



International Workboat Code of Practice

OCTOBER 2026





The Workboat Association is the trade, skills and safety standards association for the workboat industry.

Since its inception in 1994, the association has acted as a crucial point of liaison between its membership and key regulatory and industry bodies, such as the Maritime and Coastguard Agency (MCA). It has also driven the creation of safety, technical and best practice standards, provided a unifying platform for industry lobbying and debate, and delivered industry-recognised training and certification opportunities.

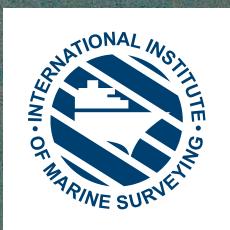
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IMCA (International Marine Contractors Association) supports their members to deliver a new offshore energy mix – safely and sustainably.

For more than 50 years, IMCA has played a key role in bringing the offshore industry together to improve safety. At their core is a Committee structure, and related focal and work groups, with more than 380 volunteers which ensures that all 750+ Members' interests are covered – no matter the expertise or technical focus of their business.

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Executive Summary

The International Workboat Code of Practice (October 2026) is a Good Practice Guide, created in collaboration between the International Marine Contractors Association, the International Institute of Marine Surveying and the Workboat Association. It is intended to establish a comprehensive safety and operational framework and guidance for commercially operated workboats at sea and in regional waters. It covers crewed vessels as well as remotely operated unmanned vessels (ROUVs), while excluding underwater vessels and craft used for sport or pleasure. Its stated objective is to provide a benchmark level of safety and environmental protection appropriate to modern commercial workboat operations globally.

The Code places primary accountability on the vessel owner/operator and Master. Owners/operators are responsible for ensuring vessels are appropriately designed, constructed, maintained, inspected, certified and manned, and for conducting risk assessments that address the intended operation, local conditions, equipment and the vulnerability of asset, environment, public, and persons on board.

The Code places considerable emphasis on people and organisational controls, not only design and construction. It addresses PPE, safe work practices, personnel competency and familiarisation, emergency drills, preparedness and medical provision, training and formal safety-management arrangements. Industrial personnel must meet defined medical, training, familiarisation and PPE expectations before undertaking offshore voyages.

The underpinning principles of the Code are “a risk-based approach, supported by Flag State oversight and adopted by Charterers”.

Disclaimer and Indemnity Statement

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1 Foreword

1.1 Introduction

This **Code** applies to **workboats** that operate either at **sea** or in **regional waters**.

This **Code** applies to such **vessels in commercial use**, other than when in use for recreational, sport or pleasure.

This **Code** applies to **vessels** operated by **crew**, and to **vessels** with no persons on board operated from a **Remote Operation Centre**. Such **vessels** are treated by international law, as a type of cargo vessel and the level of safety and protection for those on board, and/or operating the **vessel** remotely, is considered commensurate with the current expectations of the general public for such **vessels**.

A vessel which does not carry out any of its operations on the water's surface (that is, it operates underwater) is outside of the scope of this Code.

The following organisations participated in the Industry Working Group that reviewed and contributed to the drafting of this Code:

- ♦ The Workboat Association
- ♦ IMCA
- ♦ Orsted
- ♦ Scottish Power
- ♦ DNV.

This Code provides information needed for the fire protection, and provision of firefighting, lifesaving, navigation and radio equipment to ensure the safety and protection of the crew, personnel, passengers and other marine users, and to maintain environmental standards.

Whilst all reasonable measures have been taken to develop standards which will result in the production of safe and seaworthy vessels, total safety at sea can never be guaranteed. Owners/operators of a vessel are encouraged to take out a policy of insurance for all persons who are part of the vessel's complement. It is advised such insurance provide cover against any foreseeable claims that may arise. It is advised that, if a policy of insurance is in force, a copy of the Certificate of Insurance be either displayed or available for inspection by persons on board the vessel.

1.2 Health and Safety Regulations

The **owner** and/or **master** of a **vessel** is responsible for the health and safety of workers and others on the **vessel**. Where a **Remote Operation Centre** is located on board a manned vessel the health and safety of all persons on board is the responsibility of the vessel's **Master**.

On-shore **Remote Operation Centres** shall follow all applicable local HSE Regulations.

Every employer is to be aware of any risks affecting workers and ensure that appropriate measures are taken to minimise them through improving procedures or equipment where necessary. Employers must instruct those affected about the risks and how to ensure their own health and safety and the health and safety of others.

2 Definitions

This section provides the definitions that are used throughout this Code.

- ♦ “‘A’ class” divisions are those divisions formed by bulkheads and decks which comply with the criteria described in **SOLAS** Chapter II-2 Regulation 3;
- ♦ “Accommodation space” means any space, excluding machinery space, which is enclosed on all sides by solid divisions, provided for the use of persons on-board;
- ♦ “Flag state” means the Government of the State whose flag the ship is entitled to fly;
- ♦ “Annual examination” means a general or partial examination of the vessel, its machinery, fittings and equipment, as far as can readily be seen, to ascertain that it had been maintained as required by the Code. The hull, shell fittings, external steering and propulsion components of the vessel shall be examined out of the water at intervals not exceeding 3 years. The Certifying Authority may stipulate a lesser interval in consideration of hull construction material or the age or the type and service of the vessel;
- ♦ “Antarctic area” means the sea area south of latitude 60° S;
- ♦ “Approved” means approved by or acceptable to the Certifying Authority, unless otherwise specified in the Code;
- ♦ “As amended” refers to any other document that replaces, revokes or amends the document that the term “as amended” follows;
- ♦ “Authorised person” means a person who by reason of relevant professional qualifications, practical experience or expertise is authorised by the Certifying Authority chosen by the owner/managing agent to carry out examinations required;
- ♦ “‘B’ class” divisions are those divisions formed by bulkheads, decks, ceilings or linings which comply with the criteria described in SOLAS Chapter II-2 Regulation 3;
- ♦ “Bare-boat charter” means a charter for which the charterer provides the Master and the crew;
- ♦ “Battery box” means a dedicated box of steel or other equivalent material, in which a battery is located;
- ♦ “Battery-electric” means, in the context of this Code, a vessel with a propulsion motor which can be powered by batteries only;
- ♦ “Battery-hybrid” means, in the context of this Code, a vessel with a propulsion system that can be powered by both fuel and batteries;
- ♦ “Battery Management System” or “BMS” means an electronic device which performs the role of maintaining the safe charging and discharging of lithium-ion batteries or lead-acid batteries. A Battery Management System calculates SOC and SOH and communicates this to the Power Management System;
- ♦ “Battery room” means a dedicated room of steel or other equivalent material with A0 fire integrity in which a battery is located;
- ♦ “Blank” means a device or means of sealing skylights, windows and portlights (collectively referred to in this Code as windows) in the event of breakage of the glazing;
- ♦ “Boat fitted with a buoyant collar” means a vessel of similar form to a rigid inflatable boat, where the inflatable tubes are replaced by solid, or hollow, buoyant sections;
- ♦ “Cargo” means all items which are transported by the vessel except: fuel for the vessel, ballast (either solid or liquid), consumables to be used on board, permanent outfit and equipment of the vessel, ships stores for the vessel, crew and their personal baggage, passengers and their personal baggage, industrial personnel and their equipment and personal baggage;

- ♦ “Cell” means a single electrochemical unit in its simplest form, typically packaged in metal cylinders; or flat, rectangular metal or plastic cases (prismatic cells), or heat-sealed foil pouches;
- ♦ “Certificate” means the certificate appropriate to a vessel to which the Code is applied
- ♦ “Certificate of Competency” means a certificate issued and endorsed by the Flag state for masters, officers and GMDSS radio operators in accordance with the provisions of Chapters II, III, IV or VII of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), entitling the lawful holder thereof to serve in the capacity and perform the functions involved at the level of responsibility specified therein.
- ♦ “Certifying Authority” means either the Secretary of State, or anyone else authorised by the Secretary of State for the purposes of:
 1. appointing persons to carry out examinations of vessels and issuing and signing Declarations of Examinations; and
 2. issuing Certificates;
- ♦ “Charging point” means the location on a vessel where charging cables can be connected to charge lithium-ion batteries or lead-acid batteries using shore-side power, a mother vessel or platform-based facility;
- ♦ “Charter” means an agreement between the owner/managing agent and another party which enables that other party to operate the vessel, and the “Charterer” is that other party;
- ♦ “Close Company” is within sight of each vessel or a distance not exceeding 1 mile, whichever is the least distance;
- ♦ “Cockpit” means a semi-enclosed, recessed area that is lower than the surrounding decks;
- ♦ “Code” means this edition of the Code of Practice unless another Code is specified;
- ♦ “COLREGS” means the Convention on the International Regulations for Preventing Collisions at Sea 1972, as amended, published by the International Maritime Organization;
- ♦ “Command-and-control link” means the communications link(s) between a Remotely Operated Unmanned Vessel and Remote Operation Centre;
- ♦ “Compartment” means all living and working spaces within the watertight or fire-resisting boundaries on any one level which have inter-communicating access;
- ♦ “Competent harbour authority” has the same meaning as it has in the Pilotage Act 1987;
- ♦ “Competent Authority” in respect of manning qualifications means an organisation that issues Certificates of Competence which has applied for and been granted as having the appropriate technical and administrative expertise;
- ♦ “Competent Person” means:
 1. in respect of fire extinguisher servicing (section 15) a person with the necessary training, experience, with access to the relevant tools, equipment and information, manuals and knowledge of any special procedures recommended by the manufacturer of the portable fire extinguisher, to carry out the relevant maintenance procedures;
 2. with respect to The Lifting Operations and Lifting Equipment Regulations (LOLER) and Provision and Use of Work Equipment Regulations (PUWER) (section 25) is intended to mean a person possessing the knowledge or experience necessary for the performance of the duties under the LOLER and PUWER Regulations;

3. with respect to section 11 of this Code means a person, appointed by the Certifying Authority, who by reason of relevant professional qualifications may produce a stability information booklet and/or carry out assessment of the vessel's stability information;
 4. with respect to all other sections of this Code means a person appointed by the Certifying Authority who has the necessary training and experience, or by reason of relevant professional qualifications, and with access to the relevant tools, equipment and information, is deemed competent to undertake the specific task.
- ♦ "Compliance examination" means an examination of the vessel, its machinery, fittings and equipment, by an authorised person, to ascertain that the vessel's structure, construction, fire protection, stability, machinery, fittings and equipment comply with the requirements of the Code. Part of the examination should be conducted when the vessel is out of the water. Part of the examination should be conducted when the vessel is in the water. For vessels of a design with no through hull fittings below the water line, the Certifying Authority may exercise discretion by conducting the compliance examination while the vessel is out of the water;
 - ♦ "Control position" means a conning position which is manned whilst the vessel is underway;
 - ♦ "Cooker" means a galley stove designed for cooking that makes use of burners, an oven, a broiler or any combination of these items;
 - ♦ "Crew" means a person employed or engaged in any capacity on-board a vessel on the business of the vessel;
 - ♦ "Critical Downflooding Angle" means the angle at which the lower edge of the opening(s) which results in critical downflooding becomes immersed. All openings regularly used for crew access and for ventilation should be considered when determining the critical downflooding angle. Air pipes to tanks can, however, be disregarded. Where an appropriate ISO standard is used, the definition should be taken from those standards as applicable.
 - ♦ "Critical Downflooding" is deemed to occur when openings having an aggregate area, in square metres, greater than

vessel's displacement in tonnes

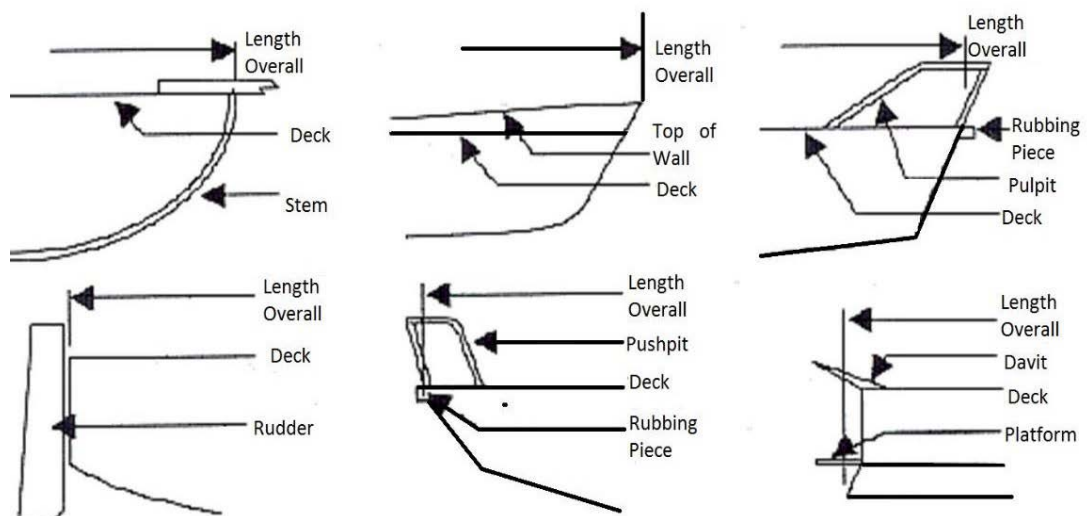
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are immersed;

- ♦ "Critical equipment" means any equipment or system which, if it fails, would result in the unsafe operation of the vessel, and compromise the safety of other water users, and the safety of the marine environment;
- ♦ "Daylight" means one hour before sunrise until one hour after sunset. In tropical waters this is to be from sunrise to sunset;
- ♦ "Decked vessel" means a vessel with a continuous watertight weather deck which extends from stem to stern and has positive freeboard throughout, in any condition of loading of the vessel. Where an appropriate ISO standard is used, the definition should be taken from those standards as applicable;
- ♦ "Deckhouse" means a permanent substantial enclosure located on the weather deck;
- ♦ "Dangerous goods" means cargoes classified in the International Maritime Dangerous Goods (IMDG) Code, as amended and includes any specialist equipment which may be classified as dangerous cargoes when carried by crew, passengers or industrial personnel;
- ♦ "Dedicated pilot boat" means a pilot boat of whatever size which is solely employed in pilotage services;

- ♦ “Diesel” means Marine Gas Oil and refers to gas oil, diesel fuel and heating oil, light which are categorised under UN1202.
- ♦ “FTP Code” means the International Code for Application of Fire Test Procedures (Resolution MSC.307(88)), as amended, including fire test procedures referred to in and relevant to the FTP Code, published by the International Maritime Organization.
- ♦ “GNSS” means global navigation satellite systems, including GLONAS, GPS and Galileo systems.
- ♦ “Grab Bag” means an easily accessible, transportable and watertight bag or other portable container containing emergency supplies and equipment to aid survival in the event of an emergency evacuation of the vessel.
- ♦ “Harmful substances” means those substances which are identified as marine pollutants.
- ♦ “Hazardous space” means a space or compartment where combustible or explosive gases or vapours may accumulate in dangerous concentrations, and are divided into three zones (refer to IEC 60079 10 1:2020 for details):
 - Zone 0 – a space where an explosive atmosphere is present frequently or for long continuous periods
 - Zone 1 – a space where an explosive atmosphere is present occasionally during normal operation, or
 - Zone 2 – a space where an explosive atmosphere is present rarely, and only occurs for short periods, during normal operations.
- ♦ “Heating appliance” means an appliance designed to heat air, water or a solid medium by means of combusting liquid fuel.
- ♦ “High Holding Power (HHP) Anchor” means an anchor that can be shown to have holding powers of at least twice those of a standard stockless anchor of the same mass.
- ♦ “High Speed” means an operating speed of 20 knots or more.
- ♦ “High voltage” means an electrical system with a minimum output of 1000V AC or 1500V DC.
- ♦ “High voltage interlock loop” (HVIL) means a system which performs the role of checking all high-voltage connections are safely in place before allowing the contactors, or other key parts of a high-voltage system, to be engaged. A HVIL also checks that the battery is disconnected from the main electrical system before charging is initiated.
- ♦ “IMDG Code” means the International Maritime Dangerous Goods Code, as amended, published by the International Maritime Organization.
- ♦ “Immersion Suit” means a protective suit which reduces the body heat-loss of a person wearing it in cold water.
- ♦ “IMO” means the International Maritime Organization.
- ♦ “Industrial Personnel” means all persons other than the crew or passengers or children of under one year of age which are transported or accommodated on board for the purpose of offshore industrial activities.
- ♦ “Inflatable Boat” means a vessel which attains its form through inflatable tubes only, which are not attached to a solid hull.
- ♦ “Land” means the seashore above the line of mean high water mark.

- ♦ “Latency” means the time interval between a signal being sent from the ROUV and being displayed to the remote operator at the ROC, or the time interval between a signal being sent from the ROC to the ROUV.
- ♦ “Lead-acid battery” means a rechargeable battery which uses lead and sulphuric acid.
- ♦ “LEL” means lower explosive limit, which is the lowest concentration required of a gas or vapour from which ignition or an explosion can occur.
- ♦ “Length” means the overall distance from the foreside of the foremost fixed permanent structure to the aft side of the aftermost fixed permanent structure of the vessel. With regard to inflatable boats, rigid inflatable boats, or boats fitted with a buoyant collar, length should be taken from the foremost part of tube or collar, to the aft most part of the tube or collar.



- ♦ “Lifting appliances & winches” means devices used for lifting or lowering loads, and includes its attachments used for anchoring, fixing, supporting the device and connections between device and load. A lifting device does not include a person retrieval system, the vessels own anchor handling equipment, or davits for tenders.
- ♦ “Light Duty Workboat” means a vessel that is certificated under the Small Commercial Vessel codes or complying with another acceptable standard.
- ♦ “Liquid fuel” means fuel that is liquid at atmospheric pressure and used for heating or for a cooker.
- ♦ “Lithium-ion battery” means a rechargeable battery containing lithium in any chemical form.
- ♦ “Load line length” in relation to a ship means the greater of the following distances:
 - 96% of the total length on a waterline at 85% of the least moulded depth measured from the top of the keel
 - the length from the fore-side of the stem to the axis of the rudder stock on that waterline
 - where the stem contour is concave above the waterline at 85% of the least moulded depth, both the forward terminal of the total length and the fore-side of the stem respectively shall be taken at the vertical projection to that waterline of the aftermost point of the stem contour (above that waterline). In ships designed with a rake of keel the waterline on which this length is measured shall be parallel to the designed waterline.

- ♦ “Load-bearing division” is a deck or bulkhead including stiffeners, pillars, stanchions and other structural members which, if eliminated, would adversely affect the designated structural strength of the ship.
- ♦ “Long international voyage” means any voyage where a vessel is more than 200 miles from a safe haven, or the length of the voyage from departure to arrival more than 600 miles.
- ♦ “Low flash point fuel” means gaseous or liquid fuel, other than petrol or diesel, which has a flashpoint lower than 60°C.
- ♦ “Machinery space” means any space which contains propelling machinery, propulsion motors, boilers, oil fuel units, steam, internal combustion engines, generators and liquid fuelled heating appliances. Spaces containing machinery of a unique or novel design may be subject to special consideration by the Flag state.
- ♦ “Making way” means a vessel which is moving through the water.
- ♦ “Managing agent” means a person appointed to act on behalf of the vessel owner or the person that operates the vessel.
- ♦ “Maritime Labour Convention” or “MLC” means setting out the minimum working and living rights for seafarers.
- ♦ “MARPOL” means *The International Convention for the Prevention of Pollution from Ships, 1973*, as modified by the Protocol of 1978 relating thereto, as amended, published by the International Maritime Organization.
- ♦ “MASS” means Maritime Autonomous Surface Ship and includes every description of vessel or craft used in navigation that can for any part of its voyage, fully or in part navigate or operate autonomously or through remote operations.
- ♦ “Master” has the same meaning as “master, captain, skipper”.
- ♦ “Maximum permissible weight” means the maximum total permissible weight of persons and their effects, cargo, and activity related equipment (for example, diving equipment).
- ♦ “MER” means The Merchant Shipping (Marine Equipment) Regulations 2016.
- ♦ “Modification” means any change to the vessel or its equipment that would affect the vessel’s compliance with statutory requirements, or that would require an amendment to its statutory certification.
- ♦ “Motor vessel” means a power-driven vessel which is not a sailing vessel.
- ♦ “Multihull vessel” means any vessel which in any normally achievable operating angle of trim or heel, has a rigid hull structure which penetrates the surface of the sea over more than one separate or discrete area.
- ♦ “New vessel” means a vessel, the keel of which was laid, or the construction or lay-up was started, on or after the first day on which this Code came into force, or any vessel where there has not been a valid certificate for the previous five years.
- ♦ “Officer”, in relation to a body corporate, means:
 - a director, manager, secretary or other similar officer of the body corporate, or a person purporting to act in any such capacity, or
 - an individual in accordance with whose directions or instructions the directors of that body corporate, or of any other body corporate which is its controller, are accustomed to act.

