut off facility.

D2.5.3 For machinery spaces and exterior locations, the diameter of the nozzles shall be such as to obtain the maximum possible discharge from the minimum number of jets of water and at the pressure required by this Appendix from the smallest fire pump permitted by sub paragraph D1.3 of this Appendix; provided that the diameter of the nozzles shall not be required to be greater than 19 mm.

D2.5.4 For accommodation and service spaces the diameter of the nozzles shall not be required to be greater than 12 mm.

APPENDIX E

FIXED FIRE EXTINGUISHING INSTALLATIONS

This Appendix applies to every fixed fire extinguishing installation fitted in compliance with this paragraph.

E1.0 General

E1.1 Where an unmanned machinery space is required by this paragraph to be fitted with a fixed extinguishing installation complying with this Appendix, the space shall be fitted with means for detecting the products of combustion prior to or resulting from an outbreak of fire in the space.

E1.2 No part of the control, storage or generating arrangement of any fixed fire extinguishing installation shall be fitted forward of the collision bulkhead in any passenger ship.

E1.3 Every fixed fire extinguishing installation shall be so arranged that a fire in any of the spaces it protects will not render the controls inaccessible or put the installation out of action.

E1.4 If the engine and boiler rooms are not entirely separated from each other by a bulkhead, or if the fuel oil can drain from the boiler room into the engine room, the combined engine and boiler rooms shall for the purpose of this Appendix be regarded as a single space.

E1.5 Operating instructions in clear and permanent lettering shall be affixed to every fixed fire extinguishing installation or in a position adjacent thereto.

E1.6 The fire-extinguishing medium shall be located outside the protected space in a room situated in a safe and readily accessible position and effectively ventilated to the satisfaction of the Chief Executive Officer or a surveyor.

E1.7 The fixed firefighting system shall be provided with an automatic audible warning of the release of any fire-extinguishing medium into any space in which personnel normally work or to which they have access. The period for which the alarm operates before the medium is released shall be acceptable to the Chief Executive Officer or a surveyor.

E1.8 Where an emergency power system is required to be fitted, then the audible alarm shall be connected to both power systems.

E1.9 The automatic release of fixed fire-extinguishing medium is not permitted.

E2.0 Fixed Fire Smothering Gas or Steam Smothering Installations

E2.1 General

E2.1.1 A fixed gas fire-extinguishing system shall not contain any fire-extinguishing medium that in itself or under expected conditions of use gives off other toxic gases in such quantities as to endanger personnel.

E2.1.2 In every such installation provided for the injection of gas or steam into machinery or cargo spaces for fire extinguishing purposes, the pipes for conveying the gas or steam shall be provided with control valves or cocks, which shall be so placed that they will be easily accessible and not readily cut off from use by an out break of fire. Such control valves or cocks shall be permanently marked to indicate clearly the compartments to which the pipes are led. Suitable provision shall be made to prevent inadvertent admission of the gas or steam into any compartment.

E2.1.3 Where cargo spaces fitted with a gas or steam smothering system for fire protection are used as passenger spaces, the smothering gas or steam pipe connection shall be blanked during service as a passenger space.

E2.1.4 Means shall be provided to close all openings that may admit air or allow gas to escape from a protected space.

E2.1.5 The piping shall be so arranged to provide effective distribution of fire smothering gas or steam. Where steam is used in any hold exceeding 18 metres in length there shall be at least two pipes, one of which shall be fitted in the forward part and one in the after part of the hold. Except in tankers and ships used for the conveyance of coal, pipes for conveying steam shall be fitted with outlets as low as practicable in the space which they serve and as nearly as possible to the centre line of the space.

E2.1.6 In tankers the piping shall be so arranged that the steam or fire smothering gas will be distributed over the surface of the cargo.

E2.1.7 Gas cylinder storage rooms shall be situated in a safe position where there will be no risk to anyone from leakage and otherwise be to the satisfaction of the Marine Board. Readily accessible means to rooms shall be provided where practicable and these shall be from the open deck and in any case be independent of the protected space. Access doors still be gas tight and bulkheads and decks which form the boundaries of such rooms shall be gas tight and adequately insulated. The rooms shall be dry, well lighted and effectively ventilated.

The gas cylinders shall be accessible, effectively secured and shall not be exposed to corrosion or subjected to a temperature exceeding 60 degrees(C).

E2.1.8 The means of control of any fixed gas fire-extinguishing system shall be—

(a) readily accessible;

(b) simple to operate; and

(c) grouped together in as few locations as possible and at positions not likely to be cut off by a fire in a protected space.

At each location, there shall be clear instructions relating to the operation of the system having regard to the safety of personnel.

E2.2 **Carbon Dioxide**

E2.2.1 When carbon dioxide is used as the fire extinguishing medium in cargo spaces, other than ro-ro cargo spaces, the quantity of gas available shall be sufficient to give a minimum volume of free gas equal to 30 per cent of the gross volume of the largest cargo space that is so protected and is capable of being sealed.

E2.2.2 If carbon dioxide is used as the fire-extinguishing medium in ro-ro cargo spaces that are capable of being sealed, the quantity of gas available shall be sufficient to give a minimum quantity of free gas equal to 45 percent of the gross volume of the largest such cargo space. The arrangements shall enable two thirds of the gas to be discharged into the space within 10 minutes.

E2.2.3 When carbon dioxide is used as the fire-extinguishing medium in machinery spaces and cargo pump rooms, the quantity of gas available shall be sufficient to give a minimum of free gas equal to the larger of the following quantities:

(a) 40 percent of the gross volume of the largest machinery space so protected, such space being measured up to the level at which the horizontal area of the casing is 40 percent or less of the gross area of such space measured midway between the tank top and the lowest part of the casing; or

(b) 35 percent of the gross volume of the largest machinery space so protected, including the casing; provided that-

(i) the percentages referred to in sub paragraphs E2.2.3*(a)* and E2.2.3*(b)* may be reduced to 35 percent and 30 percent respectively for any ship of under 2,000 tons gross tonnage, not being a passenger ship; and

(ii) if two or more machinery spaces are not entirely separate, they shall be considered to form one space.

E2.2.4 In calculating the gross volume of a machinery space in a motor ship in which a main engine starting air tank is fitted there should be added to the volume of the space a volume equivalent to the volume of air at atmospheric pressure which may be released into the machinery space from a relief valve of fusible plug on that tank.

E2.2.5 When carbon dioxide is used as the extinguishing medium both for cargo spaces and for spaces containing boilers or machinery, the quantity of gas shall not be required to be more than the maximum required either for the largest cargo compartment or machinery space.

E2.2.6 The volume of free carbon dioxide gas shall be calculated at 0.56 cubic metres per kilogram.

E2.2.7 When carbon dioxide is used as the extinguishing medium for any space containing boilers or machinery, the fixed piping system shall be such that 85 percent of the gas required to provide the concentration for the space concerned, can be discharged into the space within two minutes.

E2.2.8 Any carbon dioxide system installed immediately after coming into force of these regulations shall comply with the following requirements:

(a) two separate controls shall be provided for releasing carbon dioxide into a protected space and to ensure the activation of the alarm. One control shall be used to discharge the gas from its storage containers. A second control shall be used for opening the valve of the piping that conveys the gas into the protected space; and

(b) the two controls shall be located inside a release box clearly identified for the particular space. If the box containing the controls is to be locked, a key to the box shall be in a conspicuous breakglass-type enclosure adjacent to the box.

E2.3 **Other or equivalent gas systems**

E2.3.1 When gas other than carbon dioxide is produced on a ship and is used as a fire extinguishing medium, it shall be a gaseous product of fuel combustion in which the oxygen content, the carbon monoxide content, the corrosive elements and any solid combustible elements have been reduced to a practicable minimum.

E2.3.2 When such gas is used as the fire-extinguishing medium in a fixed fire-extinguishing system for the protection of machinery spaces and cargo pump rooms, it shall give protection equivalent to that provided by a fixed system using carbon dioxide as the medium. The equivalent fixed gas fire-extinguishing system shall comply with the requirements of the International Maritime Organisation's Maritime Safety Committee circular MSC/Circ.848 *Revised Guidelines for the Approval of Equivalent Fixed Gas Fire Extinguishing Systems, as referred to in SOLAS 74, for Machinery Spaces and Cargo Pump-Rooms*.

E2.3.3 When such gas is used as a fire-extinguishing medium for the protection of cargo spaces, except cargo oil tanks, a sufficient quantity of such gas shall be available to supply hourly, for a period of 72 hours, a volume of free gas at least equal to 25 percent of the gross volume of the largest space protected in this way.

E2.4 Periodic Testing of CO_2 Fixed Installation Systems

E2.4.1 Periodic testing of CO_2 pipings

E2.4.1.1 Five (5) yearly routine test:

(a) At intervals of not more than 5 years, a carbon dioxide fire extinguishing installation shall be subjected to the tests described below

(b) The servo - cylinders and any remote controlled stopcocks to be tested by opening one pilot cylinder. The battery shall be uncoupled for the purpose

(c) The proper operation and correct connections to the cargo holds to be checked.

(d) The entire installation to be checked to make sure that it is operational.

(e) The spring-loaded safety valves shall be also checked and reset to 180 kg/cm.

(f) The alarm system shall be tested to make sure that it functions properly.

E2.4.1.2 Ten (10) yearly routine test:

(a) At intervals of not more than 10 years, the paragraph of a carbon dioxide fire extinguishing system, which can be shut off, shall be tested with carbon dioxide or air at a minimum pressure of 25kg/cm^2; and

(b) All the tests described in sub paragraph E2.4.1.1 above.

E2.4.1.3 Fifteen (15) yearly routines:

(a) The piping shall be pressure tested as follows:—

(i) The high pressure paragraph up to and including the engine room, boiler room or pump room stopcock and up to and including the operating valves or cocks to the cargo holds: At a pressure of at least 190 kgf/cm^2 using a suitable liquid.

(ii) The medium pressure paragraph (open ended pipes where they run through accommodation spaces, together with the paragraph of the main supply line running to the engine room, boiler room or pump room between the stopcock and the room concerned):

At a pressure of at least 80 kgf/cm^2 using a suitable liquid

(iii) Low pressure paragraph (other pipes with open ends): With air at a pressure of at least 6 kgf /cm^2

NOTE: Pipes running from the pilot cylinders to the servo-cylinders and the paragraphs of pipes to deep tanks, which can be shut off, shall be considered as part of the high-pressure system. Pipe paragraphs and valves tested hydraulically with water shall be blown dry with air.

(b) The servo-cylinders and any remote-controlled stopcocks to be tested by opening 1 pilot cylinder. The battery shall be uncoupled for the purpose;

(c) The alarm system to be tested with the engine operating to full capacity;

(d) The setting of the spring loaded safety valves at 180 kgf/cm^2;

(e) The proper operation and correct connections to the cargo holds to be checked;

(f) The free flow of carbon dioxide out of the nozzles into the engine room, boiler room or pump room to be checked by opening one or more cylinders of the battery or by using air at a minimum pressure of 25 kgf/cm^2;

(g) The entire installation to be checked to make sure that it is operational;

NOTE: The high-pressure paragraph that can be shut off, the stopcocks and the controls to be checked for tightness under operational conditions by opening one cylinder of the battery. This check may be omitted if the equipment is intended solely for the engine room and consists of not more than 15 cylinders.

E2.4.2 Periodical Tests after repairs:

When extensive repairs or modifications are carried out, the part of the carbon dioxide fire extinguishing equipment involved shall be subjected to the tests described in 15 yearly routines above, in so far as they are applicable.

E2.4.3 Inspections of the CO_2 installation systems:

E2.4.3.1 At intervals of 24 months the whole installation shall be inspected externally to the extent that this is possible and CO_2 lines blown through with air.

E2.4.3.2 Before servicing, shipping owners or operators and service stations will notify the Chief Executive Officer of the periodical pressure testing of the CO_2 system. The surveyors are required to witness the hydraulic pressure testing. The servicing of CO_2 systems shall be carried out by the fire appliances service centres approved by the Chief Executive Officer.

E2.4.4 Periodical Inspection of Carbon Dioxide Cylinders

E2.4.4.1 Each carbon dioxide cylinder shall be inspected internally and tested at prescribed pressure on the 10th anniversary of the cylinders initial test after manufacture. If on the 10th anniversary of the cylinders inspection and testing there is no unacceptable defects, the inspection and test period may be extended until the 20th anniversary. After the 20th anniversary of the cylinders initial inspection and testing, the cylinder will be re-examined and tested at intervals of 5 years. The date of testing and stamp shall be placed on the cylinder.

E2.4.4.2 Carbon dioxide cylinders, which exhibit a permanent increase in volume after being pressure tested, shall be condemned.

E2.4.4.3 Before refilling the riser tube shall be inspected visually

E2.4.4.4 The valve shall also be tested for gas-tightness and if appropriate ensure that it is movable.

E2.4.4.5 Statement shall be issued by the service centres to the effect that each cylinder is filled with the prescribed quantity of carbon dioxide.

NOTE: Before servicing ship owners, operators and service stations shall notify the Chief Executive Officer of the carrying out of hydraulic testing of cylinders. The servicing of CO_2 bottles shall be carried out by the approved service centre only. Surveyors are required to witness the hydraulic pressure testing, and a service certificate shall be issued by the approved service centre.

E2.4.5. Periodical check of the Gas Content of Carbon Dioxide Cylinders

E2.4.5.1 The gas content of such carbon dioxide cylinder shall be checked at intervals of not more than 2 years by weighing or in some other manner, a maximum weight reduction of 5 per cent may be allowed, provided the total quantity of carbon dioxide is never less than the prescribed minimum.

E2.4.5.2 The approved fire appliances servicing centre shall undertake the weighing of the CO_2 cylinders and issue the weighing certificate.

E2.4.5.3 The ship owner or operator and fire appliances service centres are required to notify the Chief Executive Officer of the weighing which shall be witnessed by the surveyor. In case of non-availability of a surveyor, the fire appliances servicing centre may carry out weighing of CO_2 bottles on approval by the Chief Executive Officer. Subject to when the surveyor is available, he or she shall carry out weighing of CO_2 bottles on sample basis to his satisfaction.

E3.0 Fixed Low Expansion Foam Fire Extinguishing Installation

E3.1 Every fixed foam fire extinguishing installation fitted in compliance with this paragraph shall be capable of discharging through fixed discharge outlets in not more than 5 minutes, a quantity of foam sufficient to cover to a depth of 150 millimetres the largest single area over which oil fuel is liable to spread.

E3.2 Such installation shall be capable of generating foam suitable for extinguishing oil fires and means shall be provided for—

(a) the effective distribution of the foam through a permanent system of piping and control valves or cocks to discharge outlets to the satisfaction of the surveyor;

(b) for the foam to be effectively directed by fixed sprayers on other main oil fire hazards in the protected space either simultaneously or separately. Such

installation shall include mobile sprayers ready for immediate use in the firing area of the boiler and in the vicinity of the oil fuel unit.

(c) The expansion ratio of the foam shall not exceed 12 to 1.

E3.3 Every fixed foam fire extinguishing installation fitted in lieu of fixed fire smothering gas installation required in this paragraph to be provided in the oil cargo spaces of any tanker shall be capable of distributing on the decks over the oil cargo tanks through fixed discharge outlets in not more than 15 minutes a quantity of foam sufficient to cover to a depth of at least 50 millimetres the whole of the tank deck area. Such installation shall be capable of generating foam suitable for extinguishing oil fires and means shall be provided for the effective distribution of the foam through a permanent system of piping and control valves or cocks to discharge outlets. There shall be sufficient mobile foam sprayers, capable of being connected to the installation whereby foam can be directed into any tank. For the purpose of this sub-item "tank deck area" means an area equivalent to the extreme length of the cargo tanks multiplied by the breadth of the ship.

E4.0 Fixed High Expansion Foam Fire Extinguishing Installation

E4.1 Every fixed high expansion foam system fitted in compliance with this paragraph, shall be capable of rapidly discharging through fixed discharge outlets a quantity of foam to fill the greatest space to be protected at a rate of at least 1 m in depth per minute. The quantity of foam forming liquid available shall be sufficient to produce a volume of foam equal to five times the volume of the largest space to be protected. The expansion ratio of the foam shall not exceed 1000 to 1.

E4.2 Supply ducts for delivering foam, air intakes to the foam generator and the number of foam-producing units shall provide effective foam production and distribution to the satisfaction of the Chief Executive Officer or a surveyor.

E4.3 The arrangement of the foam generator delivery ducting shall be such that a fire in the protected space will not affect the foam generating equipment.

E4.4 The foam generator, its source of power supply, its foam forming liquid and control system shall be;

(a) readily accessible;

(b) simple to operate; and

(c) located so that it is not likely to be cut off by the fire.

E5.0 Fixed Pressure Water Spraying System for machinery space

General

E5.1 A fixed water mist system for use in machinery spaces and cargo pump rooms shall comply with the requirements of the Annex to the International Maritime Organisation's Maritime Safety Committee circular MSC/Circ.668 *Alternative Arrangements for Halon Fire-Extinguishing Systems in Machinery Spaces and Pump Rooms*.

E5.2 A fixed pressure water spraying system fitted in compliance with this paragraph shall be provided with a pump, piping system, control valves and spraying nozzles. On the discharge side of the control valves the distribution system shall be of the dry pipe type.

E5.3 The pump provided for machinery space protection shall not be used for any other purpose, except that the Chief Executive Officer or a surveyor may permit the pump to be used for supplying cargo pump room or cargo space water spraying systems. For cargo pump room protection, the water supply may be from the ship's main fire pumps, provided such pumps comply with the requirements of paragraphs E5.4, E5.5 and E5.6

Spraying Nozzles

E5.4 The spraying nozzles shall be of such a type, sufficient in number and so arranged as to ensure an effective distribution of water spraying such as will effectively extinguish oil or fire in the spaces protected in accordance with table 5 below.

E5.5 Spraying nozzles shall be fitted above bilges, tank tops and other areas over which oil fuel is liable to spread and above other main fire hazards in the spaces to be protected.

E5.6 Means shall be provided to prevent nozzles from becoming clogged by impurities in the water, and corrosion of piping, nozzles, valves and pumps.

Application rates for protected areas are listed in Table 5.2

Table 5.2

Protected Areas	*Min application rate in litres per square metres/ minute*
Boiler fronts or roof firing areas oil fuel units, centrifugal separators oil fuel purifies and clarifiers	20
Hot oil fuel pipes near exhaust pipes or similar heated main or auxiliary diesel engines	10
Tank top area, oil tanks not forming part of the ship's surfaces on main or auxiliary structure	5
Cargo pump rooms	10

Systems distribution and control for fixed water spraying system

E5.7 The water spraying system may be divided into sections and shall be controlled from distribution manifolds, the valves of which shall be capable of being operated from easily accessible positions outside the spaces to be protected and which will notbe readily cut off by an outbreak of fire.

Pumps and piping for fixed water spraying system

E5.8 The water spraying system shall:

(a) be kept charged up to the distribution manifold at the necessary pressure and the pump supplying water for the system shall be automatically put into action by a pressure drop in the system; or

(b) be arranged such that the pump supplying water for the system is capable of being started at each distribution control valve operating position.

E5.9 The pump shall be capable of supplying water at the necessary pressure simultaneously to all sections of the water spraying system in any one compartment to be protected. The pump and its controls shall be installed outside the space or spaces to be protected.

E5.10 Where a ship is provided with a fixed water spray system for the protection of more than one space with supply from a single pump, the pump capacity need only be sufficient for the largest single space.

E5.11 Means shall be provided to prevent the pump, piping, nozzles and valves becoming clogged by impurities in the water or by corrosion. A strainer shall be fitted on the suction side of the pump.

E5.12 The piping system shall be of a corrosion resistant material, for example galvanised steel, and as the "dry pipe" principle is involved due regard shall be paid to heat resistance of material used and the possibility of it being subject to very high temperature to the introduction of water.

E5.13 The water spraying system shall include mobile sprayers ready for immediate use in the firing area of the boiler or in the vicinity of the oil unit.

E5.14 The system shall be so arranged that it shall not be possible for a fire in the space or spaces protected to put the system out of action.

E5.15 No part of the water spraying system shall be situated forward of the collision bulkhead in any passenger ship.

E6.0 Fixed pressure water spraying systems for cargo spaces

General

E6.1 A fixed pressure water spraying system shall include a pump, piping system, control valves and spraying nozzles.

Spraying nozzles

E6.2 The spraying nozzles shall be of a full bore type and shall be arranged so as to secure an effective distribution of water in the spaces that are to be protected.

E6.3 The system shall provide water application at a rate of at least—

(a) 3.5 litres per square metre per minute for spaces with a deck height not greater than 2.5 metres; and

(b) 5 litres per square metre per minute for spaces with a deck height greater than 2.5 metres.

E6.4 Precautions shall be taken to prevent—

(a) nozzles from becoming clogged by impurities in the water; and

(b) corrosion of piping, nozzles, valves, and pumps.

Systems distribution and control

E6.5 The water spraying system shall cover the full breadth of the protected space, except that in ships where the protected space is subdivided with longitudinal A Class divisions, the breadth of the sections may be reduced accordingly. In ships of 75 metres or more in length or where the length of the enclosed part of the protected space is 50 metres or more, the system may be divided into sections, provided that each section is at least 20 metres in length. In all other ships, the length of a section may be less than 20 metres but not less than 10 metres, provided that the capacity of the pumps is capable of supplying the two largest adjacent sections simultaneously at the application rate required by sub-paragraph E6.3.

E6.6 The distribution valves for the system shall be situated in a position-

(a) which is easily accessible; and

(b) which is adjacent to, but outside, the space to be protected; and

(c) access to which will not be readily cut off by an outbreak of fire within the protected space.

E6.7 Direct access to the distribution valves from the protected spaces and from outside the spaces shall be provided. Adequate ventilation shall be fitted in the space containing the distribution valves.

Pumps and piping

E6.8 The water supply to the system shall be provided by one or more pumps, other than the ship's required fire pumps. The pump or pumps shall be connected to the system by a lockable non-return valve that will prevent a back flow from the system into the fire main.

E6.9 The pump or pumps shall at all times be capable of supplying simultaneously, to all nozzles in the protected space, or to all nozzles in at least two adjacent sections within the protected space, the pressure and quantity of water required to satisfy paragraph E6.2 and E6.3.

E6.10 Each main fire pump shall be capable of being brought into operation by remote control, which may be manually activated, from the position at which the distribution valves are situated.

E6.11 The sea suction of each pump shall be so arranged that, when the ship is afloat, it will not be necessary to shut off the supply of sea water to the pump for any purpose other than the inspection or repair of the pump.

E6.12 The pump suction and discharge valves and any other valves required to be operated to bring the pump into operation shall be locked open or be operable from any control position of the system.

E6.13 A waste valve with a short open-ended pipe shall be fitted between the pump discharge and section control valves for testing purposes.

E6.14 The pipes of the system shall be solid drawn or welded steel or equivalent and they shall be—

(a) hydraulically tested by the manufacturers to twice the working pressure but not less than 20 bar ($2N/mm^2$); and

(b) galvanized internally to prevent corrosion.

E6.15 Fittings such as self-aligning swivel joints and flexible pipes situated within the protected spaces shall not be readily rendered ineffective by heat. Where such fittings are used, at least one spare of each type fitted shall be carried.

E7.0 Inert gas systems

General

E7.1 An inert gas system shall be capable of—

(a) inerting empty cargo tanks and slop tanks by reducing the oxygen content of the atmosphere in each tank to a level at which combustion cannot be supported; and

(b) maintaining—

(i) the atmosphere in any part of any cargo tank or slop tank at an oxygen content not exceeding 8 percent by volume; and

(ii) a positive pressure at all times in port and at sea, except when it is necessary for such a tank to be gas-free; and

(c) eliminating the need for air to enter a tank during normal operations, except when it is necessary for such a tank to be gas-free; and

(d) purging empty cargo tanks and slop tanks of hydrocarbon gas, so that subsequent gas-freeing operations will at no time create a flammable atmosphere within the tank.

E7.2 Inert gas delivery rate and content

The inert gas system shall be capable of delivering inert gas—

(a) to the cargo tanks and slop tanks at a rate of at least 125 percent of the maximum rate of discharge capacity of the ship expressed as a volume; and

(b) with an oxygen content of not more than 5 percent by volume in the inert gas supply main to the cargo tanks and slop tanks at any required rate.

E7.3 Inert gas supply

The inert gas supply may be treated flue gas from the main or auxiliary boilers, from one or more separate gas generators or other sources or from any combination of sources. The Chief Executive Officer or a surveyor may accept systems using inert gases other than flue gas, provided that the Chief Executive Officer or surveyor is satisfied that an equivalent standard of safety is achieved. Systems using stored carbon dioxide are not permitted unless the Chief Executive Officer or a surveyor is satisfied that the risk of ignition from generation of static electricity by the system is acceptable.

E7.4 Isolating valves

Flue gas isolating valves shall be fitted in the inert gas supply mains between the boiler uptakes and the flue gas scrubber. These valves shall be provided with indicators to show whether they are open or shut, and precautions shall be taken to maintain them gastight and keep the seating clear of soot. Arrangements shall be made so that the boiler soot blowers cannot be operated when the corresponding flue gas valve is open.

E7.5 Inert gas scrubbers and filters

E7.5.1 A flue gas scrubber shall be fitted which will—

(a) effectively cool the volume of gas specified in paragraph E7.2; and

(b) remove solids and sulphur combustion products.

E7.5.2 The cooling water arrangements shall be such that an adequate supply of water will always be available without interfering with any essential services on the ship. Provision shall also be made for an alternative supply of cooling water.

E7.5.3 Filters or equivalent devices shall be fitted to minimize the amount of water carried over to the inert gas blowers.

E7.5.4 The flue gas scrubber shall be located aft of all cargo tanks, slop tanks, cargo pump rooms, and cofferdams separating these spaces from machinery spaces.

E7.6 Inert gas blowers and generator

E7.6.1 At least two inert gas blowers shall be fitted that together are capable of delivering to the cargo tanks and slop tanks at least the volume of gas specified in paragraph E7.2.

E7.6.2 In a system provided with a gas generator, the Chief Executive Officer or a surveyor may permit only one blower if the system is capable of delivering the total volume of gas required by paragraph E7.2 to the protected cargo tanks and slop tanks, provided that sufficient spares for the blower and its prime mover are carried on board to enable any failure of the blower and its prime mover to be rectified by the ship's crew.

E7.6.3 Two fuel oil pumps shall be fitted to the inert gas generator, provided that the Chief Executive Officer or a surveyor may permit only one fuel oil pump to be fitted if sufficient spares for the fuel oil pump and its prime mover are carried on board to enable any failure of the fuel oil pump and its prime mover to be rectified by the ship's crew.

E7.6.4 The inert gas system shall be so designed that the maximum pressure which it can exert on any cargo tank or slop tank will not exceed the test pressure of any cargo tank or slop tank. Shut-off arrangements shall be provided on the suction and discharge connections for each blower. Arrangements shall be made to enable the functioning of the inert gas plant to be stabilised before commencing cargo discharge. If the blowers are to be used for gas-freeing, their air inlets shall be provided with blanking arrangements.

E7.6.5 The blowers shall be located aft of all cargo tanks, slop tanks, cargo pump rooms, and cofferdams separating these spaces from machinery spaces.

E7.7 Prevention of inert gas leakage

E7.7.1 The design and location of the scrubber and blowers and their piping and fittings shall be such as to prevent flue gas leakages into enclosed spaces.

E7.7.2 To permit safe maintenance, an additional water seal or other effective means of preventing flue gas leakage shall be fitted between the flue gas isolating valves and scrubber, or incorporated in the gas entry to the scrubber.

E7.8 Regulation of inert gas

E7.8.1 A gas regulating valve shall be fitted in the inert gas supply main. This valve shall be automatically controlled to close as required in sub paragraphs E8.9.3 and E8.9.4. It shall also be capable of automatically regulating the flow of inert gas to the cargo tanks and slop tanks unless means are provided to automatically control the speed of the inert gas blowers required by paragraph E7.6.

E7.8.2 The gas regulating valve shall be located at the forward bulkhead of the most forward gas-safe space through which the inert gas supply main passes.

E7.9 Non-return devices

E7.9.1 At least two non-return devices, one of which shall be a water seal, shall be fitted in the inert gas supply main to prevent the return of hydrocarbon vapour to the machinery space uptakes or to any gas-safe spaces under normal conditions of trim, list and motion of the ship. These devices shall be located between the gas regulating valve required by paragraph E7.8 and the aftermost connection to any cargo

tank, slop tank, or cargo pipeline. The non-return devices shall be located on the cargo area on deck.

E7.9.2 The water seal required by sub-paragraph E7.9.1 shall be capable of being supplied by two separate pumps, each of which shall be capable of maintaining an adequate supply at all times.

E7.9.3 The arrangement of the seal and its associated fittings shall be such that it will prevent back-flow of hydrocarbon vapours and will ensure the proper functioning of the seal under normal operating conditions.

E7.9.4 Provision shall be made to ensure that the water seal is protected against freezing, in such a way that the integrity of the seal is not impaired by overheating.

E7.9.5 A water loop or other arrangement approved by the Chief Executive Officer or a surveyor shall be fitted to all associated water supply piping, dry piping and all venting or pressure sensing piping leading to gas-safe spaces. Means shall be provided to prevent such loops from being emptied by vacuum.

E7.9.6 The deck water seal and all loop arrangements shall be capable of preventing the return of hydrocarbon vapours at a pressure equal to the test pressure of the cargo tanks.

E7.9.7 The second non-return device shall be a non-return valve or equivalent that—

(a) is capable of preventing the return of vapours or liquids or both;

(b) is fitted forward of the deck water seal required by sub-paragraph 7.9.1; and

(c) has—

(i) positive means of closure; or

(ii) an additional valve with positive means of closure that is located forward of the non-return device to isolate the deck water seal from the inert gas main to the cargo tanks and slop tanks.

E7.9.8 As an additional safeguard against the possible leakage of hydrocarbon liquids or vapours back from the deck main, means shall be provided to permit the section of the line between—

(a) the valve having positive means of closure required by sub-paragraph E7.9.7; and

(b) the gas regulating valve required by sub- paragraph E7.8.1, to be vented in a safe manner when the first of those valves is closed.

E8.0 Piping and distribution arrangements

E8.1 The inert gas main may only be divided into two or more branches forward of the non-return devices required by paragraph E7.9.

E8.1.1 The inert gas supply main shall be fitted with branch piping leading to each cargo tank and slop tank. Branch piping for inert gas shall be fitted with either stop valves or equivalent means of control for isolating each tank. Where stop valves are fitted, they shall be provided with locking arrangements that are under the control of a responsible ship's officer.

E8.1.2 In combination carriers, the arrangement to isolate the slop tanks containing oil or oil residues from other tanks shall consist of blank flanges which will remain in position at all times when cargoes other than oil are being carried, except as provided for in the Revised Guidelines for Inert Gas Systems adopted by the Maritime Safety Committee of the International Maritime Organization at its forty-eighth session in June 1983 (MSC/Circ.387).

E8.1.3 Means shall be provided to protect cargo tanks and slop tanks against the effect of overpressure or vacuum caused by thermal variations when such tanks are isolated from the inert gas main.

E8.1.4 Piping systems shall be so designed as to prevent the accumulation of cargo or water in the pipelines under all normal conditions.

E8.1.5 Arrangements shall be provided to enable the inert gas main to be connected to an external supply of inert gas.

E8.2 Ventilation of vapours displaced

The arrangements made for the venting of all vapours displaced from cargo tanks during loading or ballasting shall consist of one or more mast risers or high velocity vents.

E8.3 Arrangements for purging or gas-freeing of empty tanks

E8.3.1 The arrangements for inerting, purging, or gas-freeing of empty tanks as required in paragraph E7.1 shall be approved by the Chief Executive Officer or a surveyor and shall be such that—

(a) the accumulation of hydrocarbon vapours in pockets formed by the internal structural members in a tank is minimized; and

(b) on individual cargo tanks and slop tanks, the gas outlet pipe, if fitted, is positioned as far as practicable from the inert gas/air inlet. The inlet of such outlet pipes shall be located either at deck level or at not more than 1 metre above the bottom of the tank; and

(c) the cross sectional area of the gas outlet pipe referred to in sub-paragraph E8.3.1 *(b)* is such that an exit velocity of at least 20 metres per second can be maintained when any three tanks are being simultaneously supplied with inert gas. The outlets of such tanks shall extend at least 2 metres above deck level; and

(d) each gas outlet referred to in sub- paragraph E8.3.1*(c)* is fitted with blanking arrangements; and

(e) if a connection is fitted between the inert gas supply mains and the cargo piping system, there is an effective isolation between the two systems. The arrangements shall—

(i) consist of two shut-off valves with an arrangement to vent the space between the valves in a safe manner or an arrangement consisting of a spool-piece with associated blanks; and

(ii) take into account any pressure difference that may exist between the systems; and

(f) the valve separating the inert gas supply main from the cargo main on the cargo main side is a non-return valve with a positive means of closure.

E8.4 Pressure relief and vacuum-breaking devices

E8.4.1 One or more pressure relief or vacuum-breaking devices shall be provided to prevent cargo tanks from being subject to-

(a) a positive pressure in excess of the test pressure of the cargo tank, if the cargo were to be loaded at the maximum rated capacity and all other outlets were left shut; and

(b) a negative pressure in excess of 700 millimetres water gauge, if cargo were to be discharged at the maximum rated capacity of the cargo pumps and the inert gas blower were to fail.

E8.4.2 The devices shall be installed on the inert gas main unless they are installed in the venting system or on individual cargo tanks.

E8.5 Temperature measurement

Means shall be provided for continuously indicating the temperature and pressure of the inert gas at the discharge side of the gas blowers whenever those gas blowers are operating.

E8.6 Instrumentation (permanent)

E8.6.1 Instrumentation shall be fitted for continuously indicating and permanently recording the following when the inert gas is being supplied—

(a) the pressure of the inert gas supply main forward of the non-return devices required by paragraph E7.9; and

(b) the oxygen content of the inert gas in the inert gas main on the discharge side of the gas blowers.

E8.6.2 The instruments required by sub paragraph E8.6.1 shall be placed in the cargo control room, provided that if there is no cargo control room on the ship, the instruments shall be placed in a position easily accessible to the officer in charge of cargo operations.

E8.6.3 In addition, meters shall be fitted-

(a) in the navigating bridge to indicate at all times—

(i) the pressure referred to in sub- paragraph 8.6.1*(a)*; and

(ii) the pressure in the slop tanks of combination carriers, whenever those tanks are isolated from the inert gas supply main; and

(b) in the machinery control room or in the machinery space to indicate the oxygen content referred to in sub- paragraph E8.6.1*(b)*.

E8.7 Instrumentation (portable)

Portable instruments for measuring oxygen and flammable vapour concentration shall be provided. In addition, arrangements shall be made on each cargo tank and slop tank so that the condition of the tank atmosphere can be determined using those portable instruments.

E8.8 Calibration

Means shall be provided for the zero and span calibration of both fixed and portable gas concentration instruments required by paragraphs E8.6 and E8.7.

E8.9 Alarms

E8.9.1 For inert gas systems of both the flue gas type and the inert gas generator type, audible and visual alarms shall be provided to indicate-

(a) low water pressure or low water flow rate to the flue gas scrubber required by sub paragraph E7.5.1; and

(b) high water level in the flue gas scrubber required by sub paragraph E7.5.1; and

(c) high gas temperature, measured by the temperature indicators required by paragraph E8.5; and

(d) failure of the inert gas blowers required by paragraph E7.6; and

(e) oxygen content in excess of 8 percent by volume measured by the instrumentation required by sub- paragraph E8.6.1*(b)*; and

(f) failure of the power supply to the automatic control system for the gas regulating valve and to the indicating devices required by E7.8 and sub- paragraph E8.6.1 respectively; and

(g) low water level in the water seal required by sub paragraph E7.9.1; and

(h) gas pressure less than 100 millimetres water gauge, measured by the instrumentation required by sub paragraph E8.6.1*(a)*. The alarm arrangement shall ensure that the pressure in the slop tanks in combination carriers can be monitored at all times; and

(i) high gas pressure as referred to in sub paragraph E8.6.1*(a)*.

E8.9.2 For inert gas systems of the inert gas generator type, additional audible and visual alarms shall be provided to indicate-

(a) insufficient fuel oil supply; and

(b) failure of the power supply to the generator; and

(c) failure of the power supply to the automatic control system for the generator.

E8.9.3 The gas regulating valve and inert gas blowers shall shut down automatically when the predetermined limits for the alarms required by sub paragraphs E8.9.1*(a)*, E8.9.1*(b)* and E8.9.1*(c)* are reached.

E8.9.4 The gas regulating valve shall shut down automatically on failure of the inert gas blowers.