- ♦ “Offshore industrial activities” means the construction, maintenance, decommissioning, operation or servicing of offshore facilities related to the exploration and exploitation of resources by the renewable or hydrocarbon energy sectors, aquaculture, ocean mining or similar activities.
- ♦ “Open boat” means a vessel which within its length is:
 - not fitted with a watertight weather deck
 - is fitted with a watertight weather deck over part of its length, or
 - is fitted with a watertight weather deck over the whole of its length but the freeboard does not meet the minimum requirement (section 12).
- ♦ “Owner/operator” means the vessel owner, managing agent or person who operates the vessel.
- ♦ “Passenger” means any person carried on a ship except:
 - a person employed or engaged in any capacity on the business of the vessel
 - a person on board the vessel either in pursuance of the obligation laid upon the Master to carry shipwrecked, distressed or other persons, or by reason of any circumstance that neither the Master nor the owner nor the charterer (if any) could have prevented or forestalled, or
 - a child of under one year of age.
- ♦ “Plastic(s)” means both thermoplastic and thermosetting plastic materials, with or without reinforcement, such as uPVC and fibre reinforced plastics (FRP). The definition includes synthetic rubber and materials of similar thermo/mechanical properties.
- ♦ “Pleasure vessel” has the same meaning as it has in *The Merchant Shipping (Vessels in Commercial Use for Sport or Pleasure) Regulations 1998* (SI 1998 No. 2771), as amended.
- ♦ “Power Management System” (PMS) means an electronic device which automatically maintains the balance between power supply and demand.
- ♦ “Programmable Electronic System” (PES) means a system based on computer technology which may be comprised of hardware, software, and of input and/or output units (IEC 61508 – 4:2010).
- ♦ “Propulsion system” means all components that convert power into vessel movement.
- ♦ “Recess” means an indentation or depression in a deck and which is surrounded by the deck and has no boundary common with the shell of the vessel. Where an appropriate ISO standard is used, the definition should be taken from those standards as applicable.
- ♦ “Recognised Organisation” means those organisations authorised in accordance with the IMO Code for Recognized Organizations (“the RO Code”) (MSC.349(92) and MEPC.237(65)) as amended.
- ♦ “Remote Operation Centre (ROC)” means either a shore-based location which is permanent or mobile or a manned vessel from which a ROUV is operated.
- ♦ “Remote Operator” means any person, including the Master, with recognised or certifiable experience who is engaged in the remote operation of a ROUV.
- ♦ “Remotely Operated Unmanned Vessel (ROUV)” means a vessel with no persons on board, that is operated from a location remote to the vessel.
- ♦ “Renewal examination” means an equivalent examination to the compliance examination. For vessels of a design with no through hull fittings below the water line, the Flag State may determine whether the renewal examination is conducted in water or out of water.

- ♦ “Rigid inflatable boat” (RIB) means a vessel with inflatable tubes, attached to a solid hull. The tubes are inflated during normal craft operation.
- ♦ “Room sealed type” means a type of appliance where the gas flames are totally isolated and where the air supply and combustion gas outlets are piped to open air.
- ♦ “Safe haven” means a harbour or shelter of any kind which affords safe entry and protection from the force of weather.
- ♦ “Safe state” means the set minimum risk condition(s) defined by the vessel owner/operator to minimise risks to people, environment(s) and asset(s).
- ♦ “Seafarer” means any person, including the Master, who is employed or engaged or works in any capacity on board a ship on the business of the ship and whose normal place of work is on a ship.
- ♦ “Seafarer employment agreement” is a legally binding, written contract mandatory under the Maritime Labour Convention (MLC, 2006) that defines the terms and conditions of employment between a seafarer and a shipowner or authorized representative.
- ♦ “Ships stores” means materials which are on board a ship for the upkeep, maintenance, safety, operation or navigation of the ship (except for fuel and compressed air used for the ship’s primary propulsion machinery or fixed auxiliary equipment) or for the safety or comfort of the ship’s passengers or crew. Materials intended for use in commercial operations by a ship are not considered as ships’ stores⁵.
- ♦ “Shore charging” means where charging cables are connected to a vessel’s charging point to charge batteries using shore-side power.
- ♦ “Similar stage of construction” means a stage at which:
 - construction identifiable with a specific vessel begins, and
 - assembly of that vessel, comprising at least 1% of the estimated mass of all structural material, has commenced.
- ♦ “Single handed operation” is considered to be taking place when either:
 - there is only one person on board the vessel, or
 - there is a Master on board with passengers or industrial personnel, and there is no one else on board capable of assisting the Master in an emergency.
- ♦ “Small vessel” means a vessel of less than 24 metres in load line length, or in the case of a vessel the keel of which was laid or which was at a similar stage of construction before 21 July 1968, less than 150 tons and in this definition “tons” means gross tons, measured in accordance with the regulations for measuring tonnage in force on 20 July 1968.
- ♦ “SOC” means battery state of charge which refers to the percentage of overall battery capacity remaining before the battery is exhausted.
- ♦ “Software” means an intellectual creation comprising the programs, procedures, data, rules and any associated documentation pertaining to the operation of a data processing system (IEC 61508-4:2010).
- ♦ “SOH” means battery state of health which refers to the percentage of original battery capacity stored when an aged battery is fully charged.
- ♦ “SOLAS” means *The International Convention for the Safety of Life at Sea, 1974*, and its Protocol of 1988, as amended, published by the International Maritime Organization.

- ♦ “Special area” means a sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of sea pollution by oil is required, as defined in MARPOL Annex I.
- ♦ “Standard” means those recognised standards such as British Standard (BS), European Standard accepted by the European Committee for Standardization, CEN (EN), International Electrotechnical Commission (IEC) and International Organization for Standardization (ISO) and includes any standards which amend or replace them or are an equivalent standard.
- ♦ “Steel or other equivalent material” means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test.
- ♦ “Substantial enclosure” means an area of the vessel which is enclosed on all sides by solid divisions in line with a definition of an accommodation space and provides protection of persons on board.
- ♦ “SWB1” means the Small Workboat 1 form for an Application for Examination of a vessel.
- ♦ “SWB2” means the Small Workboat 2 report form for a Compliance Examination and Declaration.
- ♦ “Thermal runaway” means where a battery cell undergoes an exothermic reaction, where the heat generated is greater than the heat dissipated.
- ♦ “Totally independent system” means a system which has 100% redundancy, and of which any part does not rely on another system.
- ♦ “Towing” means the act of towage of one vessel or floating object by another vessel where the two are connected:
 - by a towline about which the towing vessel is free to manoeuvre such that there is a risk of girting, where if the towline is attached towards amidships, it could adopt an angle to the towing vessel and provide a capsizing moment
 - side by side with the towing vessel firmly attached alongside the towed vessel or floating object, so as to be able to manoeuvre as if one vessel
 - fore and aft with the bow of the towing vessel firmly attached to the stern of the towed vessel or floating object, so as to be able to push, pull or manoeuvre as if one vessel.
- ♦ “UKCA” means UK Conformity Assessed. UKCA marking is a certification mark that indicates conformity with the applicable requirements for products sold within Great Britain.
- ♦ “Underway” has the same meaning as in Rule 3(i) of COLREGS.
- ♦ “Vessel” means any ship⁸ to which this Code applies.
- ♦ “Vessel in commercial use” means any vessel, but also includes any pleasure vessel while it is in possession of a broker, ship repairer or other such person for the purposes of their business.
- ♦ “Watertight” means capable of preventing the passage of water in either direction.
- ♦ “Weather deck” means the main deck which is exposed to the elements.
- ♦ “Weathertight” means capable of preventing the admission of a significant quantity of water into the vessel when subjected to a hose test.
- ♦ “Wheelhouse” means a substantial enclosure incorporating the control position.
- ♦ “Workboat” means a small vessel in commercial use for purposes other than sport or pleasure, including a dedicated pilot boat.

3 Application, Interpretation and Certification

The purpose of this section is to set out the application of this Code to workboats, and the process for certification of these vessels.

3.1 Application

This Code applies to workboats that operate to sea. It applies to vessels carrying cargo and/or not more than an aggregate 12 passengers and industrial personnel.

The Code does not apply to any vessels that operate underwater, hovercraft or those in use for sport or pleasure.

3.2 Purpose

The Code sets out the requirements for safety of a vessel and any persons on board. Operational activities undertaken from that vessel are referenced under the Code.

3.3 Interpretations of the Code

Where a question of application of the Code arises, the vessel owner/operator shall in the first instance click the document feedback button.

3.4 Equivalent Compliance

Based on the IMCA CMID inspection <500 GT, if the vessel owner/operator wishes to use an equivalent means of compliance to the Code, the Flag State vessel owner/operator should conduct an appropriate risk assessment with mitigation controls and submit this to their client for acceptance as equivalence.

Any equivalences agreed upon by the client for the vessel shall be recorded, and a copy shall be retained onboard.

3.5 Maintaining and Operating the Vessel

It is the responsibility of the vessel owner/operator to ensure that a vessel is properly maintained, examined, certified and manned in accordance with the Code.

It is the responsibility of the vessel owner/operator to ensure that the vessel is maintained in accordance with manufacturer's recommendations or best engineering practice.

A vessel, its machinery, equipment and fittings shall be designed to be efficient for its intended purpose, use and be suitable for the intended area of operation of the vessel. This shall include an ongoing maintenance and inspection regime that ensures the continued effective operation.

Where an existing vessel has new equipment installed or undergoes modification, it is recommended that it be re-inspected using the appropriate IMCA CMID template.

3.6 Accident Reporting

The vessel owner/operator has a requirement to document and report accidents and near misses.

Where a vessel experiences an accident, or incident resulting in damage affecting the safety of that vessel, the vessel owner/operator shall notify the client and appropriate Authority, explaining the circumstances by which the vessel and/or asset became damaged.

3.7 Official Log Book

All vessels of 25 GT and greater shall carry and complete an Official Log Book.

3.8 Carriage of Mandatory Safety Equipment

The type and number of mandatory safety equipment placed on board a vessel shall be SOLAS approved.

Equipment on board which is additional to the minimum requirements of the Code and which is expected to be relied on in situations affecting safety or pollution prevention must be in an operational condition. If such equipment is inoperative, it shall either be repaired, removed or if removal is not practicable, clearly marked as inoperative and secured.

3.9 Risk Assessment of Operations

The vessel owner/operator shall carry out a risk assessment appropriate to the intended operation to ensure that any circumstances, local conditions, or equipment not covered by the provisions of the Code are adequately considered and that all known risks are mitigated. This assessment shall be presented to the Accredited Vessel Inspector (AVI) at the time of inspection.

A risk assessment of all persons on board shall be carried out by the vessel owner/operator considering the intended operation of the vessel and whether or not there may be persons on board which may be more susceptible to injury as a result of that intended operation.

4 Construction and Structural Strength

4.1 General Requirements

The design and construction of the hull structure shall provide strength for the safe operation of the vessel, at its service draught and maximum service speed, to withstand the sea and weather conditions likely to be encountered in the intended area of operation.

All vessels which are not fitted with a watertight weather deck over the length of the vessel shall be provided with adequate reserves of buoyancy and sufficient stability for the vessel to survive the consequences of swamping when loaded with all the vessel's equipment, fuel, cargo, activity-related equipment (for example, diving equipment) and the number of persons for which it is to be carrying.

4.2 Structural Strength

All vessels shall be designed and built to a standard approved by the Flag State for their intended use.

4.3 Certificate of Construction and Load Line

All vessels are required to have a valid construction and Load Line Certificate from the Flag State.

Note: Some vessels may have a wind or wave height restriction or limitation, the vessel shall be limited to those wave heights or wind restrictions.

4.4 Watertight Bulkheads

The strength of any watertight bulkhead and the effectiveness of any alternative means shall be approved by the Flag State.

Where pipes, cables penetrate watertight bulkheads, they shall be provided with valves and/or watertight glands and cable transits, as appropriate or a means of preventing the transfer of water between spaces.

4.4.1 Vessels Fitted with Doors in Watertight Bulkheads

A door in a watertight bulkhead shall be fitted in such a way that the bulkhead, when the door is closed, retains its watertight integrity. The door shall be kept closed at sea, unless opened for access only, at the discretion of the Master. A notice shall be fitted to both sides of the door *"To be kept closed at sea, open for access only"*. Any watertight door shall be provided with a suitable safety provision to avoid injury to personnel by closure of the door.

If the door shall be of power operated sliding watertight construction, the door shall have controls which are local to the door and from a location(s) above the bulkhead deck, at which locations an 'open/closed' indication shall be provided. A door closure warning indicator shall be provided at the door.

4.5 Offshore Energy Service Vessels

The hull and attached structures of Offshore Energy Service Vessels shall be designed and constructed to withstand imposed static and dynamic loads typically expected for this type of operation. The structure shall be robust with scantlings equal to or greater than those typically required from a recognised Classification Society.

4.6 Lifting and Towing

Where an owner/operator intends to use a vessel for towing or the vessel is fitted with a lifting device, then the Flag State shall verify that the structure of the vessel and any associated fittings used in the activity of towing or lifting is suitable and sufficiently strong for the intended use, including when operating at the maximum capacity of any lifting device.

The breaking strength or maximum working loads of any item of equipment or of the hull structure itself shall be made available to the vessel owner/operator and displayed in the vicinity of the equipment. The breaking strength of lines/chains shall in general not exceed 80% of the breaking strength of the respective strong point.

Any modifications that are undertaken shall be verified by the Flag State or their representative.

Equipment manufacturer's instructions on installation, operation and maintenance shall be followed as required. Where equipment standards are not specified in the Code the Flag State shall set an appropriate equivalent standard.

5 Weathertight Integrity

5.1 General

A vessel shall be designed and constructed to be weathertight in a manner which will prevent the water ingress. For strength and watertightness of accessways and windows the requirements of an appropriate Standard are considered acceptable (for example, ISO 12216).

5.2 Doorways, Hatchways and Companion Hatch Openings

For the purpose of this Code, doorways, hatchways and companion hatch openings are collectively referred to as accessways.

5.2.1 General Requirements

An accessway which gives access to any compartment shall be weathertight when closed.

An accessway which is used for escape purposes shall be capable of being opened, closed and where necessary, unlocked, from both sides.

5.2.2 Doorways which are Located above the Weather Deck

A hinged doorway located in the side of the superstructure shall have the hinges on the forward edge to prevent ingress of sea water during normal operations and unfavourable sea conditions.

A doorway shall not open inwards and shall be sized such that the covering overlaps the doorway on all sides and has efficient means of opening and closure which can be operated from either side.

Each external doorway is to be provided with a door retainer/ door hook, to ensure the door can be held in the open position and restrict swinging.

Sliding weathertight doors (manual or automatic), where fitted, shall be provided with suitable safety provision to avoid injury to personnel by closure of the door.

A doorway which is either forward or side facing shall be provided with a coaming, the top of which is at least 300 mm above the adjacent weather deck.

A weathertight coaming may be portable, provided it can be permanently secured to the structure of the vessel and can be locked in position whilst at sea. A portable coaming shall be marked, *"Not to be removed at sea"*.

5.2.3 Doorways which are Located below the Weather Deck

A doorway fitted in a watertight bulkhead shall be of a watertight construction from both sides and be kept closed at sea. A notice shall be fitted to both sides of the door *"To be kept closed at sea, open for access only"*.

Sliding watertight doors, where fitted, shall be provided with suitable safety provision to avoid injury to personnel by closure of the door.

5.2.4 Hatchways and Companion Hatch Openings

Where washboards are used to close a vertical opening they shall be arranged and fitted so they will not become dislodged.

A covering to a hatchway shall be hinged, sliding or permanently secured by other equivalent means to the structure of the vessel and be provided with locking devices to enable it to be positively secured from either side in the closed position.

5.2.5 Hatchways which are Open at Sea

Hatchways, where practicable, shall be kept securely closed at sea.

5.2.6 Skylights, Windows and Portlights

For the purpose of this Code, skylights, portlights and windows are collectively referred to as windows.

All windows fitted below the weather deck shall be of watertight construction.

Where a window is an opening type it shall be provided with efficient means whereby it can be positively secured in the closed position.

A window which is provided as a means of escape shall be capable of being opened and closed from both sides.

Windows shall not be fitted in an engine space boundary, unless otherwise specifically permitted by this Code.

Windows and their frames shall meet the requirements of an appropriate Standard or Classification Society Rules.

Where a window below the weather deck can be opened it shall be fitted with a deadlight or provided with a portable blank.

Where portable blanks are required, the number of blanks shall be sufficient for at least half of the number of such windows of each different size in the vessel. A blank shall be capable of being efficiently secured in position to prevent the ingress of water and shall be of a suitable material and equivalent in strength, with regard to design pressure, to that required for the structure to which it is attached, to the satisfaction of the Flag State or representative.

A window which is capable of being opened and is located below the weather deck shall be marked, "Not to be opened at sea".

Windows used for navigational purposes shall not have their visibility impaired by (permanent) polarised or tinted glass.

5.3 Valves, Pipes, Ventilators, Exhausts, Sea Inlets and Discharges

This section applies to valves and associated piping, ventilators and exhausts, air pipes and sea inlets and discharges.

5.3.1 Valves and Associated Piping

Plastic/non-metallic piping shall only be used where the design and construction of the pipe is appropriate to its usage. When plastic piping or flexible pipe is used it shall not contribute any additional risks or spread of fire and be of a type suitable for the intended purpose.

5.3.2 Sea Inlets and Discharges

Any opening for inlets and discharges below the weather deck shall be provided with a watertight means of closure and if fitted below the waterline, the means of closure shall be either remotely operated or readily accessible in an emergency. Discharge lines shall also have an automatic non-return valve.

When an opening is for a log or other sensor, which is capable of being withdrawn, the opening shall be provided with an effective means of closure when such a fitting is removed. A non-metallic, or non-flush metallic fitting, log or sensor shall not be fitted in machinery spaces or in any spaces in vessels that operate at high speed unless located in small cofferdams designed for the purpose and with any access panels and service transits made watertight. If access is designed to be opened at sea, a test cock shall be provided.

Inlet and discharge pipes from marine toilets shall be provided with a watertight means of closure. When the rim of a marine toilet is less than 300 mm above the deepest waterline of the vessel, unless otherwise indicated by manufacturer's recommendations, anti-syphon measures shall be provided.

Observation glasses fitted in sea water systems below the deepest anticipated waterline, including any trim or heel, shall be so protected as to minimise the risk of mechanical damage, failure and consequential flooding.

5.3.3 Ventilators and Exhausts

A ventilator situated on the weather deck shall be provided with a readily available means of weathertight closure.

Ventilators including those which must be kept open, shall be located as far inboard as practicable and the height above the deck of the ventilator opening shall be sufficient to prevent inadvertent downflooding when the vessel is heeled (see section 12).

Vessels which are fitted with ventilators for machinery space(s) in the hull side, which do not satisfy the requirements of 6.4.2.1 and 6.4.2.2, may be accepted subject to approval by the Flag State. The following shall as a minimum be considered as a part of the approval process:

- ♦ the risk of fire in the machinery space(s)
- ♦ the risk of downflooding in the machinery space(s), and
- ♦ potential restrictions to operation.

Such a ventilator shall be capable of being remotely closed prior to activation of a fixed fire extinguishing system for the machinery space(s).

An engine exhaust outlet which penetrates the hull below the weather deck shall be provided with means to prevent backflooding into the hull through the exhaust system. The means may be provided by system design or a built-in valve.

5.3.4 Air Pipes

Where located on the weather deck, an air pipe shall be kept as far inboard as possible and have a height above deck sufficient to prevent inadvertent downflooding when the vessel is heeled.

An air pipe, of greater than 10 mm inside diameter, serving a tank shall be provided with a permanently attached means of weathertight closure. Means of closure may be omitted if it can be demonstrated to approval of the Flag State, that the open end of the air pipe is afforded adequate protection by other means, which will prevent the ingress of water.

An air pipe serving a tank, where provided with a closing appliance, shall be of a type which will prevent excessive pressure on the tank boundaries. Provision shall be made for relieving a vacuum when tanks are being drawn from or emptied.

An air pipe serving fresh water tanks, shall be provided with a device to prevent the ingress of particulates or living organisms (insects).

6 Water Freeing Arrangements

The purpose of this section is to set requirements for water freeing arrangements which allow water trapped on deck to run freely overboard and ensure effective drainage of the deck.

6.1 General Requirements

Where a vessel is fitted with bulwarks such that shipped water may be trapped behind them, the bulwarks shall be provided with freeing ports that will ensure the deck can be effectively drained.

Where a non-return shutter or flap is fitted to a freeing port it shall have sufficient clearance to prevent jamming and any hinges shall have pins or bearings of non-corrodible material.

Structures and spaces considered to be non-weathertight shall be provided with efficient drainage.

Where cargo is to be stowed on deck, the stowage arrangement shall be such as to not impede the free flow of water from the deck.

Where the owner/operator of a vessel intends to operate in sea areas where ice accretion can occur, the water freeing arrangements shall minimise the risk of icing impeding the free flow of water from the deck.

Where independent self-contained wheelhouses are fitted, provisions are to be made so that such wheelhouses can drain quickly, typically in the event of wheelhouse window failure and consequential flooding.

6.2 Requirements for Rigid Inflatable Boats, Inflatable Boats or Boats with a Buoyant Collar

If the boat is fitted with a transom, it shall be equipped with at least one drainplug or one bailing system.

An adequate means of draining the boat shall be demonstrated.

A rigid inflatable boat, an inflatable boat or a boat with a buoyant collar shall have adequate means of self-draining whilst moving ahead.

7 Machinery, Propulsion and Fuel Systems

The purpose of this section is to set out the requirements for propulsion systems, fuel supply and handling including stowage of spare petrol where appropriate.

7.1 General Requirements

A vessel shall be provided with a propulsion system suitable for marine use and with sufficient fuel capacity or charge for its intended area of operation.

The engine type, systems and installations essential to the propulsion and the safety of the vessel shall be of design, type, power and construction adequate to operate in accordance with the intended purpose of the vessel and its intended area of operation.

Where a vessel is fitted with multiple engine spaces it is recommended that these shall be totally independent systems and shall include separate fuel, control and electrical systems.

7.2 Automatic Shutting Down of Propulsion Systems (Kill Cords / Engine Safety Cut-out Switch)

The following section covers the means of preventing injury in the event of a person(s) unintentionally entering the water whilst the propeller is running, such systems are often referred to as kill cords/ engine safety cut-out switch but other technologies exist which achieve the same objective.

Any vessel where there is a risk of the helmsperson falling overboard or losing vessel control shall be fitted with a kill cord which shall be securely attached to the helmsperson and used at all times whilst the engine is running and in gear.

Any vessel where there is a risk of the helmsperson falling overboard shall have:

- ♦ a spare kill cord on board
- ♦ a kill system which is capable of override, or
- ♦ a sprung loaded throttle to return to idle in lieu of meeting the requirements of 7.2

7.3 Installation

Machinery, propulsion and fuel systems shall be installed in such a way as to reduce the risk of injury to persons during normal movement about the vessel.

Hazardous spaces shall be continuously ventilated. Means of ventilation shall be appropriate to the space ventilated.

Means shall be provided to isolate a source of fuel which may feed a fire in a machinery space. The means of closure shall be positioned outside the machinery space and shall be fitted as close to the fuel tank as possible. If the means of closure fitted is remotely operated, it shall have a manual override.

Where the engine(s) oil fuel system is provided with water separator filter(s) of a type which has plastic or glass bowl(s), it shall be located so that it can be easily seen and protected against heat and accidental damage.

All vessels, including those with portable tanks, shall be fitted with means to drain any spillage occurring during fuel handling into a suitable receptacle.

7.4 Fuel Pipes

Fuel pipes shall be constructed of a fuel compatible, fire resistant, non-corrosive and a non-kinking material.

Fuel pipes shall be adequately supported along their length, particularly at pipe connections. The method of supporting shall be appropriate for the material of the fuel pipe and its location in the fuel system.

Short lengths of flexible fuel pipes may only be permitted where necessary to allow for movements and vibration between fixed fuel pipes and fuel tanks or fuel consumers.

Flexible fuel pipes shall be:

- ♦ fire-resistant, metal reinforced or protected from fire
- ♦ suitable for the carriage of the fuel
- ♦ secured by either metal hose clamps or permanently attached end fittings such as swaged sleeve or sleeve and threaded insert
 - every pipe connection shall have a means of preventing slippage and shall not provide a path for fuel leakage, and
- ♦ renewed according to the manufacturer's instructions.

High pressure fuel pipe(s) and associated fittings on a machinery system(s) shall be designed and installed to reduce the risk of oil mist fires. Mitigations could include the use of double-skinned pipes, shielding, insulation of hot surfaces, proximity and protection of electrical apparatus, anti-vibration measures and fuel oil mist detection or a combination of these measures.

A fuel filling or fuel ventilation pipe(s) shall be arranged to prevent over pressure of the fuel tank systems during filling.

A vent pipe(s) shall:

- ♦ lead to the open atmosphere
- ♦ terminate in a position level with or higher than the fuel filling mouth
- ♦ be protected against water ingress
- ♦ be protected from flame ingress, and
- ♦ be protect against any other identified hazards.

7.5 Fuel Tanks

All fuel tanks shall be constructed and installed to an appropriate standard.

All fuel tanks shall be constructed of a fuel- and corrosion-resistant material.

A fuel tank shall be protected against the effect of fire in the machinery space. Where a machinery space boundary is fitted, the fuel tank(s) shall be of the same fire-resistant standard as the machinery space boundary.

A rigid aluminium fuel tank(s) shall not be fitted within a machinery space(s) or form part of the machinery space boundary.

A rigid plastic fuel tank shall not contribute to any additional fire risks, be fitted in the machinery space and shall not form part of a machinery space's boundaries.

A fuel tank(s) shall not be fitted in an area containing a heating appliance(s). Where this is impracticable, the installation shall, where possible, mitigate against any additional fire risk and be approved to the satisfaction of the Flag State.

Spaces containing a fuel tank shall be ventilated. Where a petrol tank(s) is fitted, it shall meet the ventilation requirements of the relevant standard (for example, ISO 11105).

A petrol tank(s) or a spare portable petrol container(s) (see section 7.6) shall be protected from any damage, secured to the weather deck and capable of being quickly released.

A petrol tank(s), intended for the use of supplying the vessels propulsion system, must not be filled or decanted whilst the vessel is at sea.

7.6 Stowage of Spare Petrol

Where it is essential to carry spare petrol for the use of the vessel and its equipment it shall not be classed as cargo.

Spare petrol shall be:

- ♦ stowed securely on the weather deck where they can readily be jettisoned and where any spillage drains directly overboard, and
- ♦ in an approved and clearly marked containers which are ventilated.

7.7 Pipes Carrying Flammable Liquids or Gases through Accommodation Spaces

Pipes carrying flammable liquids or gases shall not pass through accommodation spaces. Where this is unavoidable it may be permitted on a case by case basis subject to approval of the Flag State.

7.8 Noise and Vibrations

A vessel owner/operator shall meet the requirements for the protection of all persons on board from the risks related to exposure to noise at work.

A vessel owner/operator shall meet the requirements for the protection of all persons on board from the risks related to exposure to vibration at work.

8 Electrical Installations

The purpose of this section is to set out minimum requirements to satisfy appropriate national or international standards to ensure safety of marine electrical installations.

This section does not include requirements for lithium-ion batteries and lead-acid batteries used as a source of power for propulsion, these are detailed in Annex 1.

8.1 General

Electrical equipment and their installation shall be suitable for use in a marine environment and meet recognised marine standard(s).

The electrical equipment and installations shall be earthed and bonded or such that the vessel and any persons on board are protected against electrical hazards.

All exposed non-current carrying conductive parts of both fixed and portable electrical equipment which may, under fault conditions, become live (including similar parts inside non-metallic enclosures) are to be connected to earth unless the equipment is:

- ♦ supplied at a voltage not exceeding 50 V direct current or 50 V root mean square between conductors, achieved without the use of auto-transformers
- ♦ supplied at a voltage not exceeding 250 V by safety isolating transformers supplying only one consuming device, or
- ♦ constructed in accordance with the principle of double insulation (Class II) as per IEC 61440 or equivalent insulation intended to prevent the appearance of dangerous voltages on its accessible parts due to a fault in the basic insulation.

8.2 Lighting

An electric lighting system shall be installed which is capable of supplying an appropriate level of light to all enclosed accommodation and working spaces.

For lighting distribution in accommodation and working spaces, the lighting shall be distributed on different final circuits to maintain a level of lighting in case of failure of a single distribution circuit.

The design and placement of lighting shall preserve the night vision of Navigation Watchkeepers.

For vessels carrying out deck operations at night, an appropriate level of light shall be provided for those areas.

8.3 Batteries

8.3.1 Battery System Requirements

Battery systems, including any back up battery system, shall be provided to satisfy the designed electrical requirements of the vessel.

The battery terminals shall be protected from contact with metallic objects.

All battery charging systems shall be fitted with circuitry to prevent overcharging and over-voltage and shall have a charge indicator.

All back up batteries shall be fully charged prior to departure.

A battery disconnect switch shall be provided to simultaneously isolate all non-earthed poles.

8.3.2 Battery Stowage

Batteries shall be firmly secured to avoid movement and located in a position not likely to flood in normal operations or in the event of minor damage.

Ventilated batteries shall be installed with drip trays to collect any electrolyte spillage.

Where there is a possibility of dangerous gases occurring within the battery stowage space, the space shall be ventilated. Where ventilated, air shall be supplied at a level below the top of the batteries and shall be exhausted from the highest point of the space directly to the open air. The system shall be designed in a way that dangerous gases may not re-enter the battery stowage space.

Installation and ventilation arrangements shall follow national and recognised Classification Society standards appropriate for battery installations.

8.4 Electrical Cables

Electrical cables shall be located such that they:

- ♦ are protected from degradation
- ♦ avoid contact with damaging surfaces
- ♦ are protected from chafe where they pass through a part of the hull structure or storage space, and
- ♦ minimise electromagnetic interference (EMI).

8.5 Hazardous Spaces

Where electrical equipment is installed in a space where there is a risk of explosion, it must comply with a standard for prevention of ignition of a flammable atmosphere (see also Detection section 14.6).

Lighting in hazardous spaces shall have two or more sub-circuits.

Where electric cables pass through bulkheads or decks separating hazardous spaces and non hazardous spaces the integrity of the bulkhead or deck shall not be compromised.

Electric cables shall not, where practicable, pass through hazardous spaces except when:

- ♦ powering equipment installed within the space, or
- ♦ within gas tight metal pipework.

8.6 Lightning Protection

The vessel shall be fitted with suitable lightning strike protection.

8.7 Emergency Power Supplies

8.7.1 Emergency Lighting

Where a vessel's general lighting is provided by a centralised electrical system, an alternative source of lighting shall be provided by either an emergency power supply or an independent light source.

The alternative source of lighting required, shall be sufficient to facilitate continued safe operation of the vessel during emergency situations, to enable the safe mustering and evacuation of all persons on board and to enable the rescue of person(s) from the water.

8.7.2 Emergency Radio

Where an emergency power supply(s) to fixed radio equipment is installed, it shall be designed to supply power to the equipment for a minimum of 3 hours in the event of failure of the main electrical supply.

8.7.3 Navigational Supplies

Where emergency power supply(s) to navigation lights and navigation equipment are installed, they shall be designed to supply power to the equipment for a minimum of 3 hours in the event of failure of the main electrical supply.

9 Steering, Rudder and Propulsion Systems

The purpose of this section is to set out requirements for means of steering and manoeuvring.

9.1 General Requirements

A vessel shall be capable of being manoeuvred from the control position(s) by operation of:

- ♦ a steering system
- ♦ a rudder system
- ♦ a propulsion system, or
- ♦ any combination of these.

Sufficient horizontal and vertical arcs of visibility shall be provided from the control position in all conditions of loading so as to avoid impeding the maintenance of a proper lookout as required by the COLREGS.

A vessel owner/operator and all crew shall be aware of and respond appropriately to the dangers of interaction between vessels.

9.2 Steering System

The steering system may either be direct or remote control. A remote-control system shall be a means that can control both the vessel's heading and propulsion.

Primary steering systems shall comply with an appropriate standard for small craft steering systems.

When the steering system is remote control, arrangements shall be made for emergency steering in the event of failure of the primary steering system.

The emergency steering shall be demonstrated in the form of an emergency drill to the approval of the Flag State.

When steering gear is fitted with remote control, arrangements should be made for emergency steering in the event of failure of the control. Arrangements may take the form of the following, and be to the satisfaction of the Flag State:

- ♦ a tiller to fit the head of the rudder stock
- ♦ a rod attachment which may be fitted to a Z-drive framework
- ♦ a steering oar
- ♦ in the case of twin-screw vessels manipulation of power distribution between the drives. In the case of twin stern-drive arrangements, means shall be provided to lock the drives in the midships position, or
- ♦ in the case of a vessel fitted with outboard engine(s), a means to control the direction of thrust.

9.3 Rudder System

Where fitted, the design, construction and fittings of a rudder system shall be to an appropriate standard to the approval of the Flag State.

The rudder system shall comprise of the rudder blade, the rudder stock and the methods of attachment to the hull or steering system.

9.4 Propulsion System

The design, construction and fittings of the propulsion system shall be to an appropriate standard to the approval of the Flag State.

10 Bilge Pumping

The purpose of this section is to set out requirements for vessel bilge pumping systems and associated piping for the efficient drainage of bilge water, and drainage of flooded spaces. It shall be noted that a fitted bilge pump system is not to be relied upon to deal with a large ingress of water into a space or compartment, but rather to deal with leakages.

10.1 Bilge Pumping System Requirements

A bilge pump shall be permanently installed, self-priming and capable of being operated with all accessways closed.

A bilge suction line shall be fitted with an efficient filter to protect from obstruction.

A bilge suction valve of a permanently installed bilge pump shall be of a non-return type.

Any valve (manual or remote operated) in the bilge system shall not be physically inhibited at any time.

Bilge pumps shall not be connected to cockpit drains and shall not discharge into a closed cockpit, ensuring that if a pipe fails, it does not flood the interior of the boat.

To prevent pollution, any space containing potential pollutants shall not be fitted with any auto-start bilge pumps.

All spaces where bilge water is likely to occur shall be able to be drained when the vessel is heeled to an angle of 10 degrees.

The Flag State may permit an alternative means of providing efficient bilge pumping other than those described in this text, provided that full information on the bilge pumping system in place is submitted to and approved by the Flag State.

10.2 Bilge Pumping Carriage Requirements

10.2.1 All Vessels

A vessel shall have at least one manual bilge pump and one engine driven or independently powered bilge pump, which shall be situated in each separate space. If two powered pumps are provided, they shall be powered by independent sources. All pumped spaces shall be capable of being drained after the failure of one pump.

Open boats, rigid inflatable boats, inflatable boats and boats fitted with a buoyant collar are not required to comply and may instead carry a minimum of one hand powered bilge pump, one hand bailer, or one bucket of minimum capacity 10 litres.

10.3 Bilge Alarms

A bilge alarm shall be fitted:

- ♦ in any watertight compartment containing propulsion machinery, and
- ♦ in any other compartment where there is a risk of accumulation of bilge water, or where the ingress of water may not be readily seen.

Where a bilge alarm is fitted it shall be audible from the control position(s) and be capable of being heard in all anticipated weather and operational conditions. For all vessels where more than one bilge alarm is fitted, a visual alarm indication shall also be visible at the control position(s).

11 Stability

It is recommended that vessels carry a Flag State approved Stability Information Booklet specific to the vessel.

It is crucial for ensuring a vessel's safety and seaworthiness, allowing it to withstand potential damage scenarios and ensuring the safety of passengers and crew.

Where a vessel has been modified from the condition that was subject to the previous stability assessment, the vessel owner/operator shall inform the Flag State who may undertake a full stability analysis.

A competent person (s) shall conduct tests and calculations of vessel stability, and the Flag State shall approve the results.

A vessel fitted with deck lifting appliances and winches operating at maximum load and heeling moments shall demonstrate compliance to the satisfaction of the Flag State.

12 Freeboard and Freeboard Marking

The flag state may require the vessel to carry freeboard markings. The markings should comply with recognised international standards (for example, IMO load line standards).

Vessels not required by Flag State to carry freeboard markings shall comply with ISO 12217.

13 Life-Saving Appliances

The purpose of this section is to set out the minimum requirements for life-saving appliances on board.

13.1 General

The following life-saving appliances shall be marked in accordance with the guidelines in IMO Resolution A.658 (16), as amended:

- ♦ liferafts
- ♦ lifebuoys
- ♦ lifejackets, and
- ♦ thermal protective aids (TPAs).

The minimum required life-saving appliances (LSA) are to be maintained and serviced in compliance with the vessels Flag State and local Port State requirements.

13.2 General Requirements for LSA

Vessel owners/operators shall frequently inspect LSA for damage and functionality, including any containers and housing, if appropriate. If damaged, it shall be repaired/replaced as per the manufacturer's instructions at the earliest opportunity.

Hydrostatic Release Units (HRU) (other than the types which have a date limited life and are test fired prior to disposal) shall be serviced as per the manufacturer's instructions.

13.3 Stowage of Liferafts

Liferafts shall:

- ♦ be stowed on or above the weather deck as appropriate to vessel's design and intended operation, to prevent loss of the raft in a sea way, such that they float free, inflate and break free automatically, with the exception of valise liferafts which shall be stored in a dedicated locker readily accessible from the weather deck
- ♦ be safely accessible by the crew in all weather conditions
- ♦ be capable of being moved from its stowed position and stowed state to being launched in the water in the shortest practicable time
- ♦ have launching instructions displayed
- ♦ clear any projections and belting when launched, and
- ♦ if fitted with a float free arrangement, be secured through an approved and compatible HRU.

Other stowage and release mechanisms may be considered if they provide an equivalent level of safety to the satisfaction of the Flag State and Port State.

13.4 Lifebuoys

Lifebuoys shall:

- ♦ not be of an inflatable type
- ♦ so distributed as to be readily available on both sides of the vessel
- ♦ stowed as to be capable of being rapidly cast loose, and not permanently secured in any way
- ♦ at least one lifebuoy on each side of the ship shall be fitted with a buoyant lifeline
- ♦ be marked with two means of identifying the vessel (including vessel's name)
- ♦ be fitted with either a buoyant line or a drogue
- ♦ not less than one-half of the total number of lifebuoys shall be fitted with self-illuminating lights.

13.5 Lifejackets

Lifejackets shall be constructed to SOLAS or any other equivalent standard approved by the Flag State and Local Port state.

Inflatable jackets shall be serviced in accordance with the manufacturer's recommendations within a maximum of one month either side of the compliance, renewal and intermediate examinations.

Donning instructions for the types of lifejackets displayed in a position(s) that is clearly visible or persons on board the vessel

13.6 Thermal Protective Aids (TPAs)

Vessels shall have Flag State approved TPAs provided for all persons on board where:

- ♦ the sea surface temperature is 10 degrees centigrade or less, or
- ♦ the vessel has open reversible liferaft(s).

Where a vessel carries an immersion suit(s), they must be compatible with the lifejackets provided. Immersion suit(s):

- ♦ may be of the non-insulated type
- ♦ shall be compatible with the lifejackets provided.

13.7 General Alarm

A vessel shall have the ability to sound a general alarm and shall be audible in all parts of a vessel. This alarm should be able to be demonstrated where appropriate.

13.8 Recovery of Persons from the Water

An efficient means to enable the recovery of persons (whether conscious or unconscious) from the water to the satisfaction of the Flag State and local Port state.

13.9 Training Manual

A vessel's training manual shall be stowed at a control position, and shall as a minimum set out instructions from the manufacturers of the life-saving appliances with the following items explained in detail:

- ♦ the need for warm clothing and awareness of risks associated with exposure
- ♦ the number and positions of stowage of the life-saving equipment
- ♦ the donning of lifejackets
- ♦ the use of sea anchors
- ♦ the recovery of persons from the water
- ♦ the illumination in launching areas
- ♦ the boarding, launching, and clearing the survival craft from the vessel
- ♦ Guidance for Personal Survival at Sea
- ♦ the best use of all survival equipment including equipment on survival craft
- ♦ the use of all aids to location
- ♦ the instructions for emergency repair of the life-saving appliances, and
- ♦ the methods of retrieval of persons.

13.10 Maintenance of Life-Saving Appliances

A vessel's instruction manual for on board maintenance of life-saving appliances shall be stowed at a control position, and shall as a minimum set out the following instructions as appropriate:

- ♦ required criteria for inspection checklists
- ♦ log of records of inspection
- ♦ schedule of periodic maintenance
- ♦ maintenance and repair instructions
- ♦ list of replaceable parts, and
- ♦ list of sources for spare parts.

Where sufficient training and instruction on the maintenance of life-saving appliances has been provided to the crew, the vessel owner/operator of an open boat, inflatable boat, rigid inflatable boat, or boat with a buoyant collar may keep the instruction manual on shore.

13.11 Drills, Training and Recording of Drills

On board training including practice fire and abandon ship drills shall be regularly routinely carried out by the crew. For vessels over 25 GT this shall be recorded in the Official Log Book.

Means of recovery of persons from water drills shall be regularly routinely carried out and recorded.

All crew on vessels shall have familiarisation training on Life-Saving Appliances and emergency procedures on board to ensure that they are able to respond effectively in emergency situations.

It is recommended that MOB drills are carried out in a range of daylight, low light (for example, dusk and weather conditions), which shall be noted in the Official Log Book.

13.12 Search and Rescue Locating Devices

Vessels shall be provided with a waterproof and electric signalling lamp and either:

- ♦ a waterproof and electric signalling lamp, and
- ♦ a searchlight, or
- ♦ a portable daylight signalling lamp with searchlight capability.