E8.9.5 In relation to sub- paragraph E8.9.1*(e)*, when the oxygen content of the inert gas exceeds 8 percent by volume,—

(a) immediate action shall be taken to improve the gas quality; and

(b) if the quality of the gas does not improve,-

(i) all cargo tank operations shall be suspended so as to avoid air being drawn into the tanks; and

(ii) the non-return device referred to in sub- paragraph E7.9.7 shall be closed.

E8.9.6 The alarms required in sub- paragraphs E8.9.1*(e)*, E8.9.1*(f)*, and E8.9.1*(h)* shall be fitted—

(a) in the machinery space and cargo control room, where provided; and

(b) in each case in such a position that they are immediately received by responsible members of the crew.

E8.9.7 In relation to sub paragraph E8.9.1*(g)*, the Chief Executive Officer or a surveyor shall be satisfied as to—

(a) the maintenance of an adequate reserve of water at all times; and

(b) the integrity of the arrangements to permit the automatic formation of the waterseal when the gas flow ceases. The audible and visual alarm on the low level of water in the water seal shall operate when the inert gas is not being supplied.

E8.9.8 An audible alarm system independent of that required in sub paragraph E8.9.1*(h)* or automatic shutdown of cargo pumps shall be provided to operate when a predetermined limit of low pressure in the inert gas main is reached.

E8.9.9 Detailed instruction manuals shall be provided on board covering the operations, safety, and maintenance requirements and occupational health hazards relevant to the inert gas system and its application to the cargo tank system. The manuals shall include guidance on procedures to be followed in the event of a fault or failure of the inert gas system.

APPENDIX G

FIRE EXTINGUISHERS

G1.0 General provisions

G1.1 Fire extinguishers containing an extinguishing medium which, in the opinion of the Chief Executive Officer, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons shall not be permitted.

G1.2 For the purpose of this paragraph the capacity of any fire extinguisher other than a carbon dioxide fire extinguisher shall be taken to be the greatest volume or weight of extinguishing medium which it can contain when sufficient space is left to ensure the proper operation of the extinguisher.

G1.3 For the purpose of this paragraph the capacity of a carbon dioxide fire extinguisher shall be taken to be the greatest weight of carbon dioxide which it can safely contain in a tropical climate.

G1.4 Every fire extinguisher provided in compliance with this paragraph shall be kept fully charged at all times.

G1.5 Fire extinguishers provided in compliance with this paragraph, other than a carbon dioxide fire extinguisher, shall be tested by hydraulic pressure to within 345 kilopascals of the pressure to which it was tested at the time of its manufacture, and recharged at intervals not exceeding the intervals specified in the table below:

Type of extinguisher	Onboard Inspection	Recharge intervals	Pressure Test interval
Water			
Soda acid	6 monthly	Annual	6 yearly
Gas container	6 monthly	Annual	6 yearly
Stored pressure	6 monthly	3 yearly	6 yearly
Foam			
Chemical	6 monthly	Annual	6 yearly
Gas Container – Premix foam	6 monthly	Annual	6 yearly
Gas Container sealed foam liquid	6 monthly	3 yearly	6 yearly
Stored Pressure	6 monthly	Annual	6 yearly
Foam			
Proportioner	6 monthly	2 yearly	6 yearly
Dry Chemical			
Gas container	6 monthly	6 yearly	6 yearly
Stored pressure	6 monthly	6 yearly	6 yearly
BCF	6 monthly	Annual	Annual

G1.6 Every portable and non-portable carbon dioxide fire extinguisher provided in compliance with this paragraph shall be tested in accordance with standards approved by the Chief Executive Officer and having due regard to the requirements of AS2030, SAA Gas Cylinders Code, except that the interval between tests shall not exceed 6 years. If the extinguisher has been discharged at a time exceeding 2 years after its previous test, it shall be pressure tested prior to recharging and the interval between subsequent tests shall not exceed 6 years.

G1.7 In the case of ships of Classes 1 and 2 which have a length of 25 metres or over, a spare charge shall be provided for every portable fire extinguisher provided in compliance with this paragraph, except that for each such fire extinguisher which is of a type that cannot readily be recharged while the ship is at sea, an additional portable fire extinguisher of the same type, or its equivalent shall be provided in lieu of a spare charge.

G2.0 Portable fire extinguishers

G2.1 Reference to a portable fire extinguisher in this paragraph means a fire extinguisher which does not exceed 25 kilograms in weight in the fully charged condition and that;

G2.1.1 in the case of a fire extinguisher in which the fire extinguishing medium is liquid, has a capacity of not more than 13 and a half litres and not less than 9 litres of liquid;

G2.1.2 in the case of a fire extinguisher in which the fire extinguishing medium is carbon dioxide, has a capacity of not less than 3 kilograms of carbon dioxide, provided that, in the case of a ship less than 7 metres in length, the Chief Executive Officer may allow a capacity of not less than 1 kilogram of carbondioxide; or

G2.1.3 in the case of a fire extinguisher in which the fire extinguishing medium is dry powder, has a capacity of not less than 4.5 kilograms of dry powder, provided that in the case of a ship less than 7 metres in length, the Chief Executive Officer may allow a capacity of not less than 1 kilogram of dry powder.

G2.2 In the case of all ships to which this paragraph applies reference to a portable fire extinguisher shall mean, in addition to a portable fire extinguisher complying with sub- paragraph G2.1 of this Appendix, a fire extinguisher in which the fire extinguishing medium is bromochlorodifluoromethane (B.C.F.) and which has a capacity of not less than 1 kilogram and not more than 14 kilograms of B.C.F. provided that in the case of a ship less than 7 metres in length, the Chief Executive Officer may allow a capacity of not less than 1 kilogram and not more than 14 kilograms of B.C.F.

G2.3 For open boats a fire smothering blanket and fire bucket may be used instead of portable fire extinguishers.

G2.4 Portable fire extinguishers provided in compliance with this paragraph for use in accommodation or service spaces of any ship shall so far as practicable have a uniform method of operation.

G2.5 Portable fire extinguishers for use in accommodation or service spaces shall, so far as practicable, have a uniform method of operation.

G2.6 Portable Carbon dioxide fire extinguishers shall not be located in or adjacent to sleeping accommodation.

G2.7 One of the portable fire extinguishers intended for use in any space shall be stowed near an entrance to that space.

G2.8 Portable fire extinguishers provided in compliance with this paragraph shall, subject to the limitations of sub paragraphs G2.2 and G2.3 be constructed in accordance with Parts 1 to 7 of the Australian/New Zealand Standards AS/NZS 1841.1: 2007 Portable fire extinguishers as prescribed in the table below or other equivalent international standards' recognised by the Chief Executive Officer.

Type of Extinguisher	Specification Number ,
Water (Splash-proof type)	AS/NZS 1841.2; 2007
Foam (Splash-proof type)	AS/NZS 1841.4; 2007
Dry Chemical	AS/NZS 1841. 5; 2007
Wet Chemical (Potassium Bicarbonate)	AS/NZS 1841.3; 2007
Carbon Dioxide.	AS/NZS 1841.6; 2007
Bromochjorodifluoromethane (BCF)	AS/NZS 1841. 5; 2007
Vapourising liquid (Halotron)	AS/NZ 1841.7; 2007

Note: These portable fire extinguishers shall bear the Standards Association of Australia/ New Zealand mark or other equivalent international standards mark recognised by the Chief Executive Officer together with their license number.

G2.9 Where portable dry powder fire extinguishers are provided in compliance with this paragraph, in either accommodation and service spaces or in machinery spaces, their number shall not exceed one half of the total number of extinguishers provided in either of those spaces. Where only one extinguisher is required in a space, it may be of the dry powder type.

G2.10 Every portable fire extinguisher provided in compliance with this paragraph shall be tested by a competent person of an approved fire appliance service center.

G2.11 Every portable fire extinguisher provided in compliance with this paragraph shall be inspected by a person designated by the master or owner of the ship.

G2.12 Records of any testing, maintenance or inspection of extinguishers shall be maintained and kept onboard, and shall include whether a pressure test was performed by the competent person.

G2.13 Manufacturers' instructions for recharging extinguishers shall be available for use onboard those ships which have trained ships personnel in recharging of portable fire extinguishers.

G3.0 Non portable foam fire extinguishers

G3.1 A non-portable foam fire extinguisher shall comply with the manufacture and performance requirements of the Australian standard AS 4265 – 1995 *Wheeled Fire Extinguishers* or other standards' approved by the Chief Executive Officer. A non-portable fire extinguisher shall also carry a marking and instructions of that standard.

G3.2 The outside of an extinguisher shall be clearly and permanently marked with;

(a) a mark showing the level of the liquid when the extinguisher is filled to its working capacity;

(b) markings and instructions of that standard;

(c) the name of the maker or vendor of the extinguisher;

(d) the capacity of the extinguisher;

(e) the pressure under which the extinguisher was tested;

(f) instructions for operating the extinguishers;

(g) the year in which the extinguisher was manufactured; and

(h) a sticker or tag showing the service date of extinguisher.

G4.0 Non-portable Carbon dioxide fire extinguishers

G4.1 A non-portable carbon dioxide fire extinguisher shall comply with the manufacture and performance requirements of Australian standard AS 4265 – 1995 *wheeled fire extinguishers* or other standards approved by the Chief Executive Officer.

G4.2 The outside of the carbon dioxide extinguisher shall be clearly and permanently marked with;

(a) the markings and instructions of that standard;

(b) the name of the maker or vendor of the extinguisher;

(c) the weight of the extinguisher when empty and the weight when filled to ts working capacity;

(d) instructions for operating the extinguisher;

(e) the year in which the extinguisher was manufactured; and

(f) a sticker or tag showing the service date of the extinguisher.

G5.0 Non-portable dry powder fire extinguisher

G5.1 A non-portable dry powder fire extinguisher shall comply with the manufacture and performance requirements of Australian standard AS 4265 – 1995 *Wheeled fire extinguishers* or other standards approved by the Chief Executive Officer.

G5.2 The outside of the non-portable dry powder extinguisher shall be clearly and permanently marked with;

(a) the markings and instructions of that standard;

(b) the name of the maker or vendor of the extinguisher;

(c) the weight of the extinguisher when empty and the weight when filled to its working capacity;

(d) instructions for operating the extinguisher;

(e) the year in which the extinguisher was manufactured; and

(f) a sticker or tag showing the service date of the extinguisher.

Appendix H

FIREMEN'S OUTFIT

H1.0 Every fireman's outfit carried in compliance with this paragraph shall consist of:

H1.1 a breathing apparatus complying with the requirements specified in Appendix I of this paragraph;

H1.2 an electric safety lamp (hand lantern) that a surveyor is satisfied-

(i) is intrinsically safe in a dust or fuel environment; and

(ii) has a minimum operating time of 3 hours:

H1.3 spare batteries for the safety lamp

H1.4 a fireman's axe with an electrically non-conducting handle and heat treated head.

H1.5 protective clothing of material that protects the skin, including the neck, from the heat radiating from the fire and from burns and scalding by steam. Where the clothing is of aluminised material a suitable lining shall be provided to protect the skin from heat transfer. The outer surface shall be water resistant.

H1.6 boots, with heels and toecaps and gloves of rubber or other electrically non conducting material.

H1.7 a rigid helmet that provides effective protection against impact and that is suitable for wearing with breathing apparatus.

H2.0 Where more than one fireman's outfit is provided they shall be kept in readily accessible positions which are not likely to be cut off in the event of fire.

APPENDIX I

BREATHING APPARATUS

I1.0 Type of breathing apparatus

A breathing apparatus provided in compliance with this paragraph may be either-

I1.1 **Smoke helmet or a smoke mask** (A hose type) provided with,

(a) a hose of a non-collapsing type, for the supply of air from the outside atmosphere;and

(b) an air pump or bellows that is suitable for pumping air through the hose; and

(c) efficient couplings to permit two or more lengths of hose to be joined: or

I1.2 **a self-container breathing apparatus** of—

(a) an open circuit compressed air type; and

(b) a positive pressure type.

I2.0 General provisions

I2.1 A breathing apparatus furnished in a ship in accordance with this paragraph shall be constructed of materials having adequate mechanical strength, durability and resistance to deteriorating by heat or by contact with sea water and such materials shall be resistant to fire. The fabric used in the construction of any harness provided with a breathing apparatus shall be resistant to shrinkage. Where a cargo ship, constructed or adapted for the carriage of bulk fluid cargoes of a flammable nature, is furnished with a breathing apparatus, all exposed metal parts of the apparatus, harness and fittings shall be materials resistant to frictional sparking.

I2.2 Each breathing apparatus shall be clearly and legibly marked with the year of manufacture and the manufacturer's name, trade mark or the registered mark.

I2.3 Each breathing apparatus shall be provided with operating instructions in clear and permanent lettering affixed on the apparatus or for display in a clearly visible position near the apparatus stowage position.

I2.4 Every breathing apparatus shall be provided with servicing and instruction manual.

I3.0 Self-contained breathing apparatus**:**

I3.1 The design and construction of self-contained breathing apparatus of the compressed air, open circuit type shall be such that the apparatus will—

(a) provide respiratory protection;

(b) prevent entry of the external atmosphere;

(c) fittings can be readily detached for maintenance but be secure against accidental disconnection;

(d) ensure that couplings provide a secure, gas-tight joint;

(e) permit it to be worn without undue discomfort and in such a manner that it is practicable for the wearer to lift and carry an unconscious person on his shoulders, or perform other duties of rescue; and

(f) not impede the wearer when walking in a crouched attitude, crawling or manoeuvring in narrow tunnels and openings.

I3.2 The total storage capacity of the compressed air cylinder or cylinders attached to the apparatus and carried by the wearer shall be at least 1,200 litres of free air.

I3.3 Means shall be provided for the automatic regulation of the air supply to the wearer of the apparatus in accordance with his or her breathing requirements when breathing any volume of free air up to 85 litres per minute at any time when the pressure in the supply cylinder or cylinders is above 1,000 kPa. Means shall be provided for overriding the automatic air supply valve.

I3.4 A pressure gauge with an anti-bursting orifice shall be incorporated in the high pressure air-supply system to enable the wearer to read directly and easily the air pressure of air in the cylinder or cylinders.

I3.5 Means shall be provided for warning the wearer audibly when 80 percent of the usable capacity of the apparatus has been expended.

I3.6 The maximum weight of any such apparatus shall not exceed 16 kilograms, excluding—

(a) any lifeline; and

(b) any safety bolt or harness, that does not form an integral part of the apparatus.

I3.7 Any self-contained breathing apparatus shall be constructed of materials which have adequate mechanical strength, durability, and resistance to deterioration by heat or by contact with water, and such materials shall—

(a) be resistant to fire; and

(b) not allow the breathing circuit to be penetrated by smoke or chemical fumes likely to be encountered in service.

I3.8 The fabric used in the construction of any harness provided with such apparatus shall be resistant to shrinkage. Exposed metal parts of the apparatus, harness and fittings shall be of materials that so far as practicable are resistant to frictional sparking.

Equipment to be used

I3.9 The following equipment shall be provided for use with each set of breathing apparatus—

(a) a fireproof life and signaling line at least 3 metres longer than is required to reach from the open deck in clean air, well clear of any hatch or doorway, to any part of the accommodation, service, cargo, or machinery spaces. The line shall be—

(i) made of copper or galvanised steel wire rope having a breaking strain of at least 500 kilograms; and

(ii) overlaid up to at least 10 millimetres in diameter by hemp or other covering to provide a surface which can be firmly gripped when wet; and

(b) an adjustable safety belt or harness to which that line shall be capable of being securely attached and detached by the wearer by means of a snap-hook; and

(c) means for protecting the eyes and face of the wearer against smoke; and

(d) two plates of non-flammable material bearing a clearly legible code of signals to be used between the wearer and his or her attendant. One plate shall be attached to the safety belt or harness and the other plate shall be attached to the free end of the life line; and

(e) a lightweight safety helmet with lining and adjustable headband, in any apparatus other than an apparatus for which a smoke helmet or fireman's helmet shall be carried.

I3.10 Any self-contained breathing apparatus shall be provided with fully charged spare cylinders that have a total storage capacity of at least 2,400 litres of free air, except that:

(a) if the ship is carrying five sets or more of such apparatus, the total storage capacity of free air in the spare cylinders is not required to exceed 9,600 litres; and

(b) if the ship is equipped with the means for recharging the air cylinders to full pressure with air free from contamination, the spare storage capacity of the fully charged spare cylinders of each apparatus shall be at least 1,200 litres of free air, and the total spare storage capacity of free air provided in the ship is not required to exceed 4,800 litres.

I3.11 A servicing and instruction manual containing detailed instructions shall be kept with each apparatus.

I3.12 Each set of self-contained breathing apparatus shall be tested, serviced and maintained in accordance with the servicing and instruction manual. A clearly marked label shall be attached to the apparatus showing the date of any servicing and the service agent responsible.

I3.13 plates of suitable material which is not readily combustible bearing the following code of signals to be used between the wearer and his attendant, one of which shall be attached to the harness and another attached to the free end of the lifeline.

Signal	**Meaning**
By Wearer of Breathing apparatus	
2 pulls……	Slack off line
3 pulls……	Help me out immediately
To wearer of Breathing apparatus	
3 pulls……	Come out immediately

I4.0 Air hose type breathing apparatus (Smoke helmet or mask)

I4.1 Smoke helmet or smoke mask shall be fitted with a pump or bellows for the supply of air and the air inlet to the pump or bellows shall be so protected as to ensure that the supply of air cannot be obstructed. The air supply hose shall be sufficient in length to enable the air pump or bellows to be on the open deck in clear air well clear of any part of the accommodation, service, cargo or machinery spaces.

I4.2 A smoke helmet or smoke mask shall otherwise comply with the following requirements—

I4.2.1 The design and construction shall be such that it will

(a) provide the wearer with air from an uncontaminated source for an indefinite period;

(b) prevent entry of the external atmosphere;

(c) permit the component parts likely to require service to be readily detached for maintenance but be secure against accidental disconnection; and

(d) ensure that couplings provide a secure, gas-light joint and that when detached, washers are retained in position.

I4.2.2 The waist belt or body harness shall be so designed that it causes no undue discomfort or limitation of movement to the wearer. The full weight of the trailing air hose shall be supported solely by the waist belt or body harness and there shall be no drag on the breathing tube or face piece.

I4.2.3 The attachment or clip connecting the hose to the waist belt or body harness shall be so designed and constructed that whatever the direction of pull, the hose is not damaged nor is the supply of air reduced.

I4.2.4 Provision shall be made on the waist belt or body harness for attachment and detachment by the wearer of a life and signaling line fitted with a snap hook.

I4.2.5 The air hose shall be of rubber, plastic, a combination of both or other suitable material. It shall be flexible and non-kinking.

I4.2.6 The air hose shall not be less than 18 mm internal diameter and shall not exceed 36 metres in length.

I4.2.7 The apparatus shall include a breathing bag of 5 to 7 litres capacity.

I4.2.8 The pump or bellows shall be capable of delivering to the breathing bag via the air hose not less than 85 litres of air per minute.

I4.2.9 A smoke helmet or smoke mask and its associated equipment shall be checked at least annually to ensure that they perform as intended.

APPENDIX J

INTERNATIONAL SHORE CONNECTION

J1.0 The international shore connection required by this paragraph to be installed in the ship shall be in accordance with the following specification.

Description	Dimension
Outside diameter	178 mm
Inner diameter	64 mm
Bolt circle diameter	132 mm
Holes in the flange	4 holes of 19 mm diameter equidistantly placed, slotted to the flange periphery
Flange thickness	14.5 mm minimum
Bolts and nuts	4 bolts, each of 16 mm diameter and 50 mm in length, and four 16 mm nuts
Flange surface	Rat face gasket: any suited to 1035 kPa service
Material	constructed of steel or other material acceptable to the Chief Executive Officer or a surveyor and designed for 1035 kPa services

J2.0 The flange shall have a flat face on one side, and the opposite side permanently attached to a coupling that will fit the ship's hydrants and hose.

J3.0 The connection shall be kept aboard the ship together with a gasket of any material suitable for 1035 kilopascal service, together with 4 bolts of 16 mm diameter, 50 mm in length and 4 matching nuts and 8 washers.

J4.0 Fixed provision shall be made to enable the connection to be used on the port side and on the starboard side of the ship to enable water to be supplied to the fire main from another ship or from the shore.

APPENDIX K

FIRE BUCKETS

K1.0 Every fire bucket provided in compliance with this paragraph shall be;

(a) red in colour; and

(b) clearly marked with the word "Fire"; and

(c) have a capacity of at least 8 litres; and

(d) be fitted with a lanyard; and

(e) except in open boats, every fire bucket shall be kept filled with sand or water.

———

APPENDIX L

PORTABLE FOAM APPLICATOR EQUIPMENT

L1.0 A foam applicator unit shall consist of—

L1.1 an inductor type of air-foam nozzle capable of being connected to the fire main by a fire hose;

L1.2 a portable tank containing at least 20 litres of foam concentrate; and

L1.3 a spare portable tank.

L2.0 The nozzle shall be capable of producing effective foam suitable for extinguishing an oil fire, at the rate of at least 1.5 cubic metres per minute when being supplied at the minimum hydrant pressure on the ship.

APPENDIX M

FIRE CONTROL PLANS

M1.0 In all ships required to be provided with a fire control plan, a general arrangement plan of the ship shall be permanently exhibited for the guidance of the ship's officers. That plan shall show clearly for each deck—

(a) the control stations; and

(b) the various fire paragraphs enclosed by A Class divisions; and

(c) the paragraphs enclosed by B Class divisions; and

(d) particulars of the fire detection and fire alarm systems; and

(e) the sprinkler installation; and

(f) the fire extinguishing appliances; and

(g) means of access to different compartments and decks; and

(h) the ventilating system, including particulars of the fan control positions, the position of dampers, and identification numbers of the ventilating fans serving each paragraph.

M2.0 Any fire control plan on a ship shall be in the English language and graphical symbols used on the plan shall be in accordance with resolution A.654(16) Graphical Symbols for Fire Control Plans adopted by the International Maritime Organisation's Assembly on 19 October 1989.

M3.0 Fire control plans on ships shall be-

(a) approved by a surveyor; and

(b) kept up to date.

Any alterations to a fire control plan shall be recorded on the plan immediately and the Chief Executive Officer or surveyor notified accordingly.

M4.0 Every ships of 50 metres or more in length that operates beyond Fiji waters and every SOLAS ship shall be provided with a duplicate copy of the approved fire control plan, that shall be stored in a prominently marked weathertight enclosure situated in a position, outside the deckhouse, where it is readily available to shore side firefighting personnel.

APPENDIX N

SIGNAGE

N1.0 In all ships whether required to and not required to be provided with a fire control plan, signs identifying firefighting appliances and their location shall be consistent with the graphical symbols for fire control plans referred to in appendix M.

APPENDIX O

MAINTENANCE AND OPERATIONAL INSTRUCTIONS

O1.0 For a ship engaged in an international voyage, instructions concerning the maintenance and operation of all the equipment and installations for fighting and containment of fire shall be kept in one location on board, and be readily available in an accessible position.

APPENDIX P

STANDARDS

P1.0 The Chief Executive Officer may determine that a fire appliance meets a standard prescribed by this paragraph, if the Chief Executive Officer is satisfied that the appliance—

(a) complies with a recognised national or international standard different to that prescribed in this paragraph; and

(b) substantially complies with the standard as prescribed in this paragraph.

PARAGRAPH 12

RADIO EQUIPMENT

Contents

This paragraph is divided into Parts as follows:

Part 1—Preliminary

This paragraph shall be read in conjunction with the Introduction and General Requirements paragraph.

12.1 In this paragraph the under mentioned terms shall have the meanings set against them respectively.

"At Sea"—

in respect of radio watch keeping is the period occupied on a voyage extending beyond sheltered water limits.

"Coast Station"—a land station in the maritime mobile service open for public correspondence.

"Frequency Bands"—

the frequency bands referred to in this paragraph are—

Medium frequency (MF), 300-3000 kHz)

High frequency (HF), 3000-30,000 kHz (3-30 MHz)

Very High frequency (VHF), 30,000-300,000 kHz) (30-300 MHz)

"Limited Coast Station"—a land station established by or on behalf of a public utility, the fishing industry or other commercial enterprise for the exchange of communications.

"Radio Surveyor"—a person recognised or appointed by the Chief Executive Officer as a radio surveyor in consultation with the Telecommunication Authority of Fiji.

"Radiotelegraphy"—a system of radio communication for the transmission of written matter by the use of a signal code.

"Radiotelephone Distress Frequencies" allocated for sole purpose of communicating distress massages.

"Radiotelephone Operator"—a ships officer who holds a full or restricted General Operators certificate.

"Radio Watch"—listening on the appropriate Distress Frequency for the type of installation on the ship.

"Silence period" – for radiotelephone ships are period of three minutes duration beginning each hour and at the expiration of thirty minutes after each hour of each day, according to G.M.T.

PART 2—SOLAS SHIPS

12.2 Application

This Part applies to all passenger ships irrespective of size and cargo ships of 300 tons Gross tonnage and upwards, engaged on International Voyages. (Class 1, Class 2A, and Class 2B of 300GT and upwards).

12.3 Compliance with the SOLAS Ships

Ships referred to in sub-paragraph 12.2 shall comply with the relevant provisions of the Maritime (Radio) Regulations and Chapter IV of the SOLAS Convention.

PART 3—NON SOLAS SHIPS

RADIO TELEPHONY

12.4. Application

This Part applies to:

12.4.1 All ships in the International trade of less than 300 tons gross (Class 1 and Class 2).

12.4.2 All ships on near coastal voyages (Class 3A)

12.4.3 All ships in the Fiji Trade (Class 3B).

12.4.4 Such ships in the sheltered waters and inshore water service as the Chief Executive Officer determines (Class 3D and Class 3E).

12.5 Provision of Radio Installation

Each ship subject to this Part shall be equipped with a radio installation comprising a transmitter together with a separate or combined receiver, a radiation system and a main reserve source of electrical energy that comply with the detailed requirements of the Maritime (Radio) Regulations 2014 indicated in the following table:

Type of ship/and trade	*Radio equipment*
International Trade in respect of the operational area (Sea Area 1, 2, 3 & 4)	Fully GMDSS
Near Coastal	GMDSS (MF/HF VHF)
Fiji Trade	MF/HF, VHF (DSC capability- optional)
Inshore Service	VHF and mobile phone
Sheltered waters	Mobile phone or VHF radio (if the position is within mobile phone or VHF radio range)

12.6 Type of Radio Installation

12.6.1 The installations that are provided pursuant to paragraph 12.8 shall comply with the requirements of the Maritime (Radio) Regulations 2014.

12.6.2 V.H.F. equipment carried as an additional installation which provides for operation on the international distress, safety and calling frequency for the maritime mobile V.H.F. radiotelephone service 156.80 MHz (Channel 16) shall comply with the provisions of the Maritime (Radio) Regulations 2014.

12.6.3 All installations listed in paragraph 12.8 are subject to the approval of the Chief Executive Officer in consultation with the Department of Communication and shall comply with the standards detailed in the Maritime (Radio) Regulations 2014.

12.7 Exemptions

12.7.1 The Chief Executive Officer may consider applications for exemptions from compliance with any of the provisions of this Part and the Maritime (Radio) Regulations 2014.

12.7.2 The Chief Executive Officer may only grant total exemption of the following types of ships:

12.7.2.1 open boats or ships where it is impractical to install and maintain a radio installation;

12.7.2.2 ships on voyages of not more than 35 nautical miles either side of a specified port or place and not more than 5 nautical miles off shore; and

12.7.2.3 ships in company with an approved radio equipped ship.

12.8 Installations

12.8.1 Before commencing to install a radio installation or replacing a damaged or malfunctioning radio installation in a ship the owner and master shall give early notice in writing pursuant to this Part to the Chief Executive Officer of the proposed radio installation or replacement of damaged or malfunctioning radio unit, its siting and wiring.

12.8.2 Upon receiving any such notice, an officer appointed by the Chief Executive Officer in conjunction with a Radio Surveyor shall give to the owner or proposed owner such advice as is necessary to ensure compliance with the requirements of the Maritime (Radio) Regulations 2014.

PARAGRAPH 13

NAVIGATION AND MISCELLANEOUS EQUIPMENT

Contents

This paragraph is divided into Parts as follows:

Part 1—Preliminary

This paragraph should be read in conjunction with the Introduction and General Requirements paragraph.

13.1 The term "Navigation and Miscellaneous Equipment" includes any item of equipment which may be required for safety of navigation or safety of crew, passengers or any other person on board for legitimate purposes, in port or at sea.

13.2 All items of Navigation Equipment, Systems and Miscellaneous listed in Part 3 shall conform to the standards detailed in the Appendices to the paragraph.

13.3 Any master or owner who fails to comply with this sub-paragraph commits an offence and is liable upon conviction to a fine not exceeding $3000 or imprisonment of 3 months or both.

Part 2—General Provisions

13.3. Navigation Lights, Shapes and Sound Signals.

13.3.1 "Navigation Lights" means steaming lights, anchor lights, and not-under command lights.

13.3.2 "Steaming Lights" means those lights to be shown by ships when under way, including the optional manoeuvering light, and special purpose lights.

13.3.3 "Special Purpose Lights" means those lights required to be shown according to the types of operations of ships (i.e. towing, fishing, pilotage and operations restricting ships in their ability to manoeuver) and those lights required to be shown by ships constrained by their draughts.

13.3.4 All ships shall be provided with at least a full set of such navigation lights, shapes and sound signal appliances as are required according to type, size and special purpose to ensure compliance with the Maritime (Collision Prevention) Regulations 2014 and Convention.

13.3.5 Specifications-The requirements for performance capabilities and for the positioning of navigation lights, shapes and sound signals shall be in accordance with the provisions of the Maritime (Collision Prevention) Regulation 2014 and the Annexes to the Convention.

13.3.6 Spares-All ships shall be provided with such number of spare lanterns and/or replacement parts for navigation lights as are deemed necessary by the Chief Executive Officer.

13.3.7 Main and Emergency Installation for Navigation Lights.

13.3.7.1 All ships of Class 1, Class 2, Class 3A and 3B shall be provided with:

(a) A set of steaming lights capable of operating from main and emergency electrical installations; or

(b) A set of steaming lights capable of operating from a main electrical installation and a "stand-by" set of Steaming Lights operating from a separate and independent power source; and

(c) Anchor and N.U.C. lights capable of operating from a main electrical installation, and "stand-by" battery powered or oil anchor and N.U.C. lanterns.

13.3.7.2 All sheltered waters and inshore waters ships of Classes 3D and 3E shall:

(a) be provided with a set of Steaming Lights capable of operating from an electrical installation;

(b) be able to display Anchor and N.U.C. Lights; and

(c) be provided with such emergency arrangements for the display of Steaming Lights as determined by the Chief Executive Officer.

13.3.8 Attention is drawn to the following extracts from the International Regulations for Preventing Collisions at Sea:

Rule 1:*(d)* Nothing in this code shall interfere with the operation of special rules made by an appropriate authority for roadsteads, harbours, rivers, lakes or inland waterways connected with the high seas and navigable by sea-going ships. Such special rules shall conform as closely as possible to this paragraph and the provisions of the Maritime (Collision Prevention) Regulations 2014.

(e) Whenever the Government concerned shall have determined that a ship of special construction or purpose cannot comply fully with the provisions of any of these with respect to the number, position, range or arc of visibility of lights or shapes, as well as to the disposition and characteristics of sound-signaling appliances, without interfering with the special function of the ship, such ship shall comply with such other provisions in regard to the number, position, range or arc of visibility of lights or shapes, as well as to the disposition and characteristics of sound-signaling appliances, as her Government shall have determined to be the closest possible compliance with these in respect to that ship.

13.4 Owners and Masters Obligation

The owner and master of a ship shall ensure that the scales of Navigation and Miscellaneous Equipment required for their class of ship as prescribed in Part 3 of this paragraph is always provided on the ship and is kept in good working condition.

13.5 Exemptions

13.5.1 The owner of a ship may apply to the Chief Executive Officer for an exemption of his or her ship from a particular requirement of this paragraph.

13.5.2 The Chief Executive Officer may give an exemption only if the Chief Executive Officer is satisfied compliance with the requirement would be unnecessary or unreasonable having regard to the ship, its equipment and its intended voyage and the exemption would not contravene SOLAS.

13.6 Nautical charts and publications

13.6.1 Updated nautical charts and nautical publications relevant to a ships area of operation or trade shall always be carried onboard a ship.

13.6.2 The master and owner of a ship shall ensure that updated charts and nautical publication are carried onboard.

Any person who fails to comply with this sub-paragraph commits an offence and is liable upon conviction to a fine not exceeding $3000.00 or 3 months imprisonment, or both.

13.7 Dention of ships not carrying the required navigational and miscellaneous equipment.

Ships not carrying the required scales of navigational and miscellaneous equipment shall be detained until they meet the requirements specified in this paragraph.

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Part 3—Scales of Navigation and Miscellaneous Equipment

CLASS 1 AND 2-SHIPS ENGAGED IN INTERNATIONAL VOYAGES
(UNLIMITED WATERS VOYAGE)
(Note: The following scales apply to ships other than SOLAS Ships.)

Measured Gross tonnages	*Requirements*
All tonnage	Magnetic Compasses: 1.*(a)* A Magnetic compass for use as a standard compass; *(b)* A Magnetic compass for use as a steering compass in the normal steering position; and *(c)* If an alternative steering position is provided, a magnetic compass at that alternative steering position. *(d)* A pelorous or compass bearing device *(e)* Valid deviation card 2. A steering magnetic compass in pursuance of 1*(b)* is not required to be provided if: *(a)* the standard compass is a reflector or projector type which can be read at the steering position; *(b)* a gyro compass or repeater is provided the card of which can be read at the normal steering position; and *(c)* another compass is provided which is interchangeable with the standard compass provided in pursuance of 1*(a)*.
All ships of 500grt or mpre	A gyro-compass, or other means to determine or display heading by non-magnetic means.

All Tonnage	Nautical charts suitable for the trade of the ship; and An approved Electronic Chart Display and Information System (ECDIS). If ship is fitted with ECDIS, a back-up arrangement such as nautical charts or a second approved ECDIS.
All Tonnages for Class 1 (Passenger ship) For class 2 (Non Passenger ship) 300grt or more For all ships of 3000grt or more	A 9 GHz radar installation. A 9 GHz radar installation. Two radars, 9 GHz radar and a 3GHz band.
All Tonnage Class 1 (passenger ship); and For class 2 (Non passenger ships) 300grt or more	A Plotting equipment. A ship fitted with a radar installation shall be provided with an Automatic Plotting Aid (ARPA) for plotting radar readings on the navigating bridge. Plotting equipment such as nautical charts, parallel rulers and dividers.
All ships of 10000grt or more	To be fitted with an ARPA- Automatic radar plotting aid
All Tonnage	An echo-sounding device
All Tonnage Class 1 (passenger ship); and For class 2 (Non passenger ships) 300grt or more	Devices to indicate speed and distance to indicate the ships speed and distance through water
All Tonnage	1. Rudder angle indicator. 2. propeller revolution indicator. 3. where the ship has variable pitch propellers, pitch and operational mode of variable pitch propellers. 4. where the ship has lateral thrust propellers (bow/stern thrusters) , pitch and operational mode of lateral thrust propellers.
All Ships of 50,000grt or more	Rate-of-turn indicator

All Tonnage for class 1 (Passenger Ship); and Non passenger ships of 150grt or more	Daylight signalling lamp which is independent of the ship's main source of electrical power
All Tonnage	A GPS – Global Positioning System to establish and update the ships
All Tonnage Class 1 passenger ships; and 300grt or more class 2 non-passenger ship	AIS – Automatic Identification System; and LRIT- Long Range Identification System
All Tonnage	Sound Reception System – To hear sound signals and determine their direction for ships
All Tonnage	Means of communication for Emergency Steering A ship which has an emergency steering position shall be provided with a telephone or other means of communication for relaying heading information to the emergency steering position
All Tonnage	Hand lead line
All Tonnage	1 set of "International Code Flags"
All Tonnage	**Nautical publications** 1. 1 copy of "International Code of Signals". 2. an astronomical almanac 3. notices to mariners 4. sailing directions 5. lists of lights 6. tide tables
All Tonnage All Tonnage (Class 1A)	Official Log Book, deck log and engine log Search and Rescue Manual or Search and Rescue Co-orperation document
All Tonnage	1. Oil Record Book 2. Garbage Record Book 3. Sewage Record Book
All Tonnage	A Sextant
All Tonnage	1 copy of "International Code of Signals"

All Tonnage	Chronometer or Deck Watch. Binoculars. Barometer or Barograph.
All Tonnage	Accommodation ladder. Either: *(a)* Accommodation ladder fitted on each side of the ship: or *(b)* A gangway capable of being used on either side of the ship; or *(c)* A safe means of access on to the ship approved by the Chief Executive Officer; and *(d)* A safety net if an accommodation ladder or gangway is carried on board
All Tonnage	Windlass, anchors and cables-sufficient in number, weight and strength, approved by the Chief Executive Officer or a recognised Classification on its behalf
All Tonnage	Hawsers and warps-of sufficient number, weight and strength having regard to the size and service of the ship.
All Tonnage	Pilot ladder in accordance with Appendix I.
All Tonnage	Navigational lights, shapes and sound-signals to comply with provisions of the COLREG.
All Tonnage	Medicines and medical stores in accordance with paragraph K and Maritime (Ships Medical Requirements) Regulations 2014.
All Tonnage	Means for vocal communication between bridge and engine room.

CLASS 3A

SHIPS TRADING IN THE NEAR COASTAL WATERS OF FIJI
(NEAR COASTALVOYAGE)

Measured Length	Requirements
All lengths	Compasses: 1. *(a)* A Magnetic compass for use as a standard compass; *(b)* A Magnetic compass for use as a steering compass in the normal steering position; and *(c)* If an alternative steering position is provided, a magnetic compass at that alternative steering position. 2. A steering magnetic compass in pursuance of 1*(b)* is not required to be provided if: *(a)* the standard compass is a reflector or projector type which can be read at the steering position; *(b)* a gyro compass or repeater is provided the card of which can be read at the normal steering position; and *(c)* another compass is provided which is inter-changeable with the standard compass provided in pursuance of 1*(a)*. If the Chief Executive Officer is satisfied that it is unnecessary to provide more than one magnetic compass, a ship may be exempted from the requirement to carry more than one compass
All lengths	Hand lead line
All lengths	Daylight signaling lamp
All lengths	1 set of "International Code Flags"

All lengths	**Nautical publications** 1. 1 copy of "International Code of Signals" 2. notices to mariners 3. sailing directions 4. lists of lights 5. tide tables
All lengths	Nautical Charts suitable for the ship's area of operation; and An approved electronic chart display and information system (ECDIS). If ship is fitted with ECDIS, a back-up arrangement such as nautical charts or a second approved ECDIS.
All lengths	A GPS – Global Positioning System to establish and update the ship's position
All class 3A passenger ships; and 500grt or more class 3A non-passenger ships	AIS – Automatic Identification System
All lengths	1. rudder angle indicator 2. propeller revolution indicator 3. where the ship has variable pitch propellers, pitch and operational mode of variable pitch propellers 4. where the ship has lateral thrust propellers (bow/stern thrusters), pitch and operational mode of lateral thrust propellers.
All lengths	A sextant
All Lengths	**Accommodation ladder** Either: *(a)* Accommodation ladder fitted on one side of the ship; or *(b)* A gangway capable of being used on either side; or *(c)* A safe means of access on to the ship approved by the Chief Executive Officer; *(d)* A safety net if an accommodation ladder or gangway is carried on board.
All lengths	A depth sounding device
All lengths	A radar installation

All lengths	Such other electronic navigational aids as considered necessary by the Chief Executive Officer
All lengths	Windlass, anchors and cables-sufficient in number, weight and strength, approved by the Chief Executive Officer or an authorised Classification Society
All lengths	Hawsers and warps of sufficient number, weight and strength having regard to the size and service of the ship
All lengths	Pilot ladder in accordance with Appendix I
All lengths	Navigational lights, shapes and sound-signals to comply with the provisions of the Maritime (Collision Prevention) Regulations 2014 and Convention
All lengths	Medicines and medical stores in accordance with paragraph K and the Maritime (Ships Medical Requirements) Regulations 2014
All lengths	Means for vocal communication between bridge and engine room
All lengths	Chronometer or Deck Watch, Binoculars, Barometer or Barograph
All lengths All Class 3A Passenger Ships	Official Log Book, deck log and engine log. Search and Rescue Manual or Search and Rescue Co-orperation Manual.
All Tonnage	1. Oil Record Book 2. Garbage Record Book 3. Sewage Record Book

CLASS 3B

SHIPS ENGAGED IN THE FIJI TRADE (TERRITORIAL WATERS VOYAGE)

Measured Length	Requirements
All lengths	Chronometer or Deck Clock
All lengths	Binoculars
All lengths	Barometer or Barograph
All lengths	Magnetic Compass: 1. A compass placed in a suitable position for taking accurate observations; and 2. A compass placed at the normal steering position. Note: Only one compass need be provided if the Chief Executive Officer is satisfied that one compass is adequate for both steering and taking accurate observations.
All lengths	Hand lead line
All lengths	Signalling light. A torch with spare batteries and bulbs.
All lengths	**Nautical publications** 1. 1 copy of "International Code of Signals" (Flags B.C. and N) 2. notices to mariners 3. sailing directions 4. lists of lights 5. tide tables
All lengths	Nautical Charts suitable for the ship's area of operation; and An approved electronic chart display and information system (ECDIS). If ship is fitted with ECDIS, a back-up arrangement such as nautical charts or a second approved ECDIS.
All lengths	A GPS – Global Positioning System to establish and update the ships position

All class 3B passenger ships; and 500grt or more class 3B non-passenger ships	AIS – Automatic Identification System
All lengths	1. rudder angle indicator 2. propeller revolution indicator 3. where the ship has variable pitch propellers, pitch and operational mode of variable pitch propellers 4. where the ship has lateral thrust propellers (bow/stern thrusters), pitch and operational mode of lateral thrust propellers
All lengths	Gangway capable of being used on either side of the ship or a safe means of access on to the ship approved by the Chief Executive Officer
All lengths	Windlass, anchors and cables-sufficient in number, weight and strength, approved by the Chief Executive Officer or an authorised Classification Society on its behalf
All lengths	Hawsers and warps of sufficient number, weight and strength having regard to the size and service of the ship
All lengths	Navigational lights, shapes and sound-signals to comply with the provisions of the Maritime (Collision Prevention) Regulations 2014 and Convention
All lengths	Medicines and medical stores in accordance with paragraph K and Maritime (Ships Medical Requirements) Regulations 2014
All lengths All Class 3B passenger ships	Official Log Book, deck log and engine log. Search and Rescue Manual or Search and Rescue Co-orperation document.
All lengths	1. Oil Record Book 2. Garbage Record Book 3. Sewage Record Book
All lengths	Means for vocal communication between bridge and engine room

CLASS 3D
SHIPS TRADING WITHIN INSHORE WATERS OF FIJI
(INSHORE WATERS VOYAGE)

Measured Length	Requirements
All lengths	A Deck Clock
All lengths	Binoculars
All lengths	Radar for ships intending to operate within the period from sunset to sunrise
All lengths	A compass placed at the normal steering position
All lengths	Echo-sounding device or a Hand lead line
All lengths	Signaling light or torch with spare batteries
All lengths	**Nautical publications** 1. 1 copy of Flags B.C. and N 2. notices to mariners 3. sailing directions 4. lists of lights 5. tide tables
All lengths	Nautical charts suitable for ship's area of operation; or GPS plotter incorporating an ECDIS with approved back up
All lengths	1. Rudder angle indicator 2. propeller revolution indicator 3. where the ship has variable pitch propellers, pitch and operationalmode of variable pitch propellers 4. where the ship has lateral thrust propellers (bow/stern thrusters), pitch and operational mode of lateral thrust propellers
All lengths	A safe means of access on to the ship approved by the Chief Executive Officer
All lengths	Windlass, anchors and cables-sufficient in number, weight and strength having regard to the size and service of the ship

All lengths	Navigation lights, shapes and sound-signals to comply with the provisions of the Collision Convention
All lengths	Medicines and medical stores in accordance with paragraph K
All lengths All lengths Class 3D passenger ship	Official Log Book, deck log and engine log. Search and Rescue Manual or Search and Rescue Co-orperation document
All lengths	1. Oil Record Book 2. Garbage Record Book 3. Sewage Record Book
All lengths	Means for vocal communication between bridge and engine room

CLASS 3E

SHIPS TRADING WITHIN THE SHELTERED WATERS OF FIJI
(SHELTERED WATERS VOYAGE)

Measured Length	Requirements
All lengths	A Compass
All lengths	Radar for ships intending to operate within the period from sunset to sunrise
All lengths	A torch
All lengths	Current Fiji Nautical Almanac
All lengths	Nautical charts suitable for the ship's area of operation and the current; or GPS plotter incorporating an ECDIS with approved back up
All lengths	Gangway or a safe means of access approved by the Chief Executive Officer

All lengths All lengths Class 3E Passenger Ship	Official Log Book, deck log and engine log. Search and Rescue Manual or Search and Rescue Co-operation document.
All lengths	1. Oil Record Book 2. Garbage Record Book 3. Sewage Record Book
All lengths	1. rudder angle indicator 2. propeller revolution indicator 3. where the ship has variable pitch propellers, pitch and operational mode of variable pitch propellers 4. where the ship has lateral thrust propellers (bow/stern thrusters), pitch and operational mode of lateral thrust propeller
All lengths	Windlass, anchors and cables-sufficient in number, weight and strength, approved by the Chief Executive Officer or a Classification Society on its behalf
All lengths	Hawsers and warps of sufficient number, weight and strength having regard to the size and service of the ship
All lengths	Navigational lights, shapes and sound-signals to comply with the provisions of the Collision Convention
All lengths	Medicines and medical stores in accordance with paragraph K Maritime (Ships Medical Requirements) Regulations 2014
All lengths	Means for vocal communication between bridge and engine room

CLASS 3F

SHIPS TRADING WITHIN THE INLAND WATERS OF FIJI
(INLAND WATERS VOYAGE)

Measured Length	Requirements
All lengths	A compass
All lengths	Radar for ships intending to operate within the period from sunset to sunrise
All lengths	A torch
All lengths	Gangway or a safe means of access approved by the Chief Executive Officer
All lengths	Log Book
All lengths	1. Oil Record Book 2. Garbage Record Book 3. Sewage Record Book
All lengths	1. rudder angle indicator 2. propeller revolution indicator 3. where the ship has variable pitch propellers, pitch and operational mode of variable pitch propellers 4. where the ship has lateral thrust propellers (bow/stern thrusters), pitch and operational mode of lateral thrust propeller
All lengths	Windlass, anchors and cables-sufficient in number, weight and strength, approved by the Chief Executive Officer or a Classification Society on its behalf.
All lengths	Hawsers and warps of sufficient number, weight and strength having regard to the size and service of the ship.
All lengths	Navigational lights, shapes and sound-signals to comply with the provisions of the Collision Convention.
All lengths	Medicines and medical stores in accordance with paragraph k Maritime (Ships Medical Requirments) Regulations 2014.
All lengths	Means for vocal communication between bridge and engine room.

Part 4 —Types of Navigation and Miscellaneous Equipment

Appendix	Title
A	Chronometers and Deck Watches
B	Compass
C	Depth Sounding Equipment
D	Signaling Equipment
E	Charts and Nautical Publications
F	Requirement for and use of Accommodation Ladders, Gangways and Safety Nets
G	Navigational Aids
H	Anchors and Cables
I	Pilot Ladders and ship side doors or ports used in conjunction with ladders
J	Mechanical Pilot Hoist
K	Medicine and Medical Stores
L	Official Log Book
M	Navigation Lights
N	Radar and ancillary equipment
O	ECDIS
P	GPS

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APPENDIX A

CHRONOMETERS AND DECK WATCHES

A1.0 Chronometer or deck watch- shall mean a certified chronometer or deck watch capable of being rated and used in conjunction with radio time signals to provide an accurate time piece for navigation.

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APPENDIX B

COMPASS

B1.0 The term “Compass” shall include a magnetic compass, gyro compass or other mechanical compass, and shall be of a type approved by the Chief Executive Officer.

Part 1—Requirements for Magnetic Compasses

Bl. 1 Ships Class 1, 2 & 3A

B1.1.1 In approving, certifying and positioning a magnetic compass for use on a Class 1, 2 or 3 A ship, the requirements of the following international standards, or their equivalent standards, shall be used for guidance.

B1.1.2 ISO 25862: 2009 - Magnetic Compasses and Binnacles and Azimuth reading devices

ISO 2582:2009 Magnetic Compasses and Accessories

Rules for Testing Certification IMO Resolution A382X.

B1.2 be fitted with adequate means of communication between the standard compass position and the normal navigation control position.

B1.3 be provided with means such as an azimuth mirror or azimuth circle or sight vane for taking bearings as near as practicable over an arc of the horizon of 360°.

B1.4 The owner and the master of a ship shall ensure that every magnetic compass fitted to that ship is properly adjusted and has a valid deviation card that is available on the bridge at all times.

B1.5 The owner and the master of a ship shall ensure that whenever a compass is replaced, repaired or repositioned, a recognised compass adjuster is consulted.

B2 . 0 Ships Class 3B

B2.1 In approving, certifying and positioning a magnetic compass for use on a Class 3B Ship the requirements of the following international standards, or their equivalent national standards, shall be used for guidance:

B2.1.1 ISO25862:2009 - Magnetic Compasses, binnacles and azimuth reading devices

(a) ISO 1069: 1973-Magnetic Compasses and binnacles for sea navigation Vocabulary,

(b) ISO 2582:2009 -Magnetic Compasses and Accessories

(c) Rules for Testing and Certification IMO Resolution A382X.

B2.1.2 be fitted with adequate means of communication between the standard compass position and the normal navigation control position.

B2.1.3 be provided with means such as an azimuth mirror or azimuth circle or sight vane for taking bearings as near as practicable over an arc of the horizon of 360°.

B2.1.4 The owner and the master of a ship shall ensure that every magnetic compass fitted to that ship is properly adjusted and

has a valid deviation card that is available on the bridge at all times.

B2.1.5 The owner and the master of a ship shall ensure that whenever a compass is replaced, repaired or repositioned, a recognised compass adjuster is consulted.

B3.0 Ships of Class 3D, 3E & 3F

B3.1 A magnetic steering compass shall:

B3.1.1 be located so that the view of the horizon from the compass position shall be as uninterrupted as possible for a minimum arc of 115 degrees from right ahead on either side of the ship;

B3.1.2 be located forward of the steering wheel/controls in such a manner that it can be easily read from the normal steering position;

B3.1.3 be fitted with an efficient means of illumination together with a device for dimming the illuminations;

B3.1.4 be suspended by gimbals so that the bowl shall remain horizontal when the binnacle is tilted 40 degrees in any direction;

B3.1.5 be fitted with adequate means of communication between the standard compass position and the normal navigation control position;

B3.1.6 be provided with means such as an azimuth mirror or azimuth circle or sight vane for taking bearings as near as practicable over an arc of the horizon of 360°.

B3.1.7 The owner and the master of a ship shall ensure that every magnetic compass fitted to that ship is properly adjusted and has a valid deviation card that is available on the bridge at all times.

B3.1.8 The owner and the master of a ship shall ensure that whenever a compass is replaced, repaired or repositioned, a recognised compass adjuster is consulted.

B3.1.9 be located in such a position as to permit proper adjustment; and

B3.1.10 be provided with a compass card and according to the following table:

Length of ship (m)	Diameter of Compass Card (mm)
Less than 15	75
15 but less than 20	100
20 and over	125

B4.0 General Requirements

B4.1 Where a projector and/or reflector or transmitting type of standard compass is the only magnetic compass fitted on board it shall:

B4.1.1 be capable of being used as a normal magnetic compass in the event of a power failure; or

B4.1.2 be provided with an emergency electrical supply capable of operating the installation for a period of not less than 24 hours.

B4.2 General arrangement plans submitted to the Chief Executive Officer in respect of new ships are to include details of:

B4.2.1 all items of equipment or magnetic materials likely to exert a disturbing influence on the compass; and

B4.2.2 all items which will impair the visibility of the horizontal from a compass position.

B5.0 Other Equipment in Vicinity of Compasses

B5.1 When electrical instruments are located close to a magnetic compass, care should be taken to ensure that the compass is not affected whether the equipment is energised or not. Electrical equipment should not be placed nearer to any magnetic compass than the "safe distance" which has been determined by test or recommended by the manufacturer of such equipment.

B5.2 Portable electrical equipment such as hand microphones and telephone handsets can seriously affect magnetic compasses and should not be operated when held close to a compass.

B5.3 When electrical equipment is fitted nearer to a magnetic compass than the recommended safe distance, or if no safe distance is known in respect of a unit, compass deviations should be checked with the equipment in operating and non-operating modes to ensure that the compass is properly compensated and not affected by the equipment. Where such equipment is removed, modified or replaced, or major adjustment/maintenance is made, the compass deviations shall be checked to ensure that no change has taken place.

B5.4 The minimum distance at which a magnetic compass should be placed from magnetic materials is indicated in IMO Resolution A.382X. Any magnetic material in the vicinity of the compass should be disposed symmetrically about the compass and outside the minimum distance. Where magnetic material disposed outside the minimum distance still causes the compass not to operate satisfactorily, the distance of the material away from the compass should be increased.

B5.5 Where the structure of the ship does not allow magnetic materials to be placed at the required minimum distance, the compass should be sited in the best position compatible with these requirements and the owner or master of the ship should produce subsequent evidence of satisfactory performance in service.

B6.0 Recognition as a compass adjuster

B6. 1. An applicant is entitled to a maritime document as a compass adjuster under this Regulation if the Chief Executive Officer is satisfied that—

(a) the person has—

(i) a minimum of Master Class 2 certificate of competency and that the person has passed an approved course acceptable to the Chief Executive Officer; and

(ii) has carried out a minimum of 5 adjustments under the supervision and to the satisfaction of a compass adjuster approved by the Chief Executive Officer; **OR**

(iii) a certificate recognised by the Chief Executive Officer as being equivalent to Master Class 2 certificate of competency and that the person has passed an approved course and

(iv) the person has adjusted the compasses of no fewer than five commercial ships in the five years preceding the date of application, with no less than three of these adjustments being carried out while the person adjusting the compass is the master of the ship; **OR**

(v) a person holding a class 3 Master Endorsed and has passed an approved compass adjusters course; and

(vi) the person has carried out a minimum of 10 adjustments under the supervision and to the satisfaction of a compass adjuster approved by the Chief Executive Officer; and

(b) the requirements specified in the paragraph of the Decree have been complied with in respect of that maritime document.

B6.2. The maritime document for compass adjusters is to be valid for a period specified by the Chief Executive Officer up to a maximum period of five years from the date of issue.

B7.0 Adjustment of Magnetic Compasses

B7.1 Before an initial certificate of survey is issued in respect of a ship to which this item applies, the compass or compasses of that ship shall be adjusted by an adjuster of compasses. Thereafter ships to which this item applies shall have their compasses adjusted by an adjuster of compasses at intervals not exceeding 2 years. Provided that where the Chief Executive Officer is satisfied that a compass adjustment is not required or that an adjustment maybe deferred without detriment to the safety of the ship, the Chief Executive Officer may exempt the ship from compass adjustment for such period as the Chief Executive Officer may determine.

B7.2 The compass or compasses of a ship shall be adjusted in any of the following cases:

B7.2.1 if the ship has undergone repairs or alterations of such a nature as is in the opinion of the Chief Executive Officer likely to affect the accuracy of the compass or compasses;

B7.2.2 if the ship has not previously operated from any port or place in Fiji; and

B7.2.3 if the compass or compasses of the ship are, in the opinion of the Chief Executive Officer, unsatisfactory or unreliable.

B7.2.4 where a compass deviations are found to be excessive, that compass is adjusted by the master (provided that the master holds a Master Foreign-Going Certificate or an equivalent certificate) or is an approved compass adjuster.

B7.3 A "compass adjuster" shall be an adjuster of compasses so approved by the Chief Executive Officer.

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Part 2—Requirements for Gyro Compasses

B7.4 Introduction

B7.4.1 The gyro compass where fitted should determine the direction of the ship's head in relation to Geographic (True) North.

B7.4.2 The equipment should comply with the following minimum performance requirements.

B7.5 Definitions

For the purpose of this paragraph, the following definitions apply –

B7.5.1 The term gyro compass comprises the complete equipment and includes all essential elements of the complete design.

B7.5.2 The gyro compass where fitted shall provide a true heading which is the horizontal angle between the vertical plane passing through the true meridian and the vertical plane passing through the ship's fore and aft datum line. It is measured from True North (000 degrees) clockwise through 360 degrees.

B7.5.3 The compass is said to be settled if any three readings taken at intervals of 30 minutes (when the compass is on a stationery base) are within a band of 0.7 degrees.

B7.5.4 The settle point heading is the average value of three readings taken at 30 minutes intervals after the compass has settled.

B7.5.5 The settle point error is the difference between settle point heading and true heading.

B7.5.6 The errors to which the gyro compass is subject are considered to have a probability of 68.3 per cent, where the errors are taken

as differences between the observed values and their mean value. The maximum error is understood as triple the above error and has a probability of 99.7 per cent.

B7.6 Method of Presentation

The compass card should be graduated in equal intervals of one degree or a fraction thereof. A numerical indication should be provided at least at every ten degrees, starting from 000 degrees clockwise through 360 degrees.

B7.7 Illumination

Adequate illumination should be provided to enable reading of scales at all times. Facilities for dimming should be provided.

B7.8 Accuracy

B7.8.1 Settling time of equipment.

B7.8.1.1 The compass should settle within six hours of switching on in latitudes of up to 70 degrees.

B7.8.1.2 The maximum value of the settle point error of the master compass should not exceed + 2 degrees in the general conditions mentioned in sub-item 6.1 and item 8 and including variations in magnetic field likely to be experienced in the ship in which it is installed.

B7.8.1.3 The maximum error of the master compass in latitudes up to 70 degrees should not exceed:

(a) + 1 degree when the ship is travelling on a straight course at a constant speed in conditions of calm sea;

(b) + 2.5 degrees to a rapid alteration of course of 180 degrees at speeds up to 20 knots;

(c) + 2 degrees due to a fast alteration of speed to 20 knots;

(d) + 3 degrees when rolling and pitching with any period between 3 and 15 seconds, a maximum angle of 22.5 degrees and a maximum horizontal acceleration of 3 metres/seconds squared.

B7.8.1.4 The maximum divergence in reading between the master compass and repeaters should not exceed + 0.3 degrees under the conditions mentioned in sub paragraph B7.8.1.2.

Notes:

When the compass is used for purposes other than steering and bearing, a higher accuracy might be necessary.

To ensure that the maximum error referred to in sub-paragraph B7.8.1.3(d) is not exceeded in practice, it will be necessary to pay particular attention to the siting of the master compass.

B7.9 Power Supply

B7.9.1 The equipment should be capable or rating continuously in accordance with the requirements of this paragraph in the presence of such variations of the power supply as are normally expected in a ship.

B7.9.2 Means should be incorporated for the protection of the equipment from excessive currents and voltages, transients and accidental reversal of power supply polarity. "If provision is made for operating the equipment for more than one source of electrical energy, arrangements for rapidly changing from one source of supply to the other should be incorporated".

B7.10 Interference

B7.10.1 All steps should be taken to eliminate as far as practicable the causes of, and to suppress, electromagnetic interference between the gyro compass and other equipment on board.

B7.10.2 Mechanical noise from all units should be so limited as not to prejudice the hearing of sounds on which the safety of the ship might depend.

B7.10.3 Each unit of the equipment should be marked with the minimum safe distance at which it may be mounted from a standard or a steering magnetic compass.

B7.11 Durability and Resistance of Effects of Climate

The equipment should be capable of continuous operation under the conditions of vibration, humidity and change of temperature likely to be experienced in the ship in which it is installed.

B7.12 Construction and Installation

B7.12.1 The master compass and any repeaters used for taking visual bearings should be installed in a ship with their fore and aft datum lines parallel to the ship's fore and aft datum line to within +0.5 degrees. The lubber line should be in the same vertical plane as the centre of the card of the compass and should be aligned accurately in the fore and aft direction.

B7.12.2 Means should be provided for correcting the errors induced by speed and latitude.

B7.12.3 An automatic alarm should be provided to indicate a major fault in the compass system.

B7.12.4 The system should be designed to enable heading information to be provided to other navigational aids such as radar, radio direction finder and automatic pilot.

B7.12.5 Information should be provided to enable competent members of a ship's staff to operate and maintain the equipment efficiently.

B7.12.6 The equipment should be provided with an indication of manufacture, type and/or number.

B7.12.7 The equipment should be so constructed and installed that it is readily accessible for maintenance purposes.

B7.12.8 An appliance such as an azimuth mirror or azimuth circle or sight vane shall be provided to enable bearings to be taken from the gyro repeater or gyro repeaters.

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APPENDIX C

DEPTH SHOUNDING EQUIPMENT

C1.0 Depth sounding device

C1.1 Depth sounding devices shall include echo-sounders, or any other apparatus designed for determining the depth of water.

C1.2 A depth sounding device shall be complete with necessary accessories and spare parts.

C2.0 Hand lead shall consist of

C2.1 A lead weighing at least 3 kg.

C2.2 A line of at least 50 metres, correctly marked.

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APPENDIX D

SIGNALLING EQUIPMENT

D1.0 Daylight Signaling Lamp or Light

D1.1 shall be of a type approved by the Chief Executive Officer.

D1.2 shall not be solely dependent upon the ship's main source of power.

D1.3 may be portable or fixed.

D1.4 includes torch or similar apparatus.

D1.5 shall have a source of power independent of ship's main power supply.

D2.0 "International Code of Signals" means any published manual approved by the Chief Executive Officer containing the International Code of Signals adopted by I.M.C.O. in 1965 and as amended from time to time.

APPENDIX E

CHARTS AND NAUTICAL PUBLICATIONS

E1.0 Area requirements

E1.1 Classes 1, 2 & 3A

The owner and the master of any ship that operates in the unlimited waters and near coastal waters shall ensure that the ship carries—

(a) nautical charts; and

(b) the following nautical publications:

(i) British Admiralty tide tables;

(ii) British Admiralty lists of lights;

(iii) sailing directions;

(iv) notices to mariners;

(v) an astronomical almanac;

(vi) the International Code of Signals; and

(c) mathematical tables for the calculation of astronomical observations.

E1.2 Class 3B

The owner and the master of any ship that operates in the Territorial waters shall ensure that the ship carries—

(a) nautical charts; and

(b) the following nautical publications:

(i) Fiji Nautical almanac

(ii) notices to mariners

(iii) International Code of Signals.

E1.3 Classes 3D &3E

(1) Except as provided in rule 25.6(2), the owner and the master of any ship that operates in the inshore or sheltered waters shall ensure that the ship carries—

(a) nautical charts; and

(b) a Fiji nautical almanac.

(2) If a nautical chart or tide tables are not published for the waters in which a ship is operating, the owner and the master of the ship shall—

(a) ensure that the ship carries the best alternative information available; and

(b) in the case of a nautical chart, advise the Chief Executive Officer that non nautical chart is available for that operation.

E2.0 Chart and publication requirements

E2.1 Nautical Charts

(1) A nautical chart carried to meet the requirements of this Part shall—

(a) be appropriate to the ship's area of operations; and

(b) be of the largest scale available and suitable for the type of navigation it is being used for; and

(c) if it is an electronic chart—

(i) be part of an Electronic Chart Display and Information System that meets the requirements of Performance Standards for Electronic Chart Display and Information Systems (ECDIS) adopted by the International Maritime Organisation by Assembly Resolution A.817(19) as amended by Resolution MSC. 232(82); and

(ii) have paper back-up nautical charts; and

(iii) be operated only by persons who have received training, that is acceptable to the Chief Executive Officer, in the use of electronic charts.

(2) A paper nautical chart carried to meet the requirements of this Part shall—

(a) be certified by the relevant government institution as correct up to the date of supply to a retailer; and

(b) be maintained in a fully correct condition.

E2.2 An electronic nautical chart carried to meet the requirements of this Part shall be approved by the Fiji Hydrographic Office.

E2.3 Fiji Hydrographic Office shall ensure that corrections to any nautical chart supplied are made available at a frequency approved by the Chief Hydrographer to the government of Fiji.

E2.4 The Chief Executive Officer may approve the frequency of publication of correction to nautical charts in order to maintain and improve maritime safety after consultation with the Fiji Hydrographic Office.

E2.5 Nautical publications

A nautical publication carried out to meet the requirements of this Part shall—

(a) be appropriate to the ship's area of operations; and

(b) incorporate all amendments made by the relevant government institution or authority.

APPENDIX F

REQUIREMENTS FOR AND USE OF ACCOMMODATION LADDERS, GANGWAYS AND SAFETY NETS

F1.0 Accommodation Ladder shall be a sloping ladder fitted with a series of steps of treads and handrails, used to provide safe access to and from a ship.

F2.0 Accommodation Ladders

Ship's accommodation ladders shall:

F2.1 be at least 550 mm wide (clear width of step or tread);

F2.2 be provided with platform as necessary;

F2.3 if Intermediate platforms are fitted, shall be self-leveling;

F2.4 be fitted on both sides throughout the whole length with stanchions and hand railings at a vertical height of 1000mm above the stringers of the ladder or the platform as applicable;

F2.5 hand railings or hand ropes shall be tight and properly secured;

F2.6 the vertical space between the handrail and the stringers of the ladder shall be securely fenced;

F2.7 be so made that they can be adequately supported and secured by suitable fastenings against displacement, overturning or slipping;

F2.8 Accommodation ladders should be so secured that when they are used in tidal ports they can be adjusted to the height of the wharf or other landing place according to the state of the tide.

F2.9 The accommodation ladder shall be sited leading aft.

F2.10 When in use, the lower end of the accommodation ladder shall—

(a) be clear of discharges from the ship;

(b) be against the parallel body and within the aft quarter length of the ship;

(c) be secured firmly to the ship's side.

F2.11 The lower platform of the accommodation ladder shall be in a horizontal position when in use.

F3.0 Gangways

Gangways shall be a narrow platform or bridge fitted with handrails, used to provide safe access to and from a ship.

F3.1 Gangways shall:

F3.1.1 be at least 550 mm wide (clear width of step or tread);

F3.1.2 be fitted on both sides throughout the length with railings; and

F3.1.3. be provided with transverse treads at suitable stepping intervals.

F3.2 On gangways which pivot or swivel horizontally on a platform the meeting point (gangway-platform-steps) should be adequately protected by railings or ropes.

F3.3 The wheels or roller at the bottom of the gangway shall have a guard to protect persons feet if the ship moves.

F4.0 Railings

F4.1 All railings shall:

F4.1.1 be of sound material and good construction and possess adequate strength;

F4.1.2 be at least 1000 mm high measured at right angles to the line joining the top edge of the steps or trends; and

F4.1.3 consist of two rails, taut ropes or chains supported by stanchions, and, if necessary, a toe-board, to prevent persons slipping or objects falling.

F4.2 Intermediate rails, ropes or chains should be not more than 500 mm apart.

F5. 0 Use of Accommodation Ladders, Gangways and Safety Nets

F5.1 Every accommodation ladder and gangway shall be:

F5.1.1 maintained in a "safe and good condition";

F5.1.2 shall be of such length to ensure at the maximum design and operating angle the lowest platform will be not more than 600mm above the water line in the ships lightest seagoing condition;

F5.1.3 ships with embarkation and disembarkation deck exceeding 20 meters above water line an alternative means of providing safe excess to the bottom platform of the accommodation ladder or gangway may be approved by the Chief Executive Officer;

F5.1.4 adequate lighting to be provided to illuminate the area where persons embark or disembark;

F5.1.5 be placed clear of working area and where suspended loads may pass overhead;

F5.1.6 lifebuoy equipped with self-igniting light and a buoyant lifeline should be available for immediate use in the vicinity of the embarkation and disembarkation area;

F5.1.7 the winch and the accommodation ladder or gangway should be tested to confirm proper operation;

F5.1.8 a new accommodation ladder or gangway will be subjected to a static load test of the specified maximum working load upon installation;

F5.1.9 secured to prevent shifting and slipping; and

F5.1.10 suitably rigged and maintained to compensate for movement of the ship.

F5.2 Where a platform is provided at the bottom of a ladder or gangway, the platform shall be level and horizontal.

F5.3 Safety nets shall be used with accommodation ladders and gangways as follows:

F5.3.1 Where an accommodation ladder is suspended in tackles and resting against the side of the ship a safety net shall be positioned under the lower end of the ladder.

F5.3.2 Where the bottom of an accommodation ladder or gangway extends over the wharf and persons boarding or leaving the ship are protected by handrails on both sides throughout the entire length, a safety net shall not be required.

F5.3.3 The sides of an accommodation ladder or gangway shall be of sufficient height and fitted with screens or netting.

F6.0 Safety Nets

A safety net shall be approximately 5.5 metres by 2.5 metres in size, with mesh size of approximately 100 mm, and made of rope of not less than 12 mm diameter, being coir, or other cordage of equivalent strength, or shall be such dimensions and material as required by the Chief Executive Officer for particular sizes of ships. Sufficient ropes of adequate length shall be attached for positioning of the net.

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APPENDIX G

SHIPBORNE RADIO COMMUNICATION AND NAVIGATIONAL EQUIPMENT

The term "Shipborne Radio Communication and Navigational Equipment" includes:

1. Magnetic Compass
2. Gyro compass
3. Radar
4. ARPA
5. GPS
6. ECHO Sounder
7. ECDIS
8. AIS and LRIT
9. Speed and distance indicator
10. Rate of turn indicator
11. GMDSS

Standards of all the above equipment should comply with the requirements specified in the IMO Publication Performance Standards for Shipborne Radio communications and Navigational Equipment (ID978E) as amended by IMO form time to time.

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APPENDIX H

ANCHORS AND CABLES

For the purpose of this Appendix, the following terms apply:

"Accessory" means any accessory used in the chain cable assembly which includes, but is not limited to swivels, shackles and links of special design;

"Anchor" means an instrument for the purpose of holding a ship when it is at sea –

(a) in moderate sea conditions; and

(b) where the depth of water at sea is suitable for the anchor and chain cable; and

(c) where there are no other means of securing the ship;

"Chain cable" means a chain made up of links and is the means by which the anchor is attached to the ship;

"Certificate of test" means a document issued by an inspecting organization certifying that an anchor, chain cable or accessory has, after its manufacturer, satisfactorily passed its load testing and examination in accordance with the requirements of this schedule;

"Certified accessory" means an accessory which has been designed, manufactured and tested in accordance with the requirements of this schedule and the rules of an inspecting organisation and for which a certificate of test has been issued by the inspecting organisation;

"High holding power anchor" means an anchor having a holding power at least twice that of an ordinary stockless anchor;

"Inspecting Organisation" means—

(a) in relation to an anchor, chain cable or accessory manufactured, examined and tested in Fiji, a classification society or approved agencies which has entered into a memorandum of agreement with the Chief Executive Officer in compliance with the International Maritime Organization Assembly Resolution A.739 (18) and the annex as amended by Resolution MSC. 208(81) there to entitled Adoption of Amendments to the Guidelines for the Authorization of Organization acting on Behalf of the authority (Maritime Administration); or

(b) on relation to any anchor, chain cable or accessory manufactured, examined and tested in a country other than Fiji, a classification society which is a current full member of the International Association of Classification Societies;

"Testing establishment" means any laboratory complying with the requirements of paragraph 13.2.

Requirements

H1.0 MINIMUM ANCHOR MASS

H1.1 For ships of more than 24 m in measured length the minimum mass per anchor shall be determined by calculating the equipment number as specified in H2.0.

H1.1.1 For ships up to 24 m in measured length shall be the lesser value determined by—

(a) applying the values specified in Tables 3.1 to 3.4, for ships up to 24m in length only; or

(b) calculating the mass from the equipment number as specified in H2.0.

H2.0 EQUIPMENT NUMBER

H2.1 Equipment number is a function of displacement, frontal area and profile area. It shall be calculated by the following equation:

$EN = \{(\ ^{2/3}. fh) + 2(B.a + b.h.COS\ f) + 0.1\ (Ah + Ass\ .\ COS\ p)\}\ fo$.....(H1.0)

Where

EN = equipment number

= ship displacement, in tons

B = moulded breadth, in metres

a = Freeboard, in metres

b = breadth of deckhouse tier if greater than B/4, in metres

h = height of deckhouse tier if greater than B/4, in metres

Ah = the hull profile above waterline, in square metres

Ass = superstructure profile area, in square metres

f = slope of superstructure front to the vertical, in degrees

p = slope of superstructure side to the vertical, in degrees

fh = factor for hull type:

1.0 for monohulls

1.26 for catamarans

1.33 for trimarans

fo = factor for operational area:

1.0 for area 1, 2, 3A, 3B

0.8 for area 3D

0.54 for area 3E

H3.0 HOLDING POWER

H3.1 The holding power (force) of an anchor is related to the equipment number by the following equation:

$Ph = 3\ (0.002\ EN^2 + 2.3\ EN + 9) \times 9.81$.....(H2.0)

Where

Ph = holding power (force), in newtons

EN = equipment number

H4.0 ANCHOR MASS

H4.1 The required anchor mass is related to the anchor holding power by the following equation:

$Ma = Ph/(Ft \times 9.81)$……(H3.0)

where

Ma = required anchor mass, in kilograms

Ph = holding power (force), in newtons

Ft =factor for anchor type:

3.00 for standard anchors

4.29 for high holding power anchors

5.45 for super high holding power anchors

H5.0 CABLE LENGTH AND DIAMETER

H5.1 The required cable length and diameter is related to the equipment number by the following equation:

$Lc = 1\times10\text{-}6.EN3 - 1.4 \times 10\text{-}3.EN2 + 0.75\times EN + 55$ ..... (H4.0)

$Dc = -6 \times 10\text{-}5. EN2 + 0.095 \times EN + 8$.....(H5.0)

Where

Lc = length of cable, in metres

Dc = diameter of cable, in millimetres

EN = equipment number

The length of anchor cable should be dependent on the area of operation of the ship.