It is recommended that Vessels operating outside the areas covered by dedicated Search and Rescue (SAR) assets carry one or more of the following in addition to the EPIRB:

- ♦ a radar (traditional) SART
- ♦ an AIS-SART, or
- ♦ an EPIRB-AIS beacon.

13.13 Alternative Compliance Standards for Manned Rigid Inflatable Boats and Open Boats

For the purposes of this section the following definitions are provided:

'full risk assessment' means a written risk assessment that fully considers all risks that the vessel and persons on board could reasonably expect to encounter during operation. Where risks are identified in the risk assessment, mitigation to reduce any identified risk must be taken where possible.

'wearing of a lifejacket' means that all persons on board wear a SOLAS approved lifejacket. Where additional personal exposure protection clothing is worn, the lifejacket shall be suitable to be worn with that clothing. The lifejacket shall be fitted with a light.

'carrying of personal exposure protection clothing' means each person on board has the following:

- a dry suit, a flotation suit meeting EN ISO 15027-1, or other suitable foul weather clothing
- warm head wear, and
- where the dry suit, flotation suit meeting EN ISO 15027-1, or other foul weather clothing is not insulated, warm clothing worn beneath the dry suit, flotation suit meeting EN ISO 15027-1, or other suitable foul weather.

14 Fire Safety

The purpose of this section, alongside the requirements of Section 15 Fire Appliances, is to provide a level of fire safety for the vessel, which is designed to extinguish minor fires, prevent minor fires becoming major fires and in the event of the major fire permit enough time for the evacuation of the vessel. This section provides minimum requirements to maintain a level of structural integrity that ensures the vessel remains habitable following a minor fire.

14.1 Machinery Space

14.1.1 General

The machinery space shall be capable of being isolated to minimise the risk of fire extinguishing medium escaping.

The following shall be capable of being stopped from outside, or remotely to, a machinery space in the event of a fire:

- ♦ fans within machinery space(s)
- ♦ fans feeding machinery space(s)
- ♦ pumps transferring fuel or oil
- ♦ centrifuges, and
- ♦ any other equipment in areas identified to increase risk of fire acceleration.

Systems fitted with automatic fans which stop in the event of a fire shall have a manual override.

Linkages forming part of the remote operation for flaps, cut-offs and similar devices shall be of a fire-resistant construction and shall be unlikely to fail in the event of fire.

Materials stowed in a machinery space(s) must be:

- ♦ required for the operation of maintenance in the machinery space, and
- ♦ non-combustible.

Only non-combustible materials that are required for the operation and maintenance of machinery may be stowed in machinery space(s). Stowed materials in a machinery space(s) shall be adequately secured and shall not obstruct access to or from the machinery space(s).

In the machinery space windows shall only be fitted as an observation port meeting the following requirements:

- ♦ fitted only in an internal boundary bulkhead or door
- ♦ be non-opening.

Where it is impracticable to have a machinery space, the engine may be enclosed in an engine box.

14.1.2 Oily Wastes

A vessel shall have means to retain any oil leakage within the confines of the machinery space.

The machinery space shall be kept clean and clear of any oily waste, and all oily residues shall be collected and retained on board (for example, in a dedicated stowage tank) for discharge to onshore collection facilities.

14.1.3 Insulation

Any thermal or acoustic insulation fitted inside the machinery space and shall be of non combustible material(s).

Insulation shall be protected from damage and against impregnation by flammable vapours and liquids. Where insulation is cut, the edges shall be protected against such impregnation.

14.2 Open Flame Appliances and Gas Installations

Open flame gas appliances shall be designed and constructed for marine use.

Liquid gas appliances must be installed, used and maintained.

All combustible materials which do not have a surface spread of flame rating, shall not be positioned where they could combust by an open flame appliance. The following distance is recommended:

600 mm horizontally and/or vertically from the appliance, when the vessel is upright.

14.3 Liquid Fuel Appliances

Liquid fuel appliances shall only run on diesel.

Liquid fuel appliances shall be designed and constructed to meet the following general requirements:

- ♦ be suitable for marine use
- ♦ be able to operate at angles of 15 degrees in any direction
- ♦ have overheat control devices, and
- ♦ have a flame failure device if the fuel supply is pressurised, unless it is a wick type burner.

Appliances shall be installed in accordance with the appliance manufacturer's instructions. Any modifications to the appliance shall be done in consultation with the appliance manufacturer.

Diesel is the only fuel with a flashpoint under 60°C which is permitted for use in coolers or heating appliances. The use of petrol is not permitted for coolers or heating appliances.

Fuel tanks, fuel pipes and their installation for appliances shall be fitted in accordance with the requirements of sections 7.3.

Exhaust systems shall be installed in accordance with the appliance manufacturer's instructions. Exhaust systems and surrounding structures shall be arranged to allow heat dissipation and shall be insulated to prevent heat damage.

Appliances shall be installed so that the outgoing products of combustion pass through sealed ductwork terminating outside the vessel.

Operating controls for appliances shall be easily accessible and in a safe location to prevent the likelihood of injury.

In the event of fire, a space containing liquid fuel appliance(s) shall be capable of being isolated by means of a valve(s) operated from outside of the space.

Where user awareness for the safe operation of an appliance is required, a permanently legible sign shall be provided in the immediate vicinity covering:

- ♦ safe operation
- ♦ refuelling procedure (if applicable), and
- ♦ any unique hazards involved with its use.

Liquid fuel appliances must be installed, used and maintained in accordance with manufacturers requirements.

14.3.1 Stowage of Gas Cylinders

LPG cylinders, regulators and safety devices shall be stowed on the open deck (where leakage will not accumulate) or in a compartment that is vapour-tight to the vessels interior and fitted with a vent and drain, so that gas which may leak can disperse overboard.

The vent shall be installed near the top of the gas cylinder storage locker.

The drain shall:

- ♦ be located at the bottom of the gas cylinder storage locker
- ♦ run to the outside of the craft and terminate 75 mm or more above the 'at rest' waterline, and
- ♦ be not less than 19 mm in diameter.

The drain and locker ventilation shall be 500 mm or more from any opening to the vessel's interior.

The cylinders and associated fittings shall be secured against movement and protected from damage in any foreseeable event.

Any electrical equipment located in cylinder lockers shall be certified to a recognised standard for use in a potentially explosive atmosphere (See MIN 698).

14.3.2 Cylinders and Attachments

The supply pressure part of a liquid petroleum gas system shall be fitted with a readily accessible, manually operated isolation valve.

Where a liquid petroleum gas system utilises multiple cylinder installations, each cylinder shall be fitted with a shutoff valve and non-return valves located near the stop valves. Where there is a changeover device (automatic or manual) it shall be provided with non-return valves to isolate any empty cylinder.

Where multiple cylinders can supply a liquid petroleum gas system, the system shall not be used with a cylinder removed unless the unattached pipe is fitted with a suitable gas tight plug arrangement.

Cylinders not in use or not being fitted into an installation shall have the protecting cap in place over the cylinder valve.

A bubble leak detector shall be fitted in the gas outlet pipe as close to the cylinder as possible.

14.3.3 Appliances

All appliances shall be secured to avoid movement.

An appliance must be attended at all times unless it is an unattended appliance. All unattended appliances shall be of the room sealed type.

For the purpose of the Code, cookers and hobs are not classed to be unattended appliances.

14.3.4 Ventilation

Spaces containing gas consuming appliances and storage containers shall be adequately ventilated.

The gas detection system shall be tested frequently and maintained in accordance with the manufacturer's instructions.

Persons must not sleep in spaces where gas-consuming open-flame appliances are left burning, due to the risk of carbon monoxide poisoning.

14.4 Portable Petrol-Fuelled Equipment

Portable equipment powered by a petrol engine unless fully drained of fuel shall be stored on the weather deck, stowed in a deck locker or in a protective enclosure.

Where stowed in a deck locker or protective enclosure portable equipment powered by a petrol engine shall meet the following requirements to the satisfaction of the Flag State:

- ♦ be vapour tight to the vessel's interior
- ♦ be ventilated to atmosphere, and
- ♦ not openable from the vessel's interior.

A suitable receptacle shall be provided to collect any spillage which occurs during the filling and draining of a fuel tank for portable equipment powered by a petrol engine.

A safety warning sign shall be displayed by the stowage location of portable equipment powered by a petrol engine with details of any precautions to be taken when filling the fuel tank.

14.5 Assessment of Upholstered Furniture to Potentially Catch Fire

Upholstery covering fabrics shall satisfy the cigarette and butane flame tests in force at the time of initial certification.

For upholstered furniture and mattresses only Combustion Modified High Resilient (CMHR) foams shall be used.

14.6 Detection

14.6.1 General

All fire and gas detectors shall at a minimum be maintained and tested in accordance with the manufacturer's recommendations.

14.6.2 Fire Detection

Fire detectors shall be fitted in the following locations:

- ♦ machinery spaces
- ♦ accommodation spaces
- ♦ all spaces containing open flame, gas or liquid fuel appliances
- ♦ all areas of concentrated electrical equipment, and
- ♦ all other areas as identified by the Flag State as being at risk from fire.

Fire detector(s) shall be of an appropriate type to respond to potential hazard(s) (for example: smoke, flame).

Where a fire detector(s) is fitted it shall be audible from the space(s) concerned, the accommodation space(s) and the control position(s), and be capable of being heard with doors closed, machinery running and in all anticipated weather and operational conditions.

Machinery spaces shall be fitted with fire detector(s) which detect smoke and heat, or flame.

14.6.3 Carbon Monoxide (CO) Detection

Where open flame, gas or liquid fuel appliances are installed in, or adjacent to accommodation areas, a carbon monoxide (CO) detector(s) shall be fitted in accordance with the manufacturer's instructions for detection. CO detection is not required when heating or cooking is undertaken using electrical coolers or heaters.

Where a CO detector(s) is fitted it shall be audible from the space(s) concerned, the accommodation space(s) and the control position(s) be capable of being heard with doors closed, machinery running and in all anticipated weather and operational conditions.

A CO detector(s) shall be provided in spaces where exhaust gases may accumulate in the event of an exhaust leak.

14.6.4 Hydrocarbon Gas Detection

Any space which contains gas consuming appliances or into which flammable gas may be leak or accumulate, shall be provided with a hydrocarbon gas detector and alarm.

14.7 Means of Escape

All vessels shall have means of escape.

All escape routes shall be located so that a single hazardous event is not likely to cut-off all escape routes.

Any identified means of escape shall not endanger any person using it.

Any means of escape shall be clearly IMO marked and adequately illuminated for its purpose on both sides, and the function of each escape route shall be highlighted to the crew and passengers.

Two separate means of escape shall be provided in:

- ♦ accommodation spaces containing sleeping bunks
- ♦ any spaces identified as being at high risk from fire, and
- ♦ machinery or battery spaces except where:
 - usually unmanned during normal operation
 - any person entering and moving about the space is within 5 metres of the entrance at all times
 - the entrance gives ready escape, at all times, in the event of fire.

Where a hatchway or companion hatch opening is used as part of an escape route it shall be capable of being opened from both sides.

14.8 Fire Control and Safety Plan

Vessels shall have a fire control and safety plan(s) which shall be prominently displayed at the control position(s) and in a space accessible by all vessel users.

The fire control and safety plan(s) shall detail the following:

- ♦ the type and position of all fire appliances
- ♦ the location of fire detectors
- ♦ locations and means of control of systems and openings which shall be closed down in a case of a fire
- ♦ a procedure for persons on board to follow prior to or in event of activation of the fixed fire extinguishing system
- ♦ means of escape and any additional access points
- ♦ the location(s) of life-saving appliances, and
- ♦ the location(s) of embarkation stations and muster points.

The fire control and safety plan(s) shall be kept up to date.

Symbols used on the fire control and safety plan(s) shall comply with a recognised international standard where applicable.

15 Fire Appliances

The purpose of this section, alongside the requirements of Section 14 Fire Safety, is to provide a level of fire safety for the vessel, which is designed to extinguish minor fires, prevent minor fires becoming major fires and in the event of the major fire permit enough time for the evacuation of the vessel. This section provides minimum requirements to maintain a level of structural integrity that ensures the vessel remains habitable following a minor fire.

15.1 Fire Ports in Engine Boxes

For vessels installed with fire port(s) in engine boxes, fire extinguishing mediums shall be able to be discharged into the engine box without a person needing to enter the space.

Fire ports shall be:

- ♦ constructed of fire-resistant material
- ♦ appropriately sized and positioned to accept the discharge nozzle
- ♦ openable to provide access for discharge of the medium into the engine box, and
- ♦ labelled with “fire port” or an appropriate graphical symbol.

15.2 Portable Fire Extinguishers

15.2.1 General Requirements

Portable fire extinguishers shall be marked in accordance with the relevant national or international requirements.

Extinguishing media containing halons or per-fluorocarbons shall not be used.

Portable fire extinguishers shall be located within:

- ♦ 2 m from the main control position
- ♦ 2 m from any permanently installed open flame, gas or liquid fuel appliances
- ♦ 3 m from fire ports for inboard engines
- ♦ 3 m from outboard engines.

All portable fire extinguishers shall be readily accessible.

Portable extinguishers may be stored in a locker or other protected or enclosed space but shall remain readily accessible at all times. The locker or the enclosed space door shall identify that it contains a portable extinguisher.

Portable extinguishers not certified or listed for marine use which are located where they may be exposed to water shall have the extinguisher operating nozzle and triggering devices shielded. All portable fire extinguishers shall be serviced by a competent person.

15.2.2 Carbon Dioxide (CO₂) Fire Extinguishers

Portable carbon dioxide (CO₂) fire extinguishers may only be located in accommodation spaces where there is a risk of an electrical fire. The owner/operator shall consider the volume of carbon dioxide that could be released and the associated requirement for an appropriate means of ventilation in the event of discharge.

Portable carbon dioxide (CO₂) fire extinguishers shall not be located in accommodation spaces containing sleeping bunks.

A maximum of one portable carbon dioxide fire extinguisher may be located in an accommodation space.

Portable carbon dioxide fire extinguishers shall meet the requirements of an appropriate standard.

15.3 Fixed Fire Extinguishing Systems

15.3.1 General Requirements

Where a fixed fire extinguishing system is installed in a machinery space it shall be of a Flag State approved type appropriate to the space to be protected.

Fixed fire extinguishing systems shall meet the manufacturer's installation and maintenance requirements and shall be serviced at minimum on an annual interval or as per manufacturer's recommendations, whichever is more frequent.

Fixed fire extinguishing systems shall meet the vessels Flag State requirements.

Fixed fire extinguishing media are as follows:

- ♦ medium expansion foam
- ♦ high expansion foam
- ♦ carbon dioxide
- ♦ pressure water spraying
- ♦ water mist/water fog
- ♦ vaporising fluids (hydrofluorocarbons – HFCs)
- ♦ aerosols (solid pyrotechnic type).

Where activation of the fixed fire extinguishing system is automatic, or the cylinders containing extinguishing media are located within the machinery space, a visual alarm shall be displayed outside the machinery space and at the control position(s) during discharge of fire extinguishing media.

15.4 Fire Pumps

All vessels, must be fitted with:

- ♦ a power driven self-priming fire pump(s) which ensures that the fire main pressure and availability can be maintained following the loss of a machinery space, or
- ♦ in the case of one machinery space, an auxiliary emergency power supply must be provided to maintain fire pump pressure following the loss of the machinery space, or
- ♦ a hand fire pump(s) outside the machinery space (where fitting of a power driven self-priming fire pump(s) is impracticable).

Open boats, inflatable boats, rigid inflatable boats and boats with a buoyant collar of less than 8 m length not fitted with a substantial enclosure are exempt from the above fire pump requirements

A fire pump shall be fitted with sea and hose connections capable of delivering one jet of water to any part of the ship through a hose and nozzle.

Where a vessel has two independent power bilge pumps fitted (see 10.2.1), one of these pumps may be used as a fire pump where an accessible change-over arrangement is fitted. The ability to remove accumulated fire extinguishing water shall not be compromised, and contaminated bilge water shall not be pumped onto a fire.

15.5 Fire Hoses

All fire hoses shall be compatible with the onboard fire main connections.

15.6 Fire Blanket

A fire blanket shall meet the requirements of an appropriate standard.

A fire blanket shall be located close to any open flame or cooking appliance and shall be accessible for immediate use.

15.7 Fire Buckets

Where practicable or deemed necessary all vessels shall carry at least two fire buckets with lanyards long enough to reach the sea from the weather deck. Buckets shall be of suitable material and size for their intended service.

Larger vessels carrying multiple fire extinguishers and/or fixed fire extinguishing system(s) are considered to exceed the minimum required level of safety and are not required to carry fire buckets.

16 Radiocommunications Equipment

The purpose of this section is to set out requirements for **vessel** radiocommunications, including installation, operation, maintenance and testing.

16.1 The Global Maritime Distress and Safety System (GMDSS)

Equipment requirements for GMDSS ships vary according to the area (or areas) in which a ship operates. Coastal ships for example only have to carry minimal equipment if they do not operate beyond the range of shore based VHF stations (Sea Area A1). Ships which trade further from land are required to carry MF equipment in addition to VHF (Sea Area A2). Ships which operate beyond MF range are required to carry HF and/or Inmarsat equipment in addition to VHF and MF (Sea Areas A3 and A4).

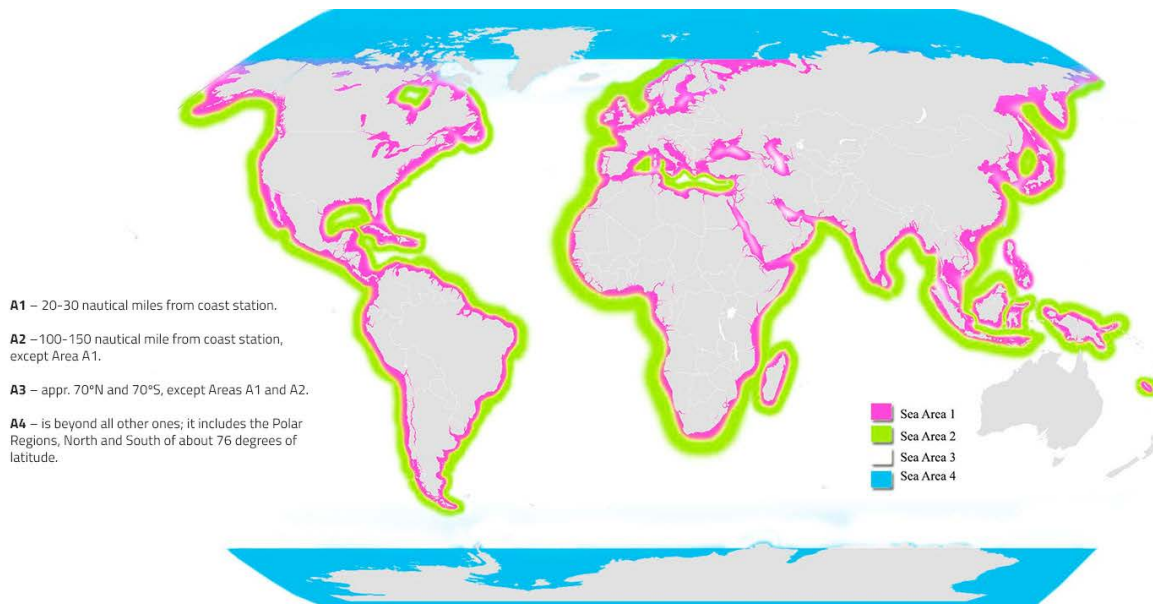


Figure 2 - GMDSS Sea Areas

16.1.1 Minimum Requirements

Every GMDSS ship is required to carry the following minimum equipment (as defined by SOLAS Chapter IV, regulation 7):

- ♦ a VHF radio installation capable of transmitting DSC on channel 70, and radiotelephony on channels 16, 13 and 6
- ♦ a SART (two on vessels over 500 GRT, one on vessels 300 – 500 GRT)
- ♦ a NAVTEX receiver, if the ship is engaged on voyages in any area where a NAVTEX service is provided
- ♦ an Inmarsat EGC receiver, if the ship is engaged on voyages in any area of Inmarsat coverage where MSI services are not provided by NAVTEX or HF NBDP, and
- ♦ a 406 MHz EPIRB; vessels trading exclusively in sea area A1 may fit a VHF DSC EPIRB in lieu of a 406 MHz EPIRB).

16.1.2 Equipment Carriage Requirements for GMDSS Sea Areas

The carriage requirements for the various GMDSS Sea Areas are defined in Chapter IV of SOLAS. Detailed guidelines when implementing new GMDSS installations on board SOLAS ships should be referred to IMO Circular COMSAR.1/Circ.32.

16.2 Radio Installation

Where practicable, aerials shall be mounted on the highest point on the vessel. A Flag State may accept alternative locations that provide at least equivalent levels of performance.

In areas where transmission quality may be reduced, vessel owners/operators shall consider alternative radio communications such as Medium Frequency (MF) or mobile satellite communications systems. Vessel owners/operators shall if required, seek advice from the local Port State Flag state on what equipment should be carried.

All radio installations shall be located to aid operational availability and be protected against damage.