NOTES:

1. The length of anchor cable attached to an anchor should be sufficient to achieve a scope of 7 to 1 or 45 m, whichever is longer.
2. Ships operating in Class1, 2, 3A, 3B or waters should carry at least 150 m of anchor cable and those operating in class 3D waters should carry at least 100 m of anchor cable.
3. Ships operating in class 3E waters should carry at least 45 m of anchor cable.

Additional requirements for anchor cables are specified in paragraph H11.0

H6.0 LIGHT CRAFT

H6.1 A ship is considered a light craft if it has a maximum speed

$V_m \geq 7.16\ \Delta^{0.1667}$……(H6.0)

Where

V_m = maximum speed in knots

Δ = the craft displacement corresponding to the design waterline, in tonnes

H7.0 DETERMINING ANCHOR MASS BY TABLES

H7.1 Tables 3.1 to Table 3.4 provide the mass of standard anchors for ships with displacement hulls. If the parameters of the ship fall between the values as shown in the Tables, the anchor mass should be calculated by interpolation. In the event of the non-availability of an anchor having the calculated mass, the next higher size anchor should be selected.

The mass of a single anchor shall be determined from the following formula:

MA = MTfvfA……..(H7.0)

Where

MA = mass of a single anchor, in kilograms

MT = tabular mass of anchor from Tables 3.1 and 3.3

fv = speed factor:

= 1 if not a light craft as defined by paragraph H6.0

= 0.75 a light craft as defined by paragraph H6.0

fA = 1 for standard anchors

= 0.7 for high holding power anchors

= 0.55 for extra high holding power anchors

H8.0 NUMBER OF ANCHORS

H8.1 The number of anchors required to be carried by a ship shall depend on its operating profile. The operating profile affects the risk of encountering an emergency situation.

H8.2 Where a ship is required to carry two anchors, each anchor shall be capable of providing the required holding power. The primary anchoring system shall be ready at all times. The secondary anchoring system shall be ready to deploy within 15 min.

H8.3 All ships shall carry two anchors if their equipment number is more than 10 or they are located below the double line in Tables 3.1 to 3.3.

H8.4 Unless carrying dangerous goods, a ship shall be allowed to carry one anchor if all of the following risk mitigating measures are in place:

(a) The ship has complete redundancy with respect to main propulsion which means twin screw and two means of steering system independent from each other.

Excluding ships carrying dangerous goods, any ship less than 24m which operates solely in sheltered waters (Class D and E) shall be exempted from the requirement to carry a second anchor.

NOTE: A ship may require more than one anchor for the following reasons:

(i) Operational requirements.

(ii) Anchoring in different types of sea beds.

Table 3.1 – Anchor mass in kg for Class 1, 2 and 3A ships, unlimited and near coastal

H / L	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
3														
4			8	11										
5		8	12	13.5	16									
6	8	11	14	16	18.5	21								
7	10	13	16	18.5	21	24	26							
8	12	15	18.5	21	24.5	27	31	35						
9	14	17	21	24	28	32	36	41	46					
10	16	19	23.5	27	32	37	42	47	52	59				
11	18	22	26	31	37	42	48	54	61	67.5	75			
12	20	24.5	29	35	41	48	54	62	69.5	77	87	96		
13	22	27	33	40	46.5	53.5	62	70	80.5	90	99.5	110	121	
14	24	30.5	37.5	45	52	61	70	81	91	102	113	125	138	148
15	27	35	42	50	59	69	79	91	102	115	128	141	154	168
16	31	39	47	56	66	77	90	102	115	129	142	156	171	186
17	35	43	52	63	74	87	100	114	129	143	158	174	190	206
18	39	48	58	70	83	97	111	127	142	158	175	191	210	226
19	43	53	65	78	93	108	124	140	156	175	192	211	228	246
20	48	59	72	87.5	103	120	137	154	173	191	211	229	248	268
21	53	66	80	97	114	132	149	169	189	208	228	248	270	291
22	59	73	90	107	126	145	164	185	206	226	247	270	292	318
23	65	82	100	118	138	158	180	201	223	244	268	291	318	347
24	72	90	109	130	150	172	195	218	240	264	289	318	344	388

Above = 1 anchor required
Below = 2 anchors required

H is height in metres
L is measured length in metres

Table 3.2 – Anchor mass in kg for Class 3B Ships, Fiji territorial waters

H / L	0.5	11.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
3														
4			7	10										
5		7	10	12	14									
6	7	10	12	13	15	18								
7	9	11	14	16	18	20	22.5							
8	10	12.5	15	17.5	20	22.5	25	30						
9	12	15	17.5	20	22.5	27.5	30	35	40					
10	14	17	20	22.5	27.5	30	35	40	45	50				
11	15	20	22.5	25	30	35	40	45	50	55	60			
12	17	20	25	30	35	40	45	50	57.5	65	72.5	80		
13	20	25	30	35	40	45	50	60	67.5	75	82.5	90	100	
14	20	25	32.5	37.5	45	50	57.5	67.5	75	85	95	105	115	125
15	22.5	30	35	42.5	50	57.5	65	75	85	95	110	120	130	140
16	25	32.5	40	47.5	55	65	75	85	97.5	110	120	130	140	155
17	30	37.5	45	52.5	62.5	72.5	85	95	110	120	130	145	160	175
18	32.5	40	50	60	70	80	92.5	105	120	130	145	160	175	190
19	35	45	55	65	77.5	90	105	120	130	145	160	175	190	205
20	40	50	60	72.5	85	100	115	130	145	160	175	190	205	225
21	45	55	67.5	80	95	110	125	140	160	175	190	210	225	245
22	50	60	75	90	105	120	135	155	175	190	205	225	245	265
23	55	70	85	100	115	130	150	170	190	205	225	245	265	290
24	60	75	90	110	125	145	165	180	200	220	240	260	285	320

Above = 1 anchor required
Below = 2 anchors required

H is height in metres
L is measured length in metres

Table 3.3 – Anchor mass in kg for Class 3D ships, inshore waters

H / L	0.5	11.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
3														
4			6	8										
5		6	8	9.5	11									
6	6	8	9.5	11	12.5	14								
7	7	9	11	12.5	14.5	16	18							
8	8	10.5	12.5	14.5	16.5	18.5	21	23.5						
9	9.5	12	14	16.5	18.5	21.5	24.5	28	31					
10	11	13	16	18.5	21.5	25	28.5	32	35	40				
11	12.5	15	18	21	24.5	28.5	32.5	36	41	45.5	50			
12	13	16.5	20	23.5	28	32.5	36.5	42	46	52	58	64		
13	15	18.5	22.5	27	31.5	36	42	47	53	60	66	73	81.5	
14	17	20.5	25	30.5	35	41.5	47	53	60.5	68	74.5	84.5	92	99
15	19	23	29	33.5	40	46	53	60.5	68	77	86	94	103	112
16	21	26	32	37.5	44.5	51.5	59.5	68	77	87	95.5	105	115	125
17	23	30.5	35	42.5	49	58	66.5	76	87	95.5	106	117	117	138
18	26.5	32.5	39	47	55.5	64.5	74.5	85.5	96	106	117	129	140	152
19	29	36	44	52	62	72	83.5	96	106	117	129	141	153	165
20	32.5	40	48	58.5	68.5	81	92	105	116	128	141	154	166	180
21	35.5	44.5	53.5	64.5	76	88.5	100	114	127	138	153	167	181	195
22	40	49	60	71.5	85	96.5	111	124	138	152	166	181	196	212
23	44	54	66.5	79	93	107	120	135	150	164	180	196	211	230
24	48	60.5	73	88	101	116	131	146	162	175	196	210	229	250

Above = 1 anchor required
Below = 2 anchors required

H is height in metres
L is measured length in metres

Table 3.4 – Anchor mass in kg for Class 3E & 3F ships

H / L	0.5	11.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
3														
4			4	5										
5		4	5	6	7									
6	4	5	6	7	8	9								
7	4.5	6	7	8	9.5	11	12							
8	5.5	6.5	8	9.5	11	12.5	14	15.5						
9	6	7.5	9	11	12.5	14.5	16	18.5	21					
10	7	8.5	11	12.5	14.5	16.5	19	21.5	24	26.5				
11	8	10	12	14.5	16	19	22	24.5	27.5	31	34.5			
12	9	11	14	15.5	18.5	22	25	28	31.5	35.5	39.5	43		
13	10	12.5	15	18	21.5	24.5	28	32	36	40.5	45	50	54.5	
14	11.5	14	17	20.5	24	27.5	32	36.5	41	46.5	51	56.5	62	67
15	12.5	15.5	19	23	27	31	36	41	46	52	57.5	63.5	69.5	75
16	14	17.5	21.5	25.5	30	35	40.5	46	52	58	64	70	76.5	83
17	15.5	19.5	24	28.5	34	39.5	45	51.5	58	64	71	77.5	85	92
18	17.5	22	26.5	32	38	43.5	50.5	57.5	64	71	78	86	93.5	102
19	19.5	24.5	29.5	35.5	41.5	49	56	63	70.5	78	86	94.5	103	111
20	22	27	33	39.5	46.5	54	62	70	77	85.5	94.5	104	113	121
21	24.5	30	36.5	43.5	51.5	59	67.5	75.5	84	94	103	113	122	133
22	27	33.5	40.5	47	57	65	73.5	82.5	92	102	112	122	133	144
23	29.5	37	45	53	62	71	80	90	100	111	121	132	145	158
24	33	40.5	49.5	58.5	68	77	87	98	109	119	131	144	157	171

Above = 1 anchor required
Below = 2 anchors required

H is height in metres
L is measured length in metres

H9.0 MATERIALS AND CONSTRUCTION

H9.1 General requirements

Anchors shall comply with the following requirements:

(a) The anchor as constructed shall be able to withstand the design loads without bending, shearing or failing in any way.

(b) The materials, or combination of materials shall be protected from corrosion that is likely to cause failure of the anchor in service. Corrosion protection may be inherent to the material or applied externally.

(c) The method of construction or assembly process shall minimize the variation in strength from one anchor to the next.

NOTE: The components of an anchor may be cast, forged or fabricated from plate materials.

H9.2 Certificate for fabricated components

For fabricated anchor components, certificates relating to the chemical composition and material properties shall be obtained from the material manufacturer.

H9.3 Certificate for cast or forged components

For cast or forged anchor components, the anchor manufacturer shall be responsible for the provision of certificates relating to chemical composition and material properties.

H9.4 Record of treatment processes

Anchor manufacturers shall record details of any heat treatment, cold working or other process, which may affect either the material properties, or corrosion resistance of the anchor.

H9.5 Type and size approved

Details relating to anchor materials shall be supplied to the assessment body for obtaining a certificate of approval for type and size.

H10.0 ANCHOR SHACKLE

H10.1 The anchor shackle provides the link between the anchor and the anchor cable. The basic requirements of the anchor shackle are:

H10.1.1 The strength of the anchor shackle shall be equal to or more than that of the anchor cable it is connected to.

NOTE: As the shape of the anchor shackle is inherently weaker than stud-link anchor cable this will require a larger diameter for the shackle leg and pin.

H10.1.2 The proof load for the anchor shackle shall be greater than the certified holding power of the anchor it is connected to.

H11.0 ANCHOR CABLE

H11.1 Cable type

The anchor cable shall be of stud- link chain, short-link chain, wire rope or fibre rope, subject to the requirements of this paragraph.

H11.2 Design requirements

H11.2.1 The anchor cable shall be designed as such that the following applies:

(a) it provides a connection between the anchor and the ship of sufficient length so that the anchor is able to provide maximum holding power.

(b) it provides a measure of elasticity to reduce the responsible loads on the ship and anchor caused by the variation in the applied loads on the ship due to wind, wave and current forces.

H11.2.2 To satisfy the design requirements, the anchor cable shall have a working strength greater than the holding power of the anchor to be used. The anchor cable shall be able to absorb the design accelerations without exceeding the holding power of the anchor. This may be achieved by the use of mass, the elastic properties of the anchor cable, cable length or some combination of these characteristics.

H11.3 Steel Chain

The diameter of the chain shall be as per paragraph H5.0 or Table 4.1. Chain shall be manufactured, tested and certified in accordance with one of the following:

(a) ISO 1704 or equivalent standard;

(b) AS 2321 or equivalent standard;

(c) Ship Classification Society recognized and authorised by MSAF.

H11.4 Steel wire rope

H11.4.1 It is permitted to replace chain by steel wire rope where the equivalent anchor mass does not exceed that of a 130 kg standard anchor and the breaking load of the steel wire rope is at least equal to that of chain cable. The minimum length of chain at the end of wire rope shall be as per Table 4.1.

H11.4.2 Wire ropes shall be manufactured, tested and certified in accordance with one of the following:

(a) AS 3569 or equivalent standard

NOTE: For information on the operation and maintenance of steel wire ropes, refer to AS 2759.

(b) The requirements of a Ship Classification Society recognised and authorised by MSAF

H11.5 Fibre rope

H11.5.1 Fibre rope is allowed for any anchor except anchors on class 1, 2, 3A & 3B ships where the equivalent anchor mass exceeds that of a 130 kg standard anchor. The minimum breaking load of the fibre rope shall be equal to or more than that of a chain cable. The rope shall be in good condition, free from sunlight damage, abrasions, and hockles. The minimum length of chain at the end of fibre rope shall be as per Table 4.1.

NOTE: For guidance, rope diameters are given in table 4.1

H11.5.2 The fibre ropes shall be manufactured as per AS 4142.2 or equivalent standard and tested as per AS 4143.1 or equivalent standard.

NOTE: For information on care and safe usage of fibre ropes, refer to AS 4142.1

H11.5.3 Fibre ropes that have been certified by Ship Classification Society that is recognized by MSAF shall be deemed to comply with this standard.

Table 4.1 – Dimensions of anchor cable

Cable material	Standard anchor mass	Short-link chain	Manila	Poly-propelene	Nylon	Poly-ethylene	+ chain length
	Kg	Diameter mm					
Chain, wire rope or fibre rope	Under 8	8	14	12	10	14	3m chain of table size shackled between rope and anchor
	8-13	8	16	12	10	14	
	13-18	8	18	14	11	16	
	18-25	8	20	16	12	18	
Chain, wire rope or fibre rope	25-32	10	24	16	14	20	6m chain of table size shackled between rope and anchor
	32-38	10	24	18	14	22	
	38-44	10	24	22	16	24	
	44-51	13	30	24	18	28	
	51-76	14	34	28	20	32	
	76-89	14	38	32	22	36	
	89-100	15	40	34	24	36	
	100-130	15	48	40	30	44	
Fibre rope permitted for ships operating in partially smooth water and smooth water	130-178	16					9m chain of table size shackled between rope and anchor
	178-226	17					
	226-274	19					
	274-322	20					
	322-370	21					
	370-432	21					

INSPECTION, EXAMINATION AND TESTING OF ANCHOR

H12.0 ANCHOR AND CABLES MANUFACTURED OVERSEAS

H12.1 Anchor

The owner of the ship shall not fit an anchor that is manufactured outside Fiji to the ship unless the anchor has been examined and tested by an inspecting organization and the surveyor has—

(a) sighted the original or a certified copy of test; and

(b) verified that marking on the anchor are consistent with the certificate of test.

H12.2 Chain cables and accessories

The owner of a ship shall fit a chain cable or any accessory that is manufactured outside Fiji to the ship unless that chain cable or accessory has been examined and tested by an inspecting organisation and the surveyor has—

(a) sighted the original or a certified copy of the certificate of test; and

(b) verified that marking on the chain cable or accessory are consistent with the certificate of test.

H13.0 ANCHOR AND CABLES MANUFACTURED IN FIJI

Responsibility

H13.1 Anchor and chain cable manufacturer

Any person who manufactures any anchor, chain cable and accessory in Fiji shall—

(a) notify an inspecting organisation of that persons intention to commence the manufacture of any anchor, chain cable or accessory; and

(b) if intending to change the design or specification of any anchor, chain cable or accessory that is manufactured by the person-

(i) Notify an inspecting organisation of the change; and

(ii) Obtain the approval of the inspecting organisation for the change before commencing manufacture to the changed design or specification; and

(c) permit an inspecting organisation to inspect that persons facilities for the purpose of inspecting the manufacturing process and witnessing any tests required by this schedule; and

(d) keep a record for a period of not less than 15 years from the date of the test required by paragraph H13.7, of any anchor, Chain cable or accessories manufactured and issued with a certificate of test; and

(e) ensure that the record required by sub paragraph H13.1*(d)* provides—

(i) the name of the inspecting organisation; and

(ii) the number of the certificate of test; and

(iii) the month and year of the test; and

(iv) for anchors—

(A) The mass of the anchor; and

(B) An indication as to whether it is high holding power type; and

(C) The identification mark which will enable the full history of the anchor to be traced; and

(v) for chain cable, a description of the chain cable including-

(A) The dimensions of the chain cable; and

(B) The grade of the chain cable; and

(vi) make the records available for examination by the Chief Executive Officer on demand.

H13.2 Testing establishment

H13.2.1 An inspecting organisation that examines an anchor or chain cable for the issue of a certificate of test shall ensure that any testing establishment or laboratory in Fiji used for testing the anchor and the chain cable, or for testing mechanical specimens taken from the anchor or the chain cable, is accredited by International Accreditation Fiji to International Standards Organization/ International Electronical Commission (ISO/ IEC) 17025:2005 general requirements for the competence for calibration and testing laboratories.

H13.2.2 An inspecting organisation that examines chain cable for the issue of a certificate of test shall ensure that any test machine used for the breaking and proof tests of chain cable is—

(a) constructed to test chains tonnage of not less than 27.5 meters at any one time, and so constructed that the straining arrangement allows such length of chain cable to be tested without the need to take a fresh holds to complete the test; and

(b) manufactured and installed to the satisfisfaction of the inspecting organisation.

H13.2.3 An inspecting organisation that examines an anchor or chain cable for the issue of a certificate of test shall ensure that the accuracy of calibration for any chain cable breaking load or proof load test machine or anchor proof load test machine used for the examination is—

(a) established before the machines is put into use; and

(b) verified

(i) at intervals not exceeding 12 months; and

(ii) after any major overhaul; and

(iii) when any parts affecting the accuracy of the machine is repaired or replaced , or when the machine is moved to another site; and

(c) within a tolerance of plus or minus one percent.

H13.2.4 An inspecting organisation that examines an anchor or chain cable for the issue of a certificate of test shall ensure that the accuracy of the calibration of any tensile, impact and hardness testing machine used in the examination is verified in accordance with the following standards—

Tensile testing machine	AC 2193:1978 Methods for calibration and grading of force measuring systems of testing machines; or BS EN ISO 7500-1:2004: Regulation 2 Verification of the Force Measuring System of the Tensile Testing Machine
Impact testing machine	AS 1544.2:1989 - Methods for Impact Test on Metals Charpy V-notch; or BS 131:1972: Regulation 4 - Calibration of Pendulum Impact Testing Machines for Metals and BS EN 10045-2:1993 Method for the verification of impact testing machines, as appropriate.
Hardness testing - Brinell	AS 1816:1990: Metallic Materials - Brinell Hardness Test; Or BS EN ISO 6506-2:2005 Regulation 2 - Metallic Materials. Brinell Hardness Test - Verification of Brinell Hardness Testing Machines.
Hardness testing -Vickers	AS 1817:1991: Metallic Materials - Vickers Hardness Test; or BS EN ISO 6507: Regulation 2 Metallic Materials. Vickers Hardness Test - Verification of Testing Machines
Hardness testing - Rockwell	AS 1815:1991: Metallic Materials - Rockwell Hardness Test; or BS EN ISO 6508-2:2005 Regulation 2 - Verification of Rockwell Hardness Testing Machines (Scales A, B, C, D, E, F, G, H, K, N, T)

H13.2.5 An inspecting organisation that examines an anchor or chain cable for the issue of a certificate of test shall ensure that any non-destructive testing used in the examination is carried out in accordance with the following standards.

Penetrant flaw detection	BS EN 571-1:1997 Non-destructive Testing - Penetrant Testing - General Principles; or AS 2062:1997 Non-destructive Testing - Permanent Testing of Products and Components
Magnetic Particle Flaw Detection	BS 6072:1981 Method for Magnetic Particle Flaw Detection; BS EN ISO 9934-1:2001 Non-destructive testing – Magnetic Particle Testing- Regulation 1: General principles; or AS 1171:1998 Non-destructive Testing – Magnetic Particle Testing of Ferromagnetic Products, Components and Structures.
Ultrasonic testing	AS 1065:1988 Non-destructive Testing -Ultrasonic Testing of Carbon and Low Alloy Steel Forgings; or AS2574:2000 Non-destructive Testing of Ferritic Castings; or Testing–Ultrasonic BS EN 10228-4:1999 Non-destructive Testing of Steel Forgings – Ultrasonic Testing of Austenitic-ferritic Stainless Steel Forgings BS EN 1714:1998 Non -destructive Examination of Welded Joints — Ultrasonic Examination of Welded Joints.
Radiographic testing	AS 3507-1:2003 Non-destructive Testing – Guide to Radiography for Ferrous Casting and AS 3507-2:2003 Non-destructive Testing – Radiography Determination of Quality Ferrous Castings; or BS EN 444:1994 Non-destructive Testing - General Principles for Radiographic Examination of Metallic Materials by X-ray and Gamma Rays; or BS EN 1435:1997 Non -destructive Examination of Fusion Welds -Radiographic Examination of Welded Joints.
Visual inspection	AS 3978:2003 Non-destructive Testing - Visual Inspection of Metal Products and Components; or BS EN 970:1997 Non -destructive Examination of Fusion Welds - Visual Examination.

H13.3 Inspecting Organisation

H13.3.1 An inspecting organisation undertaking the examination and testing of anchors, chain cables and accessories manufactured in Fiji shall—

(a) undertake the examination and witnessing of any testing for the issue of a certificate of test for any anchor, chain cable or accessory in accordance with the requirements of this schedule; and

(b) issue a certificate of test on satisfactory examination and test of any anchor, chain cable or accessory in accordance with the requirements of this schedule; and

(c) ensure that the anchor, chain cable or accessory is marked with the identification requirements of sub paragraph H13.8.1 or sub paragraph H13.12.1 as applicable, on issue of a certificate of test.

H13.3.2 Before issuing a certificate of test, the inspecting organisation shall—

(a) approve the design, drawings, calculations and specifications of a new anchor, chain cable or accessory to verify that they comply with the requirements of this Regulation and any of that inspecting organisation; and

(b) satisfy itself, by inspecting such facilities as are necessary, that the manufacturer's works facilities are sufficient for proper production of the anchor, chain cable or accessory; and

(c) satisfy itself that the testing establishment and its facilities comply with the requirements of this Regulation; and

(d) supervise where necessary, and witness, the proof and breaking load tests of the anchor, chain cable and accessory, and any other mechanical tests that may be required by this Regulation

H13.3.3 The inspecting organisation shall, within one month after marking the anchor, chain cable or accessory in accordance with sub paragraph H13.3.1 (c), deliver a certificate of test showing the details required by sub paragraph H13.8.2 or sub paragraph H13.12.1 as applicable to the person on whose application the tests were conducted.

H13.3.4 An inspecting organisation undertaking the examination and testing of anchors, chain cables and accessories manufactured in Fiji shall retain—

(a) any records relating to refused applications for a period of 5 years from the date of refusal; and

(b) any records relating to approved applications for a period of 25 years from the date of approval.

H13.3.5 The records maintained by an inspecting organisation under sub–paragraph H13.3.4 shall include—

(a) copies of applications for a certificate of test, all drawings, any calculations and specifications supplied in connection with each application, and evidence of design approval by the inspecting organisation; and

(b) details of all examinations and testing, and copies of each certificate of test issued.

H13.3.6 Copies of any documents issued notifying design approval, and copies of any certificate of test issued, shall be made available by the inspecting organisation, on request, to—

(a) any owner of the anchor or chain cable other than the person to whom the documents or certificate were initially issued; and

(b) the person to whom the documents or certificate were initially issued, if the documents or certificate are lost; and

(c) the Chie f Executive Officer.

H13.4 Surveyors

H13.4.1 A surveyor shall not permit any anchor, chain cable or accessory that is manufactured in Fiji to be fitted to a ship unless the anchor has been examined and tested by an inspecting organisation and the surveyor has—

(a) sighted the original or a certified copy of the certificate of test; and

(b) verified that markings on the anchor are consistent with the certificate of test.

ANCHORS

H13.5 Manufacture

The manufacturer of an anchor shall ensure that—

(a) The design of the anchor is approved by an inspecting organisation; and

(b) The anchor is manufactured and tested in accordance with the requirements of this paragraph and the rules of the inspecting organisation; and

(c) the mass of the anchor is measured by weighing or other means acceptable to the inspecting organisation prior to the issue of a certificate of test for the anchor by an inspecting organisation; and

(d) the surface finish of the anchor regulations are of sufficient smoothness to allow good visual examination and the use of non-destructive testing; and

(e) where an inspecting organisation requires the shank of an anchor to undergo ultrasonic non-destructive testing the profile of the shank design allows for test results that may be easily interpreted.

H13.6 Inspection before Testing

H13.6.1 Before testing any anchor, the inspecting organisation shall be satisfied with the quality of the materials from which the anchor is manufactured and the method of its manufacture.

H13.6.2 The inspecting organisation shall visually examine the anchor before application of the proof load test to ensure that it is free from defects that might impair the testing, or its proper workability, use and strength. Subject to the agreement of the inspecting organisation, surface defects may be removed by grinding.

H13.7 Testing

H13.7.1 All anchors shall be tested at a testing establishment complying with sub paragraph H13.2.1, in the presence of the inspecting organisation.

H13.7.2 The anchor, including its shackle, shackle pins, and welded or bolted connections, if any, shall be tested by subjecting it to the proof load test specified by the inspecting organisation. That test shall be undertaken on a proof load testing machine complying with sub paragraph H13.2.3.

H13.7.3 After proof load testing, the anchor, including its shackle, shackle pins, and welded or bolted connections, if any, shall be visually re-examined and, where considered appropriate by the inspecting organisation, subjected to non-destructive testing to the relevant standards referred to in sub- paragraph H13.2.5

H13.7.4 The anchor, including its shackle, shackle pins, and welded or bolted connections, if any, is satisfactory if, after application of the test and its examination, the inspecting organisation considers that it is without material deformation, significant defect or other weakness.

H13.7.5 If required by the rules of the inspecting organisation, a high holding power anchor shall be subjected to sea bed tests to demonstrate the anchor's effective hold.

H13.8 Identification and Certificate after testing

H13.8.1 Following a satisfactory examination and test, the following details shall be stamped on one side of the anchor which is to be reserved solely for this purpose—

(a) the details of the inspecting organisation and its local office that is issuing the certificate of test; and

(b) the details of the inspecting organisation and its local office that is issuing the certificate of test; and

(c) the month and year of test; and

(d) the mass in kilograms; and

(e) the letters HHP, if approved as a high holding power anchor; and

(f) in the case of stocked anchors, the mass of stock in kilograms.

H13.8.2 The anchor's certificate of test shall include the following particulars for the anchor—

(a) the purchaser's name and order number; and

(b) the type of anchor; and

(c) the mass of stock in kilograms (in the case of stocked anchors); and

(d) he proof load applied in tons; and

(e) the identification mark that will enable the full history of the anchor to be traced; and

(f) the material from which the anchor is manufactured and the chemical composition of that material; and

(g) the dimension of the anchor.

H13.8.3 Where appropriate, the certificate of test shall also include a list of all the accessories, together with their grade of steel, the name of the steel maker, any heat treatment used during manufacture, and the purchase order number.

Chain Cable and Accessories

H13.9 Manufacturer

H13.9.1 The manufacturer of any grade of chain cable and any accessories shall ensure that the chain cable and accessories are manufactured in accordance with procedures approved by the inspecting organisation at works approved by the inspecting organisation.

H13.9.2 The manufacturer of any grade of chain cable and any accessories shall ensure that the chain cable and accessories are cleaned and any paint, anti-corrosive coating or heavy oxidisation scale resulting from heat treatment used during manufacture is removed before any inspections and tests are carried out.

H13.9.3 The manufacturer of any grade of chain cable and any accessories shall ensure that the chain cable and accessories undergo dimensional inspection to ensure that the links meet the tolerances specified by the inspecting organisation before or after testing the chain cable and accessories.

H13.10 Inspection before testing

H13.10.1 Before testing any chain cable or accessories, the inspecting organisation shall—

(a) be satisfied with—

(i) the quality of the materials from which the chain cable or accessories are manufactured; and

(ii) the method of their manufacture; and

(b) ascertain the grade of the chain cable in accordance with the requirements of that inspecting organisation.

H13.10.2 Before testing any chain cable or accessories, the inspecting organisation shall visually examine the chain cable or accessories before application of any testing to ensure that they are free from internal and surface defects that might impair the testing, or their proper workability, use and strength.

H13.10.3 With the agreement of the inspecting organisation, grinding may be carried out to—

(a) remove surface defects, provided tolerances specified by the inspecting organiSation are not exceeded; or

(b) improve the link profile.

H13.11 Testing

H13.11.1 All chain cables or accessories shall be tested at a testing establishment complying with sub paragraph H13.2.1, in the presence of the inspecting organisation.

H13.11.2 The chain cable or accessories shall be tested by subjecting them to a breaking load test as follows—

(a) the chain cable or accessories shall be subjected to a breaking load test in a breaking load test machine complying with sub paragraph H13.2.3 and in accordance with the requirements of the inspecting organisation; and

(b) if after application of the minimum breaking test load specified by the rules of the inspecting organisation, the sample is unbroken and in the opinion of the inspecting organisation is without material flaw or other defect, the sample has satisfactorily withstood the breaking load test; and

(c) if the selected sample fails to satisfactorily withstand the minimum breaking test load specified by the inspecting organisation, procedures adopted for additional tests or other requirements, if any shall be in accordance with the requirements of the inspecting organisation; and

(d) where the required breaking test load specified by the inspecting organisation is greater than the capacity of any available test machine, an alternative testing procedure may be accepted by the inspecting organisation.

H13.11.3 Following a satisfactory breaking load test carried out in accordance with sub paragraph H13.11.2, the chain cables and accessories shall then be tested by subjecting them to a proof load test as follows—

(a) samples of the chain cable and the accessories shall be tested by subjecting them to the proof load specified by the inspecting organisation. That test shall be undertaken on a proof load test machine complying with sub-paragraph H13.2.3; and

(b) after proof load testing, the samples of chain cable and accessories shall be visually re- examined and, where considered appropriate by the inspecting organisation, subjected to non-destructive testing to the relevant standards referred to in sub paragraph H13.2.5.

H13.11.4 The chain cable or accessory is satisfactory if, after the application of the test and examination under sub paragraph H13.11.3, it is, in the opinion of the inspecting organization without material deformation, significant defects or other weakness.

H13.11.5 Mechanical testing to determine the ultimate tensile strength, related elongation, hardness and impact value of the material from which the chain cable or accessories are manufactured shall be undertaken in accordance with the requirements of the rules of the inspecting organisation.

H13.12 Identification and certification after testing

H13.12.1 Following a satisfactory test and examination, each length of chain cable and each accessory shall be stamped with the following identification marks—

(a) the details of the inspecting organisation and its local office that is issuing the certificate of test; and

(b) the number of the certificate of test issued for the chain cable or accessory; and

(c) the proof load of the chain cable and accessory; and

(d) the grade of chain cable.

H13.12.2 The chain cable or accessory certificate of test shall include the following particulars in respect of the cable or accessory—

(a) the purchaser's name and order number; and

(b) a description and the dimensions of the chain cable or accessory; and

(c) the grade of chain cable; and

(d) an identification mark that will enable the full history of the chain cable or accessory to be traced; and

(e) the chemical composition of the steel from which the chain cable or accessory is manufactured; and

(f) the details of any heat treatment used in manufacturing the chain cable or accessory; and

(g) the mechanical test results; and

(h) the breaking test load; and

(i) the proof load.

H13.12.3 Where accessories are to be used with any chain cable, the certificate of testfor the chain cable shall include a list of all accessories together with their grade of steel, the name of the steel maker, the heat treatment used during manufacture and the purchase order number.

WINDLASS, CAPSTAN OR WINCH

H13.13.1 Means shall be provided to secure the cable at the required length. The means shall be of strength sufficient to withstand loads not less than the breaking strength of the cable, including shock loading.

H13.13. 2 The bitter end of the cable shall be permanently secured to the ship by an attachment of strength sufficient to withstand loads not less than the breaking strength of the cable.

H13.13.3 Power operated windlass and capstan shall be capable of lifting one anchor and 35 m of its cable plus a 20 per cent overload at a speed of not less than 7.5 metres per minute.

H13.13.4 Capstan shall be provided. For an anchor the weight of which is 30 kg and over but less than 50 kg the windlass or capstan may be hand operated, and for anchor weights of 50 kg and over the windlass or capstan shall be power operated. The windlass or capstan shall be of suitable size and lifting capacity for the anchor(s) and rope(s) carried by the ship. Except that in smooth water ships the need for a windlass may be left to the discretion of the Chief Executive Officer.

H13.13.5 Such windlasses or cable winches or other suitable lifting devices, shall be securely fitted to the deck of the ship.

H13.13.6 The Chief Executive Officer shall satisfy him or herself that the arrangements for lowering and hoisting anchors and for securing the chain or rope when a ship is at anchor are satisfactory for the size and type of ship.

H13.13.7 Where a windlass or capstan is suitable for operation by hand and power, the manual drive shall not be operational in power mode.

APPENDIX I

PILOT LADDERS, AND SHIP SIDE DOORS OR PORTS USED IN CONJUNCTION WITH PILOT LADDERS

Pilot Ladders

I 1. 0 Position, reach and securing arrangements

I 1.1 The pilot ladder is to be capable of providing safe embarking and disembarking of pilots and shall be kept clean and in good repair.

I 1.2 The pilot ladder shall only be used by pilots and other persons on official business and not used for general purposes.

I 1.3 Provision is to be made to enable the pilot ladder to be rigged on either side of the ship.

I 1.4 Pilot ladders shall be positioned and secured so that it complies with the following:

(a) it is clear of any discharge from the ship; and

(b) as far as practicable from the finer lines (curvatures and projectors) of the ship so that each step rests firmly against the ship's side, and that the pilot may gain safe and convenient access to the ship from the ladder after climbing not more than 9 metres; and

(c) as far as practicable, it is within the amidships half-length of the ship; and

(d) each step rests firmly against the ship's side.

I1.5. The pilot ladder is to consist of one continuous length without joins, capable of reaching the waterline from the point where access to the ship is provided for the pilot and allow for:

(a) all conditions of loading;

(b) all conditions of trim; and

(c) an adverse list of 15 degrees.

I1.6**.** A pilot ladder shall not require a climb of more than nine metres above the surface of the water.

I.1.7 Whenever the distance from the sea level to the point of access to the ship is more than 9 metres, an equally safe and convenient means such as an accommodation ladder shall be placed against the ship side of the ship and secured firmly at all times and clear of all discharges.

I1.8 The pilot ladder is to be positioned against the side of the ship and the lower platform of the accommodation ladder, to allow safe access between the pilot ladder and the accommodation ladder and so that the pilot ladder extends for a distance of at least two metres (2m) above the level of the lower platform and is secured at this point.

I1.9 The rigging of the pilot ladder and the accommodation ladder or alternative means of access onto or off the ship, and the embarkation and disembarkation of a pilot or other persons using the equipment are to be supervised by a designated ship officer.

I2.0 Steps of the pilot ladder

The steps of the pilot ladder shall meet the following requirements:

(a) steps made of hardwood, or other material of equivalent properties (strength, stiffness and durability), shall be made of one piece free of knots, having an efficient non-slip surface;

(b) the four lowest steps shall be made of rubber of sufficient strength and stiffness or of other suitable material of equivalent characteristics;

(c) the steps excluding any non-slip device or grooving, shall not be less than 480 millimetres long, 115 millimetres wide and 25 millimetres in depth;

(d) equally spaced not less than 300 millimetres nor more than 380 millimetres apart and secured in such a manner that they will remain horizontal;

(e) approved by the Chief Executive Officer or in the case of foreign ship by the flag state administration.

I 3.0 Replacement steps of a pilot ladder

I 3.1 No pilot ladder may have more than two replacement steps which are secured in position by a method different from that used in the original construction of the ladder.

I 3.2 Any steps so secured are to be replaced as soon as reasonably practicable by a step secured in position by the method used in the original construction of the pilot ladder.

I3.3 Where a replacement step is secured to the side ropes of a pilot ladder by means of grooves in the sides of the steps, the grooves shall be in the longer side of the step.

I4.0 Anti-Twist Battern

I 4.1 The pilot ladder is to be provided with battens that will prevent the ladder from twisting.

I 4.2 Each batten being made of hardwood or other material of equivalent properties, made in one piece free of knots or other defects.

I 4.3 Each batten shall not less than 1.8 meters in length and is to be integrated with a step.

I 4.4 The interval between any batten and the next is not to exceed 9 steps and the lowest batten shall not be lower than the fifth step from the bottom of the ladder.

I5.0 Ropes

The side ropes of the pilot ladder are to consist of the following:

(a) two uncovered manila ropes or other material of similar characteristics (strength, durability and grip) and protected against actinic degradation;

(b) shall be not less than 32 millimetres in diameter;

(c) shall be continuous with no joints below the top step of the pilot Ladder;

(d) the top ends of the manropes are to be secured to the ship not more than 800 millimetres apart;

(e) a safety line shall be provided for use with a pilot ladder;

(f) approved by the Chief Executive Officer or in the case of foreign ships by the flag state administration.

I 6.0 Access to Deck

I6.1 Means shall be provided to ensure safe and convenient access onto or into or off the ship between the head of the pilot ladder or of any accommodation ladder or other appliance provided.

I6.2 Where the access between the top of the ladder and the ship is by means of a gateway in the rails or bulwark, adequate hand holds shall be provided.

I6.3 Where access between the top of the ladder and the ship is by means of a bulwark ladder, that ladder shall be securely attached to the deck and two hand hold stanchions shall be securely attached to the deck not less than 700 millimetres or more than 800 millimetres apart at the point of boarding or leaving the ship. These stanchions shall:

I6.3.1 be rigidly attached to the structure of the ship at or near the base of the stanchions and also at a higher point;

I6.3.2 be not less than 40 millimetres in diameter; and

I6.3.3 extend not less than 1.2 meters above the top of the bulwark.

I 7.0 For use in connection with the pilot ladder, a ship is to be provided with:

I7.1 a lifebuoy equipped with a self-igniting light; and

I7.2 a heaving line of adequate length in relation to the freeboard of the ship which shallbe kept at hand for immediate use while the pilot ladder is rigged.

I 8.0 Lighting or illumination

Sufficient lighting shall be provided to adequately illuminate the pilot ladder, the accommodation ladder or mechanical pilot hoist, (if any) and the position at which the pilot boards the ship. The lighting may be fixed or portable but in the latter case the light or lights shall be secured so as to provide steady illumination.

I 9.0 Where the constructional features of a ship would prevent compliance with any of these provisions, special arrangements may be approved by the Chief Executive Officer to ensure safe embarkation and disembarkation of pilots and other persons to and from the ship.

I 10.0. If a ship has such a low freeboard that the provision of a pilot ladder is not considered necessary it may be exempted from carrying a pilot ladder. The other provisions in regard of safe means of passage through or over the bulwark, hand holds and lighting still apply.

I 11.0 Tripping Rope

If a tripping rope is required to retrieve a pilot ladder, the rope is—

(a) secured to the ladder no lower than the half length of that ladder; and

(b) tended throughout the transfer.

I 12.0 Shipside doors and ports used in conjunction with pilot ladders

I 12.1 Shipside doors used in conjunction with a pilot ladder shall-

(a) not open outwards from the ship; and

(b) be sited so as to enable the pilot ladder to be positioned and secured in accordance with the requirements of sub-paragraph 1.4; and

(c) have the following characteristics and features—

(i) a height sufficiently above the level of the sea to provide safe access, taking into account the requirements of sub-paragraph 2 and 3; and

(ii) a height of not less than 2 meters and a width of not less than 1.5 m, provided that these minimum dimensions may, in the case of retrofitted doors, be reduced marginally in order to conform with the space between principal strength members.

I 12.2 The point at which the pilot embarks or disembarks from the shipside door shall be fitted with two handhold stanchions that are:

(a) rigidly secured to the ship's structure at or near the stanchion's base and also at a higher point; and

(b) not less than 40mm in diameter and extending not less than 1.2 metres above the top step of the ladder; and

(c) not less than 700millimeters or more than 800 millimeters apart; and

(d) fitted with an eye of a diameter that permits a man-rope to be passed through it, unless equally secure strongpoints for this purpose are provided in the deckhead directly above the ladder side ropes.

I12.3 The securing strongpoints, shackles and securing ropes for a pilot ladder used in conjunction with a shipside door shall be at least as strong as the 32 mm side ropes referred to in paragraph I5.0, taking into account that the side ropes are doubled.

I13.0 Access to navigating bridge – deck cargoes

If a ship carries a deck cargo of timber or logs which obstructs normal access between the transfer arrangement and the navigating bridge, means shall be provided to ensure safe, convenient and unobstructed passage between these points using properly constructed, fenced, secured, and illuminated walkways, gangways and ladders.

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APPENDIX J

MECHANICAL PILOT HOISTS

J1.0 General

J1.1 A pilot hoist shall be designed to operate as-

(a) a moving ladder to lift and lower one person on the side of the ship; or

(b) a platform to lift and lower one or more persons on the side of the ship.

J1.2 A mechanical pilot hoist shall be of a type approved by the Chief Executive Officer and shall be required to comply with the provisions contained in this Appendix. Design and construction shall be such as to ensure that the pilot can be embarked and disembarked in a safe manner including a safe access from the hoist to the deck and vice versa. The hoist shall be used solely for the embarkation and disembarkation of pilots and persons on official business.

J1.3 A pilot ladder complying with the provisions of Appendix I is to be rigged adjacent to the mechanical pilot hoist and available for immediate use.

J1.4 The working load should be the sum of the weight of the ladder and falls in the fully lowered condition and the maximum number of persons which the hoist is designed to carry; the weight of each person being taken as 150 kg.

J1.5 Every pilot hoist shall be of such construction that when operating under the defined "working load" each component other than a wire rope fall has a minimum factor of safety of 5.0 having regard to the material used, the method of construction and the nature of its duty.

J1.5.1 In the case of a pilot hoist davit made of cast steel or of wrought steel or other material fabricated by a welding process, the davit and its attachments at full outreach are to be capable of withstanding a static load test of not less than 2.2 times the "working load".

J1.5.2 The attachments at the davit head from which the blocks are suspended shall be capable of withstanding of proof-load test of not less than 2.5 times the "working load".

J1.5.3 In the case of metal blocks, the material used shall be of ductile quality and adequate strength and the block shall be capable of withstanding a proof load test of not less than 25 times the working load on the davits.

J1.5.4 The breaking tensile load of ropes used for raising and lowering the "mechanical hoist" from davits shall be not less than 6 times the working load on each wire.

J1.5.5 In selecting the material of construction, due regard should be paid to the conditions under a which the hoist will be required to operate.

J1.6 The pilot hoist should be located within the parallel body length of the ship and clear of all discharges.

J1.7 The operator shall be able to control the hoist, even in its lowest position.

J1.8 The manufacturer of the pilot hoist is to supply with each installation an approved maintenance manual, together with a maintenance log.

J1.9 The Master of a ship shall ensure that the pilot hoist is kept in good order and is maintained in accordance with the approved maintenance manual and that the hoist is examined at intervals of not more than 6 months. An entry is to be made in the maintenance log after each examination and both manual and log are to be available for inspection by a Surveyor.

J2.0 Pilot Hoist Construction

J2.1 The hoist will generally consist of the following three main parts, but hoists of other equally efficient construction may be considered:

J2.1.1 a mechanical powered appliance together with means for a safe passage from the hoist of the deck and vice versa;

J2.1.2 two separate falls;

J2.1.3 *(a)* a rigid upper part for the transportation of the pilot upwards or downwards;

(b) a lower part consisting of a short length of pilot ladder, which enables the pilot to climb from the pilot launch to the upper part of the hoist and vice versa.

J3.0 Mechanical Powered Winch

J3.1 Power Source

J3.1.1 The source of power for the winches may be electrical, hydraulic or pneumatic except that an electrical power system may not be used on ships carrying inflammable fluids in bulk.

J3.1.2 All electrical, hydraulic and pneumatic systems shall be capable of efficient operation under the conditions of vibration, humidity and range of temperature likely to be experienced in the ship in which they are installed.

J3.1.3 In the case of a pneumatic or hydraulic power winch, the power supply and any reticulation shall:

(a) have a capacity to raise and lower the pilot hoist loaded to its working load:

(i) twice, the second operation being effected immediately following completion of the first operation; and

(ii) for a total of five operations over a period not exceeding 30 minutes:

(b) be such that operation of the winch will not adversely affect the satisfactory operation of any other connection item or appliance essential to the safe operation of the ship; and

(c) be such that operation of any other connected item or appliance essential to the safe operation of the ship will not adversely affect the operation of the winch.

J3.1.4 If the source of power is electric, the motor and electrical equipment are to be designed to operate on a wet exposed deck.

J3.1.5 If the source of power is hydraulic the liquid shall not freeze in ambient temperature above minus 10 degrees (C).

J3.1.6 In the case of a pneumatic system, an exclusive air supply shall be provided with adequate arrangements to control the air supply's quality.

J3.2 Design and Construction

J3.2.1 The design of the winch should include a brake or other equally effective arrangement such as a properly constructed worm drive, which is capable of supporting the working load in the event of power failure. If the brake is exposed to the weather, it shall be capable of withstanding a test with the braking surface wetted.

J3.2.2 Efficient hand gear should be provided to lower or recover the pilot at a speed of not less than 10 metres per minute in the event of power failure. The brake or other arrangement required in sub- paragraph J3.2 above should be capable of supporting the working load when the hand gear is in use.

J3.2.3 Crank handle(s) provided for manual operation should, when engaged, be interlocked so that the power supply is automatically cut off.

J3.2.4 Hoists should be fitted with safety devices to automatically cut off the power supply before the ladder comes against any stop to avoid overstressing the falls or other parts of the hoist. However, in the case of hoists operated by pneumatic power, if the maximum torque available from the air motor cannot result in overstressing of the falls or other parts of the hoist, the safety cut-out device may be omitted.

J3.3 Winch Controls

J3.3.1 All hoist controls should incorporated an emergency stop to cut off the power supply.

J3.3.2 Have an emergency stop switch within easy reach of the person or persons carried.

J3.3.3 A pilot hoist that is operated by pneumatic power is not required to be fitted with an automatic safety device if the maximum torque available from the air motor cannot result in overstressing of the falls or other parts of the hoist.

J3.3.4 The winch controls should be clearly and durably marked to indicate the action to "Hoist", "Stop" and "Lower". The movement of these controls should correspond with the movement of the hoist returning to the stop position when released.

J3.4 Efficient arrangements should be provided to ensure that the falls wind evenly onto the winch-drums.

J3.5 Pilot hoists should be securely attached to the structure of the ship. Proper and strong attachment points should be provided for hoists of the portable type on each side of the ship. Attachment of the pilot hoists should not be solely by means of the ship's side rails.

J3.6 The winch should be capable of hoisting or lowering the pilot(s) at a speed of between 15 and 30 metres per minute.

J3.7 There should be safe means of access between the top of the hoist and the deck and vice versa; such access should be gained directly by a platform securely guarded by handrails.

J3.8 Any electrical appliance associated with the ladder paragraph of the hoist should be operated at a voltage not exceeding 25 volts.

J4.0 Falls

J4.1 A pilot hoist shall have two separate falls and are to be manufactured from flexible steel wire of adequate strength and resistance to corrosion in a salt-laden atmosphere.

J4.2 Wire ropes should be securely attached to the winch-drums and the ladder. These attachments should be capable of withstanding proof load of not less than 2.2 times the load on such attachment. The falls should be maintained at a sufficient relative distance from one another to reduce the possibility of the ladder becoming twisted.

J4.3 The wire rope falls are to be of sufficient length to allow for all conditions of freeboard encountered in service and to retain at least three full turns on the winch drums with the hoist in its lowest position against the side of the ship and so arranged that ladder or lift platform remains level if one fall breaks.

J5.0 Ladder or Platform Section

The ladder is to consist of an upper rigid section and a lower flexible section.

J5.1 The rigid section shall be not less than 2.5 meters in length and so constructed and equipped that the pilot can maintain a safe position whilst being hoisted or lowered.

The rigid section shall be provided with:

J5.1.1 steps which comply with the requirements of paragraph I2.0 of the requirements of Appendix I for pilot ladders, except that rubber may not be used for the steps;

J5.1.2 a spreader at the lower end of not less than 1.80 metres fitted with an efficient roller at each end which is to roll freely against the side of the ship, during the whole operation of raising or lowering the hoist;

J5.1.3 an effective guard ring, suitably padded, positioned and secured as to furnish physical support for the pilot without hampering his movements;

J5.1.4 suitable protection against extremes of temperature to provide safe hand holds;

J5.1.5 means of communication between the pilot and the winch operator or the responsible officer supervising the operation; and

J5.1.6 an emergency stop switch within reach of the pilot by means of which he may-cut off the power supply to the winch.

J5.2 The lower section is to consist of a section of pilot ladder of a length equivalent to 8 steps, complying with requirements of items 5 to 7 inclusive of the requirements of Appendix J for pilot ladders.

J5.3 The steps of the flexible lower section and those of the upper rigid section shall be in the same vertical line and the steps are to be equidistant in both sections. The hand holds of both sections of the ladder are to be aligned as closely as possible.

J6.0 Operational aspects

J6.1 Rigging and testing of the hoist and the embarkation and disembarkation of a pilot should be supervised by a designated officer of the ship. Personnel engaged in rigging and operating the hoist should be instructed in the safe procedures to be adopted and the equipment should be tested, prior to the embarkation or disembarkation of a pilot.

J6.2 Lighting should be provided at night so that the pilot hoist over the side, its controls and the position where the pilot boards the ship should be adequately lit. A lifebuoy equipped with a self-igniting light should be kept at hand ready for use. A heaving line should be kept at hand ready for use if required.

J6.3 The position on the ship's side where the hoist will be lowered should be indicated as well as possible.

J6.4 An adequate protected stowage position should be provided for the portable hoist. In very cold weather to avoid the danger of ice formation, the portable hoist should not be rigged until use is imminent.

J6.5 The assembly and operation of the pilot hoist should form part of the ship's routine drills.

J7.0 Testing

J7.1 Every new pilot hoist should be subjected to an overload test of 2.2 times the working load. During this test the load should be raised to a distance of not less than 5 metres.

J7.2 During the overload test referred to in paragraph J7.1 —

(a) where a winch is fitted with a brake, the working load shall be lowered a distance of not less than five metres and the brake shall be applied to stop the hoist drum; and

(b) where a winch is not fitted with a brake but is fitted with an equally effective arrangement, the load shall be lowered at the maximum permitted lowering speed and a power failure shall be simulated to show that the hoist will stop and support the load.

J7.3 An operating test of 10 per cent overload should be carried out after installation on board the ship to check the attachment and performance of the hoist to the satisfaction of the Chief Executive Officer.

J7.4 A written record evidencing the conduct of the overload and operating tests described in paragraphs J7.1 and J7.3 shall be kept on board a Fiji ship and on foreign ships in Fiji waters on which a pilot hoist is installed on or after the date these regulations comes into force.

J7.3 Subsequent examination of the hoist under working conditions should be made at the time of each survey of equipment for the renewal of the ship's Certificate.

APPENDIX K

MEDICINES AND MEDICAL STORES

Ships medical requirements

Medical requirements for Ships of 15 meters or more in length is as prescribed in the Maritime (Ships Medical Requirements) Regulations 2014

APPENDIX L

OFFICIAL LOG-BOOK

Ships Log book requirements

Ships Log Book requirements is as prescribed in the Maritime (Ships Medical Requirements) Regulations 2014.

APPENDIX M

NAVIGATION LIGHTS

M1.0 General Conditions

M1.1 All lights required to be shown by ships at sea in accordance with the Maritime (Collision Prevention) Regulations 2014 and the Convention shall be of a design and construction approved by the Chief Executive Officer.

M1.2 The Chief Executive Officer shall not approve any light type specified in sub paragraph M1.3 unless it has been successfully tested by a Maritime Administration of the Government of the Country in which the light was manufactured, or a Standards Institute recognised by that Government.

M2.0 Marking

M2.1 Each light shall by means of a nameplate or other permanent means, bear the manufacturer's name or identifying mark, identification of design compliance and shall show the type of light and type and size of ship for which it is intended.

M2.2 The type and wattages of the proper replacement bulb shall be designated by permanent marking on the light.

APPENDIX N

RADAR AND ANCILLIARY EQUIPMENT

N1.0 Radar

The performance standards for radar equipment should comply with IMO Resolution A. 222 (VII) radar equipment installed before September 1984, IMO Resolution A. 477 (XII) for radar equipment installed between September 1984 and 31st December 1998, IMO Resolution MSC. 64 (67) Annex 4 valid for radar equipment installed on or after 1st January 1999, IMO Resolution MSC. 192 (79) for radar equipment installed on or after 1st July 2008 and IMO Resolution A. 278 (VIII) for control symbols on radar equipment

N2.0 Plotting equipment (ARPA)

The performance standards for automatic radar plotting aid should comply with IMO Resolution A. 422 (XI) for equipment installed before 1st January 1997, IMO Resolution A. 823 (19) for plotting equipment installed on or after 1st January 1997 and IMO Resolution A. 820 (19) for navigation radar equipment used for high speed craft.

N3.0 AIS – Automatic Identification System

The performance standards for automatic identification system should comply with IMO Resolution MSC. 74 (69) for equipment installed on or after 1st January 2000.

APPENDIX O

ECDIS- ELECTRONIC CHART DISPLAY INFORMATION SYSTEMS

The performance standards for electronic chart display information systems should comply with IMO Resolution A. 817 (19) for equipment installed before 1st January 1999, IMO Resolution MSC. 64 (67) Annex 5 for back up requirements for Equipment installed on or after 1st January 1999 and IMO Resolution MSC. 232 (82) for equipment installed on or after 1st of January 2009.

APPENDIX P

GPS - GLOBAL POSITIONING SYSTEM

The performance standards for Global Positioning System (GPS) receiver equipment should comply with IMO Resolution MSC. 112 (73) for equipment installed on or after 1st July 2003, GLONASS receiver equipments IMO Resolution MSC. 53 (66) for equipment installed before 1st July 2003, for DGPS and DGLONAS radio beacon receiver equipment IMO Resolution MSC. 64 (67) Annex 2 for equipment installed on or after 1st of January 1999, Combined GPS/GLONASS receiver equipment IMO Resolution MSC. 74 (69) Annex 1 for equipment on or after 1st of January 2000, revised performance standards for combined GPS/GLONASS IMO Resolution MSC. 115 (73) for equipment installed on or after 1st of July 2003 and Shipbourne GALILEO receiver equipment IMO Resolution MSC. 233 (82) for equipment installed on or after 1st January 2009.

PARAGRAPH 14

SURVEYS AND CERTIFICATES OF SURVEY

Contents

Part 1—Preliminary

This paragraph is to be read in conjunction with the Introduction and General Requirements paragraph.

This paragraph applies to all ships under the jurisdiction of the Chief Executive Officer which are required to be surveyed at intervals and to carry onboard evidence of compliance with the survey requirements of the Authority. It does not apply to SOLAS ships. Such ships shall comply with the requirements of the SOLAS Convention.

14.1 In this paragraph, unless otherwise indicated, these terms apply:

14.1.1 "equipment" in relation to a ship, includes everything or article belonging to or to be used in connection with, or necessary for the operation of the ship and, includes life-saving appliances, fire-fighting appliances, miscellaneous equipment, radio equipment, lights and sound signals and medical stores;

14.1.2 "inspection" means a visual inspection performed by a person approved by the Chief Executive Officer to carry out inspection of ships and its equipment;

14.1.3 "machinery" means boilers, engines, pumps, electrical and ancillary equipment used in the operation of the ship;

14.1.4 "survey" means a thorough examination performed by, or in the presence of a Surveyor or an uthorized person or society;

14.1.5 "prescribed form" means a form designed for the purpose, provided by the Chief Executive Officer. Such form is to be based on those prescribed in Appendices 3 and 4;

14.1.5 "Under water surveyor" means a surveyor approved or appointed by the Chief Executive Officer for the purpose of conducting under water survey of ships underwater hull and under water gear for the purpose of annual afloat surveys and extension surveys

Part 2—Survey Requirements

Initial Survey

14.2 The Chief Executive Officer shall require all new ships constructed to be registered in Fiji, and all existing ships being brought under survey for the first time, to undergo an Initial Survey. The purpose of this survey shall be to satisfy the Chief Executive Officer that the ship complies with the laws and regulations of the Authority.

14.3 The owner of a ship to be constructed or of an existing ship being surveyed for the first time shall forward to the Chief Executive Officer an "Application for Initial Survey" as prescribed together with the appropriate survey fee.

14.4 An application for Initial Survey shall be accompanied by the following necessary information:

14.4.1 type and purpose of ship;

14.4.2 intended area of operations(inland waters, sheltered waters, inshore waters, territorial waters, near coastal or unlimited waters);

14.4.3 whether ship is to be classed and if so, name of the Classification Society and if it is recognized by the Chief Executive Officer (for an existing ship, details of any Classification);

14.4.4 full set of plans (soft and hard copies) and details of hull, machinery and equipment, as required by the Chief Executive Officer;

14.4.5 any existing Tonnage Certificate with calculation;

14.4.6 any existing Loadline Certificate with calculation;

14.4.7 such other information as the Chief Executive Officer may require; and

14.4.8 where a ship is, or is to be classed, the owner shall forward to the Chief Executive Officer only such plans and details as specified in Part 5 – Submission of Information including all valid class documents as are required by the Chief Executive Officer;

14.4.9 the information in respect of a new ship shall be forwarded 30 days prior to the commencement of construction and construction shall not begin until approval has been obtained from the Chief Executive Officer;

14.4.10 the information in respect of an existing ship shall be forwarded 30 days prior to the date of Initial Survey or such time as may be determined by the Chief Executive Officer.

14.5 An Initial Survey shall be carried out in full by the Authority's Surveyors. On completion of the Initial Survey, the Surveyors shall forward to the Chief Executive Officer in writing a report of the condition of the hull and its machinery and equipment and shall make a written declaration of such condition. The survey report and declaration shall be as prescribed by this regulation.

14.6 The Chief Executive Officer may accept such part of the survey as performed by an authorized person of an authorised organisation or Classification Society.

Subsequent Periodic Surveys

14.7 Subsequent to completion of the Initial Survey, the Chief Executive Officer shall require all ships under survey to undergo Periodic surveys and inspections to satisfy himself that such ships continue to comply with its laws and regulations. However, the Chief Executive Officer may accept such part of the survey as performed by an recognised Classification Society.

14.8 The intervals between surveys shall be as follows:

14.8.1 Subject to sub regulation 14.8.2, ship's superstructure, accommodation, lifesaving appliances, firefighting appliances, radio equipment, engine room and deck machineries and documentations shall be surveyed at intervals not exceeding 6 months in accordance with the survey checklist for semi-annual Sight Survey (schedule 2 of the Maritime (Survey Reports) Regulations 2014) and semi-annual safety equipment survey (schedule 1 of the Maritime (Survey Reports) Regulations 2014);

14.8.2 Fishing ships irrespective of length shall be surveyed annually in accordance with the survey checklist for annual surveys (Schedule 2 of the Maritime (Survey Reports) Regulations 2014;

14.8.3 a ship's hull, structure, machinery and fittings shall be surveyed at intervals as specified:

(a) in an approved survey programme; or

(b) when the Chief Executive Officer may require other lesser survey intervals if it is considered desirable because of:

(i) the age of the ship;

(ii) hull plating thickness;

(iii) tank plating (tank tops, tank sides) thickness;

(iv) water tight and weather tight integrity of the ships;

(v) anodic protection systems;

(vi) planned maintenance system of the ship;

(vii) the service of the ship, (e.g. passenger, cargo, salvage, towage);

(viii) the area or proposed area of operation of the ship;

(ix) the materials used and the method of construction;

(x) the type of underwater fittings;

(xi) the size of the ship; or

(xii) any other requirements.

14.9 A survey program not consistent with the mandatory survey intervals as specified in Appendix 1 may be submitted by the owner to the Chief Executive Officer for approval taking into consideration the requirements of sub-paragraphs 14.8.3.

14.10 An owner may submit to the Chief Executive Officer for his or her approval, a survey programme for a ship. In drawing up such a programme consideration shall be given to the following;

14.10.1 the survey intervals specified in Appendix 1 or by arecognised Classification Society if the vessel is under class;

14.10.2 such periods as may be required by the Chief Executive Officer.

14.11 Where an approved survey programme is being followed, the survey of particular items shall be carried out as detailed in such programme, except where the Chief Executive Officer directs otherwise or agrees to modify, defer or cancel the survey programme.

14.12 It shall be the responsibility of the owner to make an "Application for Survey" as prescribed, giving such notice as is required by the Chief Executive Officer and to forward such application together with the appropriate fee.

14.13 It shall be the responsibility of the owner to make his ship available for survey at the agreed time and place. Failing to do so will result in additional charges.

14.14 Where a survey or inspection of a ship's hull is to be carried out, the owner shall cause the ship to be withdrawn from the water and placed in a satisfactory manner to enable the Surveyor to make an external examination of the hull, underwater fittings, shafting, propeller(s), rudder(s) and any other appurtenances. Prior to such examination, the hull shall have been blasted, washed and cleaned, but shall not have been painted.

14.15 During the course of a survey or inspection, the Surveyor shall have discretion to require the opening up for examination of any other parts of the ship including removal of linings and permanent ballast where applicable.

14.16 After a survey or inspection, the Surveyor shall make as prescribed by the regulation, a duplicate list of repairs and deficiencies which shall be counter signed by the owner or his representative who shall retain one copy. The survey will not be completed until such repairs and/or deficiencies have been made good to the satisfaction of the Surveyor.

14.17 On completion of a survey or inspection, a Surveyor shall make his survey report and declaration as prescribed by the regulation.

14.18 On completion of a survey of an approved survey programme, the Surveyor shall sign the owner's copy, the ship's copy and the Authority's copy of the survey report, which shall be submitted to the Chief Executive Officer with the surveyors declaration.

14.19 A Surveyor, when making a survey or inspection of a ship shall be accompanied by the owner or his appointed representative.

Surveys & Inspections other than Initial & Periodic

14.20 Authority's surveyors, or authorised persons, in the execution of their duties, may board any ship at all reasonable times to make an occasional or random inspection.

14.21 The owner of a ship shall report to the Chief Executive Officer any special factors which may influence the survey requirements for that ship including any change of trade, change of type of operation, change of area of operations and alterations to structure or machinery which have occurred since the previous survey. The Chief Executive Officer may require a Special survey to be conducted.

Any person who fails to comply with sub-paragraph 14.21 commits an infringement offence and is liable to a fine not exceeding $2000.

14.22 (1) The master and owner of a ship shall report to the Chief Executive Officer as prescribed by this regulation any accident, incident or mishap, occurring on their ship. The master shall submit a written report of the accident, incident or mishap within 24 hours of such occurrence for a ship in port, and, within 24 hours after the first arrival at a port, for a ship at sea.

(2) Any person who fails to comply with sub-paragraph 14.22(1) commits an infringement offence and is liable to a fine not exceeding $2000.

14.23 Where any part of a ship's hull, structure, machinery, fittings or equipment is open for routine maintenance or substantial repair, the owner shall inform the Chief Executive Officer so that a special survey may take place at the Chief Executive Officer's discretion.

Any person who fails to comply with sub-paragraph 14.23 commits an infringement offence and is liable to a fine not exceeding $2000.

Underwater hull thickness testing

14.24 Ultrasonic thickness gauging of the ship's underwater hull from the focsle area, collision bulkhead, all double bottom tank areas especially ballast water tanks, engine room bilge space areas and stern areas of the ship is to carried out every two years depending on the hull thickness wastage and on the discretion of the surveyor subject to ultrasonic gauge readings.

14.25 Hull wastage below 70% of original hull plate thickness may be considered by surveyors for replacement. Wastage should not fall below 50% of original hull plate thickness.

14.26 If hull plate needs to be replaced because of wastage, new plates of similar thickness will be inserted where the wastage area of the hull has been cropped out. Doubler plates are not allowed.

14.27 The minimum size allowable for plates to be inserted in replacement of wasted areas of the underwater hull is not to be less than 300mm × 300mm.

Part 3—Survey Certificate

Issue of Survey Certificate

14.28 Upon the receipt of a satisfactory report and declaration of each Surveyor performing the Initial Survey of a ship, the Chief Executive Officer shall prepare and issue a Survey Certificate as prescribed by the regulation and Record of Survey describing the hull, machinery and equipment of the ship.

14.29 The Survey Certificate shall include the following information:

(a) Name of Ship;

(b) Port of Registry;

(c) Survey certificate number;

(d) Official Number (if registered ship);

(e) Assigned freeboard;

(f) Number of Passengers;

(g) Number of Crew;

(h) Number of Life Saving Apparatus;

(i) Class of Ship;

(j) Limits of Operation(s);

(k) Measured Length;

(l) Gross Tonnage;

(m) Net Tonnage;

(n) Particulars of Main Propulsion;

(o) Particulars of auxiliary machinery;

(p) Name of Master, and Certificate of competency;

(q) Endorsement for ships;

(r) Name and Address of Owners;

(s) Authority's Seal;

(t) Signature of authorized officer(s);

(u) Period of Validity from …….to……;

(v) Statement that ship complies with the survey requirements of this Regulation.

14.29.1 The period of Validity of the Certificate shall not exceed 6 months.

14.30 The original of the Survey Certificate shall be issued to the owner or his agent.

14.31 A ship under the Authority's survey shall be required to carry evidence onboard, that the ship complies with the appropriate survey requirements ofthis Code.

14.31.1 this evidence is either the original or a copy of the Survey Certificate or interim certificate;

14.31.2 this evidence shall be displayed in the wheelhouse or the steering position, except on passenger ships, where the evidence shall be displayed in such a position that it is readily visible to passengers;

14.31.3 if the Chief Executive Officer so requires, the evidence carried onboard the ship shall be placed in such a position onboard that it shall be visible to passengers on boarding the ship.

14.31.4 Any person who fails to comply with sub-paragraph 14.31 commits an infringement offence and is liable to a fine not exceeding $2000.

14.32 The owner of a ship shall not operate that ship without the approval of the Chief Executive Officer unless:

14.32.1 a Survey Certificate has been issued for such ship; or

14.32.2 an Interim Survey Certificate issued by the Chief Executive Officer or the Manager Ships Inspection for the purpose of allowing the ship to travel on one (1) voyage only or for a period not exceeding two weeks whichever is earlier. An Interim Survey Certificate is issued only when the survey report is still in the process of completion by the surveyor but then the delay in the completion of such a report subsequently delays a ship's outward clearance. The Interim certificate shall be on the prescribed Form SUR4; and

14.32.3 this evidence of compliance with the appropriate survey requirements of these regulations is displayed onboard.

14.32.4 Any person who fails to comply with sub-paragraph 14.32 commits an infringement offence and is liable to a fine not exceeding $2000.

14.33 If the Chief Executive Officer so requires upon the satisfactory completion of an approved survey programme for a ship and the receipt of the report and declaration of each Surveyor, the Chief Executive Officer may then issue for display on the ship either an original or a copy of the evidence required to be carried on board under paragraph 14.31.

Extension, Suspension, Cancellation

14.34 Application for extension

14.34.1 the owner(s) of a ship under survey by the Authority may apply in writing to the Chief Executive Officer for an extension of the Survey Certificate carried by the ship in accordance with paragraph 14.31;

14.34.2 this application shall be accompanied by the appropriate fee, as determined by the Maritime (Survey Fees) Regulations 2014.

14.35 Terms of an extension.

14.35.1 In any case in which the Chief Executive Officer is satisfied that the immediate survey of a ship is impracticable and unable to be carried out at that time, the Chief Executive Officer may extend the time of survey for a period not exceeding one month. Notwithstanding that the survey certificate has expired, an extension may be granted subject to the following:

14.35.1.1 an underwater survey is conducted to ascertain the condition of the underwater hull and gears and a report submitted to the Chief Executive Officer.

14.35.1.2 completed application form Sur 5- Application for extension of certificate of survey.

14.35.1.3 an inspection or survey of the ship is carried out and a report on the condition of a ship in the form of general remarks is made by the surveyor and submitted to the Chief Executive Officer.

14.35.2 The Chief Executive Officer on receipt of satisfactory reports in accordance to sub- paragraphs 14.35.1.1, 14.35.1.2 & 14.35.1.3, may grant an extension of the Survey Certificate and shall issue to the owner of the ship a Notice of Extension.

14.36 Where the Chief Executive Officer is satisfied, by reason of a report that a ship under its survey fails to comply, for any reason, with the appropriate survey requirements of this regulation, the Chief Executive Officer may suspend the Survey Certificate and the owner shall be advised accordingly. The owner when so advised, shall not operate the ship without the approval of the Chief Executive Officer.

14.37 Where the Survey Certificate has been suspended or has expired or has been cancelled, the Chief Executive Officer may require it and the evidence of survey to be delivered up as directed.

Part 4—Miscellaneous

Duty of owner or operator of a ship

14.38 For the purposes of control and coordinating of the survey or inspection of ships holding Survey Certificates issued by the Chief Executive Officer, this regulation requires the owner or operator of the ship to advise the Chief Executive Officer within such period as maybe required that:

(a) a ship has been sold and the name and address of a new owner;

(b) the intention to withdraw the ship from commercial operations;

(c) the transfer of the ship into the jurisdiction of another Authority for an extended period; or

(d) any proposed alteration to the ship, area of trade and the type of operation.

Recognition of other survey certificate

14.39 The Chief Executive Officer may recognize the survey certificate issued by another maritime administration or classification society but may require certain requirements of these regulations to be complied with and impose conditions the Chief Executive Officer thinks fit to ensure safety of ships and its crew is not compromised.

Part 5—Single Voyage Towage Permit

14.40 This Part applies to all ships which are engaged in towing or being towed on a seagoing voyage.

14.41 This Part does not apply to:

14.41.1 ships designed for regular towage of cargo where a coast trade license is applicable;

14.41.2 tugs used in assisting the berthing and unberthing of ships where a coast trade license is applicable;

14.41.3 the towage/assistance of oil-exploration structures, semi-submersible oil platforms etc. where a coast trade license is applicable; and

14.41.4 a ship assisting a ship in distress or stranded and where immediate action by the towing ship is vital to the saving of life and/or property.

14.42 The Chief Executive Officer shall require all ships which are to be towed on a seagoing voyage to undergo survey to determine their fitness to be towed. Such ships may only be towed on a seagoing voyage after the Chief Executive Officer or the Manager Ships Inspection issues a “Towage Permit” as prescribed by this regulation.

14.43 The ship that is required to be towed will not be required to comply with STCW minimum manning requirements, but shall have onboard a suitably qualified seafarer or seafarers to tender the towing line, attend to the navigation lights and regularly monitor the condition of the ship during the tow.

14.44 The owner of a ship intended to be towed shall forward to the Chief Executive Officer an "Application for Towage Permit" form SUR 11 as prescribed by this regulation, together with the appropriate survey fee.

14.45 An "Application for Towage Permit" shall be accompanied by the following necessary information regarding the ship to be towed:

14.45.1 nature of tow (e.g. ferry, cargo ship, unloaded barge etc.);

14.45.2 name, official number and port of registry of towed ship:

14.45.3 details of any current certificates relating to the survey of the towed ship:

14.45.4 point of departure and destination of tow;

14.45.5 details of towing operation i.e. manning (if any) estimated departure date, estimated towing speed, duration of operation;

14.45.6 such other information as the Chief Executive Officer may require.

14.46 The owner of the ship to be towed, the owner, master or agent of the towing ship shall be required to forward the following information to the Chief Executive Officer regarding the towing ship—

14.46.1 name, official number, and port of registry;

14.46.2 type of ship;

14.46.3 details of any current certificate relating to the survey of the towing ship;

14.46.4 propulsion power and or bollard pull; and

14.45.5 any such other information as the Chief Executive Officer may require.

14.47 Due consideration shall be given to the following main aspects when inspecting a ship for fitness to be towed—

14.47.1 the structural condition of the hull, taking into account the intended voyage;

14.47.2 the water tight integrity of the ship and the necessary action required for the prevention of water entering the ship, by the provision of adequate means of closing all openings;

14.47.3 the stability in the towed condition;

14.47.4 the towing arrangements; and

14.47.5 to ensure compliance with the Collision Regulations.

Part 6 – Under Water Surveyor requirements

14.48 Any person who would like to apply for approval as an underwater surveyor shall make an application and submit all documents which should specify his knowledge, experience and qualification, to the Chief Executive Officer in an approved form

14.49 The Chief Executive Officer or an authorised officer shall make an assessment of the applications and all the documents submitted and may be require to undertake an assessment of the person applying to be approved as an underwater surveyor.