Fixed radio installation(s) shall be clearly marked with the vessel's call sign, any other codes applicable to the use of the radio, and a Maritime Mobile Service Identity (MMSI).

Fixed radio installation(s) shall have a clear summary of the radio distress, urgency and safety procedures displayed in full view of the radio operating position(s).

Where batteries are used for the electrical supply to radio equipment, an alternative power supply shall be provided by either charging facilities which shall be capable of recharging batteries to required minimum capacity within 6 hours, or a back-up battery of capacity sufficient for the voyage.

The battery electrical supply to radio shall be located in a position not likely to flood in normal operations or in the event of minor damage to the **vessel**, and shall be arranged so that radio communications, as far as practicable, are not interrupted in adverse conditions including extremes of temperature and harmful effects of water.

When fully charged, the batteries shall provide at least the minimum required hours of operation to ensure effective use of the GMDSS installation.

16.3 Portable VHF Radio

A vessel shall carry at least one portable VHF radio fitted with a Digital Selective Calling (DSC) facility.

A portable VHF radio shall be capable of operation on Channel 16 and at least one additional voice channel in the international VHF marine band.

A portable VHF radio shall have brief and clear operating procedures provided if not already printed on the casing.

A portable VHF radio shall have means to attach to clothing or a lanyard with a low breaking strain safety link.

A portable VHF radio and spare batteries shall be protected against water damage, either by design or by a waterproof cover, to a depth of 1 metre for a period of 5 minutes.

A portable VHF radio, batteries and any waterproof covers shall not have any sharp projections that might damage a survival craft.

A vessel shall carry charging facilities or spare batteries able to provide at all times at least 8 hours of portable VHF radio operation. Batteries or seals shall be marked with an expiry date by the manufacturer and shall be in date.

Where a vessel is equipped with more than one liferaft, it shall carry one portable VHF per liferaft.

16.4 Emergency Position Indicating Radio Beacon (EPIRB)

Vessels required to carry a 406 MHz EPIRB shall be installed in a location so that it is capable of floating free and activating automatically if the vessel sinks. This location shall also be easily accessible so that it can be manually released and placed in a liferaft.

All EPIRBs shall be maintained in accordance with the manufacturer's recommendations. Batteries shall be replaced as required by a manufacturer approved service station.

16.5 Personal Emergency Radio Devices

A Personal Locator Beacon equipped with GPS and a light shall be worn by all crew members whilst working outside and in close proximity to open water.

PLB shall be of an automatic activation variety, if the PLB does not operate automatically then internal training shall be undertaken on its correct usage.

16.6 Test and Maintenance

A vessel owner/operator shall ensure that the radio equipment is tested and operating effectively prior to departure. Equipment shall be maintained regularly according to the manufacturer's instructions. Additionally, for Remotely Operated Unmanned Vessels testing shall be carried out following any power or communications outage either on the Remotely Operated Unmanned Vessel or at the Remote Operation Centre.

16.7 Radio Watches

A vessel, while at sea, shall maintain a continuous radio watch:

- ◆ on VHF Digital Selective Calling (DSC), on Channel 70
- ◆ for broadcasts of local Maritime Safety Information
- ◆ on VHF Channel 16
- ◆ on distress and safety DSC frequency 2187.5 kHz if fitted with a MF/HF DSC radiotelephone
- ◆ for satellite shore-to-ship distress alerts, if fitted with a terminal for a recognised GMDSS satellite service.

16.8 Ships' Radio Licence

A vessel shall be issued with a valid Ships' Radio Licence by the relevant authority.

16.9 Ships' Radio Survey

Where a vessel is fitted with GMDSS radio equipment, the vessel owner/operator shall undertake a survey of the radio installation every 5 years. The survey shall be undertaken by an organisation authorised by the Flag state to perform a survey of code vessel radio equipment. A Statement of Compliance may be issued by the authorised organisation upon successful completion of the radio survey. As per Resolution A.1156(32) of the IMO.

17 Navigation Lights, Shapes and Sound Signals

The purpose of this section is to set out requirements for navigation lights, shapes and sound signalling appliances.

All vessels shall comply with the requirements of the IMO convention on *The International Regulations for Preventing Collisions at Sea, 1972* (COLREGS).

Where full compliance is impracticable Flag State requirements shall at all times be adhered to.

As provided for in rule 33(b) of the COLREGS, a vessel of less than 12 metres in length shall not be obliged to carry the full sound signalling appliances, but shall be provided with some other means of making an efficient sound signal.

Table 1 is a summary table of common navigation lights, shapes and sound signalling appliance requirements. This Table is not exhaustive, does not cover all possible operations, and is for guidance only.

Table 1 – Common navigation lights, shapes and sound signalling appliance requirements

Overall length	Power driven vessels when underway	At anchor ^{1,3}	Not under command ⁶	Aground	Sound signalling appliances
Less than 7m	All round white + sidelights ^{1,2,3}	Required ^{4,5}	Not required ^{6,9}	Not required	Means to make an efficient sound signal required
7m – 12m	All round white + sidelights ^{1,7} or Masthead + sidelights ¹ + stern light or (if lights have to be offset from centreline) combined lantern sidelights plus either all round white or masthead and stern light	Required ^{5,8}	Not Required ⁹	Not required	Means to make an efficient sound signal required
12m – 20m	Masthead + sidelights + stern light	Required ^{5,9}	Required ^{5,7}	Required ^{5,7,8}	Whistle required
20m – 24m	Masthead + sidelights + stern light	Required	Required	Required ⁸	Whistle and bell required approved by UK nominated bodies

- 1 Range of sidelight is 1 mile.
- 2 Vessels with a maximum speed of 7 knots shall, if practicable, show sidelights.
- 3 By night a round white light where most visible. By day one black ball (0.6 metres in diameter) in the fore part.
- 4 Compliance with point 3 is only required when anchored in or near a narrow channel, fairway, anchorage or where other vessels normally navigate.
- 5 Size of the daytime shapes may be reduced commensurate with vessel size.
- 6 A vessel not under command shall exhibit:
 - (i) two all-round red lights in a vertical line where they can best be seen
 - (ii) two balls or similar shapes in a vertical line where they can best be seen
 - (iii) when making way through the water, in addition to the lights prescribed in this paragraph, sidelights and a stern light
- 7 The distances for the lights may be reduced to one metre apart and two metres above the hull (weather deck).
- 8 By night two round red lights in a vertical line two metres apart, plus a round white light (see point 3). By day three black balls (0.6 metres diameter) in a vertical line.
- 9 Vessels of less than 12 metres in length which are engaged in diving operations shall exhibit the lights and shapes prescribed in point 6.

Notes

- a) Sidelights and stern light shall have a range of 2 miles unless indicated otherwise.
- b) All round white lights, lights used at anchor and where not under command shall have a range of 2 miles.
- c) Vessels of 7 to 12 metres shall have a masthead light range of at least 2 miles.
- d) Vessels of 12 up to 20 metres shall have a masthead light range of at least 3 miles. Vessels of 20 to 24 metres shall have a masthead light range of at least 5 miles.
- e) For open boats vertical height shall be measured from the gunwale. For rigid inflatable boats, inflatable boats and boats fitted with a buoyant collar vertical height shall be measured from the top of the collar or tubes.

18 Navigation

The purpose of this section is to set out requirements for the safe navigation of a vessel.

18.1 General

All navigational equipment shall be routinely tested and maintained in accordance with the manufacturer's instructions.

18.2 Compass

A vessel shall be fitted with a properly adjusted suitable magnetic marine compass with consistent deviation

At the discretion of the Flag State alternative arrangements may be of an equivalent standard to a magnetic compass, recommendations include:

- ♦ be independent of the vessel's main power supply
- ♦ have means of determining the ship's heading
- ♦ have means of displaying the ship's heading at the control position(s), and
- ♦ have means of correcting headings and bearings to true at all times (for example, a valid deviation card).

The compass, alternative device or a repeater:

- ♦ shall be clearly readable at all times at the main steering position, and
- ♦ means shall be provided for taking bearings as nearly as practicable over an arc of the horizon of 360 degrees.

Each magnetic compass shall be properly adjusted and its deviation card available at all times.

Magnetic compasses shall be adjusted when:

- ♦ they are first installed
- ♦ they become unreliable
- ♦ the vessel undergoes structural repairs or alterations that could affect its permanent and induced magnetism
- ♦ electrical or magnetic equipment close to the compass is added, removed or altered, or
- ♦ a period of two years has elapsed since the last adjustment and a record of actual compass deviations has not been maintained, or the recorded deviations are excessive or when the compass shows physical defects.

In a steel vessel it shall be possible to correct a magnetic compass for coefficients B, C and D and heeling error.

A record of a vessel's compass deviation shall be maintained.

Lighting shall be provided to ensure the compass can be read in restricted visibility.

18.3 Nautical Publications

Charts and nautical publications shall be kept up to date and accessible for the entire duration of the voyage.

Charts shall be sufficient scale and detail to display:

- ♦ all relevant navigational marks
- ♦ known navigational hazards, and
- ♦ where appropriate, information concerning ship's routing and ship reporting schemes.

Electronic Chart Display and Information System (ECDIS) or an electronic chart plotting system which complies with the requirements of the Flag State or Port State may be accepted as an alternative to the requirements of carriage of paper charts.

As per the requirements for paper charts, electronic charts shall be maintained up to date at all times.

18.4 Signalling Lamp

A vessel shall be equipped with a waterproof electric lamp suitable for signalling.

18.5 Echo Sounder

All vessels shall be fitted with an echo sounder, or other effective means to measure the available depth of water.

18.6 Radar Reflector

A vessel shall be provided with a radar reflector of an appropriate standard. A radar reflector shall be fitted on the vessel in accordance with the manufacturer's instructions.

If the radar cross sectional area of the boat is larger than the passive reflector standard then the carriage of a reflector is not required.

Vessels shall be equipped with:

- ♦ an electronic position fixing system GPS (global navigation satellite system) or a terrestrial radio-navigation system, or other automatic means suitable for use at all times throughout the intended voyage)
- ♦ a distance measuring log or means to accurately access distance travelled
- ♦ a 3cm radar on an appropriate standard shall be fitted (radars for vessels designed to operate at speeds over 30 knots shall comply with the Flag State marine equipment regulations; where radar is equipped with automatic target tracking then a suitable transmitting heading device shall be fitted), and
- ♦ a suitable Automatic Identification System (AIS) transceiver.

19 Anchors and Cables

A vessel shall be equipped with anchor(s) and cable(s) to grip the sea bottom and hold the vessel at the desired position.

19.1 Anchoring Systems

A strong securing point shall be located on the foredeck or equivalent structure, and where appropriate a fairlead or roller shall be located at the stem head.

Mechanical means shall be provided for handling the anchor where an anchor mass is more than 30 kg.

Anchors are to be rigged ready for use.

19.2 Anchors

The design, material, strength and form of the anchor and its attachments to the anchor cable shall be approved by the Flag State.

Where a vessel has an unusually high windage (as a result of a high freeboard, a large rig, large deckhouses or superstructures, or other factors), the mass of the anchor and the anchor cable diameter shall be increased to account for the increased wind loading.

For vessels intended to be engaged in any towing, the vessel owner/operator shall consider carrying an increased anchor mass and corresponding cable size. The increased anchor mass and cable size should be suitable for the additional mass of the towed object, in case the vessel is required to anchor whilst towing. This should be referenced in the vessels towing plan/procedure.

19.3 Cables

Anchor cables shall be formed from steel wire, rope, chain or a mixture of these materials. But must meet the following minimum requirements:

- ♦ that it is certified
- ♦ regularly inspected and maintained.

Anchor steel wire rope shall be fitted with thimbles at both ends.

The bitter end of the anchor cable shall be secured to the vessel's structure and shall be capable of being released in an emergency.

All vessels shall have second/spare anchor.

20 Accommodation and Recreational Facilities

20.1 Maritime Labour Convention

All vessels accommodation and recreational facilities shall be constructed according to the Maritime Labour Convention (MLC) 2006 requirements.

- ♦ *Option A* – It would be primarily expected that all vessels shall comply and be certified to/ with MLC 2006.
- ♦ *Option B* – For vessels flagged by countries not ratified to the convention or vessels under 500GT working domestically the Flag State regulations shall as a minimum apply at all times.

As a minimum standard this shall include:

- ♦ Heavy items of equipment shall be secured firmly to avoid movement either during normal conditions, or when the vessel is subjected to sudden acceleration, deceleration, or a large angle of heel or trim.
- ♦ Stowage lockers containing heavy items shall have lids or doors which can be securely fastened.
- ♦ Mechanical ventilation shall be provided to all accommodation spaces below the weather deck:
 - where an air conditioning system(s) is not fitted
 - where 9 or more persons are berthed below the weather deck, or
 - for vessels engaged on long international voyages or operating in tropical waters.

Such mechanical ventilation shall be in good working order.

Where a vessel is fitted with a galley there shall be secure and hygienic storage for food and garbage in the vicinity.

All hot water supply systems shall be appropriately designed, installed and maintained for the pressure and temperature at which they are intended to operate.

All vessels fitted with marine toilet(s) shall have suitable receptacle(s) for the safe disposal of non flushable sanitary wastes.

Accommodation shall provide decent living conditions and recreational facilities for all persons on board, and shall not be exposed to excessive vibration or noise.

The materials used for construction of internal bulkheads, panelling and sheeting, floors and joints shall be suitable for the purpose and conducive to ensuring a healthy environment.

An adequate supply of drinking water shall be provided and easily accessible in locations throughout the accommodation spaces.

An emergency reserve supply of drinking water shall be carried, sufficient to provide at least 2 litres per person.

A vessel not fitted with a toilet able to be used at sea shall have a procedure in place to provide safe access to and use of toilet and sanitary facilities throughout the duration of the vessels intended operation.

A vessel shall have adequate dry stowage facilities for the clothing and personal effects of each person on board.

An electric lighting system shall be installed which is capable of supplying adequate light to all enclosed accommodation spaces.

Persons employed onboard a vessel shall have a valid Seafarer Employment Agreement.

For spaces where seafarers are expected to stand for prolonged periods, the minimum headroom shall be 190 centimetres.

All accommodation spaces shall be adequately heated and insulated for the intended area of operation and anticipated weather conditions.

Where a sleeping room(s) is adjacent to a machinery space(s), galley(s), storeroom(s), drying room(s), or communal sanitary space(s), there shall be a bulkhead between spaces with a door that can be locked.

In seafarer accommodation, wherever possible, the maximum number of persons per sleeping room is to be two. Where cots are provided for seafarers, they shall have a minimum inside dimension of either:

- ♦ not less than 190 centimetres in length and not less than 70 centimetres in width, with no tapering, where the Flag State is satisfied that this is reasonable and will not result in discomfort to the seafarer, or
- ♦ not less than 198 centimetres in length and not less than 80 centimetres in width over half the length of the cot. A taper is permitted from half the length of the cot towards the foot of the cot but under no circumstances is the cot permitted to be narrower at any point than 50 centimetres.

In spaces where sanitary or galley facilities are provided there shall be ventilation that draws from the accommodation and extracts to the open air.

All floors intended for personnel movement shall have a non-slip surface and provide a good foothold.

Where galleys are fitted, all furniture and fittings shall be made of a material which is resistant to absorbing dirt and moisture. All metal parts of furniture and fittings shall be rust resistant.

A means of preventing seafarers from falling out of their bunk shall be provided where appropriate.

Each set of sanitary facilities shall be provided with a door that is lockable.

Where a sanitary system is fitted with a holding tank it shall be designed to ensure that any fumes from the holding tank are not released into the sanitary space if the water seal of the toilet is broken.

21 Protection of Personnel

The purpose of this section is to set a minimum required level of safety to ensure protection of all personnel on board. There are a number of additional regulations which set out requirements for protection of personnel and it remains the responsibility of the vessel owner/operator to comply with the requirements of these regulations.

21.1 Health and Safety at Work

The vessel should comply with, and adhere to, the applicable local health and safety regulations.

21.2 Structural Requirements and the Carriage of Equipment

21.2.1 Deckhouses

A deckhouse's construction shall be of an appropriate strength to withstand the sea and weather conditions likely to be encountered in the intended area of operation.

21.2.2 Bulwarks, Guardrails and Handrails

There shall be sufficient hand holds and grab rails throughout the vessel, both internally and externally, to allow safe movement when the vessel is underway.

Where persons are required to work or access the deck of a vessel, the vessel shall be fitted with either bulwarks or guardrails (including the use of taut guard wires); where fitted, guardrails and guard wires shall be supported by stays or stanchions.

Where guardrails or guard wires are not fitted, other means of protection shall be installed where open deck edges are present, such as portable or fixed jackstays secured to strong points.

Where open deck edges are present, in snap back zones or areas where moving deck machinery is operating, a notice shall be prominently displayed that clearly indicates that passengers are not permitted in the restricted area.

For an open boat, boat with a buoyant collar, inflatable boat or rigid inflatable boat where it is not possible to fit bulwarks, handrails or guardrails there shall be handgrips and toeholds provided to ensure safety of all persons on board in the range of the sea and weather conditions likely to be encountered in the intended area of operation.

21.2.3 Prevention of Injury, Due to Falling

Each person who may be required to work in an area where there is a risk of injury due to falling, shall be provided with a certified and fitted safety harness. This includes the rigging of pilot ladders and offshore transfer attendants.

Fastening points for the attachment of safety harness lifelines shall be provided at all locations where a fastening point(s) would mitigate the risk of injury from falling.

21.2.4 PPE and Clothing

Each person on board a vessel shall have:

- ♦ protective clothing appropriate to the prevailing air and sea temperatures that provides protection from precipitation and spray from the sea
- ♦ personnel protective equipment (PPE) shall be provided for all personnel, including high visibility, as per G+
- ♦ safety footwear with slip resistant soles and protected toes.

All persons onboard, operating in areas with a sea surface temperature of 10 degrees Celsius or less shall hold an appropriately fitting, and certified immersion suit or a dry suit.

21.3 Safety and Transfer of Personnel

All persons shall have a safe, clear access to the embarkation station.

A designated embarkation area shall have sufficient hand holds, foot holds and/or grab rails to allow safe access.

A safety briefing shall be provided prior to departure to all persons engaged in transfer operations. See Safety Management.

Ambient sea conditions and whole body vibration shall be continually assessed throughout the voyage.

Individual ergonomic seating shall be provided for all persons on board vessels operating at high speed or in a planing mode. A comprehensive risk assessment shall be carried out to identify and implement appropriate mitigation measures to reduce the effects and impacts of vibration including (but not limited to) seat belts, headrests, footrests, movable armrests and shock absorbent seating.

21.3.1 Industrial Personnel Requirements

Before commencing any voyage, the Master shall ensure that any industrial personnel:

- ♦ are engaged and on board for transport for the purposes of offshore industrial activities
- ♦ are able-bodied and meet appropriate medical standards
- ♦ have received basic safety training, according to relevant industry standards
- ♦ have an understanding of the layout of the ship and the handling of the vessel's safety equipment before departure from port (for example, through a safety briefing)
- ♦ are equipped with appropriate Personal Protective Equipment (PPE) suitable for the risks to safety such personnel are likely to experience on the forthcoming voyage (for example, immersion suits)
- ♦ declare any quantities of dangerous goods carried onboard as personal effects, and stow these as appropriate.

Industrial personnel that do not meet all of the requirements, may be transported as passengers, subject to an overall limit of 12 passengers being carried within the total number of persons on board.

22 Medical Care

The purpose of this section is to set out the minimum requirements for medical stores to be carried on board a vessel and to define the liability of a vessel owner for medical care.

22.1 Medical Stores

The requirements for medical stores are:

- ♦ Vessels certified to operate an unlimited distance from a safe haven shall meet the requirements for Category of Medicines and Medical Stores A.
- ♦ Vessels certified to operate up to 150 nm from a safe haven shall meet the requirements for Category of Medicines and Medical Stores B.
- ♦ Vessels certified to operate less than 60 nm from a safe haven shall meet the requirements for Category of Medicines and Medical Stores C.

A vessel owner/operator shall ensure that medical stores are carried in accordance with the latest flag state and local national requirements.

A vessel owner/operator is responsible for the cost of any medicine and medical equipment, including periodic replacements in order to keep stocks of any required medicines in date and immediately useable.

The Master shall manage the medical store and ensure it is kept in a good condition. Alternatively, the Master may designate a competent person to manage the medical store.

A vessel certificated for operation further than 60 nm from a safe haven shall carry an annually reviewed checklist of the medical stores kept on board.

Vessel's certified to operate less than 60 nm from a safe haven shall carry medical stores stored in a sealed kit or cupboard, in an easily accessible safe place, which shall be inspected as part of the vessel's planned maintenance system.

Where carrying a specific item(s) is impractical or unsafe, this may be omitted subject to satisfactory risk assessment and medical advice from a qualified medical practitioner or pharmacist. Where any item is omitted, this shall be stated on the checklist.

If the vessel carries dangerous goods, the vessel's owner/operator shall ensure that the additional medical requirements are met.

22.2 Vessel Owner's Liability for Medical Care

A vessel owner has liability to meet the following:

- ♦ Where a passenger requires medical care beyond the scope of first aid trained crew, the vessel's owner/operator shall as soon as reasonably practicable provide onshore access to medical care.
- ♦ Where a member of the crew requires prompt and adequate medical, surgical, optical or dental treatment which cannot be provided on board, the vessel's owner shall as soon as reasonably practicable provide onshore access to medical care at no cost to a crew member.
- ♦ For crew members who are ill or injured during, or as a result of, employment on the vessel, the owner shall pay for the medical care and any related expenses for accommodation or upkeep as per MLC.

23 Tenders and Daughter Craft

The purpose of this section is to define permitted use and requirements for vessels to operate as mother vessels and daughter craft, and ensure a level of safety for tenders which are launched and recovered from mother vessel(s) or shore/platform based facilities.

23.1 Mother Vessels

A mother vessel is any vessel which leads, serves, or carries tenders, and may provide a safe haven for a daughter craft.

Where a mother vessel or shore/platform-based facility carries its tender(s) onboard, it shall have lifting equipment capable of safely launching and recovering the tender in any sea or weather conditions anticipated in the mother vessel's intended area of operation or in the location of the shore/platform based facility.

23.2 Tenders

23.2.1 Daughter Craft (with Mother Vessel Restriction)

For the purpose of this Code, Daughter Craft (with Mother Vessel Restriction) are vessels which are towed or carried on board specifically for off-ship working on the business or support of the mother vessel.

For a vessel to operate as a Daughter Craft (with Mother Vessel Restriction) it shall:

- ♦ be limited to operations no more than 10 miles from the mother vessel regardless of a tender's certified area category of operation
- ♦ be limited to daylight hours in favourable weather regardless of a tender's certified area category of operation
- ♦ have a risk assessment of the operation and equipment carried as per requirements where applicable.

23.2.2 Daughter Craft (Unrestricted by Mother Vessel)

For the purpose of this Code, Daughter Craft (Unrestricted by Mother Vessel) are independent vessels which support the main working business of the mother vessel and are specifically designed to be carried on board.

For a vessel to operate as a Daughter Craft (Unrestricted by Mother Vessel) it shall:

- ♦ be issued with its own flag state safety certificate independently of the mother vessel
- ♦ not use the mother vessel as a safe haven
- ♦ be separately named from the mother vessel
- ♦ be limited to its own distance from a safe haven, irrelevant to its mother vessel
- ♦ have risk assessments and documented procedures for all foreseeable operations
- ♦ have its own independent equipment carried as per the requirements of this code

- ♦ be designed and constructed in such a way to allow the crew to access and operated the release/lifting equipment in a safe way without risk of falling overboard or crushing, and
- ♦ ensure all external equipment be suitably situated, or otherwise protected, to prevent damage via lifting equipment or launching facilities.

23.3 Daughter Craft Launched and Recovered from Mother Vessels or Shore/Platform-Based Facilities

Where a daughter craft is required to be launched and recovered by lifting or via a ramp, its hull structure shall be designed and constructed to withstand the expected range of static and dynamic loads.

Where a daughter craft is required to be launched or recovered by lifting, it shall be fitted with lifting points that correspond with the construction of the vessel. Additional factors of safety and operational limitations shall be considered if personnel will be on board the tender during lifting. Preferably one point lifting hook.

Where a daughter craft is required to be launched or recovered by lifting, proof load tests and inspections shall be carried out to verify the functionality of:

- ♦ the lifting structures of the daughter craft, and
- ♦ the safe operation of the lifting device, its foundation and supporting structures.

Tests shall be conducted in accordance with the manufacturer's recommendations for the installation. Such tests shall be repeated after any modifications (including any structural modifications).

24 Cargo Carrying, Lifting, High Speed and Bow Push Up Operations

The purpose of this section is to set out the minimum additional requirements for vessels which intend to undertake any of the following operations:

- ♦ cargo carrying
- ♦ lifting (including diver lifts)
- ♦ high speed or planing mode
- ♦ bow push up.

24.1 Cargo Carrying Operations

All cargo shall be stowed and secured in a manner which will not adversely affect the safe operation of the vessel.

A vessel shall have adequate cargo support and securing arrangements appropriate for all intended modes of operation.

Stowed cargo shall not obstruct accessways or walkways, drainage of water from the deck or restrict visibility from the wheelhouse.

24.2 Lifting Operations

24.2.1 Vessels Fitted with Lifting Devices

A vessel intending to operate lifting equipment shall comply with the applicable local and flag state safety requirements

Lifting operations shall be undertaken only where the manufacturer's operating manual and instructions on safety procedures to be followed have been provided by the vessel owner/operator to the master and crew, and the Flag State is satisfied that any lifting operations do not endanger the vessel or any persons on board.

Means shall be provided for the efficient securing of cargo and any loose equipment on board during lifting operations.

A non-decked vessel (example: RIBS & open boats) shall not be fitted with a crane or other lifting device(s).

24.2.2 Safety of Lifting Operations

The vessel owner/operator shall conduct a risk assessment before any lifting operation or examination or testing of lifting equipment is carried out.

The vessel owner/operator shall have a formally documented test procedure, with records/evidence to be maintained onboard the vessels of periodic testing being carried out.

An inclinometer or other on-board device to display heel angle to the crane or lifting device operator shall be used when controlling the lifting items of unknown weight. The heel angle shall not exceed the maximum permitted by the vessel's stability information booklet.

A prominent clear notice shall be displayed on or near the crane or lifting device and contain the following information and instructions:

- ♦ the maximum permitted load and outreach which satisfy the requirements of the Flag State or the Safe Working Load (SWL), whichever is the lesser, and
- ♦ details of all accessways leading below the weather deck which shall be securely closed prior to undertaking lifting operations.

A crane or lifting device with a working load which varies with its operating radius shall have visible means provided to the operator at all times to determine the radius of load lifting attachments and safe working load.

Where a load is required to be lifted, that is either wet due to weather or storage conditions, or has been submerged in water prior to the lifting operation taking place, the Master shall give due consideration to the additional unknown weight of the load. Where a load is being lifted from the seabed consideration shall be given to marine growth, suction and snagging.

Vessels fitted with more than one crane and/or lifting device(s) shall:

- ♦ have documented procedure(s) in place for safe operation where crane(s) and/or lifting device(s) are operated simultaneously
- ♦ have stability calculations for safe operation of multiple cranes and/or lifting device(s) included in the stability information booklet.

Every vessel shall conduct a risk assessment by the vessel owner/operator to determine whether risks to persons located below deck during lifting operations have been acceptably reduced and mitigated.

24.2.3 Testing and Maintenance of Lifting Devices

Load tests and inspections to verify the safe operation of the lifting device, its foundation and supporting structures shall be carried out in accordance with Flag State and local regulations. Tests shall be conducted in accordance with the manufacturer's recommendations for the installation. Such tests shall be repeated after any modifications (including any structural modifications).

A thorough examination of the lifting device, including functional tests, shall be carried out annually, records shall be maintained and be available for inspection.

Where a land-based hydraulic crane that is not supplied with marine environment features is installed, it shall be subject to a more frequent inspection and maintenance schedule, suitable for the environment and usage. This increased inspection regime shall include inspection of electrical connectors and components, drive train, structural components, fasteners and wire ropes.

24.3 Vessels Fitted with Diver Lifts

When conducting a heel test for a vessel fitted with a diver lift, the vessel shall be tested in the fully loaded condition with the lift system deployed in the air, with the maximum intended number of fully equipped divers and shall comply with stability requirements of this Code.

A Safe Working Load (SWL) shall be assigned based on the specific diving operations and calculated using a minimum weight of 150 kg per diver. The overload test shall be carried out at 2 x SWL.

Where a vessel is fitted with a lift system on a transom, it shall not cause a reduction in freeboard at the aft end of more than 50% of the minimum permitted freeboard when deployed in air with the maximum intended number of fully equipped divers.

Precautions shall be taken to ensure safe means of access from the water and that the diver and/or equipment is protected from damage/injury or endangerment, and that the lift is controlled when in motion.

All practicable precautions shall be taken during diving operations to minimise the risk of persons in the water receiving injury from rotating equipment.

Where a diver lift is planned to be installed or modified, the following considerations shall be made:

- ♦ the strength of the vessel's construction
- ♦ the stability of the vessel
- ♦ the integrity of the bulwarks.

24.4 High Speed or Planing Mode Operations

A vessel owner/operator shall carry out a risk assessment for all high speed or planing mode operations.

The vessel owner/operator shall ensure that vessels have individual inboard seating for all persons on board that allow them to effectively brace themselves and provide lateral support, which shall be located so that persons avoid the greatest shock loads.

All persons on board shall remain seated (or stood over jockey seats, as appropriate) during high speed or planing operations unless moving about the vessel for a specific purpose authorised by the Master.

On a rigid inflatable boat, boat with a buoyant collar, inflatable boat or open boat persons shall only be seated in designated inboard seats (this excludes the gunwale or the tubes of a boat fitted with a buoyant collar).

24.5 Bow Push Up Operations

Where a vessel is intended for operations to transfer any persons or cargo over the bow, the bow structure shall be suitably arranged and strengthened for this purpose.

Where a vessel is intended for the transfer of persons over the bow, it shall be equipped with suitable foredeck and bow fendering arrangements, including but not limited to, handrails, 'step-across' arrangements and flush deck fittings positioned within walkways.

Bow structures supporting fenders for bow push up operations shall be of suitable strength and be constructed not to yield or buckle under the design loads intended.

Bow structures shall be designed for contact with a boat landing, as defined in IMCA Standardised boat landing research report.

Main propulsion machinery, shaft bearings, engine mounts, propellers and rudders shall be suitably arranged and strengthened to take into account contact shock loading and to minimise vibrations.

25 Towing and non-Self-Propelled Vessels

The purpose of this section is to set the minimum additional requirements for vessels engaged in towing or the requirements for non-self-propelled vessels, it is not intended to serve as comprehensive guide to towing for vessels primarily designed for towing operations (for example, tugs).

25.1 General

The definition of towing includes three specific towing methods as outlined below:

- ♦ by a towline about which the towing vessel is free to manoeuvre such that there is a risk of girting, particularly where the towline is attached towards amidships, it could adopt an angle to the towing vessel and provide a capsizing moment
- ♦ side by side with the towing vessel firmly attached alongside the towed vessel or floating object, so as to be able to manoeuvre as if one vessel
- ♦ fore and aft with the bow of the towing vessel firmly attached to the stern of the towed vessel or floating object, so as to be able to push, pull or manoeuvre as if one vessel.

A vessel engaged in towing shall be of a design to ensure safe and effective towing operation.

The requirements of this section do not apply to vessels towing in an emergency situation (force majeure).

A vessel's towing equipment shall be serviced in accordance with the manufacturer's recommended service schedule but with no more than 12 months between services. Certification of servicing shall be made available for inspection.

A vessel owner/operator shall carry out a regular detailed examination of the towing gear, including but not limited to the winch/posts structure welds and/or retaining bolts. This shall form part of a documented procedure for the inspection, maintenance and routine testing of all towing equipment which shall also be made available for inspection.

A vessel owner/operator shall have a documented procedure for the inspection, maintenance and routine testing of all towing equipment.

A Towage Survey shall be carried out by a competent person prior to the vessel undertaking towing operations. For the purposes of this section, a competent person may be a warranty surveyor, a Flag State examiner or another person engaged or employed by the owner/operator having the necessary experience and training to carry out such a survey.

Where a vessel is intended to be engaged in towing the safety of the towing operation shall be assessed prior to departure.

25.2 Risk Assessment of Towing Operations

The owner/operator of a vessel engaged in towing operations shall have a risk assessment and plan of towing operations for every voyage where towing is undertaken and shall include the following risk mitigating actions:

- 1) weather, sea state and environmental conditions likely to be encountered during the planned voyage
- 2) any restrictions applicable to the towed object that may limit the safe speed
- 3) limitations of towing equipment in use at the time of the planned voyage
- 4) adequate towline length and control systems
- 5) effectiveness of communications between vessel undertaking towing
- 6) and a towed vessel or floating object
- 7) safety of personnel during towing operations
- 8) the means of safe access to a vessel undertaking towing, a towed vessel or floating object
- 9) the availability of safe havens on the planned route, and
- 10) adequate accommodation, emergency escape provisions and equipment including life-saving appliances and fire appliances where a towed vessel or floating object is intended to be manned at sea.

Where area(s) of risk not covered by paragraph 1) of the above list is identified, mitigating action(s) shall be included and implemented as part of the risk assessment.

Table 2 – Towing Arrangements Requirements

	Vessels towing up to and including twice its displacement	Vessels towing more than twice its displacement
Design of towing arrangements	The design of towing arrangements shall minimise the overturning moment due to the lead of the towline.	
Towing preparation	Whilst undertaking towing a vessel engaged in towing and a towed vessel shall ensure that the following are secured in closed position, blanked or sealed: 1) accessways 2) windows, and 3) external appliances. All accessways shall be marked '<i>Not to be opened during towing operations</i>' on both sides.	
Towing equipment	A vessel shall be provided with a towline of minimum breaking strain of 2.5 x bollard pull, and of not less than the length and diameter of the spare anchor cable. Where practicable, the towline shall be buoyant. Towing at sea by towline shall only be done using a towing hook, towing winch or towline.	
Release mechanism	A vessel engaged in towing shall have a positive means of safe and rapid release in all anticipated operating conditions.	
Emergency release mechanism	A vessel shall have a documented and drilled procedure and means to release the tow which shall be demonstrated to the approval of the Flag State.	
		The release mechanism shall be controlled and tested from all control positions including the winch and hook itself where practicable. Where the release mechanism is able to be operated at the tow hook or winch it shall be: 1) of the direct mechanical type, and 2) capable of independent operation from the release mechanism system, and 3) independent of normal powered operation.
Towing arrangements load	The towing arrangements (including any item and equipment of the vessel used for the purpose of towing and any supporting structure) shall be strong enough to withstand the loads imposed during towing operations.	
Towing winch	A towing winch shall be able to withstand a force equal to the breaking load of the tow line acting at its maximum height above the deck, without over-stressing either the winch or the deck connections.	
Towing winch break	The towing winch brake shall be capable of preventing the towline from paying out when the towing vessel is towing at its maximum continuous static bollard pull and shall not release automatically in case of power failure (but shall be capable of release).	
Towing on a line	The winch line shall be secured to the winch drum by methods which allow the tow to be fully released under loads only. The towline shall be connected by a weak link to the drum to allow it to run free in an emergency	

25.3 The Towed Vessel or Floating Object

A vessel may only tow another vessel or floating object to sea from a point of departure in the UK which has been surveyed and issued with an appropriate conditional Load Line or Load Line Exemption Certificate for the towed voyage by the flag state, which shall be displayed on board the vessel. The certificate shall be displayed on board the towing vessel and the Tow Master shall be provided with a copy.

Where due to the nature of the vessel displaying the certificate is impracticable, this certificate shall be made available on shore for inspection by a relevant authority and by users of the vessel. A floating object being towed may require a condition survey.

A vessel may only tow an object where that object is not manned, unless that object has accommodation designed to be occupied at sea, appropriate life- saving appliances, fire safety and emergency escape provisions.

The towed object may be boarded at sea for the purpose of inspection or maintaining safe navigation where a means of safe access from the vessel engaged in towing or a support vessel is provided to the tow. The location and means of boarding should be suitable for both for daylight and night-time operations. Where transfer of crew is necessary, appropriate personal protective equipment shall be worn.

A towed vessel or floating object shall be equipped with:

- ♦ two lifebuoys and lines
- ♦ an anchor and cable suitable for holding the tow in an emergency, and
- ♦ a pre-rigged emergency towline suitable for continuing the tow in an emergency.

Where a towed vessel in a "dead ship" condition is required to be manned, then proposals shall be submitted to the Flag state stating the reason, proposed manning, provision of lifejackets, survival suits and direct communication methods with the vessel engaged in towing.

A towed vessel or floating object shall be assessed to establish a suitable margin of safety on the (positive) stability and freeboard for the towed voyage.

Where any quantities of oil and pollutants are carried on board these shall be restricted to the minimum required for safe operation of the voyage.

25.4 Non-Self-Propelled Vessels

25.4.1 General

Unmanned, non-self-propelled vessels of defined rigid form (barges) which are a working platform for equipment and/or power producing plant, shall be assessed for compliance with the parts of the Code which are appropriate to its commercial operation.

A non-self-propelled vessel shall have Load Line marking in accordance with this code with the exception of scale of draught marks which are not required.

A non-self-propelled vessel shall be marked at the forward end with one or more white bars 2000 mm in length and 150 mm high (or alternative marking which is clearly visible from the towing vessel).

The purpose of this section is to set out the minimum safe manning requirements for the number of the crew members and their qualifications necessary to ensure the safe operation of a vessel.

A vessel shall be safely manned, as a minimum, in accordance with *IMO Principles of minimum safe manning* (resolution A.1047(27)) which highlights that safe manning is a function of the number of qualified and experienced seafarers necessary for the safety and security of the ship, crew, passengers, cargo and property and for the protection of the marine environment. In addition, it highlights that the ability of seafarers to maintain observance of relevant requirements is also dependent upon conditions relating to training, hours of work and rest, occupational safety, health and hygiene and the proper provision of food and that international acceptance of broad principles as a framework for flag states to determine the safe manning of ships would materially enhance maritime safety, security and protection of the marine environment.

25.5 Minimum Manning and Qualifications Requirements

All licences and Certificates of Competency (CoCs) shall be appropriate to the vessel's area and type of operation.

Anyone employed or engaged in any capacity onboard a vessel shall complete the required Flag state approved mandatory training courses. If completion of the relevant mandatory courses cannot be demonstrated to the satisfaction of the Flag State, then the vessel may be detained by the Port State.

Anyone employed or engaged in any capacity onboard a vessel shall hold a valid medical fitness certificate.

A Certificate of Competency or Service shall not, on its own, be regarded as evidence of the ability to serve in a particular rank on a specific vessel. The vessel owner/operator shall ensure that there are sufficient trained personnel on board to work the vessel having due regard for the type of vessel, type of operation, and duration of the voyage.

All Certificates of Competency shall be revalidated in accordance to the Flag State and / or certifying authorities requirements. The validity shall be clearly displayed.

A vessel shall carry at least one person qualified for distress and safety radio communication. The qualified person shall hold a valid certificate of competence appropriate to the area of operation and issued by the relevant authority.

25.6 Single-Handed Operations

Single handed operations are not recommended.

A vessel shall not undertake single handed operations unless permitted by the Flag State. The Flag State may permit a vessel to undertake single handed operations where the following criteria are met:

- ♦ the Flag State is satisfied it is necessary for the vessel to undertake single handed operations
- ♦ the Flag State is satisfied that the vessel is suitable for single handed operations due to the size and arrangements of the vessel
- ♦ the vessel does not meet any of the following criteria:
 - the vessel requires a watch system to maintain safe navigation
 - the vessel engages in towing
 - the vessel is a Dedicated Pilot Boat or holds a Pilot Boat endorsement, and is undertaking Pilot boat duties

- the vessel is involved in the transfer of personnel at sea
- the vessel is used as a diving platform.

A vessel that has been permitted by a Flag State to undertake single handed operations shall not undertake a single handed operation in conditions of restricted visibility and it is recommended that single handed operation shall not exceed 6 hours in duration.

Where a vessel is permitted to undertake single handed operations, a vessel's Workboat Certificate shall be endorsed with the following: *"Suitable for single handed operation"*.

Where a workboat with a Pilot Boat Endorsement is permitted to undertake single handed operations, the conditions on the Certificate shall be endorsed so that it is clear that the vessel shall not be used for single handed operations when undertaking pilot boat duties.

In all cases where single handed operations take place the vessel owner/operator and the Master shall be satisfied that it is safe to do so and shall at a minimum meet the following requirements:

- ♦ a lifejacket which meets the requirements of paragraph 13.5 shall be worn at all times by the Master
- ♦ a 406 MHz personal locator beacons (PLB) with GPS and a light shall be worn by the Master at all times
- ♦ no overside working shall take place whilst the vessel is being operated single handed
- ♦ details of the time and point of departure, voyage plan and the Expected Time of Arrival (ETA) of every single-handed voyage shall be left with a person ashore who shall be notified of the safe arrival on completion of each voyage
- ♦ communication shall be made with the person ashore or with a vessel
- ♦ in company at agreed regular intervals, and
- ♦ all inflatable boats, boats fitted with a buoyant collar, rigid inflatable boats and open boats that achieve planing speed (including tenders) shall meet the requirements of 7.2.

25.7 Keeping a Safe Navigational Watch

The Master of a vessel shall ensure that the watchkeeping arrangements are adequate for maintaining a safe watch or watches, taking into account the type of vessel, the type of operation, the duration of the voyage, and any prevailing weather or sea state conditions likely to be encountered.