14.50 The chief executive Officer shall only grant approval to an applicant when he or she is satisfied that the person applying to be approved as an underwater surveyor has the relevant knowledge, experience and qualification required for an underwater surveyor and an assessment has been carried out by an authorised officer on the applicant.

14.50 The assessment by the authorised officer may include inspection of specialised equipment and facilities.

14.51 The fee for the assessment and inspection by authorised officers shall be as approved by the Chief Executive Officer.

APPENDIX 1

ITEMISED SURVEY LIST

Part 1—Semi-Annual Surveys

1.0 The following items shall be inspected and tested while the ship is afloat to ensure that the standards required of the Annual Survey are being satisfactorily maintained.

1.1 Safety Equipment as listed in Part 2 – safety equipment Survey.

1.2 Running trial of each main engine and associated gear box.

1.3 Operational test of the auxiliary generators.

1.4 Operational test of boilers and electric heaters.

1.5 Operational test of bilge pumps, alarms and bilge valves.

1.6 Operational testing of oily water separator and testing of 15ppm alarms.

1.7 Inspection of medical logbooks.

1.8 Inspection of all logbooks including official, deck and engine log.

1.9 Inspection of oil record book, garbage record book and sewage record book.

1.10 Inspection of engine room bilges and cargo space bilges.

1.11 Operational test of fire pumps and all valves in the Fire Main System.

1.12 Running trial of all machinery essential to the safe operation of the ships including but not limited to bow and stern thruster, purifiers or separators, oily water separators, desilinators, sewage systems, pumps, compressors, cranes, winches, windlass and hoists.

1.13 Inspection of pipe and valves arrangements.

1.14 Inspection of emergency escapes from engine room and accommodation spaces.

1.15 Inspection of personal protection arrangements in machinery spaces including but not limited to machinery guards, heat shields, eye, body and heat protection equipment.

1.16 Inspection of casings, superstructure, skylights, hatchways, companionways, bulwarks and guard rails, ventilators and air pipes together with all closing devices.

1.17 Emergency equipment and machineries including but not limited to, emergency generators, emergency fire pumps, emergency compressors, emergency steering, emergency lighting and emergency alarm system and fire and detection systems.

1.18 Surveyors to test crews competency by caring out dry or wet drills including fire, abandon ship (launching of lifeboat or approved boat), emergency, security, and first aid when required.

Annual Surveys

(Additional to Semi-Annual Sight Surveys)

2.0 In addition to the items in Semi Annual Surveys, the following items shall be inspected:

2.1 Operational test of all sea injections and overboard discharge valves and cocks;

2.2 Operational test of main and emergency means of steering;

2.3 General examination of machinery installation and electrical installation;

2.4 All safety and relief valves associated with the safe operation of the ship to be set at the required working pressure;

2.5 Pressure vessels, (including boilers, electric heaters, starting air bottles, hydrophor tanks etc) and associated fittings used for the generation of steam pressure or the heating of water to a temperature exceeding 99 degrees (C);

2.6 Inspection of the liquefied petroleum gas installation;

2.7 Inspection of cargo handling machinery;

2.8 Inspections of tanks including but not limited to ballast water tanks, slop tanks, sewage tanks, fresh water tanks and coffer dams;

2.9 Pressure ship, and associated fittings of an air pressure/salt water having a working pressure of more than 274 kPa;

2.10 Inspecting and testing of boiler and its mountings and fittings (ships of less than 24 years of age may extend items 19 to 22 to two year surveys subject to the requirements of part 2 and the results of an underwater Diver's Survey report);

2.11 Hull externally and internally except in way of tanks forming part of the structure;

2.12 Sea injection and overboard discharge valves and cocks;

2.13 Inspection of propellers, rudders A- Frames, fixed nozzles, rope guards, skeggs and all underwater fittings;

2.14 Checking of Clearances including but not limited to for stern tube bearings, rudder pintel bearings;

2.15 Inspection of ground tackle;

2.16 When underwater gears are removed the following will be carried out, propeller balancing, tailshaft and rudder stock straightness test and crack testing;

2.17 Inspection and testing of anchors, anchor cables and links;

2.18 Hull thickness testing below water line area from the ship's bow, collision bulkhead, double bottom tank, ballast water tanks, engine room bilge, and the ship's stern. Wastage of hull plates shall not exceed 50%. Hull wastage between 50 - 70% of original hull thickness plating, the hull plate shall be replaced. However, depending on the discretion of the surveyor.

Four Yearly Survey

(Additional to semi-annual and annual survey)

3.0 In addition to the items in the Semi-Annual and Annual Surveys, the following items shall be inspected and tested:

3.1 Each propeller, propeller shaft, rudder stock and tube shall be drawn out if not drawn out in the last four years and in any case when there is visual damage or excessive bearing clearance;

3.2 Propeller shaft and rudder stock straightness is checked and shaft is crack tested;

3.3 All shipside valves opened up inspected and serviced;

3.4 Each rudder and stock bearing inspected and examined. Bearings replaced if damaged or excessive;

3.5 Main and emergency steering gear system inspected, examined and tested;

3.6 Windlass and capstans inspected, examined and tested;

3.7 Winches inspected, examined and tested;

3.8 Compressed air pressure vessels having a working pressure of more than 275 kPa and associated fittings;

3.9 Pressure ship and associated fittings of an air pressure/fresh water system having a working pressure of more than 275 kPa;

3.10 Insulation tests of all electrical installations above 32V, AC. or D.C;

3.11 Anchors and Cables to range and calibrate and changed end to end;

3.12 Inspection of chain locker internally and bitter end;

3.13 Tanks forming part of the hull other than fuel oil tanks, internally;

3.14 Fifty percent of all fuel oil tanks forming part of the hull, internally, so that all fuel tanks are inspected within a ten year period;

3.15 All void spaces or coffer dams internally inspected;

3.16 Internal portion of hull where removable ballast is placed;

3.17 Selected paragraphs of internal structure within refrigerated space;

3.18 Hull thickness gauging for ships every two years. However, depending on hull thickness wear, a surveyor may request yearly under water hull thickness testing;

3.19 Annual hull thickness gauging for ships where it is evident that wear on the hull is equal to or more than 30% of the original thickness of the hull;

3.20 Cargo handling gear, inspected and load tested;

3.21 The survey period for an item not specified in this part shall be that period determined by the Chief Executive Officer; and

3.22 In respect of pressure vessels, boilers and cargo handling gear, the Surveyor may accept valid Certificates issued by an Inspector authorised by and in compliance with the Maritime (Ships Lifting Appliances) Regulations 2014 and Health and Safety at Work Act.

Part 2—Safety Equipment Survey

4.1 Lifeboats, rescue boats and approved boats, equipment and launching arrangements.

4.2 Inflatable liferafts and Buoyant Apparatus. Certificates of Servicing and launching arrangements, cradles and hydrostatic releases.

4.3 Buoyant Appliances such as rigid buoyant appliances.

4.4 Internal buoyancy in small ships.

4.5 Lifebuoys, self-igniting lights, MOB smoke signals and buoyant lines.

4.6 Lifejackets and attachments (whistles and self-ignitions lights)-buoyancy check if required.

4.7 Portable Radio Equipment Certificate and testing.

4.8 Line Throwing Appliance. Expiry date of rockets.

4.9 Pyrotechnic Distress Signals, Expiry date.

4.10 Rescue Signals Table.

4.11 Chronometer, watches, bridge clock.

4.12 Compasses, Deviation Card.

4.13 Depth Sounder.

4.14 Signaling equipment.

4.15 Charts and Nautical Publications to be up to date and adequate for the area of operation.

4.16 Accommodation ladders, Gangways and Safety nets.

4.17 Electronic Navaids including radar, ECDIS and GPS.

4.18 Anchors and Cables-windlass operation and securing equipment.

4.19 Pilot Ladders and mechanical pilot hoist.

4.20 Medicines and Medical Stores.

4.21 Medical Log Book.

4.22 Official Log Book. Accident reports, Emergency drills.

4.23 Navigation Lights, shapes and Sound Signals.

4.24 Fire Detection System-test (includes testing of fire detectors and quartzodic bulbs).

4.25 Fire pumps hydrants, nozzles, hose and connections.

4.26 Emergency fire pump.

4.27 Fixed fire extinguishing installations. Certificate of Servicing. Carbon Dioxide fixed firefighting systems evidence of air blow through lines, CO_2 bottle weighing and alarm testing. Internal examination and testing of CO_2 bottles.

4.28 Fixed fire extinguishing installations. Certificate of Servicing.

4.29 Fire extinguishers. Certificate of Servicing.

4.30 Firemans Outfit-safety lamp. Cylinders contents of breathing apparatus.

4.31 Breathing apparatus and cylinder content checking.

4.32. International Shore Connection.

4.33 Firebuckets.

4.34 Fire axe.

4.35 Sand trays.

4.36 Fire Blanket.

4.37 General And Fire Alarm bells.

4.38 Public address system.

4.39 Remote Control Valves including quick closing valves.

4.40 Remote Controls, including push buttons or switches for engine room fans, water tight remote controlled doors.

4.41. Muster list and emergency instruction.

4.42 Cargo gear. Visual inspection, Sight Certificates' Validity.

4.43 Validity of Classification Society Certificates as appropriate.

4.44 Notice Board for correct display of Survey Certificates.

4.45 Stability information.

4.46 Emergency Lighting.

APPENDIX 2

LIST OF APPROVED OR AUTHORISED CLASSIFICATION SOCIETIES

1. Valid certificates of survey issued by the Societies listed below will be accepted by the Chief Executive Officer:

   (a) American Bureau of Shipping

   (b) Bureau Veritas

   (c) DNV/GL - Det Norske Veritas / Germanischer Lloyd

   (d) LR - Lloyds Register of shipping

   (e) NKK - Nippon Kaiji Kyokai

   (f) KR - Korean Register

APPENDIX 3

SURVEY FORMS

Form SUR1	Application for Survey
Form SUR2	Report of Survey & Surveyors Declaration
Form SUR3	Survey Certificate
Form SUR4	Interim Survey Certificate
Form SUR5	Application for Extension of Survey Certificate
Form SUR6	Extension of Survey Certificate
Form SUR7	Notice of Expiry of Survey Certificate
Form SUR8	Notice of Suspension/Cancellation
Form SUR9	Report of Accident or other occurrence
Form SUR10	Application for Towage Permit
Form SUR11	Towage Permit

Form SUR 1

MARITIME SAFETY AUTHORITY OF FIJI

APPLICATION FOR SURVEY
(Maritime Transport Decree, 2013)

PARTICULARS OF SHIP

Name: .....

Type of survey: Equipment only. Initial, Sight, Annual,
4 year, Compass Adjustment, Special

Length: .....Gross Tons: .....

Kilowatts: .....

Passengers: Intended number – 40 = ...

Locality of ship: .....

Date & Time for Survey:.....

Date & Time ship entering Slipway: .....

Basic fee paid: ..... *

Additional visit: No.: ..... *

Victualling: ..... *

.....

.....

FOR OFFICIAL USE ONLY
$ .....
$ .....*
$ .....*
$ .....*
TOTAL _____
R/R No. $..... *

_____
Chief Executive Officer (MSAF)

Notes:

1. At least 24 hours written notice is required for attendance of a Surveyor.
2. Ship shall not be unslipped without Hull Surveyors authority.
3. Additional charges may be incurred due to overtime working or delays beyond the control of the Surveyors. Such costs much be paid by the ship owners before a Survey Certificate will be issued. To prevent this causing undue delay to a ship the owner may request an "Interim Survey Certificate" of 2 weeks duration to be issued as soon as the Surveyor Declaration is signed.
4. For initial Survey only state:
   - 4.1 Type and purpose of ship: _____
   - 4.2 Intended area of operation: _____
   - 4.3 If ship to be in class, the Society: _____
   - 4.4 Attach any Certificates of Tonnage, Class Loadline, and Ship's plans.

   I hereby apply for a Survey to be conducted.

Date: _____ _____

Owner/Agent

FORM SUR 2

MARITIME SAFETY AUTHORITY OF FIJI

REPORT OF SURVEY

(Maritime Transport Decree 2013)

For the purposes of the Decree

Class: _____
(EEZ/Territorial/Inland) N/A

Present: Initial Semi Annual
Survey 4 Yearly

Special .....

NEXT PERIODICAL SURVEY DUE:

Annual: _____ /20

On Slip: _____ /20

5 year: _____ /20

PARTICULARS OF SHIPS

Name & Official Number	Port of Registry	Tonnage		Date of Build	Master and Certificate
		GT	NT		

Owner's Name & Address	L.O.A.	Breadth	Draught	Freeboard

Type of Machinery & KW	Endorsements:
	Please refer overleaf

LIVE SAVING APPLIANCES

Life buoys	Life jackets	Approved Boats	Inflatable	Rigid Buoyant Apparatus

Passengers Accommodated IN/ON	Sheltered Waters		Inshore Waters		Territorial Waters		Near Coastal Waters	Unlimited Waters
	Day	Night	Day	Night	Day	Night		
Approved Berths:								
Unberthed/Hatch:								
Unberthed/Other:								
Total Passengers:								
Crew:								
Total:								

SURVEYORS DECLARATION

The details described in this document were inspected commencing on the …… to ……20…… and found to be in accordance with the requirements of the Decree and Regulations made thereunder:

Date of completing Survey: _____ Marine Survey Office: _____

Name: _____ (Surveyor) Name: _____

Signature: _____ Signature: _____

FORM SUR 3
Type of Survey -------

MARITIME SAFETY AUTHORITY OF FIJI
SURVEY CERTIFICATE
(Maritime Transport Decree 2013)

(No of 20)

Of the _____ (Class) _____ Gross Tons: _____ Net: 65 No: _____
DIMENSIONS PARTICULARS OF MAIN PROPULSION
Length _____ Make: _____
Breadth: _____ Type: _____
Assigned Freeboard: ---------- Power (KW) _____
Name of Master: _____
Grade: _____ No: _____

Name & Address of Owner:_ _____ of _____

Endorsement ----------

Passengers Accommodated IN/ON	Harbour & River		Short Coasting		Fiji		Pacific Region	Unlimited
	Day	Night	Day	Night	Day	Night		
Approved Berth								
Unberthed / Hatch								
Unberthed / Other								
Total Passengers Crew								
Total								

LIFE SAVING APPLIANCES

Life buoys	Life jackets	Approved Boats	Inflatable	Rigid Buoyant Apparatus

The duplicate copy of this certificate shall be exhibited in a place accessible to all persons on board, and the originals of this Certificate shall be produced at the Maritime Safety Authority of Fiji Office before any clearance can be obtained and unless revoked or cancelled, shall be held in-

force until the_____ day of _____ 20 _____
Issued at Suva this _____ day of_____ 20 _____
This ship complies with the survey requirements of the Maritime Safety Authority of Fiji (MSAF).

_____
Chief Executive Officer (MSAF)

FORM SUR4

MARITIME SAFETY AUTHORITY OF FIJI

INTERIM SURVEY CERTIFICATE
(Maritime Transport Decree 2013)

This is to certify that the ship ..... has been surveyed and that the conditions of its hull and machinery are in seaworthy condition. The ship may proceed to sea and operate within the ..... with .....

This certificate shall remain in force for one voyage or two weeks from the date of issuance whichever is earlier depending on the issuance of the survey certificate.

Date of Issuance: Port:

.....
Chief Executive Officer Maritime Safety Authority of Fiji

_____

FORM SUR 5

MARITIME SAFETY AUTHORITY OF FIJI

APPLICATION FOR EXTENSION OF
CERTIFICATE OF SURVEY
(Maritime Transport Decree 2013)

To_____
Name of Ship _____
Registered or Identifying No. of Ship_____
Port of Registry _____
Type of Ship _____

DECLARATION PRIOR TO THE EXTENSION OF A CERTIFICATE

I/We, the undersigned, hereby declare that the above ship has not been subject to any accident or other occurrence which would raise any doubts as to the ship continuing to be seaworthy and properly equipped to operate in the limits prescribed by the Survey Certificate, and that there is not, to my / our best knowledge, any reason why an extension, as permitted under the Maritime Transport Decree, should not be granted.

Signed at _____ this _____ day of _____ 20 _____.

_____ (MASTER)
_____ (OWNER)

FORM SUR 6

MARITIME SAFETY AUTHORITY OF FIJI
(Seal)

EXTENSION(RENEWAL) OF CERTIFICATE OF SURVEY
(Maritime Transport Decree 2013)

Name of Ship: ———————————————————————————
Registered or Identifying No. of Ship: ———————————————————————————
Port of Registry: ———————————————————————————
Class of Ship: ———————————————————————————

Under Section 23 of the Maritime Transport Decree, 2013 the currency of this Certificate is extended or renewed for a period not exceeding: _____ month(s) from the expiration date of the Certificate.

Port: _____

Signed: ……..
Chief Executive Officer, MSAF

Date: _____

THIS DOCUMENT IS TO BE ATTACHED TO THE CERTIFICATE OF SURVEY

_____

FORM SUR 7

MARITIME SAFETY AUTHORITY OF FIJI

NOTICE OF EXPIRY OF SURVEY CERTIFICATE
(Maritime Transport Decree 2013)

Name of Ship: ……
Port of Registry: ……
Registered No. of Ship: ……

Under Section 67 of the Maritime Transport Decree, 2013, you: ..... owner of the above ship are hereby reminded that the Survey Certificate of the ship expires on: .....Type of Survey due: .....

If no application for extension of the above Survey Certificate or no application of survey is received by the Maritime Safety Authority of Fiji before such date, the ship will be declared "out of survey" and shall not be taken to sea or remain at sea.

Issued at ..... this ..... day of ..... 20 .....

_____
Chief Executive Officer (MSAF)

FORM SUR 8

MARITIME SAFETY AUTHORITY OF FIJI

NOTICE OF SUSPENSION / REVOCATION OF SURVEY CERTIFICATE
(Maritime Transport Decree 2013)

Name of Ship: ———————————————————————————

Port of Registry: ———————————————————————————

Registered No. of Ship: ———————————————————————————

Under Section 27/29 of the Decree, you: ———————————————————————————
owner of the above ship are hereby advised that:

1. *The Validity of the Survey Certificate of the ship is suspended until such time that the ship is again reported to comply with survey requirements.

2. The Survey Certificate of the ship is revoked.

Issued at ..... this ..... day of ..... 20 ..... .

Indicate which term is applicable .....Chief Executive Officer (MSAF)

FORM SUR 9

MARITIME SAFETY AUTHORITY OF FIJI

REPORT OF ACCIDENT OR OTHER OCCURRENCE
(Maritime Transport Decree 2013)

To: Chief Executive Officer (MSAF)

PARTICULARS OF SHIP

Name of ship:_____ Registered No. of Ship _____

Port of Registry:_____ Measured Length: _____

If Ship classed
Name of Society: _____

Name & Address of Owner (s): _____

Date of Occurrence: _____ Place of occurrence:_____

Number of Persons onboard: _____ Crew: _____ Passenger on a voyage

from:_____ to: _____

Master's Name: _____

Master's Address: _____

Weather Conditions: _____

NATURE AND PARTICULARS OF ACCIDENT OR OTHER OCCURRENCE

_____
_____
_____
_____
_____

Date: _____ _____

FORM SUR 10

MARITIME SAFETY AUTHORITY OF FIJI

APPLICATION FOR TOWAGE PERMIT
(Maritime Transport Decree 2013)

To: _____

PARTICULARS OF SHIP TO BE TOWED

Name and Port of Registry: _____
Registered or Identifying No: _____
Type of Ship: _____
Name & Address of Owners: _____
_____
Details of any Certificates in Force: _____
_____
Place, Date and Time where ship will be available for inspection: _____
_____

Date when ship last slipped: _____

PARTICULARS OF TOWING SHIP

Name and Port of Registry: _____
Type of Ship: _____
Name & Address of Owners: _____
Details of any Certificates in Force: _____
_____
Propulsion power or bollard pull: _____

DETAILS OF TOW

Point of Departure, Date & Time: _____
Destination: _____
Estimated Towing Speed: _____ Estimated Date of Arrival: _____
Manning: _____
_____ (Owner)
_____(Date)

OFFICE USE ONLY

Date Application Received: _____ Fee Received: _____
Date of Inspection: _____
Surveyors Report Received: _____
Date Towage Permit Issued: _____
Conditions: _____
Date Tow Departed: _____
Date Tow Arrived: _____

FORM SUR11

MARITIME SAFETY AUTHORITY OF FIJI

TOWAGE PERMIT
(Maritime Transport Decree 2013)

Name of Ship and Port of Registry: _____
Registered or Identifying No: _____
Type of Ship: _____
Name & Address of owner(s): _____
_____
Details of Certificates in Force: _____
_____
_____
_____

This is to certify that the ship is permitted to be towed a sea-going voyage from:
_____to_____
by the ship: _____ departing on or about _____
and arriving on or about_____
subject to the following conditions.

Date: _____(Chief Executive Officer MSAF)

_____

Appendix 4

SOLAS CERTIFICATE FORMS

The following are the Forms of Safety Certificates to be used in respect of Safety Convention Ships:

Form Sur12 Passenger Ship Safety Certificate

Form Sur13 Cargo Ship Safety Construction Certificate

Form Sur14 Cargo Ship Safety Equipment Certificate

Form Sur15 Cargo Ship Safety Radio Certificate

Form Sur 16 Cargo Ship Safety Certificate

Form Sur17 Exemption Certificate

Form Sur18 Nuclear passenger ship safety certificate

Form Sur19 Nuclear cargo ship safety certificate

FORM SUR 12

Form of Safety certificate for Passenger Ships

PASSENGER SHIP SAFETY CERTIFICATE

This certificate shall be supplemented by a record of Equipment
(Form P)

(FIJI Seal)

For an[2] / *a short* international voyage

Issued under the provision of the

INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA,
1974 as modified by the Protocol of 1988 relating thereto

under the authority of the Government of
FIJI

by

_____
(Signature of Chief Executive Officer MSAF or authorised person)

[2] *Delete as appropriate*

Particulars of ship[3]

Name of ship .....

Distinctive number or letters.....

Port of registry .....

Gross tonnage.....

Sea areas in which ship is certified to operate (regulation IV/2) .....

IMO Number[4] .....

Date of build:

Date of building contract .....

Date on which keel was laid or ship was at a similar stage of construction.....

Date of delivery .....

Date on which work for a conversion or an alteration or modification of a major character was commenced (where applicable) .....

All applicable dates shall be completed.

THIS IS TO CERTIFY:

1. That the ship has been surveyed in accordance with the requirements of regulation 1/7 of the Convention.

2. That the survey showed that:

2.1 the ship complied with the requirements of the Convention as regards:

1. the structure, main and auxiliary machinery, boilers and other pressure vessels;

2. the watertight subdivision arrangements and details;

3. the following subdivision load lines:

Subdivision load lines assigned and marked on the ship sides amidships (regulation ll- 1/18)[1]	Freeboard	When the spaces in which passengers are carried includes the following alternatives spaces
P.1	……..	……..
P.2	……..	……..
P.3	……..	……..

2.2 the ship complies with the requirements of the convention as regards structural fire protection, fire safe system and appliances and fire control plan;

2.3 the life-saving appliance and the equipment of the lifeboats, liferaft and rescue boat were provided in accordance with the requirements of the convention.

2.4 the ship was provided with line throwing appliance and radio installation used in life-saving appliance in accordance with the requirements of the convention.

---

[3] *Alternatively, the particulars of the ship may be placed horizontally in boxes.*

[4] *In accordance with IMO ship identification number scheme adopted by the Organization by resolution A.600(15).*

2.5 the ship complies with the requirements of the convention with regards radio installation.

2.6 the function of the radio installation used in life saving appliance complied with the requirements of convention.

2.7 the ship complies with the requirements of the convention as regards shipborne navigational equipment, means of embarkation for pilots and nautical publication;

2.8 the ship was provided with lights, shapes, means of making sound signals and distress signals, in accordance with the requirements of the convention and international regulations for preventing collisions at sea in force.

2.9 in all other respects the ship complies with the relevant requirements of the convention.

2.10 the ship was/was not[5] subjected to an alternative design and arrangements pursuant to regulation 11-2/17 of the convention

2.11 a document of approval of alternative design and arrangement for fire safety is/is not[5] appended to this certificate

3. That an Exemption certificate has/has not[5] been issued.

This Certificate is valid until ……

Completion date of the survey on which this certificate is based …… (dd/mm/yyyy)

Issued at……
(*Place of issue of Certificate*)

....
(date of Issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

[5] *Delete as appropriate*

Endorsement where the renewal survey has been completed and regulation 1/14*(d)* applies

The ship complies with the relevant requirements of the convention, and this certificate shall, in accordance with regulation 1/14*(d)* of the Convention, be accepted as valid until ……..

Signed ……
(Signature of Chief Executive Officer MSAF or authorised person)

Place ……..

Date ……

(MSAF seal or authorised organisation seal)

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 1/14*(e)* or 1/14*(f)* applies

This certificate shall, in accordance with regulation 1/14*(e)* / 1/14*(f)*[6] of the convention, be accepted until ……...……

Signed ……
(Signature of Chief Executive Officer MSAF or authorised person)

Place ……

Date …….

(MSAF seal or authorised organisation seal)

[6] *Delete as appropriate*

RECORDS OF EQUIPMENT FOR THE PASSENGERS SHIP SAFETY CERTIFICATE
(FORM P)

This Record shall be permanently attached to the
Passengers Ship Safety Certificate

RECORDS OF EQUIPMENT FOR COMPLIANCE WITH THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO

1. **Particulars of ship**

Name of Ship ……

Distinctive Number or letters ……

Number of passengers for which certified ……..

Minimum number of persons with required qualifications to operate the radio installations ……

2. **Details of life-saving Appliances**

1. Total number of person for which lifesaving appliances are provided	.....	
	Port Side	Starboard side
2. Total number of life boats	.....	.....
2.1 Total number of persons accommodated by them	.....	.....
2.2 Number of Partially enclosed lifeboats (regulation 111/2 and LSA code, paragraph 4.5)	.....	.....
2.3 Number of totally enclosed life boat (regulation 111/21 and LSA code, paragraph 4.6)	.....	.....
2.4 Other lifeboats	.....	.....
2.4.1 Number	.....	.....
2.4.2 Type	.....	.....
3 Number of motor lifeboat included in the total lifeboat shown above	.....	.....
3.1 Number of life boats fitted with search lights	.....	.....
4 Number of rescue boats	.....	.....
4.1 Number of boats which are included in the total life boat shown above	.....	.....

5 Liferafts	.....
5.1 Those for which approved launching appliance are required	.....
5.1.1 Number of liferafts	.....
5.1.2 Number of persons accommodated by them	.....
5.2 Those for which approved launching appliances are not required	.....
5.2.1 Number of liferafts	.....
5.2.2 Number of persons accommodated by them	.....
6 Buoyant apparatus	.....
6.1 Number of apparatus	.....
6.2 Number of persons capable of being supported	.....
7 Number of lifebuoys	.....
8 Number of lifejackets	.....
9 Immersion suits	.....
9.1 Total number	.....
9.2 Number of suits complying with the requirement of lifejackets	.....
10. Number of thermal protective aids[2]	.....
11. Radio installation used in life-saving appliances	.....
11.1 Number if radars transponders	.....
11.2 Number of two-way VHF radiotelephone apparatus	.....

3**. Details of radio facilities**

Items	Actual provision
1. Primary system	……..
1.1 VHF radio installation	…….
1.1.1 DSC Encoder	……..
1.1.2 DSC watch receiver	……..
1.1.3 Radiotelephony	……
1.2 MF radio installation	……..
1.2.1 DSC encoder	……..
1.2.2 DSC Watch receiver	……..
1.2.3 Radiotelephony	…….
1.3 MF/HF radio installation	……..
1.3.1 DSC radio installation	……..
1.3.2 DSC watch receiver	……..
1.3.3 Radiotelephony	……..
1.3.4 Direct- printing radio telephony	…….
1.4 INMARSAT ship earth station	……..
2. Secondary means of alerting	……..
3. Facilities of reception of maritime safety information	……

3.1 NAVTEX receiver	…….
3.2 EGC receiver	…….
3.3 HF direct-printing radio telephony receiver	…….
4 Satellite EPIRB	……
4.1 COSPAC-SARSAT	……
4.2 INMARSAT	……
5 VHF EPIRB	……..
6 Ships radio transponder	……

4. Methods used to ensure availability of radio facilities (regulations IV/ 15.6 and 15.7)

4.1 Duplication of equipment ……

4.2 Shore base maintenance …….

4.3 At sea maintenance capability

5. Details of navigational system and equipment

Items	Actual Provision
1.1 Standard magnetic compass[3]	…….
1.2 Spare magnetic compass[8]	……
1.3 Gyro-compass[8]	……
1.4 Gyro-compass heading repeater[8]	……
1.5 Gyro-compass bearing repeater[8]	…….
1.6 Heading or track control system[8]	…….
1.7 Pelorus or compass bearing device[8]	……
1.8 Means of correcting heading and bearing[8]	……
1.9 Transmitting heading device (THD)[8]	……
2.1 Nautical charts / Electronic Charts display and information system (ECDIS)[4]	…….....
2.2 Back-up arrangement for ECDIS	……..
2.3 Nautical publication	…….
2.4 Back-up arrangement for electronic nautical publication	…….
3.1 Receiver for a global navigation satellite system/ terrestrial radio navigation system[8,9]	……... …….
3.2 9 GHz radar[8]	…….
3.3 Second Radar (3 GHz /9 GHz[9])[8]	…….
3.4 Automatic radar plotting aid (ARPA)[8]	…….
3.5 Automatic tracking aid[8]	…….
3.6 Second automatic tracking aid[8]	…….
3.7 Electronic plotting aid[8]	…….
4.1 Automatic identification system (AIS)	…….
4.2 Long-range identification and tracking system	…….
5. Voyage data recorder (VDR)	…….
6.1 Speed and distance measuring device (through the water)[8]	…….
6.2 Speed and distance measuring device (over the ground and athwartship direction)[8]	…….

7. Echo-sounding device[8]	……
8.1 Rudder, propeller, thrust, pitch and operational mode indicator[8]	……
8.2 Rate-of-turn indictor[8]	…….
9 Sound reception system[8]	……..
10. Telephone to emergency steering position[8]	……..
11. Daylight signaling lamp[8]	……..
12. Radar reflector[8]	…….
13. International code of signals[8]	……

THIS IS TO CERTIFY that the Record is correct in all respects

Issued at ……..

(place of issue of the record)

……..……

(Date of issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

FORM SUR 13

Form of Safety Construction Certificate
For Cargo ships

CARGO SHIP SAFETY CONSTRUCTION CERTIFICATE

(FIJI Seal)

Issued under the provision of the
INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974,
As modified by the protocol of 1988 relating thereto

Under the authority of the Government of
FIJI

By

_____
(Signature of Chief Executive Officer MSAF or authorised person)

Particulars of Ship[7]

Name of ship ……..……

Distinctive number or letters …….....……

Port of registry …….....…..

Gross tonnage …….....……

Deadweight of ship (metric tons)[8] ……

IMO Number[9] …….....….……

[7] *Alternatively, the particulars of the ship may be placed horizontally in boxes.*
[8] *For oil tankers, chemical tankers and gas carriers only.*
[9] *In accordance with IMO ship identification number scheme adopted by the Organization by resolution A.600(15).*

Type of ship[10]

Bulk carriers
Oil tanker
Chemical Tanker
Gas carrier
Cargo ship other than any of the above

Date of Build:

Date of building contract……

Date on which keel wad laid or ship was at similar stage of construction ……..

Date of delivery……..

Date on which work for a conversion or an alternation or modification of a major character was commenced (where applicable) ……..

All applicable dates shall be completed.

THIS IS TO CERTIFY:

1. That the ship has been surveyed in accordance with the requirements of regulations 1/10 of the Convention

2. That the survey shows that the condition of the structure, machinery and equipment as defined in the above regulation was satisfactory and the ship complied with the relevant requirements of chapter II-1 and II-2 of the Convention (other than those relating to fire safety system and appliance and fire control plans)

3. That the last two inspections of the outside of the ship's bottom took place on …….. and ……

(dates)

4. That an Exemption Certificate has/has not[13] been issued.

5. The ship was / was not[14] subjected to an alternative design and arrangements in pursuance of regulation II-2/ of the convention.

6. A document of an approval of alternative design and arrangement for fire safety is/is not[11] appended to this certificate.

---

[10] *Delete as appropriate*
[11] *Delete as appropriate*

This Certificate is valid until ……[12] subject to the annual and intermediate survey and inspection of the outside of the ships bottom in accordance with regulation 1/10 of the Convention

Completed date of the survey on which this certificate is based: ……(dd/mm/yy)

Issued by ……
(Place of issue of certificate)

…… ……..
Date of issue (Signature of Chief Executive Officer
MSAF or authorised person)

(MSAF seal or authorised organisation seal)

Endorsement for annual and intermediate survey

THIS IS TO CERTIFY that, at a survey required by regulation 1/10 of the Convention, the ship was found to comply the relevant requirements of the Convention.

Annual survey: Signed:
……
(Signature of Chief Executive Officer
MSAF or authorised person)

Place: ……

Date: ……

(MSAF seal or authorised organisation seal)

Annual/intermediate[13] survey: Signed:
……
(Signature of Chief Executive Officer
MSAF or authorised person)

Place: ……

Date: ……

(MSAF seal or authorised organisation seal)

---

[12] *Insert the date of expiry as specified by the Administration in accordance with Regulation 1/14(a) of the convention. The day and the month of this date correspond to the anniversary date ,as defined in regulation ½(n) of the convention, unless amended in accordance with regulation ¼(h)*

[13] *Delete as appropriate*

Annual/intermediate[16] survey: Signed: ……
(Signature of Chief Executive Officer MSAF or authorised person)
Place: ……
Date: ……

(MSAF seal or authorised organisation seal)

Annual Survey:
Signed: …….....……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….....……

Date: …….....……

(MSAF seal or authorised organisation seal)

Annual/intermediate survey in accordance with regulation 1/14*(h)*(iii)

THIS IS TO CERTIFY that, at an annual/intermediate survey in accordance with regulation 1/14 *(h)*(iii) of the Convention, this ship was found to comply with the relevant requirement of the Convention.

Signed: …….....…….....……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….....…….....……

Date: …….....…….....……

(MSAF seal or authorised organisation seal)

Endorsement for inspections of the outside of the ships bottom[14]

THIS IS TO CERTIFY that, at an inspection required by regulation 1/10 of the Convention, the ship was found to comply with the relevant requirements of the Convention.

First inspection: Signed: …….....…….....
(Signature of chief Executive Officer MSAF or authorised person)

Place:…….....…….....

Date: …….....…….....

(MSAF seal or authorised organisation seal)

Second inspection: Signed: …….....…….....
(Signature of chief Executive Officer MSAF or authorised person)

Place:…….....…….....

Date: …….....…….....

(MSAF seal or authorised organisation seal)

Endorsement to extend the certificate if valid for less than 5years where regulaton 1/14*(c)* applies

The ship complies with the relevant requirement of the convention, and this certificate shall, in accordance with regulation1/14*(c)* of the Convention, be as valid until ……

Signed: …….....…….....
(Signature of chief Executive Officer MSAF or authorised person)

Place:…….....…….....

Date: …….....…….....

(MSAF seal orauthorised organisation seal)

[14] *Provision may be made for additional inspections.*

Endorsement where the renewal survey has been completed and regulation1/14*(d)* applies

The ship complies with the relevant requirement of the convention, and this certificate shall, in accordance with regulation 1/14*(d)* of the Convention, be accepted as valid unit.

Signed: …….....…….....
(Signature of chief Executive Officer MSAF or authorised person)

Place:…….....…….....

Date: …….....…….....

(MSAF seal orauthorised organisation seal)

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 1/14*(e)* or 1/14*(f)* applies

The certificate shall, in accordance with regulation 1/14*(e)* or 1/14*(f)*[15] of the Convention, be accepted as valid unit .....

Signed: …….....…….....
(Signature of chief Executive Officer MSAF or authorised person)

Place:…….....…….....

Date: …….....…….....

(MSAF seal orauthorised organisation seal)

Endorsement for advancement of anniversary date where regulation 1/14*(h)* applies

In accordance with regulation 1/14*(h)* of the Convention, the new anniversary date is

Signed: …….....…….....
(Signature of chief Executive Officer MSAF or authorised person)

Place:…….....…….....

Date: …….....…….....

(MSAF seal orauthorised organisation seal)

---

[15] *Delete as appropriate*

In accordance with regulation 1/14*(h)* of the Convention, the new anniversary date is

Signed: …….....…….....
(Signature of chief Executive Officer MSAF or authorised person)

Place:…….....……...…….....

Date: …….....…….....

(MSAF seal orauthorised organisation seal)

FORM SUR 14

Form of Safety Equipment Certificate
For Cargo Ship

CARGO SHIP SAFETY EQUIPMENT CERTIFICATE

This certificate shall be supplemented by a record of Equipment
(Form E)

(FIJI seal)

Issued under the provisions of the
INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974,
As modified by the protocol of 1988 relating thereto

Under the authority of the Government of

FIJI

by

_____
(Signature of Chief Executive Officer MSAF or authorised person)

Particulars of ship[16]

Name of Ship .....
Distinctive number or letters.....
Port of registry .....
Gross Tonnage .....
Deadweight of ship (metric tons)[17] .....
Length of ship (regulation III/3.12 .....
IMO Number[18] .....

16 *Alternatively, the particulars of the ship may be placed horizontally in boxes.*
17 *For oil tankers, chemical tankers and gas carriers only.*
18 *In accordance with IMO ship identification number scheme adopted by the Organization by resolution A.600(15)*

Type of ship[19]

Bulk carrier
Oil tanker
Chemical tanker
Gas carrier
Cargo ship other than any of the above

Date on which keel was laid or ship was at a similar stage of construction or, where applicable, date on which work for a conversion or an alternation or modification of a major character was commenced …… ……

THIS IS TO CERTIFY :

1. That the ship has been surveyed in accordance with the requirements of regulation1/8 of the Convention

2. That the survey showed that:

   2.1 The ship complies with the requirements of the Convention as regards structural fire protection, fire safety systems and appliances and fire control plan;

   2.2 The life-saving appliance and the equipment of the life boat, liferaft, and rescue boats were provided in accordance with the requirements of the Convention;

   2.3 The ship was provided with a line throwing appliance and radio installation used in life saving appliances in accordance with the requirements of the Convention;

   2.4 The ship complies with the requirements of the convention as regards shipborne navigational equipment means of embarkation for pilot and nautical publications;

   2.5 The ship was provided with lights, shapes and means of making sound signals and distress signals in accordance with the requirements of the convention and international regulations for preventing collisions at sea force;

   2.6 In all other respects the ship complies with the relevant requirements of the Convention;

   2.7 The ship was/was not[22] subjected to an alternative design and arrangement in pursuance of regulation II-2/17 the Convention;

   2.8 A document of approval of alternative design and arrangement for fire safety is /is not[22] appended to this certificate.

3. That an exemption certificate has/has not[22]been issued.

---

[19] *Delete as appropriate*

This certificate is valid until ……..[20] subject to the annual and periodical surveys in accordance with regulation I/8 of the Convention.

Issued at .....
(Place of issue of certificate)

Completion date of the survey on which this certificate is based:
……...……...……...……dd/mm/yyyy)

…….. ……...……...……..
(Date of Issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

Endorsement for annual and periodic surveys

THIS IS TO CERTIFY that, at a survey required by regulation I/8 of the convention, the ship was found to comply with the relevant requirements of the Convention.

Annual survey: Signed:....……...……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……...……...……..

Date: ……...……...……..

(MSAF seal or authorised organisation seal)

Annua/Periodical[21] survey: Signed:....……...……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……...……...……..

Date: ……...……...……..

(MSAF seal or authorised organisation seal)

---

[20] *Insert the date of expiry as specified by the Administration in accordance with Regulation 1/14(a) of the convention. The day and the month of this date correspond to the anniversary date, as defined in regulation ½(n) of the convention, unless amended in accordance with regulation ¼(h)*

[21] *Delete as appropriate*

Annual/periodical[24] survey: Signed: ……..……..……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..……..……

Date: ……..……..……

(MSAF seal or authorised organisation seal)

Annual survey: Signed: ……..……..……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..……..……

Date: ……..……..……

(MSAF seal or authorised organisation seal)

Annual/periodical survey in accordance with regulation 1/14*(h)*(iii)

THIS IS TO CERTIFY that, an annual/periodical[24] survey in accordance with regulation 1/14*(h)*(iii) of the convention this ship was found to comply with the relevant requirements of the Convention.

Signed: ……..……..……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..……..……

Date: ……..……..……

(MSAF seal or authorised organisation seal)

Endorsement to extend the certificate if valid for less than 5 years where regulation 1/14*(c)* applies.

This ship complies with the relevant requirements of the Convention, and this certificate shall, in accordance with regulation 1/14*(d)* of the Convention, be accepted as valid until ……..……..…… ……..……..…… ……..……..……

Signed: ……..……..……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..……..……

Date: ……..……..……

(MSAF seal or authorised organisation seal)

Endorsement where the renewal survey has been completed and regulation 1/14*(d)* applies.

The ship complies with the relevant requirements of the Convention, and this certificate shall, in accordance with regulation 1/14*(d)* of the Convention, be accepted as valid until ……..……..…… ……..……..…… ……..……..……

Signed: ……..……..……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..……..……

Date: ……..……..……

(MSAF seal or authorised organisation seal)

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 1/14*(e)* or 1/14*(f)*[22] applies

The certificate shall, in accordance with regulation 1/14*(e)* or 1/14*(f)* of the Convention, be accepted as valid until……..……..

Signed: ……..……..……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..……..……

Date: ……..……..……

(MSAF seal or authorised organisation seal)

Endorsement for advancement of anniversary date where regulation 1/14*(h)* applies

In accordance with regulation 1/14*(h)* of the Convention, the new anniversary date is ……..……..…… ……..……..…… ……..……..……..

Signed: ……..……..……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..……..……

Date: ……..……..……

(MSAF seal or authorised organisation seal)

---

[22] *Delete as appropriate*

In accordance with regulation 1/14*(h)* of the Convention, the new anniversary date is ……
……..…

Signed: ……..……..……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..……..……

Date: ……..……..……

(MSAF seal or authorised organisation seal)

RECORDS OF EQUIPMENT FOR THE CARGO SHIP SAFETY EQUIPMENT CERTIFICATE

(FORM E)
These records should be permanently attached to the
Cargo ship safety equipment certificate

RECORDS OF EQUIPMENT FOR COMPLIANCE WITH THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO

1. Particulars of ship
Name of ship…….....

Distinctive number or letters ……..……

2. Details of life- saving appliances

1. Total number of persons for which lilfe saving appliances are provided	……	
	Port Side	Starboard side
2. Total number of life boats	……	……
2.1 Total number of persons accommodated by them	……	……
2.2 Number of totally enclosed lifeboats (regulation III/31 and LSA code, paragraph 4.6)	……	……
2.3 Number of totally enclosed life boats (regulation III/31 and LSA code, paragraph 4.8)	……	……
2.4 Number of fire protected lifeboats (regulation III/31 and LSA code, paragraph 4.9)	…….. ……	…….. ……

2.5 Other lifeboats 2.5.1 Number 2.5.2 Type	....	....
2.6 Number of freefall lifeboats 2.6.1 Totally enclosed (regulation III/31 and LSA Code, paragraph 4.7) 2.6.2 Self-contained (regulation III/31 and LSA Code, paragraph 4.8) 2.6.3 Fire-protected (regulation III/31 and LSA Code, paragraph 4.9) 3. Number of motor life boats (included in the total lifeboats shown above) 3.1 Number of lifeboats fitted with searchlights. 4. Number of rescue boats 4.1 Number of boats which are included in the total lifeboats shown above 5. Liferafts 5.1 Those for which approved launching appliances are required 5.1.1 Number of liferafts 5.1.2 Number of persons accommodated by them 5.2 Those for which approved launching appliances are not required 5.2.1 Number of liferafts 5.2.2 Number of persons accommodated by them 5.3 Number of liferafts required by regulation III/31.1.4		
6 Number of lifebuoys 7. Number of lifejackets 8. Immersion suits 8.1 Total number 8.2 Number of suits complying with the requirements for lifejackets 9. Radio installations used in life saving appliances 9.1 Number of radar transponders 9.2 Number of two way VHF radiotelephone apparatus		

3. Details of navigational systems and equipment

Item	Actual provision
1.1 Standard magnetic compass[5]	.....
1.2 Spare magnetic compass[26]	.....
1.3 Gyro-compass[26]	.....
1.4 Gyro-compass heading repeater[26]	.....
1.5 Gyro-compass bearing repeater[26]	.....
1.6 Heading or track control system[26]	.....
1.7 Pelorus or compass bearing device[26]	.....
1.8 Means of correcting heading and bearings	.....
1.9 Transmitting heading device (THD)[26]	.....
2.1 Nautical charts/ Electronic chart display[6] and information system (ECDIS)	.....
2.2 Back up arrangements for ECDIS	.....
2.3 Nautical publications	.....
2.4 Back-up arrangements for electronic nautical publications	.....
3.1 Receiver for a global navigation satellite system/ terrestrial radio navigation system.[26,27]	.....
3.2 9 GHz radar[26]	.....
3.3 Second radar (3GHz/9GHz[27])[26]	.....
3.4 Automatic radar plotting aid (ARPA)[26]	.....
3.5 Automatic tracking aid[26]	.....
3.6 Second automatic tracking aid[26]	.....
3.7 Electronic plotting aid[26]	.....
4.1 Automatic identification system (AIS)	.....
4.2 Long–range identification and tracking system	.....
5.1 Voyage data recorder (VDR)[27]	.....
5.2 Simplified voyage data recorder (S-VDR)[27]	.....
6.1 Speed and distance measuring device (through the water)[26]	.....
6.2 Speed and distance measuring device (over the ground in the forward and athwartship direction)[26]	.....
6.3 Echo- sounding device[26]	.....
7.1 Rudder, propeller, thrust pitch and operational mode indicator[26]	.....
7.2 Rate of turn indicator[26]	.....
8. Sound reception system[26]	.....
9. Telephone to emergency steering position[26]	.....
10. Daylight signalling lamp[26]	.....
11. Radar reflector[26]	.....
12. International Code of Signals	.....
13 IAMSAR Manual, Volume III	.....

THIS IS TO CERTIFY that this Record is correct in all respects

Issued at……....
.....……..

(Place of issue of the Record)

…….....…….. .....……..

(Date of issue) (Signature of Chief Executive Officer
MSAF or authorised person)

(MSAF seal or authorised organisation seal)

FORM SUR 15

Form of Safety Radio Certificate
For Cargo Ships

CARGO SHIP SAFETY RADIO CERTIFICATE

This Certificate shall be supplemented by a Record of Equipment of Radio Facilities (Form R)

(FIJI seal)

Issued under the provisions of the

INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, as modified by the Protocol of 1988 relating thereto

Under the authority of the Government of
FIJI

By

_____
(Signature of Chief Executive Officer MSAF or authorised person)

Particulars of ship[23]

Name of Ship …….....
Distinctive number or letters…….....……
Port of registry ……
…….....
Gross Tonnage ……
…….....
Sea areas in which ship is certified to operate (regulation IV/2) ……
IMO Number[24] ……
…….....

Date on which keel was laid or ship was at a similar stage of construction or, where applicable, date on which work for a conversion or an alternation or modification of a major character was commenced ……
…….....

---

[23] *Alternatively, the particulars of the ship may be placed horizontally in boxes.*

[24] *In accordance with the IMO ship identification number scheme adopted by the Organization by resolution A.600(15).*

THIS IS TO CERTIFY :

1. That the ship has been surveyed in accordance with the requirements of regulation1/9 of the Convention.

2. That the survey showed that:

   2.1 the ship complied with the requirements of the Convention as regards radio installations.

   2.2 the functioning of the radio installations used in life-saving appliances complied with the requirements of the Convention.

3. That an Exemption Certificate has/has not[25] been issued.

This certificate is valid until ……..[26] subject to the annual and periodical surveys in accordance with regulation I/9 of the Convention.

Completion date of the survey on which this certificate is based: ……...(dd/mm/yyyy)

Issued at ……...……...……...……...……...……..
(Place of issue of certificate)

……...…… ……...……..……...……
(Date of Issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

Endorsement for periodic surveys

THIS IS TO CERTIFY that, at a survey required by regulation I/9 of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Periodic survey: Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

---

[25] *Delete as appropriate*

[26] *Insert the date of expiry as specified by the Administration in accordance with regulation 1/14(a) of the Convention. The day and the month of this date correspond to the anniversary date as defined in regulation ½(n) of the Convention, unless amended in accordance with regulation 1/14(h).*

Periodic survey: Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Periodic survey: Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Periodic survey: Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Periodical survey in accordance with regulation 1/14*(h)*(iii)

THIS IS TO CERTIFY that after a periodical survey in accordance with regulation 1/14*(h)* (iii) of the Convention this ship was found to comply with the relevant requirements of the Convention.

Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement to extend the certificate if valid for less than 5 years where regulation 1/14*(c)* applies

This ship complies with the relevant requirements of the Convention, and this certificate shall, in accordance with regulation 1/14*(c)* of the Convention, be accepted as valid until ……

Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement where the renewal survey has been completed and regulation 1/14*(d)* applies

The ship complies with the relevant requirements of the Convention ,and this certificate shall, in accordance with regulation 1/14*(d)* of the Convention, be accepted as valid until ……
……

Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 1/14*(e)* or 1/14*(f)*[27] applies

The certificate shall, in accordance with regulation 1/14*(e)* or 1/14*(f)* of the Convention, be accepted as valid until……..……..

Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

---

[27] *Delete as appropriate*

Endorsement for advancement of anniversary date where regulation 1/14*(h)* applies

In accordance with regulation 1/14*(h)* of the Convention, the new anniversary date is ……
……

Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

In accordance with regulation 1/14*(h)* of the Convention, the new anniversary date is ……
……

Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

RECORD OF EQUIPMENT FOR THE CARGO SHIP SAFETY RADIO CERTIFICATE

(FORM R)

This Record shall be permanently attached to the Cargo Ship Safety Radio Certificate

RECORD OF EQUIPMENT OF RADIO FACILITIES FOR COMPLIANCE WITH THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO

1. Particulars of ship

Name of ship…….……

Distinctive number or letters…….……

Minimum number of persons with required qualifications to operate the radio installations…….……..

2. Details of radio facilities

Item	Actual Provision
1. Primary systems	.....
1.1 VHF radio installation	.....
1.1.1 DSC encoder	.....
1.1.2 DSC watch receiver	.....
1.1.3 Radiotelephony	.....
1.2 MF radio installation	.....
1.2.1 DSC encoder	.....
1.2.2 DSC watch receiver	.....
1.2.3 Radiotelephony	.....
1.3 MF/HF radio installation	.....
1.3.1 DSC encoder	.....
1.3.2 DSC watch receiver	.....
1.3.3 Radiotelephony	.....
1.3.4 Direct-printing telegraphy	.....
1.4 INMARSAT ship earth station	.....
2. Secondary means of alerting	.....
3. Facilities for reception of maritime safety information	.....
3.1 NAVTEX receiver	.....
3.2 EGC receiver	.....
3.3 HF direct-printing radiotelegraph receiver	.....
4. Satellite EPIRB	.....
4.1 COSPAS-SARSAT	.....
4.2 INMARSAT	.....
5. VHF EPIRB	.....
6. Ship's radar transponder	.....

3. Methods used to ensure availability of radio facilities (regulation IV/15.6 and 15.7)

3.1 Duplicate of equipment.....

3.2 Shore-based maintenance.....

3.3 At-sea maintenance capability.....

THIS IS TO CERTIFY that this Record is correct in all respects

Issued at……

(Place of issue of the record)

…… ……

(Date of issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

FORM SUR 16

Form of Safety Certificate
For Cargo Ships

CARGO SHIP SAFETY CERTIFICATE

This Certificate shall be supplemented by a Record of Equipment of Radio Facilities (Form C)

(FIJI seal)

Issued under the provisions of the
INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, as modified by the Protocol of 1988 relating thereto

Under the authority of the Government of

FIJI

By

_____
(Signature of Chief Executive Officer MSAF or authorised person)

Particulars of ship[28]

Name of Ship ……
Distinctive number or letters ……
Port of registry ……
Gross Tonnage ……
Deadweight of ship (metric tons)[29] ……
Length of ship (regulation III/3.12 ……
Sea areas in which ship is certified to operate (regulation IV/2)……
IMO Number[30] ……

Type of ship[31]

Bulk carrier
Oil tanker
Chemical tanker
Gas carrier
Cargo ship other than any of the above

Date of Build:

Date of building contract ……
Date on which keel was laid or ship was at similar stage of construction ……..
Date of delivery ……..
Date on which work for a conversion or an alternation or modification of a major character was commenced (where applicable) ……..
All applicable dates shall be completed.

THIS IS TO CERTIFY :

1. That the ship has been surveyed in accordance with the requirements of regulation I/8, I/9 and I/10 of the Convention.

2. That the survey showed that:

   2.1 the condition of the structure, machinery and equipment as defined in regulation I/10 was satisfactory and the ship complied with the relevant requirements of Chapter II-1 and Chapter II-2 of the Convention (other than those relating to fire safety systems and appliances and fire control plans);

   2.2 the last two inspections of the outside of the ship's bottom took place on …… and ……

(dates)

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[28] *Alternatively, the particulars of the ship may be placed horizontally in boxes.*
[29] *For oil tankers, chemical tankers and gas carriers only.*
[30] *In accordance with IMO ship identification number scheme adopted by the Organization by resolution A.600(15).*
[31] *Delete as appropriate*

2.3 the ship complied with the requirements of the Convention as regards fire safety systems and appliances and fire control plans;

2.4 the lifesaving appliances and the lifesaving equipment of the lifeboats, liferafts and rescue boats were provided in accordance with the requirements of the Convention;

2.5 the ship was provided with a line-throwing appliance and radio installations used in lifesaving appliances in accordance with the requirements of the Convention;

2.6 the ship complied with the requirements of the Convention as regards radio installations;

2.7 the functioning of the radio installations used in lifesaving appliances complied with the requirements of the Convention;

2.8 the ship complied with the requirements of the Convention as regards shipborne navigational equipment, means of embarkation for pilots and nautical publications;

2.9 the ship was provided with lights, shapes, means of making sound signals and distress signals in accordance with the requirements of the Convention and the International Regulations for Preventing Collisions at Sea in force;

2.10 in all other respects the ship complied with the relevant requirements of the Convention;

2.11 the ship was/was not[32] subjected to an alternative design and arrangements in pursuance of regulation II-2/17 of the Convention;

2.12 a Document of approval of alternative design and arrangements for fire safety is /is not[37] appended to this Certificate.

3. That an Exemption Certificate has/has not[37] been issued.

This certificate is valid until …….....[33] subject to the annual, intermediate and periodical surveys and inspections of the outside of the ship's bottom in accordance with regulation I/8, I/9 and I/10 of the convention.

Issued at ……

(Place of issue of certificate)

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[32] *Delete as appropriate*

[33] *Insert the date of expiry as specified by the Administration in accordance with Regulation 1/14(a) of the convention. The day and the month of this date correspond to the anniversary date, as defined in regulation ½(n) of the Convention, unless amended in accordance with regulation ¼(h)*

Completion date of the survey on which this certificate is based:
……..... .....……. (dd/mm/yyyy)

…….. ……
(Date of Issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

Endorsement for annual and intermediate surveys relating to structure, machinery and equipment referred to in paragraph 2.1 of this certificate.

THIS IS TO CERTIFY that, at a survey required by regulation I/10 of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Annual survey: Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Annual/Intermediate[34] survey: Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Annual/Intermediate[34] survey: Signed: ……..……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

[34] *Delete as appropriate*

Annual survey: Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Annual /intermediate survey in accordance with regulation 1/14*(h)*(iii)

THIS IS TO CERTIFY that, after an annual/intermediate[35] survey in accordance with regulation I/10 and 1/14*(h)*(iii) of the Convention, this ship was found to comply with the relevant requirements of the Convention.

Signed:
……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place:…….

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement for inspections of the outide of the ship's bottom[35]

THIS IS TO CERTIFY that, at an inspection required by regulation I/10 of the Convention, the ship was found to comply with the relevant requirements of the Convention.

First inspection: Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

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[35] *Provision may be made for additional inspections*.

Second inspection: Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement for annual and periodical surveys relating to life saving appliances and other equipment referred to in paragraph 2.3, 2.4, 2.5, 2.8, 2.9 of this certificate.

THIS IS TO CERTIFY that, at a survey required by regulation I/8 of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Annual survey: Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Annual/Periodical[36] survey: Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Annual/Periodical[36] survey: Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

[36] *Delete as appropriate*

Annual survey: Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Annual /periodical survey in accordance with regulation 1/14*(h)*(iii)

THIS IS TO CERTIFY that, after an annual/periodical[36] survey in accordance with regulation I/8 and 1/14*(h)*(iii) of the Convention this ship was found to comply with the relevant requirements of the Convention.

Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement periodical surveys relating to radio installations referred to in paragraph 2.6 and 2.7 of this certificate.

THIS IS TO CERTIFY that, after a survey required by regulation I/9 of the Convention, the ship was found to comply with the relevant requirements of the Convention.

Periodical survey: Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Periodical survey: Signed: ……..……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Periodical survey: Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Periodical survey: Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Periodical survey in accordance with regulation 1/14*(h)*(iii)

THIS IS TO CERTIFY that, a periodic survey in accordance with regulation I/9 and 1/14*(h)* (iii) of the Convention this ship was found to comply with the relevant requirements of the Convention.

Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement to extend the certificate if valid for less than 5 years where regulation I/14*(c)* applies.

The ship complies with the relevant requirements of the Convention, and this Certificate shall, in accordance with regulation 1/14*(c)* of the Convention be accepted as valid until .....

Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement where the renewal survey has been completed and regulation I/14*(d)* applies

The ship complies with the relevant requirements of the Convention, and this Certificate shall, in accordance with regulation 1/14*(d)* of the Convention be accepted as valid until……

Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement to extend the validity of the certificate until reaching the port of survey or for the period of grace where regulation I/14*(e)* or I/14*(f)* applies

The ship complies with the relevant requirements of the Convention, and this Certificate shall, in accordance with regulation 1/14*(e)*/I/14*(f)*[37] of the Convention be accepted as valid until……

Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement for advancement of anniversary date where regulation I/14*(h)* applies

The ship complies with the relevant requirements of the Convention, and this Certificate shall, in accordance with regulation 1/14*(h)* of the Convention be accepted as valid until……

Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..

Date: ……..

(MSAF seal or authorised organisation seal)

---

[37] *Delete as appropriate*

In accordance with regulation I/14*(h)* of the Convention, the new anniversary date is……
……

Signed: ……
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……

Date: ……

(MSAF seal or authorised organisation seal)

1. **Particulars of ship**

Name of ship……

Distinctive number or letters……

Minimum number of persons with required qualifications to operate the radio installations .....

2. **Details of life- saving appliances**

1. Total number of person for which lifesaving appliances are provided	…….	
	Port Side	Starboard side
2. Total number of life boats	……	……
2.1 Total number of persons accommodated by them	……	……
2.2 Number of totally enclosed lifeboats (regulation III/31 and LSA code, paragraph 4.6)	……	……
2.3 Number of totally enclosed life boats (regulation III/31 and LSA code, paragraph 4.8)	……	……
2.4 Number of fire protected lifeboats (regulation III/31 and LSA code, paragraph 4.9)	……	……
2.5 Other lifeboats		
2.5.1 Number	……	……
2.5.2 Type	……	……
	……	……

2.6 Number of freefall lifeboats	……
2.6.1 Totally enclosed (regulation III/31 and LSA Code, paragraph 4.7)	……
2.6.2 Self-contained (regulation III/31 and LSA Code, paragraph 4.8)	……..
2.6.3 Fire- protected (regulation III/31 and LSA Code, paragraph 4.9)	……..
	……...
3. Number of motor life boats (included in the total lifeboats shown above)	……
3.1 Number of lifeboats fitted with searchlights.	……..
	……...
4. Number of rescue boats	……
4.1 Number of boats which are included in the total lifeboats shown above	……..
5. Liferafts	……
5.1 Those for which approved launching appliances are required	……
5.1.1 Number of liferafts	……
5.1.2 Number of persons accommodated by them	……
5.2 Those for which approved launching appliances are not required	……
5.2.1 Number of liferafts	……
5.2.2 Number of persons accommodated by them	……
5.3 Number of liferafts required by regulation III/31.1.4	……..
6 Number of lifebouys	
7. Number of lifejackets	……
8. Immersion suits	
8.1 Total number	……
8.2 Number of suits complying with the requirements for lifejackets	……
	……
	……
9. Radio installations used in life saving appliances	……
9.1 Number of radar transponders	……..
9.2 Number of two way VHF radiotelephone apparatus	……
	……..
	……..

3 Details of radio facilities

Item	Actual Provision
1. Primary systems	.....
1.1 VHF radio installation	.....
1.1.1 DSC encoder	.....
1.1.2 DSC watch receiver	.....
1.1.3 Radiotelephony	.....
1.2 MF radio installation	.....
1.2.1 DSC encoder	.....
1.2.2 DSC watch receiver	.....
1.2.3 Radiotelephony	.....
1.3 MF/HF radio installation	.....
1.3.1 DSC encoder	.....
1.3.2 DSC watch receiver	.....
1.3.3 Radiotelephony	.....
1.3.4 Direct-printing telegraphy	.....
1.4 INMARSAT ship earth station	.....
2. Secondary means of alerting	.....
3. Facilities for reception of maritime safety information	.....
3.1 NAVTEX receiver	.....
3.2 EGC receiver	.....
3.3 HF direct-printing radiotelegraph receiver	.....
4. Satellite EPIRB	.....
4.1 COSPAS-SARSAT	.....
4.2 INMARSAT	.....
5. VHF EPIRB	.....
6. Ship's radar transponder	.....

4 Methods used to ensure availability of radio facilities (regulation IV/15.6 and 15.7)

4.1 Duplicate of equipment……

4.2 Shore-based maintenance……

4.3 At-sea maintenance capability……..

5. Details of navigational systems and equipment

Item	Actual provision
1.1 Standard magnetic compass[7]	.....
1.2 Spare magnetic compass[43]	.....
1.3 Gyro-compass[43]	.....
1.4 Gyro-compass heading repeater[43]	.....
1.5 Gyro- compass bearing repeater[43]	.....
1.6 Heading or track control system[43]	.....
1.7 Pelorus or compass bearing device[43]	.....
1.8 Means of correcting heading and bearings	.....
1.9 Transmitting heading device (THD)[43]	.....
2.1 Nautical charts/ Electronic chart display[8] and information system (ECDIS)	.....
2.2 Back up arrangements for ECDIS	
2.3 Nautical publications	.....
2.4 Back-up arrangements for electronic nautical publications	.....
	.....
3.1 Receiver for a global navigation satellite system/ terrestrial radio navigation system.[43,44]	.....
3.2 9 GHz radar[43]	.....
3.3 Second radar (3GHz/9GHz[44])[43]	.....
3.4 Automatic radar plotting aid (ARPA)[43]	.....
3.5 Automatic tracking aid[43]	.....
3.6 Second automatic tracking aid[43]	.....
3.7 Electronic plotting aid[43]	.....
	.....
4.1 Automatic identification system (AIS)	
4.2 Long–range identification and tracking system	.....
5.1 Voyage data recorder (VDR)[44]	.....
5.2 Simplified voyage data recorder (S-VDR)[44]	.....
6.1 Speed and distance measuring device (through the water)[43]	.....
6.2 Speed and distance measuring device (over the ground in the forward and athwartship direction)[43]	.....
	.....
7 Echo-sounding device[43]	
8.1 Rudder, propeller, thrust pitch and operational mode indicator[43]	.....
8.2 Rate of turn indicator[43]	.....
9. Sound reception system[43]	.....
10. Telephone to emergency steering position[43]	
11. Daylight signalling lamp[43]	.....
12. Radar reflector[43]	.....
13. International Code of Signals	
14 IAMSAR Manual, Volume III	.....

THIS IS TO CERTIFY that this Record is correct in all respects

Issued at ……..
(Place of issue of the record)

…… …….
(Date of issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

FORM SUR 17

Form of Exemption Certificate

EXEMPTION CERTIFICATE

(FIJI seal)
Issued under the provisions of the
INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, as modified by the Protocol of 1988 relating thereto

Under the authority of the Government of

FIJI

By

_____
(Signature of Chief Executive Officer MSAF or authorised person)

Particulars of ship[38]

Name of ship……

Distinctive number or letters……

Port of registry……..

Gross tonnage……..

IMO Number[39]……

[38] *Alternatively, the particulars of the ship may be placed horizontally in boxes.*

[39] *In accordance with the IMO ship identification number scheme adopted by the Organization by resolution A.600(15)*

THIS IS TO CERTIFY:

That the ship is, under the authority conferred by regulation …….. of the Convention, exempted from the requirements of …… …… of the Convention.

Conditions, if any on which the Exemption Certificate is granted:
…….....

Voyages, if any, for which the Exemption Certificate is granted:

……
……..

This certificate is valid until…….subject to the ……Certificate, to which this certificate is attached, remaining valid.

Issued at……
(Place of issue of certificate)

…….. ……....……..
(Date of issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

Endorsement to extend the certificate if valid for less than 5 years where regulation 1/14*(c)* applies.

This certificate shall, in accordance with regulation 1/14*(c)* of the Convention, be accepted as valid until …… subject to the ……. Certificate to which this certificate is attached, remaining valid.

Signed: ……....……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: …….

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement where the renewal survey has been completed and regulation 1/14*(d)* applies

This certificate shall, in accordance with regulation 1/14*(d)* of the Convention, be accepted as valid until …… subject to the…….. Certificate, to which this certificate is attached, remaining valid.

Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..

Date: ……..

(MSAF seal or authorised organisation seal)

Endorsement to extend the validity of the certificate until reaching the port of survey or for a period of grace where regulation 1/14*(e)* or 1/14*(f)*[40] applies

The certificate shall, in accordance with regulation 1/14*(e)* or 1/14*(f)* of the Convention, be accepted as valid until…….. subject to the…….. Certificate, to which this certificate is attached, remaining valid.

Signed: ……...……..
(Signature of Chief Executive Officer MSAF or authorised person)

Place: ……..

Date: ……..

(MSAF seal or authorised organisation seal)

[40] *Delete as appropriate*

FORM SUR 18

Form of Nuclear Passenger Ship Safety Certificate

NUCLEAR PASSENGER SHIP SAFETY CERTIFICATE

This certificate shall be supplemented by a Record of Equipment
(Form PNUC)

(FIJI Seal)

for ~~*an*[41]~~ international stage
a short

Issued under the provisions of the
INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974,
as modified by the Protocol of 1988 relating thereto

Under the authority of the Government of

FIJI

By

_____
(Signature of Chief Executive Officer MSAF or authorised person)

Particulars of ship[42]

Name of ship……

Distinctive number or letters……

Port of registry……..

Gross tonnage……..

Sea areas in which ship is certified to operate (regulation IV/2)……...
IMO Number……

41 Delete as appropriate
42 Alternatively, the particulars of the ship may be placed horizontally in boxes.

Date on which keel was laid or ship was at a similar stage of construction or, where applicable, date on which work for a conversion or an alteration or modification of a major character was commenced……

THIS IS TO CERTIFY:

1. That the ship has been surveyed in accordance with the requirements of regulation VIII/9 of the Convention.

2. That the ship, being a nuclear ship, complied with all the requirements of Chapter VIII of the Convention and conformed to the Safety Assessment approved for the ship; and that:

2.1 the ship complied with the requirements of the Convention as regards:

1. the structure, main and auxiliary machinery , boilers and other pressure vessels, including the nuclear propulsion plant and the collision protective structure;

2. the watertight subdivision arrangements and details;

3. the following subdivision load lines:

Subdivision load lines assigned and marked on the ship's side amidships (regulation II-1/18)[9]	Freeboard	To apply when the spaces in which passengers are carried include the following alternative spaces
P.1	.....	.....
P.2	.....	.....
P.3	.....	.....

2.2 the ship complied with the requirements of the Convention as regards structural fire protection, fire safety systems and appliances and fire control plans;

2.3 the ship complied with the requirements of the Convention as regards radiation protection systems and equipment;

2.4 the lifesaving appliances and the equipment of the lifeboats, liferafts and rescue boats were provided in accordance with the requirements of the Convention;

2.5 the ship was provided with a line throwing appliance and radio installations used in life saving appliances in accordance with the requirements of the convention;

2.6 the ship complied with the requirements of the Convention as regards radio installations;

2.7 the functioning of the radio installations used in life- saving appliances complied with the requirements of Convention;

2.8 the ship complied with the requirements of the Convention as regards ship borne navigational equipment, means of embarkation for pilots and nautical publications;

2.9 the ship was provided with lights, shapes, means of making sound signals and distress signals, in accordance with the requirements of the Convention and the International Regulations for Preventing Collisions at sea in force;

2.10 in all other respects, the ship complied with the relevant requirements of the Convention;

2.11 the ship was/was not[39] subjected to an alternative design and arrangements in pursuance of regulation II-2/17 of the Convention;

2.12 a Document of approval of alternative design and arrangements for fire safety is/is not[43] appended to this Certificate.

This Certificate is valid until……..

Completion date of the survey on which this certificate is based:……(dd/mm/yy)

Issued at……
(Place of issue of certificate)

…… ……
(Date of issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

RECORD OF EQUIPMENT FOR THE NUCLEAR PASSENGER SHIP SAFETY CERTIFICATE

(FORM PNUC)

This Record shall be permanently attached to the Nuclear Passenger Ship Safety Certificate

RECORD OF EQUIPMENT FOR COMPLIANCE WITH THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA 1974, AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO

1. **Particulars of ship**

Name of ship……
Distinctive number or letters……
Number of passengers for which certified……..
Minimum number of persons with required qualifications to operate the radio installations……

43 Delete as appropriate

2. **Details of life saving appliances**

1. Total number of persons for which lifesaving appliances are provided	.....	
	Port Side	Starboard side
2. Total number of life boats	.....	.....
2.1 Total number of persons accommodated by them	.....	.....
2.2 Number of Partially enclosed lifeboats	.....	.....
(regulation 111/2 and LSA code, paragraph 4.5)	.....	.....
2.3 Number of totally enclosed life boat (regulation	.....	.....
111/21 and LSA code, paragraph 4.6)	.....	.....
2.4 Other lifeboats	.....	.....
2.4.1 Number	.....	.....
2.4.2 Type	.....	.....
3 Number of motor lifeboat included in the total	.....	.....
lifeboats shown above	.....	.....
3.1 Number of life boat fitted with search lights	.....	.....
4 Number of rescue boats	.....	.....
4.1 Number of boat which are included in the total	.....	.....
life boat shown above	.....	.....
5 Liferafts	.....	.....
5.1 Those for which approved launching appliances	.....	.....
are required	.....	.....
5.1.1 Number of liferaft	.....	.....
5.1.2 Number of persons accommodated by	.....	.....
them	.....	.....
5.2 Those for which approved launching appliance	.....	.....
are not required	.....	.....
5.2.1 Number of liferafts	.....	.....
5.2.2 Number of persons accommodated by	.....	.....
them	.....	.....
6 Buoyant apparatus	.....	.....
6.1 Number of apparatus	.....	.....
6.2 Number of person capable of being supported	.....	.....
7 Number of lifebuoys	.....	.....
8 Number of lifejackets	.....	.....
9 Immersion suits	.....	.....
9.1 Total number	.....	.....
9.2 Number of suits complying with the	.....	.....
requirements of lifejackets	.....	.....
10. Number of thermal protective aids[10]	.....	.....
11. Radio installation used in life-saving appliances	.....	.....
11.1 Number if radars transponders	.....	.....
11.2 Number of two - way VHF radiotelephone	.....	.....
apparatus	.....	.....