26 Training Requirements

26.1 Minimum Manning and Qualification Requirements

The vessel owner/operator shall ensure that the crew are appropriately trained in accordance to STCW Part A, or equivalent.

26.2 Dangerous Goods Training

26.2.1 General

A vessel owner/operator shall keep a record of all dangerous goods training. This record shall be available to the employee, competent authority or Flag State.

The owner/operator of a vessel engaged in the transport of dangerous goods, shall ensure that the crew receive the appropriate carriage of dangerous goods training in accordance with Chapter 1.3 of the IMDG Code.

26.2.2 IMDG Carriage of Dangerous Goods Training

The vessel owner/operator must determine:

- ♦ members of crew required to be trained
- ♦ the required level of training, and
- ♦ appropriate training methods.

Where a crew have not yet received an appropriate carriage of dangerous goods training, they are only permitted to perform functions under the direct supervision of a trained person.

The carriage of dangerous goods training shall be supplemented with refresher training to take account of changes in regulations and practice. The Flag State may audit the vessel owner/operator to verify that the system in place, effectively provides training for the crew roles and responsibilities.

26.2.3 General awareness/familiarisation training in transport of dangerous goods

All crew shall receive a general awareness/familiarisation training in transport of dangerous goods.

26.3 Training for lithium-ion batteries and lead-acid batteries used as a source of power for propulsion

Training requirements for the safe operation of lithium-ion batteries and lead-acid batteries used as a source of power for propulsion shall be detailed in the vessel's operating manual and shall cover, at a minimum:

- ♦ normal operation
- ♦ maintenance, and
- ♦ how to rectify common faults and issues.

27 Carriage and Transfer of Dangerous Goods

The purpose of this section is to set out requirements for vessels which are engaged in the carriage of dangerous goods and transfer arrangements for Marine Gas Oil (MGO).

27.1 General

For the purposes of the section all goods carried on board which are not included as part of ship's stores are considered to be cargo.

A vessel which is engaged in the carriage of dangerous goods shall comply with the following:

- ♦ the International Maritime Dangerous Goods (IMDG) Code.

A vessel must be certified by its flag state to carry Dangerous goods under the IMDG Code in order to carry packaged Dangerous Goods above officially specified "limited quantities".

The local Port State and statutory authority may have different Dangerous Goods Carriage and Declaration requirements than the Flag State of the vessel. A vessel where bulk cargo is loaded into and carried in the vessel's hold or tanks is considered to be a small tanker or a bulk carrier and does not fall under the provisions of the IMDG Code.

Before transporting or loading Dangerous Goods on board a vessel, the vessel owner/operator shall undertake a Carriage of Dangerous Goods Risk Assessment, this Risk Assessment shall include at least the following:

- ♦ the types of Dangerous Goods to be carried, including their quantities
- ♦ the carriage of additional safety equipment
- ♦ number of persons on board
- ♦ structural fire protection
- ♦ fire suppression
- ♦ separation between dangerous goods and accommodation
- ♦ stability, and
- ♦ positioning of life saving appliances, assembly stations and emergency exit routes.

When a vessel is carrying dangerous goods, a designated person on shore shall be aware of details of the voyage, have a list of contact numbers for the emergency services and hold sufficient details of all the dangerous goods being carried on board so to assist the emergency services in being able to respond to any incident involving the vessel.

The designated person shall be employed by the vessel owner/operator.

A vessel owner or designated person shall retain on shore a manifest of the dangerous cargo being carried, and shall at a minimum include:

- ♦ the UN Number
- ♦ the Proper Shipping Name
- ♦ the Packing Group, and
- ♦ the quantity of each dangerous good being carried.

27.2 Stowage and Segregation Requirements

Dangerous goods shall be secured firmly to avoid movement either during normal conditions, or when the vessel is subjected to sudden acceleration, deceleration, or a large angles of heel or trim.

Dangerous goods shall be packed in accordance with the IMDG Code.

27.3 Scuppers and Drains

Scupper and drainage arrangements shall drain overboard and shall have no connections to internal spaces.

27.4 Electrical Equipment

Electrical equipment and the associated installation located in the area(s) of the vessel where dangerous goods are carried shall be either certified to an appropriate standard for the dangerous goods being carried, or shall be securely isolated during the carriage of dangerous goods.

27.5 First Aid Kit Requirements

A vessel carrying dangerous goods or their residues shall comply with the IMDG Code and the guidance in the IMO Medical First Aid Guide for use in accidents involving Dangerous Goods (MFAG) (Current Edition).

27.6 Transfer Arrangements of Marine Gas Oil (MGO)

For the purpose of this section, Marine Gas Oil is defined as UN1202 gas oil or diesel fuel or heating oil.

Light oil fuel is as defined in Regulation 12A.3.1 of MARPOL Annex I. Where light oil fuel is being transferred, it is considered to be dangerous goods under the IMDG Code.

27.7 Oil Spillage Prevention

A vessel shall carry on board an up to date plan of mechanisms to deal with oil spillage during the transfer of oil within the vessel and from the vessel to the receiving facilities. The plan shall be approved by the Flag State where the Flag State is satisfied the plan complies with MEPC 54(32).

A vessel owner/operator shall carry out a risk assessment for transfer of oil operations. The risk assessment shall include but not be limited to:

- ♦ the hose not breaking free
- ♦ pollution

- ♦ fire safety, and
- ♦ training.

A vessel owner/operator shall have documented procedures which detail the loading, discharging, handling and transferring of fuel. The documented procedures shall be kept on board at all times.

All fuel, and products posing a risk to the environment shall be documented in a record book or log book.

A vessel shall carry suitable clean up equipment which shall be readily available when transferring fuel. Drains and scuppers shall be plugged during fuel transfer operation(s) to prevent oil entering the water.

Fuel pump(s) for the transfer of oil shall have an emergency shut-down button which is easily accessible from a permanently manned position during fuel transfer operation(s).

A vessel shall have suitable stowage provided for fuel transfer hoses.

Fuel transfer hose(s) shall:

- ♦ have a dry break coupling fitted
- ♦ comply with a suitable standard
- ♦ be bonded, and
- ♦ be of a suitable type for the product being transferred, system pressure and height of usage.

Fuel transfer hose(s) shall be maintained to a good condition and shall be inspected at minimum on an annual interval or as per the manufacturer's recommendations, whichever is more frequent. Worn or damaged hoses shall be replaced.

27.8 Vessels Engaged in MGO Transfer

This section applies to vessels engaged in the MGO transfer from the vessel's own fuel tank, or transfer of more than 1000 litres of MGO from portable tank(s) or Intermediate Bulk Containers (IBCs).

A vessel may only be permitted to engage in MGO transfer operations where the following requirements are met:

- ♦ the vessel meets the relevant requirements of this section and shall be subject to satisfactory examination by the Flag State
- ♦ the Certificate shall be endorsed to permit this operation, and
- ♦ the suitability of the vessel to be used for MGO transfer operations shall be reported by the Flag State to the Flag state.

A vessel which is engaged in MGO transfer from the vessel's own fuel tank(s) shall comply with MARPOL requirements.

A vessel's owner/operator shall keep a record of MGO transfers including times, start and finish, quantities on board and quantities transferred.

A vessel which is engaged in MGO transfer from the vessel's own fuel tank(s) shall have metering or equivalent arrangements and documented procedure(s) in place to ensure that sufficient fuel remains on board for all normal and emergency operations.

All crew on vessels engaged in MGO transfer operation(s) shall be trained in bunkering and transferring operations. The training shall at the minimum include the following:

- ♦ safe use of the equipment to minimise fire risks and pollution
- ♦ identifying the appropriate weather conditions in which to use the equipment required to undertake the operation, and
- ♦ use of an up-to-date Safety Data Sheet (SDS) provided by the fuel supplier, and which is specific to the fuel carried on board the vessel.

27.9 Vessels Engaged in Transfer of MGO and Other Products Posing a Risk to the Environment from a Portable Tank(s) or Portable and Fixed Intermediate Bulk Container(s) (IBC)

For the purpose of this Code, a portable tank is one that is not permanently attached to the vessel and which is not used as the vessel's own fuel tank(s). Portable tanks and IBCs shall be considered as cargo and meet the relevant requirements of section 24.1.

This section applies to vessels engaged in the transfer of MGO and other products posing a risk to the environment in a portable tank(s) or IBCs of less than 1000 litres.

Vessels engaged in transfer of more than 1000 litres shall meet the requirements of 27.8

For the purpose of this section products other than MGO posing a risk to the environment are defined as:

- ♦ other oils (UN 3038)
- ♦ any other product identified to cause or have the potential to cause harm to the environment (for example, lubricating oils).

A portable tank or IBC shall meet the constructional requirements of the IMDG Code for the carriage of MGO, UN1202, oils classified as dangerous goods or products other than MGO posing a risk to the environment.

A portable tank or IBC which is intended to be lifted shall meet the requirements of *MSC.1/Circ.860 – Guidelines for the Approval of Offshore Containers Handled in Open Seas*.

The Flag State shall be satisfied that the vessel's structure in the proposed stowage locations for portable tanks or IBC are suitable for the carriage of cargo and will not fail under the anticipated loading conditions and expected dynamic forces imposed whilst operating in the vessel's certified area category of operation, and during landing of the tank units on board.

Where a filling operation of any portable tank(s) is carried out on board, the filling and transfer equipment must meet the following requirements:

- ♦ filling and transfer equipment shall be fitted with an automatic shut off function to prevent overfilling. The tank filling and venting arrangements shall be compatible with the automatic shut off function, and shall prevent water ingress
- ♦ a portable tank shall be fitted with continuous level gauging of a type, which if damaged, will not result in leakage
- ♦ powered pumps shall be provided with a remote stop in a suitable location
- ♦ portable tank shall be provided with a suitable receptacle to prevent spillage of MGO over board.

If not considered within a vessel's stability assessment, the vessel's owner/operator shall carry out a separate stability assessment on the impact of the tanks on the vessel's stability (including free surface effect).

27.10 Carriage of Dangerous Goods by Industrial Personnel or Passengers

The vessel owner/operator shall ensure that any dangerous goods carried by industrial personnel or passengers shall be declared to a member of the crew at the point of embarkation.

Any dangerous goods carried by industrial personnel or passengers shall be included in the quantities permitted. Dangerous goods must be stowed in accordance with these requirements.

A vessel owner/operator shall bring this requirement to the attention of all persons on board – that is, by providing relevant signage posted at the point of embarkation.

28 Prevention of Pollution

The purpose of this section is to ensure that the standards set by *The International Convention for the Prevention of Pollution from Ships* (MARPOL) are complied with, to ensure prevention of marine pollution from vessels.

28.1 Oil Pollution Prevention

All vessels shall comply with *MARPOL Annex 1 – Prevention of pollution of oil*, as appropriate.

No discharge into the sea shall contain chemicals or other substances in quantities or concentrations which are hazardous to the marine environment.

28.2 Sewage

Vessels to comply with *MARPOL Annex IV – Prevention of pollution by sewage from ships*, as applicable.

A vessel which is not required to comply with MARPOL Annex IV and operates in an area(s) where the direct overboard discharge from a water closet is prohibited shall be fitted with a 'holding tank' of sufficient capacity to store waste for discharge to shore facilities.

28.3 Garbage

All vessels shall comply with *MARPOL Annex V – Prevention of pollution by garbage from ships*.

All vessels are prohibited from discharging garbage into the sea, with limited exceptions. Under certain conditions discharge into the sea of food wastes, animal carcasses, cleaning agents and additives contained in hold washwater, deck and external surface washwater and cargo residues which are not considered to be harmful to the marine environment is permitted.

28.4 Air Pollution

Vessel shall comply *MARPOL Annex VI – Prevention of air pollution from ships*, as appropriate.

All vessels installed with marine diesel engines constructed after 1st January 2000 with a power output greater than 130 kW shall be issued with an Engine International Air Pollution Prevention (EIAPP) Certificate and a Technical File, a copy of which shall be presented to the Flag State and shall remain on the vessel's file.

29 Safety Management

The purpose of this section is to outline the Safety Management System requirements which are appropriate and applicable for workboats.

29.1 Safety Management System

All vessel owner(s)/operator(s) operating under this Code shall implement a Safety Management System (SMS) which is proportionate with the size and complexity of the vessels and the company or owner/operator's operations. The SMS shall consider both terrestrial and marine aspects as appropriate to the vessels and company's operations. See for details of the areas which must be addressed by an SMS.

Below sets out how to develop and implement an appropriate and proportionate Safety Management System based on the requirements that can be found within the International Safety Management Code.

29.1.1 General

A Safety Management System shall include:

- ♦ Safety and Environmental Protection Policy
- ♦ Risk Assessment for Safe Working
- ♦ Health and Safety Protection Policy
- ♦ responsibilities of the Master and Personnel
- ♦ training of Personnel
- ♦ procedures to ensure safe operation of a vessel
- ♦ emergencies
- ♦ reporting of accidents
- ♦ maintenance of the vessel and equipment, and
- ♦ review.

29.1.2 A Safety and Environmental Protection Policy

A Safety and Environmental Protection Policy must address the following, as they affect the company and its staff, both onshore and onboard:

- ♦ health
- ♦ safety
- ♦ working environment, and
- ♦ the environment

29.1.3 Risk Assessment(s) for Safe Working

The vessel owner/operator shall produce an effective Risk Assessment(s) which shall identify risks to personnel, vessels and the environment. The outcomes from the risk assessment(s) shall inform the development of safe systems of work.

29.1.4 Health and Safety Protection Policy

The vessel owner/operator shall produce a Health and Safety Protection Policy. It is the responsibility of the vessel owner/operator to ensure that the policy is complied with, and that the responsibilities are understood.

A competent person(s) shall be delegated to take responsibility for health and safety, and that person(s) shall be clearly identifiable to all personnel.

The vessel owner/operator shall develop and uphold a policy on prevention of alcohol and drug abuse.

29.1.5 Responsibilities of the Master and Personnel

Clear lines of responsibility and authority shall be established for all personnel.

The Master must have authority at all times to make decisions with regard to the safety of the vessel and the persons on board. There shall be a written statement confirming the authority of the Master.

All personnel have a duty to take care of themselves and any other persons who may be affected by their acts or omissions.

29.1.6 Person Ashore

The vessel owner/operator shall, in relation to each vessel owned by it or for which it has operational responsibility, designate a person ashore who shall be responsible for monitoring the safe operation of the vessel and, so far as it may affect safety, the efficient operation of the vessel.

The person ashore shall:

- ♦ take such steps as are necessary to ensure compliance with the Safety Management System, and
- ♦ ensure that proper provision is made for the vessel to be adequately manned, equipped and maintained, relating to safety applicable to the vessel.

The vessel owner/operator shall ensure that the person ashore:

- ♦ is provided with sufficient authority and resources, and
- ♦ has appropriate knowledge and sufficient experience of the operation of vessels, and
- ♦ shall have access to the appropriate level of management resource(s) within the company to fulfil the role.

29.1.7 Training of Personnel

All personnel shall receive training appropriate to the tasks they undertake. It is the responsibility of the vessel owner/operator to ensure that this training is given, and that the personnel have an understanding of the relevant regulations and rules.

Prior to the first occasion of working on the vessel, each worker must receive appropriate familiarisation training and proper instruction in on board procedures. This shall at the minimum include:

- ♦ emergency drills and MOB recovery
- ♦ mooring and unmooring
- ♦ launching and recovery of survival craft
- ♦ evacuation from all areas of the vessel
- ♦ donning of lifejackets, and
- ♦ use and handling of fire-fighting equipment.

29.1.8 Procedures to Ensure Safe Operation of a Vessel

Procedures shall be developed and documented for the operation of the vessel. These shall at the minimum include:

- ♦ testing of equipment, including steering gear, prior to commencing a passage
- ♦ navigation and handling of the vessel
- ♦ maintenance routines
- ♦ bunkering operations
- ♦ watertight/weathertight integrity
- ♦ stability of the vessel
- ♦ conduct of passengers and crew while on board, and
- ♦ emergency towing.

29.1.9 Safety Briefing

Before commencing any voyage the Master shall ensure that all persons on board are briefed, as a minimum on the:

- ♦ stowage and use of personal safety equipment such as lifejackets, thermal protective aids and lifebuoys, and
- ♦ procedures to be followed in emergencies.

In addition to the requirements above, the Master shall brief at least one other person on board about:

- ♦ the location of liferafts and the method of launching
- ♦ the procedures for the recovery of a person from the sea
- ♦ the location and use of pyrotechnics
- ♦ the procedures and operation of radios carried on board
- ♦ the location of navigation and other light switches
- ♦ the location and use of firefighting equipment
- ♦ the method of starting, stopping and controlling the main engine
- ♦ the method of navigating to a suitable port of refuge, and
- ♦ the location of Stability Guidance Booklet and Stability Information Booklet, where applicable.

Safety cards are considered to be an acceptable way of providing the above information.

29.1.10 Emergencies

Clear procedures for responding to emergency situations shall be understood by all personnel, and shall at the minimum include:

- ♦ fire
- ♦ flooding
- ♦ collision
- ♦ grounding
- ♦ violent act
- ♦ main propulsion or steering failure
- ♦ man overboard
- ♦ abandon ship
- ♦ medical emergency
- ♦ aid to other vessels, and
- ♦ enclosed space rescue if applicable.

The roles and responsibilities of all personnel in an emergency situation shall be clearly defined.

All **vessels** shall be equipped with a continuously available communication system (including during emergency situations) which shall enable communication with the emergency services via a shore base. A shore base may be the company office ashore, the local Coastguard, Police or Fire Station, or another office as may be agreed between the vessel and the shore base.

Emergency situations likely to be encountered shall be considered by the vessel owner/operator.

Exercises shall be carried out in the handling of the identified emergency situations and evacuation from the vessel. The exercises shall be recorded. The names of those who participated shall also be recorded.

Where possible, all personnel shall be involved in these exercises, both on shore and on board.

29.1.11 Reporting of Accidents

A clear procedure for reporting any accidents shall be understood by all personnel.

The vessel owner/operator shall report any accidents to the Flag state and the company must therefore have a procedure in place.

All accidents and near-misses shall be recorded and reported to the vessel owner/operator who shall implement corrective action.

29.1.12 Maintenance of the Vessel and Equipment

The vessel owner/operator shall develop documented procedures for a more detailed inspection and maintenance program for the vessel and its equipment. The frequency of the required inspection and maintenance shall be determined by the vessel owner/operator. All inspections and maintenance activities shall be recorded.

29.1.13 Review

The vessel owner/operator shall undertake a management system at least once every three years.

29.2 Cyber Security

A vessel's owner/operator shall implement cyber security measures to protect the vessel and crew from risks associated with cyber-attacks.

The required extent of cyber security measures shall be commensurate with the size, complexity and type of operation of the vessel, and shall be determined by the vessel owner/operator and shall be made available for inspection.

Cyber security measures shall include at a minimum:

- ♦ identification of the systems, assets, data and capabilities which would impact vessel operations if disrupted
- ♦ established roles and responsibilities of those managing cyber-risks
- ♦ measures to minimise risks and defend against cyber-attacks
- ♦ means to successfully detect a cyber-attack in a timely manner
- ♦ resilient means to restore key systems
- ♦ means to ensure that critical back-up systems maintain functionality during a cyber-attack
- ♦ measures to successfully back-up and restore critical systems following a cyber-attack.

A vessel owner/operator shall carry out a cyber-security risk assessment which shall at a minimum include:

- ♦ information technology (IT) systems
- ♦ operation and control technology (OT) systems
- ♦ remotely operable equipment
- ♦ communication systems, and
- ♦ crew responsibilities in the event of a cyber-attack.

This risk assessment shall be carried out where alterations are made to any of the above, or at least every five years.

Where a cyber security system identifies an attack or potential risk(s) it shall be alerted at the control position(s).

An electronic log shall be kept by the vessel owner/operator of:

- ♦ systems which are permitted to be remotely accessed, and
- ♦ all occurrences of remote access.

A vessel owner/operator shall have a back-up plan which will allow the vessel to reach a safe haven in a safe and responsible manner or enter a safe state following a cyber-attack. Back-up files required to resume safe operations following a cyber-attack shall be located on board the vessel.

Annex 1 – Alternative Fuels and Propulsion Systems

This Annex provides all the additional information needed for vessels that use lithium-ion batteries or lead-acid batteries as a source of power for propulsion (whether exclusively, or in conjunction with diesel fuel in a battery-hybrid propulsion system) and shall be referred to alongside the main body of the Code. In this Annex lithium-ion batteries and lead-acid batteries are collectively referred to as batteries, unless where specified.

Where a Flag State considers it does not have the necessary expertise relating to vessels which use lithium-ion batteries or lead-acid batteries as a source of power for propulsion, the Flag state shall be consulted with regard to the procedures to be adopted.

1 Ventilation

The purpose of this section of this Annex is to provide the additional ventilation equipment and component requirements for battery-hybrid or battery-electric powered vessels, including thresholds for effective ventilation of battery boxes and battery rooms relevant to battery capacity.