3. **Details of radio facilities**

Items	Actual provision
1. Primary system	…….
1.1 VHF radio installation	…….
1.1.1 DSC Encoder	…….
1.1.2 DSC watch receiver	……
1.1.3 Radiotelehony	……
1.2 MF radio installation	……
1.2.1 DSC encoder	……..
1.2.2 DSC Watch receiver	……
1.2.3 Radiotelephony	……..
1.3 MF/HF radio installation	…….
1.3.1 DSC radio installation	……..
1.3.2 DSC watch receiver	……..
1.3.3 Radiotelephony	……
1.3.4 Direct- printing radio telephony	……..
1.4 INMARSAT ship earth station	……..
	……..
2. Secondary means of alerting	…….
	……..
3. Facilities of reception of maritime safety information	……..
3.1 NAVTEX receiver	……..
3.2 EGC receiver	……..
3.3 HF direct-printing radio telephony receiver	…….
	……..
4 Satellite EPIRB	……..
4.1 COSPAC-SARSAT	……
4.2 INMARSAT	…….
5 VHF EPIRB	……
6 Ships radio transponder	……

4. **Methods used to ensure availability of radio facilities (regulations IV/15.6 and 15.7)**

4.1 Duplication of equipment……

4.2 Shore-based maintenance……

4.3 At-sea maintenance capability……

5. **Details of navigation systems and equipment**

Items	Actual Provision
1.1 Standard magnetic compass[11]	.....
1.2 Spare magnetic compass[41]	.....
1.3 Gyro-compass[41]	.....
1.4 Gyro-compass heading repeater[41]	.....
1.5 Gyro-compass bearing repeater[41]	.....
1.6 Heading or track control system[41]	.....
1.7 Pelorus or compass bearing device[41]	.....
1.8 Means of correcting heading and bearing	.....
1.9 Transmitting heading device (THD)[41]	.....
2.1 Nautical charts / Electronic Charts display and information system (ECDIS)[12]	....
2.2 Back-up arrangement for ECDIS	.....
2.3 Nautical publication	.....
2.4 Back-up arrangement for electronic nautical publication	....
3.1 Receiver for a global navigation satellite system/terrestrial radio navigation system[41,42]	....
3.2 9 GHz radar[441]	.....
3.3 Second Radar (3 GHz /9 GHz[42])[41]	.....
3.4 Automatic radar plotting aid (ARPA)[41]	.....
3.5 Automatic tracking aid[41]	.....
3.6 Second automatic tracking aid[41]	.....
3.7 Electronic plotting aid[41]	.....
4 Automatic identification system (AIS)	....
5. Voyage date reorder (VDR)	....
6.1 Speed and distance measuring device (through the water)[41]	.....
6.2 Speed and distance measuring device (over the ground and athwartship direction)[41]	....
7. Echo-sounding device[41]	.....
8. Rudder, propeller, thrust, pitch and operational mode indicator[41]	....
8.2 Rate-of-turn indictor[41]	.....
9 Sound reception system[41]	....
10. Telephone to emergency steering position[41]	.....
11. Daylight signaling lamp[41]	....
12. Radar reflector[41]	.....
13. International code of signals	.....
14. IAMSAR Manual, Volume III	

THIS IS TO CERTIFY that the Record is correct in all respects

Issued at……
(Place of issue of the Record)

…… ……..
(Date of issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

FORM SUR 19

Form of Nuclear Cargo Ship Safety Certificate

NUCLEAR CARGO SHIP SAFETY CERTIFICATE

This Certificate shall be supplemented by a Record of Equipment (Form CNUC)

(FIJI Seal)

Issued under the provisions of the INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, as modified by the Protocol of 1988 relating thereto

Under the authority of the Government of FIJI

By

_____
(Signature of Chief Executive Officer MSAF or authorised person)

Particulars of ship[44]

Name of ship……

Distinctive number or letters……

Port of registry……

Gross tonnage……

Deadweight of ship (tons)[45] ……

---

[44] *Alternatively, the particulars of the ship may be placed horizontally in boxes.*

[45] *For oil tankers, chemical tankers and gas carriers only.*

Length of ship (regulation III/3.12)

Sea areas in which ship is certified to operate (regulation IV/2)……..

IMO Number……..

Type of Ship[46]

Bulk carrier

Oil tanker

Chemical tanker

Gas carrier

Cargo ship other than any of the above

Date on which keel was laid or ship was at a similar stage of construction or, where applicable, date on which work for a conversion or an alteration or modification of a major character was commenced……

THIS IS TO CERTIFY:

1. That the ship has been surveyed in accordance with the requirements of regulation VIII/9 of the Convention.

2. That the ship, being a nuclear ship, complied with all the requirements of chapter VIII of the Convention and conformed to the Safety Assessment approved for the ship; and that:

2.1 the condition of the structure, machinery and equipment as defined in regulation I/10 (as applicable to comply with regulation VIII/9), including the nuclear propulsion plant and the collision protective structure, was satisfactory and the ship complied with the relevant requirements of chapter II-1 and chapter II-2 of the Convention (other than those relating to fire safety systems and appliances and fire control plans);

2.2 the ship complied with the requirements of the Convention as regards fire safety sytems and appliances and fire control plans;

2.3 the life- saving appliances and the equipment of the lifeboats, liferafts and rescue boats were provided in accordance with the requirements of the Convention;

2.4 the ship was provided with a line- throwing appliance and radio installations used in life- saving appliances in accordance with the requirements of the Convention;

2.5 the ship complied with the requirements of the Convention as regards radio installation;

2.6 the functioning of the radio installation used in life saving appliances complied with the requirements of the Convention;

---

[46] *Delete as appropriate*

2.7 the ship complied with the requirements of the Convention as regards ship borne navigational equipments means of embarkation for pilots and nautical publications;

2.8 the ship was provided with lights, shapes, means of making sound signals and distress signals, in accordance with the requirements of the convention and the International Regulations for Preventing Collision at Sea in force;

2.9 in all other respects the ship complied with the relevant requirements of the regulations, so far as these requirements apply thereto;

2.10 the ship was/ was not[46] subjected to an alternative design and arrangements in pursuance of regulation II-2/17 of the Convention;

2.11 a Document of approval of alternative design and arrangements for fire safety is/ is not[47] appended to this Certificate.

This certificate is valid until……..

Completion date of the survey on which this certificate is based:……..(dd/mm/yy)

Issued at……..

(Place of issue of certificate)

..... ……

(Date of issue) (Signature of Chief Executive Officer MSAF or authorised person)

(MSAF seal or authorised organisation seal)

[47] *Delete as appropriate*

RECORD OF EQUIPMENT FOR THE NUCLEAR CARGO SHIP SAFETY CERTIFICATE
FORM (CNUC)

This Record shall be permanently attached to the
Nuclear Cargo Sip Safety Certificate

RECORD OF EQUIPMENT FOR COMPLIANCE WITH THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS MODIFIED BY THE PROTOCOL OF 1988 RELATING THERETO

1. **Particulars of ship**

Name of ship……

Distinctive number or letters……..

Minimum number of persons with required qualifications to operate the radio installations……

2. **Details of life-saving appliances**

1. Total number of persons for which lilfe saving appliances are provided	…….	
	Port Side	Starboard side
2. Total number of life boats	……	……..
2.1 Total number of persons accommodated by them	……	…….
2.2 Number of totally enclosed life boat (regulation 111/21 and LSA code, paragraph 4.6)	……	…….
2.3Number of self-righting partially enclosed lifeboats (regulation III/31 and LSA Code, paragraph 4.8)	……	……..
2.4 Number of fire protected lifeboats (regulation III/31	……..	……
2.5 Other lifeboats	……..	……
2.5.1 Number	……	……
2.5.2 Type	…….	……

2.6 Number of freefall lifeboats	
2.6.1 Totally enclosed (regulation III/31 and LSA Code, paragraph 4.7)	.....
2.6.2 Self-contained (regulation III/31 and LSA Code, paragraph 4.8)	.....
2.6.3 Fire protected (regulation III/31 and LSA Code, paragraph 4.9)	.....
3. Number of motor lifeboats included in the total lifeboats shown above	.....
3.1 Number of lifeboats fitted with searchlights	.....
4. Number of rescue boats	.....
4.1 Number of boats which are included in the total lifeboats shown above	.....
5. Liferafts	.....
5.1 Those for which approved launching appliances are required	.....
5.1.1 Number of liferafts	.....
5.1.2 Number of persons accommodated by them	.....
5.2 Those for which approved launching appliances are not required	.....
5.2.1 Number of liferafts	.....
5.2.2 Number of persons accommodated by them	.....
5.3 Number of liferafts required by regulation III/31.1.4	.....
6. Number of lifebouys	.....
7. Number of lifejackets	.....
8. Immersion suits	.....
8.1 Total number	.....
8.2 Number of suits complying with the requirements for lifejackets	.....
9. Number of thermal protective aids[13]	.....
10. Radio installations used in life- saving appliances	.....
10.1 Number of radio transponders	.....
10.2 Number of two- way VHF radio telephone apparatus	.....

3. **Details of radio facilities**

Items	Actual provision
1. Primary system	…….
1.1 VHF radio installation	…….
1.1.1 DSC Encoder	…….
1.1.2 DSC watch receiver	……
1.1.3 Radiotelephony	……
1.2 MF radio installation	……
1.2.1 DSC encoder	……..
1.2.2 DSC Watch receiver	……
1.2.3 Radiotelephony	……..
1.3 MF/HF radio installation	…….
1.3.1 DSC radio installation	……..
1.3.2 DSC watch receiver	……..
1.3.3 Radiotelephony	……
1.3.4 Direct- printing radio telephony	……..
1.4 INMARSAT ship earth station	……..
	……..
2. Secondary means of alerting	…….
	……..
3. Facilities of reception of maritime safety information	……..
3.1 NAVTEX receiver	……..
3.2 EGC receiver	……..
3.3 HF direct-printing radio telephony receiver	…….
	……..
4 Satellite EPIRB	……..
4.1 COSPAC-SARSAT	……
4.2 INMARSAT	……..
5 VHF EPIRB	…….
6 Ships radio transponder	…….

4. **Methods used to ensure availability of radio facilities** (regulation IV/15.6 and 15.7)

4.1 Duplication of equipment…….....

4.2 Shore based maintenance…….....

4.3 At-sea maintenance capability…….....

5. Details of navigation systems and equipments

Items	Actual Provision
1.1 Standard magnetic compass[14]	.....
1.2 Spare magnetic compass[48]	.....
1.3 Gyro-compass[48]	.....
1.4 Gyro-compass heading repeater[48]	.....
1.5 Gyro-compass bearing repeater[48]	.....
1.6 Heading or track control system[48]	.....
1.7 Pelorus or compass bearing device[48]	.....
1.8 Means of correcting heading and bearing	.....
1.9 Transmitting heading device (THD)[48]	.....
2.1 Nautical charts / Electronic Charts display and information system (ECDIS)[15]	.....
2.2 Back-up arrangement for ECDIS	.....
2.3 Nautical publication	.....
2.4 Back-up arrangement for electronic nautical publication	.....
3.1 Receiver for a global navigation satellite system/terrestrial radio navigation system[48,49]	.....
3.2 9 GHz radar[48]	.....
3.3 Second Radar (3 GHz /9 GHz[49])[48]	.....
3.4 Automatic radar plotting aid (ARPA)[48]	.....
3.5 Automatic tracking aid[48]	.....
3.6 Second automatic tracking aid[48]	.....
3.7 Electronic plotting aid[48]	.....
4. Automatic identification system (AIS)	.....
5.1 Voyage data recorder (VDR)[47]	.....
5.2 Simplified voyage data recorder (S-VDR)[49]	.....
6.1 Speed and distance measuring device (through the water)[48]	.....
6.2 Speed and distance measuring device (over the ground and athwart ship direction)[48]	.....
6.3 Echo-sounding device[48]	.....
7.1 Rudder, propeller, thrust, pitch and operational mode indicator[48]	.....
7.2 Rate-of-turn indictor[48]	.....
8 Sound reception system[48]	.....
9. Telephone to emergency steering position[48]	.....
10. Daylight signaling lamp[48]	.....
11. Radar reflector[48]	.....
12. International code of signals	.....
13. IAMSAR Manual, Volume III	.....

THIS IS TO CERTIFY that this Record is correct in all respects

Issued at……..
(Place of issue of the Record)

…… ……..
(Date of issue) (Signature of Chief Executive Officer MSAF
or authorised person)

(MSAF seal or authorised organisation seal)

PARAGRAPH 15

EMERGENCY PROCEDURES AND SAFETY OF NAVIGATION

Contents

Part 1—Preliminary

Emergency Procedures and Safety of Navigation Paragraph

15.1 Preliminary

15.1.1 This paragraph shall be read in conjunction with the Introduction and General Requirements paragraph.

15.1.2 For the purposes of this paragraph "crew" means ships personnel assigned specific duties in relations to drills and exercise on board ships.

15.1.3 The Chief Executive Officer may require that a notice required under this paragraph shall be printed in other languages, in addition to the English language.

Part 2—Emergency Procedures

152 Application

15.2.1 This Part shall apply to all ships of more than 15 metres in length other than SOLAS Ships which shall comply with the SOLAS Convention.

15.2.2 Where the Master is the only crew member, he shall not be subject to the requirements of Schedules I to IV for the crew provided that he shall ensure that the lifesaving, firefighting and other emergency equipment is in working order and ready for immediate use at all times.

153. Allocation of Crew and Passengers to Emergency Stations

15.3.1 The Master of a ship shall ensure that each crew member on joining the ship, is allocated an emergency station and is properly informed of emergency station duties as prescribed in the ships muster list.

153.2 The muster list and emergency instruction shall be displayed in a conspicuous position including the navigation bridge, engine-room and crew accommodation space so as to be readily observed by all persons on the ships.

15.3.3 Instructions in the English language or other language required by the Chief Executive Officer shall be posted in the passenger cabins and be conspicuously displayed at muster station and other passenger space to inform passenger of:

(a) Their muster station;

(b) The essential actions they shall take in an emergency; and

(c) The method of donning lifejackets.

15.3.4 The Emergency Station List shall be in accordance with Form 1in Appendix A of this paragraph.

15.3.5 Each cabin allocated for crew or passengers shall be given a number and where there is more than one berth in a cabin, each berth shall be given a letter.

15.3.6 Crew member identification on the Emergency Station List shall be by name, or designated capacity or in the case of berthed crew, the cabin number for single accommodation and the cabin number with berth letter as a suffix for multi-berth accommodation.

15.3.7 Where in the allocation of duties the Chief Executive Officer requires the person nominated to take charge of survival craft to possess an appropriate certificate. This fact shall be stated on the Emergency Station List.

15.4. Ships Officers Emergency Station Notice

Ships Officers cabin or berth shall have affixed to the head or side of the berth a notice with the following information:

(a) Cabin number and berth letters as applicable;

(b) Emergency Station and emergency duty to be performed;

(c) Emergency Station Signal; and

(d) Abandon ship signal.

15.5. Crew Emergency Exercise Procedures

Crew Emergency Exercise Procedures shall be conducted in accordance with the procedures specified in Schedule I at intervals of not more than two weeks.

15.6. Emergency Procedures for Passengers

15.6.1 After completion of embarkation at any port or place and prior to departure from that port or place the Master of a sea going ship shall ensure that passengers are informed of the location and the purpose of Emergency Procedures Notices applicable to passengers.

15.6.2 Passenger Emergency Procedures Notice shall be located in conspicuous places throughout the passenger spaces as required by the Chief Executive Officer.

15.6.3 Sufficient conspicuous signs shall be displayed indicating the direction to and position of Emergency Stations.

15.6.4 Passenger Emergency Procedures Notices, in the case of berthed passengers, shall be placed adjacent to the berth of each passenger.

15.6.5 Passenger Emergency Procedures Notices shall include the following information:

(a) Cabin number and berth letter where applicable;

(b) Emergency Signal;

(c) Action to take on hearing, emergency signal when in or near own cabin;

(d) Action to take when not in or near own cabin;

(e) Location of lifejackets;

(f) Location of Emergency Station;

(g) Survival Craft allocation; and

(h) Abandon Ship Signal.

15.6.6 Notices showing how to don and secure lifejackets shall be displayed in every passenger cabin and in conspicuous places throughout the passenger spaces and these notices shall include information on how to adjust the lifejackets of children.

15.6.7 Demonstrations shall be given on the donning and securing of lifejackets and emergency procedures for passengers of a ship prior to the ship leaving for a voyage.

15.7. Survival Craft Drills

15.7.1 The Master of the ship shall ensure that each passenger and crew member is allocated a survival craft where applicable.

15.7.2 A survival craft list shall be in accordance with Appendix B approved by the Chief Executive Officer, or may form additional columns to Appendix A as approved by the Chief Executive Officer.

15.7.3 Passengers should remain at their emergency stations during a survival craft drill, but may be dismissed at the discretion of the Master.

15.7.4 Ships which are provided with a lifeboat shall conduct lifeboat drill in accordance with the procedure specified in Schedule II at intervals of not more than 3 months.

15.7.5 Lifeboat drill shall be arranged so that each lifeboat carried on the ship is placed in the water and test run lifeboat engines with its crew at least once in each period of 6 consecutive months.

15.7.6 The Master of a ship which does not carry a lifeboat or approved boat, but which is provided with a rescue boat, should exercise his crew with that boat as though it were a lifeboat, except that the crew for the boat should not exceed that which is normally used in rescue operations.

15.7.7 The Master of a ship which carries a liferaft shall at intervals of not more than 3 months ensure that the liferaft or liferafts carried are ready for launching and that the crew are familiar with the procedure for launching the liferaft or liferafts and their subsequent operation.

15.8. Crew Fire Drills

15. 8 . 1 The Master of a ship shall ensure that crew members are allocated special fire duties.

15.8.1.1 The crew members assigned crew fire duties may have those duties recorded on a crew fire duty list or at the discretion of the Chief Executive Officer included with the Emergency Station List.

15.8 . 2 Ships shall conduct crew fire drill in accordance with the procedure specified in Schedule III at intervals of not more than two weeks.

15.9. Crew Collision Drills

15.9 . 1 The Master of a ship shall ensure that crew members are allocated special collision duties.

15.9.1.1 The crew members, assigned crew collision duties may have those duties recorded on a crew collision duty list or at the discretion of the Chief Executive Officer included with the Emergency Station List.

15.9. 2 Ships shall conduct crew collision drill in accordance with the procedure specified in Schedule IV at intervals of not more than two weeks.

15.10. **Rocket Drill**

Rocket drill for ships having a length of 50 metres and over at intervals of not more than two weeks to ensure all crew are familiar with the handling of the line throwing appliance, rockets and flares.

15.11. **Emergency Signals**

15.11.1 The general signal to call the crew and passengers to their emergency stations is a signal consisting of a succession of not less than seven short blasts followed by one long blast given on the ship's whistle or siren. The signal may be supplemented by an identical signal on the ship's general alarm bell system, and supplemented by warnings given on the ship's public address system.

15.11.2 When the crew are to carry out a drill, the general emergency signal should be used to call the crew to their emergency stations. Then the Master shall, by messenger, public address system or other method at his disposal direct the crew to carry out a specific drill.

15.11.3 The signal to inform the crew and passengers that the ship will be abandoned is the order "ABANDON SHIP" given verbally by the Master.

15.11.4 Where possible the Master shall ensure that all crew members working in the engine room or other parts of the ship distant from the survival craft are warned that the ship is to be abandoned. Such warning shall be given in sufficient time to allow them to reach the survival craft.

15.11.4.1 Where possible the Master shall ensure that the engine room controls are placed on "Finished with Engines" before giving the signal to abandon ship. In the case of bridge control engines he should stop the engines.

15.11.5 Where, for the purpose of drills, in the opinion of the Master, the blowing of the whistle, or siren of the ship would constitute a nuisance outside the ship, the general emergency signal may be made on the ship's alarm bell system, ship's public address system or by hand blown whistles.

15.11.6 In the event when a ship is actually sinking as a result of an incident or accident such as collision and grounding, the master who is in overall command of a ship, shall give the abandon ship signal. The master shall ensure that all passengers and crew of the ship have safety abandoned the ship and shall be the last person abandoning the ship.

15.12 Crew List

15.12.1 (i) on board the ship; and

(ii) at a place required by the Chief Executive Officer and shall contain the following particulars;

(a) the name of the ship and official number;
(b) the name of the owner and his address;
(c) the name of the employer of the crew and his address; and
(d) in respect of every employee from time to time in the ship whether or not he is employed under a crew agreement.

15.12.2 If a new crew list is made or any change made in an existing crew list, the employer or his agent shall immediately deliver to the chief Executive Officer or the proper officer the list of the changes made.

15.12.3 The Master, shall immediately after a crew list ceases to apply to a ship, deliver such list to the proper officer.

15.12.4 Any person who fails to comply with sub-paragraph 15.12.3 commits an infringement offence and is liable to a fine not exceeding $2000.

15.12.5 A Master shall on demand produce to the proper officer the list of crew which is required to be kept on board the ship.

15.12.6 Any person who fails to comply with sub-paragraph 15.12.5 commits an infringement offence and is liable to a fine not exceeding $2000.

15.13 List of All Persons onboard

15.13. 1 For all class of ships a list of all persons on board shall be kept ashore with owners/operators or agents so that it will be readily available to the proper officer in the case of an emergency. Such list shall contain:

(a) the name and/or identification number of the ship; and

(b) the name and address of each person on board the ship.

15.13.2 Any person who fails to comply with sub-paragraph 15.13.1 commits an infringement offence and is liable to a fine not exceeding $2000.

APPENDIX A

Form 1

MARITIME SAFETY AUTHORITY EMERGENCY STATION LIST

Name of ship: _____

Crew Member Identification	Emergency Station	Emergency Duty Allocation

_____

Date / / Master

APPENDIX B

Form 2

MARITIME SAFETY AUTHORITY OF FIJI
SURVIVAL CRAFT LIST

Name of Ship:_____

Crew	Survival Craft Station		Survival Craft Duty	
Identification	Lifeboat	Liferaft	Lifeboat	Liferaft

Schedule I

CREW
EMERGENCY EXERCISE
PROCEDURES

1. On hearing the general emergency alarm, or an equivalent order, the crew members except personnel on duty who, in the opinion of the Master, cannot be relieved from those duties shall proceed to their emergency station and report to the person in charge. Where possible the operation of non-essential electrical, heating and ventilation appliances should be stopped.

2. Every crew member shall wear a lifejacket.

3. The crew member in charge at the emergency station shall ensure that every person is wearing a lifejacket properly adjusted and secured.

4. After reporting to the emergency station, each crew member who has been assigned an emergency duty shall attend to such duty when so directed and then report back to his emergency station. Crew members not assigned specific emergency duties shall remain at their emergency station.

4.1 Crew members assigned to take charge of a survival or a group of survival craft shall ensure that they are ready to be launched.

4.1.1 Crew members assigned to assist with the preparation of survival craft shall report to the person in charge of the survival craft and comply with any orders given by that person.

4.2 Crew members assigned to firefighting duties shall prepare that equipment for use.

4.2.1 Fixed firefighting systems shall be operated by a person delegated by the master as specified in the muster list and is only activated at the command of the master or in his absence the Chief Officer or the Chief Engineer.

4.3 Crew members assigned to close hull openings, internal watertight doors, fire doors, fire dampers, ventilation cowling and scoops shall ensure that ventilation fan is stopped and shall carry out that duty.

4.4 Crew members assigned to passenger control shall simulate assisting and directing passengers to their emergency station(s) and maintain order in passages and on stairways.

Schedule 2

SURVIVAL CRAFT DRILLS

1. At least half the total number of lifeboats carried shall, weather permitting:

   (i) be lowered or placed at the embarkation position;

   (ii) have the painters passed and made fast;

   (iii) have the rudders fitted, plugs fitted or valves closed;

   (iv) have the engine or mechanical propulsion system operated; and

   (v) have the stores and equipment checked.

2. To comply with sub-paragraph 15.7.6 of this paragraph, a lifeboat placed in the water shall be:

   (i) manned with its crew; and

   (ii) exercised at the discretion of the Master.

3. Liferafts and Inflatable Buoyant Apparatus shall be checked to ensure that:

   (i) painters are secured to a strong point on the ship;

   (ii) liferafts are free and clear for launching;

   (iii) liferaft hydrostatic releases (where fitted) operate;

   (iv) liferaft davits (where fitted) operate.

4. Crew to be instructed in search and rescue and survival procedures including the operation of the survival craft and use of the equipment and stores.

5. Side ladders shall be rigged and checked.

6. Rescue boats (these are not survival craft) are swung out, lowered into the water and crew exercised at the discretion of the Master in accordance with sub-paragraph 15.7.7 of this paragraph.

Schedule 3

CREW FIRE DRILL

A fire drill shall be conducted as follows:

(a) A crew member appointed for that purpose by the Master shall direct a simulated attack on a fire which for the purpose of the drill, shall be assumed to have occurred in a selected part of the ship, this selected part should be varied from drill to drill.

(b) On receipt of the fire warning the fire pumps shall be prepared.

(c) The members of the crew forming the fire party shall be sent to the location of the assumed fire.

(d) The fire party shall be exercised in firefighting in the vicinity of the assumed fire by:

(i) suitable fire extinguishers being brought to the vicinity of the assumed fire; and

(ii) on a ship having a fire hydrant using at least one fire hose supplied with water at working pressure from a fire pump.

(e) Not less than once in each period of three consecutive months, a practical demonstration of the use of the portable fire extinguishers shall be given by expending the charge of at least one extinguisher of each type aboard which can be refilled aboard.

(f) The Crew shall be exercised in:

(i) the closing of doors, ventilating shafts and other openings so as to isolate the assumed fire from other parts of the ship, and in particular stairways and lift shafts, and to reduce the supply of air to the assumed fire;

(ii) the use of breathing apparatus and safety lamps; and

(iii) any other emergency procedures considered necessary to combat the assumed fire.

(g) The crew shall be instructed in the use of all firefighting appliances provided in the ship.

(h) The crew shall be instructed in the use of any fixed fighting installations provided on the ship.

Schedule 4

CREW COLLISION DRILL

Collision drill shall be conducted as follows:

(a) Bulkhead doors in the various paragraphs of the ship shall be closed immediately by members of the crew allotted to that duty.

(b) A messenger from each party that has been allotted to a paragraph of the ship shall report to the Master, or to the officer appointed for that purpose by the Master, when all bulkhead doors in that paragraph are closed.

(c) Doors other than those in the shell, which were already closed at the commencement of the drill, shall be opened and then closed.

(d) Nothing in the last preceding paragraph shall be taken to authorise the opening while the ship is at sea of any watertight door or other device which is required by the Chief Executive Officer to be kept closed.

(e) An officer appointed by the Master to be the officer in charge of the drill shall indicate a paragraph of the ship where the emergency is assumed to have occurred for the purposes of the drill.

(f) Members of the crew allotted to sounding duty shall immediately sound tanks and bilges in the paragraph of the ship indicated for the purposes of the drill.

(g) A messenger from the sounding party shall communicate with, as required:

(i) the officer in charge of the drill; and

(ii) the Chief Engineer

(h) As many pumps as are available and operated from the engine room shall be connected to the paragraph of the ship indicated for the purposes of the drill.

(i) A report shall be made to the bridge by messenger or other means when the pumps are ready for action.

(j) *S*hip's side doors, side scuttles, valves and similar devices shall be closed as directed.

(k) A report shall be made to the bridge by messenger or other means when the side doors, side scuttles, valves and similar devices have been closed.

(l) The stability of the ship shall be estimated assuming the damaged condition, including an assessment of the necessary corrective action to maintain an adequate positive stability condition.

Part 3—Safety of Navigation

15.14. Application

This Part shall apply to all ships.

15.15 Automatic Pilot

15.15.1 An automatic pilot shall not be used in areas of high traffic density, in conditions of restricted visibility and in other hazardous navigational situations unless it is possible to establish human control of the ship's steering immediately.

15.15.2 In the circumstances set out in sub-paragraph 15.15.1, it shall be possible for the officer of the watch to have available without delay the services of a qualified helmsman who shall be ready at all times to take over steering control.

15.15.3 The change over from automatic to manual steering and vice versa shall be made by or under the supervision of a responsible officer.

15.15.4 In ships which have an automatic pilot fitted, the manual steering shall be tested after prolonged use of the automatic pilot, and before entering areas where navigation demands special caution.

15.16 Operation of Steering Gear

In areas where navigation demands special caution, ships so fitted shall have more than one steering gear power unit in operation when such units are capable of simultaneous operation.

15.17 Steering gear system checks and test

15. 17 . 1 At least 1 hour before departure, the ship's steering gear shall be checked by the ship's crew. The test procedure shall include, where applicable, the operation of the following:

(i) the main steering gear;

(ii) the auxiliary steering gear;

(iii) the remote steering gear control systems;

(iv) the steering positions located on the navigating bridge;

(v) the emergency power supply;

(vi) the rudder angle indicators in relation to the actual position of the rudder;

(vii) the remote steering gear control system power failure alarm; and

(viii) the steering gear power unit failure alarms.

15.17. 2 The checks and tests shall include:

(i) the full movement of the rudder according to the required capabilities of the steering gear;

(ii) a visual inspection of the steering gear and its connecting linkage; and

(iii) the operation of the means of communication between the navigating bridge and steering gear compartment.

15.17.3 Simple operating instructions with a block diagram showing the changeover procedures for remote steering gear control systems and steering gear power units shall be permanently displayed on the navigating bridge and in the steering gear compartment.

15.17.4 All officers concerned with the operation and/or maintenance of steering gear shall be familiar with the operation of the steering systems fitted on the ship and with the procedures for changing from one system to another.

15.18 Emergency steering gear drill

15.18.1 In addition to the routine checks and tests required by sub- paragraph 15.17.1 and 15.18.2 emergency steering drills shall take place at least once every (3) three months in order to operate the emergency steering gear and practice its procedures. These drills shall include direct control from within that steering gear compartment, the communications procedure with the navigating bridge and, where applicable, the operation of alternative power supplies.

15.18.2 The date upon which the checks and tests prescribed in sub-paragraphs 15.17.1 and 15.17.2 are carried out and the date and details of emergency steering drills carried out under sub-paragraph 15.18.1 shall be recorded in the log book or ship record book or in such manner as may be required by the Chief Executive Officer.

15.19. Danger Messages

15.19.1 The Master of every ship which meets with dangerous ice, a dangerous derelict or wreck, missing aids to navigation, or any other direct danger to navigation, or a tropical storm, or encounters sub-freezing air temperatures associated with gale force winds causing severe ice accretion on superstructures, or winds of force 10 or above on the Beaufort scale for which no storm warning has been received shall communicate the information by all the means at his disposal to ships in the vicinity, to the Authority and other relevant Authorities at the first point on the coast with which he can communicate. The form in which the information is sent is not obligatory. It may be transmitted either in plain language (preferably English) or by means of the International Code of Signals. It should be broadcast to all ships in

the vicinity and sent to the first point of contact on the coast to which communication can be made, with a request that it be transmitted to the Authority.

15.19.2 The Authority will take all steps necessary to ensure that when intelligence of any of the dangers specified in sub-paragraph 15.19.1 is received, it will be promptly brought to the knowledge of those concerned.

15.19. 3 All radio messages issued under sub-paragraph 15.19.1 shall be preceded by the Safety Signal, using the procedure as prescribed by the Maritime (Radio) Regulations and paragraph 12 of this schedule.

15.20. Information Required in Messages

The following information is required in danger messages:

(a) Ice, Derelicts and other direct dangers to Navigation:

(i) the kind of ice, derelict or danger observed;

(ii) the position of the ice, derelict or danger when last observed; and

(iii) the time and date when danger last observed.

(b) Tropical Storms:

(i) a statement that a tropical storm has been encountered. This obligation should be interpreted in a broad spirit, and information transmitted whenever the Master has good reason to believe that a tropical storm is developing or exists in his neighborhood;

(ii) time, date and position of ship when the observation was taken; and

(iii) as much of the following information as is practicable should be included in the massage:

— barometric pressure preferably corrected (stating millibars, millimetres or inches, and whether corrected or uncorrected);

— barometric tendency (the change in barometric pressure during the past three hours);

— true wind direction;

— wind force (Beaufort scale);

— state of the sea (smooth, moderate, rough, high);

— swell (slight, moderate, heavy) and the true direction from which it comes.

— period or length of swell (short, average, long) would also be value; and

— true course and speed of ship.

(c) Subsequent Observations.

When a Master has reported a storm, it is desirable, but not obligatory, that further observations be made and transmitted hourly, if practicable, but in any case at intervals of not more than three hours, so long as the ship remains under the influence of the storm.

(d) Winds of force 10 or above on the Beaufort scale for which no storm warning has been received.

This is intended to deal with storms other than the tropical storms referred to in paragraph *(b)*: when such a storm is encountered, the message should contain similar information to that listed under that paragraph but excluding the details concerning sea and swell;

(e) Sub-freezing air temperatures associated with gale force winds causing severe ice accretion on superstructures:

(i) Time and date;

(ii) Air temperature;

(iii) Sea temperature (if practicable); and

(iv) Wind force and direction.

15.21. Meteorological Services

Any ships in transmitting or receiving transmissions "to all stations" of Meteorological Forecasts and warnings shall conform to the Provisions of the Maritime (Radio) Regulations, and paragraph 12 of this schedule.

15.22 Speed Near Ice

When ice is reported on or near his course the Master of every ship at night, is bound to proceed at a moderate speed or alter his course so as to go well clear of the danger zone.

15.23 Routing

The practice of following, particularly in converging areas, routes adopted for the purpose of separation of traffic including avoidance of passage through areas designated as areas to be avoided during unsafe conditions, is to be followed by all ships concerned.

15.24. Distress-Messages-Obligations and Procedures

15.24.1 The Master of a ship at sea, on receiving a signal from any source that a ship or aircraft or survival craft thereof is in distress, shall proceed with all speed to the assistance of the persons in distress informing them if possible of what he is doing. If he or she is unable to, or in the special circumstances of the case, considers it unreasonable or unnecessary to proceed to their assistance, he shall enter in the log book or ship record book the reason for failing to proceed to the assistance of the persons in distress.

15.24.2 The Master of a ship in distress, after consultation so far as may be possible, with the Masters of the ships which answer his call for assistance, has the right to requisition such one or more of those ships as he considers best able to render assistance, and it shall be the duty of the Master or Masters of the ship or ships requisitioned to comply with the requisition by continuing to proceed with all speed to the assistance of person in distress.

15.24.3 The Master of a ship shall be released from the obligation imposed by sub-paragraph 15.24.1 if his ship has been requisitioned, from the obligation imposed by sub-paragraph 15.24.2 if he is informed by the persons in distress or by the Master of another ship which has reached such person that assistance is no longer necessary.

15.24.4 The provisions of this paragraph do not prejudice the International Convention for the unification of certain rules with regard to Assistance and Salvage at Sea, signed at Brussels on 23 September 1910 particularly the obligation to render assistance imposed by Article 2 of that Convention.

15.25 Radar Reflector

The owner and master of a ship shall ensure that a radar reflector or other means to enable detection by ships navigating by radar at both 3 and 9 GHz is fitted on the craft which will allow ships navigating by radar to detect the ship in the area.

15.26 Lifesaving Signals

15.26.1 The owner or master of a ship shall ensure that a life-saving signals table as described in the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual Volume III, Mobile Facility, and illustrated in the International Code of Signals, as amended is carried on-board the ship.

15.26.2 Such lifesaving signals shall be used by ships or a person in distress when communicating with the ships and aircraft within the area.

15.27 Voyage Planning

15.27.1 Prior to proceeding to sea, the master of a ship shall ensure that the intended voyage has been planned using relevant nautical charts and a nautical almanac.

15.27.2 The voyage plan shall include but is not limited to the following factors—

(a) normal shipping routes and ships traffic within the area;

(b) sufficient sea room for the safe passage of the ship throughout the voyage;

(c) all known navigational hazards;

(d) adverse weather conditions;

(e) marine environmental protection requirements that apply, and avoids, as far as possible, actions and activities which could cause damage to the marine environment;

(f) sufficient food and water provisions for the voyage for all persons on board the ship; and

(g) sufficient fuel for the voyage.

15.28 Offences

15.28.1 The master of the ship shall not fail to comply with an obligation or duty imposed upon him by virtue of Part 3—Safety of Navigation of this paragraph.

15.28.2 Any person who fails to comply with this Part commits an offence and is liable upon conviction to a fine not exceeding $2000 or 3 months imprisonment or both.

PARAGRAPH 16

Ship's Bunkering Operation Requirements

16.1 The owner or master of a ship of more than 15 meters in registered length prior to a bunkering operation shall ensure the following is complied with–

(a) The Port Authority or Port operator and the Authority is informed of the bunker operation which should include information:

i. Time period of bunker including start and stop time;

ii. Grade of fuel being bunkered.

(b) All relevant safety signs is posted on the ship or in the vicinity of the bunker operation which should include;

i. No smoking warning signs;

ii. Bunker in operation signs;

iii. For night bunkering operation red lights to be lit.

(c) Oil spill equipment (Oil spill dispersant, oil absorbent materials and sand bags) and fire extinguishers Foam and Dry powder) to be made ready at the ship's bunker stations;

(d) All scuppers to be plugged;

(e) A bunkering operation procedure and bunkering line plan to be posted at the ship's bunker station;

(f) Area of bunkering to be restricted and cordoned off;

(g) No cargo loading or discharge or passenger embarkation or disembarkation is allowed during any bunkering operation.

16.2 The owner or master of a ship of more than 15 meters in registered length during a bunkering operation shall ensure the following is complied with—

(a) cargo operation and passenger embarkation should not be conducted;

(b) continuous monitoring of the bunkering operation by ship's personnel and fuel bunkering tanker or fuelling barge personnel;

(c) Communication should be maintained between ship's personnel and fuelling barge or tanker;

(d) Bunkering rate should be monitored and regular sounding of tanks on ships that are bunkered;

(e) Any spill or leakage of fuel should be contained;

(f) Bunker sample is taken and kept on board the ship for a period of one year.

16.3 The owner or master of a ship of more than 15 meters in registered length after a bunkering operation shall ensure the following is complied with:

(a) The oil record book is updated with the bunkering information if applicable or in the record book.

(b) The Port Authority or Port operator and the Authority is informed of the completion of bunker operation.

16.4 Any owner or master of the ship who fails to comply with the sub-regulations 16.1, 16.2 and 16.3 commits an infringement offence and is liable to a fine not exceeding $2000.00.

Price: $30.00 S. NAVUNILAWA, Government Printer, Suva, Fiji – 2014 168/FGGS/14—900
Official Printer Since 1883