1.1 General Requirements

See section 8.3.2 in the main body of the Code for general requirements for ventilation.

It is the responsibility of the vessel owner/operator to ensure that the ventilation arrangements are in accordance with the battery manufacturer's recommendations.

Active or passive ventilation of battery boxes and battery rooms shall be separate from other on-board heating, ventilation or air conditioning systems.

Any failure or fault in a ventilation system shall activate an auditory and visual alarm at the control position(s).

Positive isolation devices shall be designed to remain operable in event of equipment failure or emergency conditions.

All batteries used for a source of power for propulsion shall be stored in battery boxes or battery rooms (see section 3.1 of this Annex). Battery boxes and battery rooms shall be adequately ventilated, by either passive or active ventilation, to prevent the build-up of explosive or toxic gases.

A power-driven active ventilator shall be connected to a back-up power source which automatically activates if the primary power source fails.

1.2 Ventilation Equipment

Exhaust ducts shall, during normal operations, prevent exhaust gases, rainwater or seawater from being drawn through air intakes.

Ventilators and ventilation fans located within, or feeding, battery boxes and battery rooms shall be composed of Ex-rated and non-static materials and components, and shall be of a construction suitable to withstand any corrosive gases which may be produced by the batteries.

Dedicated active or passive ventilation ducting shall be used to discharge off-gassing from batteries to the open air and shall be located at a height above deck sufficient to prevent inadvertent downflooding if the vessel is heeled.

Back-up batteries that power active ventilators during emergency conditions must not be stored within the area(s) that they ventilate.

1.3 Ventilation of Battery Boxes and Rooms

Batteries located in a battery box may be ventilated by either:

- ♦ passive ventilation, where battery off-gas would not produce an explosive atmosphere; or
- ♦ active ventilation;

Batteries located in a battery room shall be ventilated by active ventilation.

The required number of air changes per hour for a battery box or battery room shall be calculated using:

$$\text{Air changes per hour} = \alpha 60 / \beta \gamma$$

Where:

α = airflow per minute (m^3)

β = total area of the battery box or battery space

γ = height of the ceiling in the battery box or battery space

A battery box or battery room shall not have less than 6 air changes per hour.

If a fire is detected ventilators shall stop automatically, except in the presence of an explosive atmosphere. Ventilators shall be able to continue operating safely in the presence of an explosive atmosphere.

For active ventilation, air inlet(s) and an exhaust outlet(s) shall be positioned to ensure effective distribution of air through the space.

Where the required ventilation or battery storage location cannot be met due to being impracticable or unsafe, alternative arrangements providing an equivalent level of safety may be considered on a case-by-case basis by the Flag state.

2 Battery-Electric Propulsion

The purpose of this section of this Annex is to provide requirements and standards for the operation, monitoring, charging, and replacement of lithium-ion batteries or lead-acid batteries used as a source of power for propulsion, and requirements for battery management, power management and cooling systems which manage and stabilise battery conditions.

2.1 Approval of Battery-Electric Propulsion Systems

The design and installation of the propulsion system and batteries shall be suitable for marine use with due consideration of humidity, temperature, degradation due to a saltwater environment and vibration.

2.2 Testing and Assessment of Batteries and Associated Systems

For newbuilds a risk assessment shall be carried out by the vessel manufacturer.

For retrofitted vessels a risk assessment shall be carried out by the vessel owner/operator.

The risk assessment shall be submitted to the Flag State for consideration, and shall be submitted by the Flag State to the Flag state for approval. The risk assessment shall, at a minimum, assess all risks associated with the following components and systems:

- ♦ batteries;
- ♦ battery management system;
- ♦ battery box or battery room;
- ♦ spaces surrounding battery boxes or adjoining battery rooms;
- ♦ charging system;
- ♦ fuses and cables;
- ♦ switchgear
- ♦ alarms and shutdowns;
- ♦ required sensors and detectors (see section 3.2 of this Annex);
- ♦ fire suppression system;
- ♦ passive or active ventilation;
- ♦ fire extinguishers (if appropriate);
- ♦ cooling system (if installed); hybrid power management system (if installed);
- ♦ interfaces with other vessel systems; and
- ♦ any sensors, detectors, safety measures or other equipment installed in excess of the requirements of the Code.

The risk assessment shall consider the components of the batteries and connected systems both individually and as an entire operating unit, and shall be carried out either as part of, or in addition to, the risk assessment required in section 3.9 of the Code.

Batteries intended to be used as a source of power for propulsion shall be tested at cell, module and system levels.

Batteries are permitted to be used as emergency batteries or engine start batteries.

An intention to test batteries shall be notified to the Flag State and Flag state with reasonable notice, and the Flag State may require that a surveyor witness the battery tests.

The Flag state may appoint an surveyor, or other designated person, to witness battery tests.

2.3 General Requirements

A battery-electric powered vessel shall have sufficient charged capacity for its intended area category of operation. A battery-hybrid powered vessel shall be provided with a combination of sufficient charged capacity and fuel for its intended area of operation.

The components of batteries, connected systems and installations shall be designed to protect the vessel, other equipment and any persons on board against electrical hazards, and shall be suitable for marine use.

Vessel owner/operators shall keep a copy (whether a hard-copy or electronic) of the battery manufacturer's instructions for use. Where it is not practicable to keep the instructions on board, it may be retained on shore.

Batteries and its connections shall have ingress protection with a minimum IP44 rating which is appropriate to the risks associated with the:

- ♦ location in which the batteries are installed; and
- ♦ risk of ingress.

The following information shall be clearly detailed in the operating manual, and shall be available at the control position(s). Internationally recognised signage shall be used where appropriate:

- ♦ battery cell chemistry;
- ♦ fire suppression system requirements and method of operation;
- ♦ maximum charging and discharging characteristics;
- ♦ safe upper and lower ambient temperature;
- ♦ what protective device(s) and/or safety feature(s) are installed, if applicable; and
- ♦ battery manufacturer's name.

Means shall be provided to isolate the batteries from outside, or remotely to, the battery box or battery room.

Lead-acid batteries shall comply with the requirements of this Code.

2.4 Installation of batteries and electrical equipment

Battery boxes and battery rooms shall be located away from high risk factors including, but not limited to, critical components, fuel tanks, fire hazards, escape routes and life-saving apparatus, and shall not be located in front of a collision bulkhead. Where, due to the size of the vessel, this is not practicable alternative arrangements providing an equivalent level of safety may be considered on a case- by-case basis subject to the approval of the Flag state.

Batteries approved by the battery manufacturer to be safely co-located with other equipment within a battery box or battery room may be co-located with the following:

- ♦ critical equipment;
- ♦ fuel tanks;
- ♦ fire hazards; and
- ♦ electrical equipment

Subject to completion of a risk assessment carried out by the vessel owner/operator and submitted via the Flag State to the Flag state for consideration and approval.

Batteries and the BMS shall be located in a position not likely to flood during normal operation, or in the event of minor damage (see section 8.3.2 of the Code).

Batteries shall be secured firmly (such as within mounting frames) to avoid movement either during normal conditions, or when the vessel is subjected to sudden acceleration, deceleration, or a large angle of heel or trim.

Batteries shall be positioned and secured to minimise exposure to mechanical damage, slamming accelerations or excessive vibration.

Battery casing shall be composed of flame-retardant and moisture resistant materials.

Batteries and the BMS shall:

be fully compatible with the electromagnetic emissions they will be exposed to during a vessel's anticipated range of operating conditions; and

not produce electromagnetic emissions that will affect the operation of all other equipment on board the vessel.

Batteries shall be positioned so that all parts requiring inspection or replacement whilst in service can be safely accessed.

Batteries shall be protected against overheating even when disconnected from a power source or isolated.

Means shall be provided to fully isolate a battery, and to electrically isolate a battery at the pack level for maintenance, or to address a fault, with means to lock the system off or otherwise ensure that it cannot be reactivated during maintenance.

Outgoing circuits from batteries shall have switchgear or equivalent means to electrically isolate the circuits.

An emergency power-off circuit shall be installed to allow isolation and remote stopping of batteries from outside, or remotely to, the battery box or battery room.

Batteries and connected systems shall be designed to remain in a safe state in event of exposure to seawater.

All electrical equipment associated with batteries and connected systems shall (see Section 8 of the Code):

- ♦ operate in all expected operating conditions;
- ♦ be watertight;
- ♦ minimise the risk of initiating fire or explosion;
- ♦ enable maintenance and repair; and
- ♦ be appropriately protected against humidity, temperature, and degradation due to seawater and vibration.

Equipment and spares used for maintenance of batteries, connected systems and electrical equipment shall be manufacturer approved and to the satisfaction of the Flag State.

2.5 Battery Replacement

A battery module or system shall be replaced where:

- ♦ it can no longer function safely;
- ♦ it has reached an end-of-life state; or
- ♦ the battery's state of health (SOH) or C-rate capability has declined below the minimum level needed to deliver the required vessel performance.

Where batteries used as a source of power for propulsion are replaced they must be of an equivalent type, and shall be fully compatible with all on-board systems. New and old batteries must not be connected in parallel.

Where batteries used as a source of power for propulsion are replaced with a type which is not equivalent it must be treated as a new installation, and a survey shall be carried out to the satisfaction of the Flag State (see 3.9 of the Code).

Vessel owners/operators shall comply with the requirements for end-of -life disassembly and recycling of lithium-ion batteries.

2.6 Battery Boxes and Battery Rooms

Batteries used as a source of power for propulsion, as part of a battery-electric or battery-hybrid system shall be located in battery boxes or battery rooms as set out in section 1.3 of this Annex.

Ventilation requirements for battery boxes and battery rooms are detailed in section 1.3 of this Annex.

Electrical equipment shall, as far as practicable, be located in non-hazardous areas. Only electrical equipment required either for operational reasons, or for lighting within the space itself may be installed within battery boxes, battery rooms or ventilation exhaust ducts, and shall not contribute any additional overall fire risk. Such equipment shall be Ex-rated and IIC atmosphere certified.

Where size allows, electrical equipment shall not be located within 1.5 m of battery box or battery room ventilation outlets.

Batteries which meet the safe co-location requirements of section 2.4 of this Annex are not required to meet the requirements of section 2.6 of this Annex.

Light fittings in a battery box or battery room shall be appropriately protected (e.g. by glass) to reduce the risk of sparking. Light fittings shall be isolated if the protection fails.

Openings to battery boxes or battery rooms where exhaust gas build-up is a risk shall be gas-tight. Openings shall not be located next to spaces containing combustible or flammable materials.

Battery boxes and battery rooms shall be kept clean and clear of oily waste.

The ambient temperature of a battery box or battery room shall be monitored by the Battery Management System, Energy Management System and Power Management System, as appropriate, to allow management of the battery system. The ambient temperature of a battery box or battery room shall be displayed at the control position(s).

A walk-in battery room shall meet the means of escape requirements set out in Section 14.7 of the code.

Battery boxes and battery rooms shall not form a means of access to any other compartment, or form part of an escape route.

Where battery modules or systems are contained within gastight containers, a safety pressure relief valve or weak point must be included within the container design. A pressure relief valve or weak point shall vent to open air.

2.7 Signage and Training

Safety warning signs shall be displayed outside battery boxes and battery rooms detailing that:

- ♦ appropriate precautions are to be taken when opening or entering this space;
- ♦ naked lights, smoking and sources of ignition are not permitted within or outside the entrance of a battery box or battery room or ventilation discharge points; and
- ♦ no unauthorised personnel are permitted to enter or open battery boxes or battery rooms.

Batteries, high voltage equipment, battery systems and compartments shall be adequately labelled using internationally recognised symbols, where available.

A record of the battery, Battery Management System, Power Management System and Energy Management System specifications for operation (e.g. maximum temperature or discharge rates) shall be stored in a known accessible location.

The following documents shall be stored at the control position(s):

- ♦ a manual detailing standard operating, maintenance and emergency procedures for the batteries and connected systems; and
- ♦ a management plan for the lifetime of the batteries (including disposal).

There shall be at least one person on board the vessel who is trained in the range of alarms produced by the battery, Battery Management System and Power Management System/Energy Management System, the meaning of the alarms and any required action(s). For Remotely Operated Unmanned Vessels this person(s) shall be in the Remote Operation Centre.

All crew on board a vessel, and all Remote Operators at a Remote Operation Centre shall be trained in the vessel's emergency procedures relating to batteries, the Battery Management System, Power Management System/Energy Management System.

2.8 Starting and Stopping of Propulsion Systems

Where the sole means of starting the propulsion system is by batteries there shall be a spare battery to provide back-up power for starting of the propulsion system. Charging facilities for the spare battery shall be available.

The vessel owner/operator shall have a contingency plan in place which details actions to be taken if the designated back-up power source fails.

2.9 Battery and Power Management Systems

All vessels which use batteries as a source of power for propulsion shall have a Battery Management System and a Power Management System and Energy Management System installed, details of which shall be submitted via the Flag State to the Flag state for consideration and approval. If a Battery Management System is replaced, or has its programming significantly altered, details of the replacement or reprogramming shall be submitted via the Flag State to the Flag state for reconsideration and approval.

A Battery Management System shall be required to detect, monitor, respond and produce alarms to, at a minimum, the following operational conditions:

- ♦ voltage (at cell, module and system level);
- ♦ temperature (at cell, module and system level); and
- ♦ current (at string level).

A Battery Management System shall, at a minimum, calculate, transmit and display the following at key locations (including the control position(s)):

- ♦ State of Charge (SOC); and
- ♦ State of Health (SOH) estimate.

An alarm shall be produced at the control position(s) if any of the following occurs:

- ♦ loss of communication between the Battery Management System and
- ♦ Energy Management System or Power Management System;
- ♦ Battery Management System failure;
- ♦ the cooling system (if installed) develops a fault or fails;
- ♦ the Battery Management System has disconnected a battery pack(s);
- ♦ the Battery Management System operates a battery in a derated condition;
- ♦ low remaining battery charge;
- ♦ ambient temperature in the battery box or battery room exceeds a specified level, which shall not exceed the peak operating temperature as specified by the battery manufacturer;
- ♦ a build-up of explosive gases are detected (as per the requirements of Section 3.2 of this Annex).

A Battery Management System shall record atypical event data and diagnostic information and shall report the occurrence of such an event to the control position(s).

A Battery Management System shall be tested and inspected as per the manufacturer's requirements. The Battery Management System manufacturer must supply testing and inspection requirements for annual maintenance.

A Battery Management System, including all its components, shall be protected against impact or falling objects.

A Battery Management System or Power Management System shall provide an indication at the control position(s) when servicing of the batteries, ventilation, fire suppression and connected systems is due.

A Battery Management System shall maintain balancing of cell voltage at module and system levels.

Where a Battery Management System acts to isolate a battery string(s) or module(s) this shall be communicated with the Energy Management System or Power Management System to ensure that:

- ♦ the battery system is not overloaded; and
- ♦ the correct remaining range is displayed at the control position(s).

It is strongly recommended that a Battery Management System or Power Management System shall log battery usage history, warnings and faults.

A Battery Management System shall have a backup source of power.

For battery-hybrid propulsion systems the Power Management System shall balance both the diesel and battery power sources to ensure system stability and effective load-sharing.

2.10 Charging of Lithium-ion Batteries and Lead-Acid Batteries

A vessel with a battery-electric propulsion system shall charge its batteries:

- ♦ using shore charging;
- ♦ from a mother vessel; or
- ♦ from a platform-based facility.

A vessel with a battery-hybrid propulsion system shall charge its batteries by:

- ♦ shore charging; and/or
- ♦ charging from a mother vessel; and/or
- ♦ charging from a platform-based facility; and/or
- ♦ a self-charging battery-hybrid propulsion system.

A vessel is not permitted to be charged by another vessel, except where a tender is charged by a mother vessel.

Charging cables and associated equipment for charging of batteries used for propulsion shall either:

- ♦ be carried on board the vessel being charged; and/or
- ♦ be provided by the shore charging facilities, mother vessel or platform-based facility.

Batteries shall be charged in accordance with manufacturer's instructions.

Battery charging systems shall have overcurrent and overcharge protection, and must constantly communicate with, and remain within set limits defined by the Battery Management System.

2.11 Shore Charging

A vessel which uses batteries as a source of power for propulsion and can be charged by an on-shore mains power source, shall have a sufficient number of electric charging points installed on the vessel.

Electric charging points shall be:

- ♦ located at a height above deck sufficient to prevent inadvertent downflooding if the vessel is heeled;
- ♦ sealed with a watertight cap when not in use; and
- ♦ constructed of non-sparking materials.

A vessel with a battery-hybrid propulsion system shall not have an electric charging point located adjacent to a ventilation or exhaust vent.

The charging system shall be included within the high voltage interlock loop. Any break of the loop shall stop charging and isolate the charger from the battery terminals.

A vessel shall, at a minimum, have the following installed to monitor charging from an on-shore mains power source:

- ♦ voltmeter; and
- ♦ current meter.

2.12 Vessels with a Self-Charging Battery-Hybrid Propulsion System

Vessels with a self-charging battery-hybrid propulsion system shall be designed to safely charge the batteries whilst operating in a diesel mode of propulsion. This shall be demonstrated to the satisfaction of the Flag State.

2.13 Cooling Systems

Batteries shall be cooled by either:

- ♦ passive or active ventilation of the battery box or battery room (see section 1.3 of this Annex); or
- ♦ direct cooling (such as liquid cooling) from a dedicated battery cooling system.

Battery cooling systems shall be able to maintain battery cells within their required operational temperature range, including during fault events where cell temperature spikes but remains within operational limits.

Auditory and visual alarms shall be activated at the control position(s) if the cooling system fails or develops a fault, including where the following are detected:

- ♦ high coolant temperature; or
- ♦ reduced coolant flow.

3 Fire Safety and Appliances

The purpose of this section is to provide a level of fire safety for vessels, which is designed to extinguish minor battery fires, prevent minor battery fires from becoming major fires, and in the event of a major battery fire permit enough time for the evacuation of the vessel. Where a minor battery fire has occurred, this section provides structural integrity requirements of battery boxes and battery rooms to enable the vessel to remain habitable.

3.1 Construction Standards for Battery Boxes and Battery Rooms

Batteries shall, in accordance with the battery manufacturer's recommendations, be located within either a:

- ♦ battery box; or
- ♦ dedicated battery room with A0 fire integrity.

A risk assessment shall be carried out as per the requirements of section 2.2 of this Annex.

Any penetrations through battery box or battery room insulation shall be of an equal fire rating to the insulation it passes through.

If a risk of static in the battery box or battery room is identified, and cannot be suitably mitigated, the walls of the box or room shall be painted with anti-static paint.

3.2 Battery Fault and Fire Detection

Battery rooms, battery boxes or spaces containing a battery box shall be fitted with suitable detectors in relation to the:

- ♦ battery size;
- ♦ battery power;
- ♦ cooling system;
- ♦ fixed fire extinguishing system; and, where installed
- ♦ mechanical ventilation system.

These shall include smoke, heat and flame detectors, and these shall activate auditory and visual alarms in the affected space and at the control position(s).

For lithium-ion batteries, where it is determined from the risk assessment in Section 2.2 of this Annex that accumulation of explosive gases up to the Lower Explosive Limit (LEL) is possible, gas detector(s) able to detect explosive gases likely to be produced by the battery's specific chemistry, or type, shall be fitted in battery boxes and battery rooms. If the concentration of explosive gas in the battery box or battery room reaches 60% of the LEL the battery shall be automatically disconnected, all electrical circuits in the space shall be de-energised, and auditory and visual alarms shall be emitted in the affected space and at the control position(s).

For lead-acid batteries, where it is determined from the risk assessment in Section 2.2 of this Annex that accumulation of explosive gases up to the LEL is possible, gas detector(s) able to detect explosive gases likely to be produced by the battery's specific chemistry, or type, shall be fitted in battery boxes and battery rooms. If the concentration of explosive gas in the battery box or battery room reaches 60% of the LEL auditory and visual alarms shall be emitted in the affected space and at the control position(s).

Gas detectors in battery boxes and battery rooms shall be located where gas may accumulate and in the ventilation outlets. A gas dispersal analysis or physical smoke test may be used to identify the most suitable locations for gas detectors.

Toxic gas detectors in battery room(s) large enough to be entered shall have gas detectors positioned at breathing height.

It is the responsibility of the vessel owner/operator to ensure that crew are protected from toxic gases. The vessel owner/operator shall develop a risk assessment which informs the development of safe systems of work.

3.3 Battery Fires

Hand fire pumps and fire buckets shall not be used to extinguish battery fires.

Fire extinguishing medium(s) shall be able to penetrate the casing of batteries to extinguish a potential fire.

3.4 Fixed Fire Suppression Systems

All vessels shall have a fixed fire suppression system installed for battery boxes and battery rooms in accordance with the battery manufacturer's requirements and shall be designed in consideration of the potential size and specification of the installed batteries.

A fixed fire suppression system shall be of an approved type appropriate to the battery box or battery room, and shall be able to prevent heat propagation at battery pack level. The fixed fire suppression system shall be tested to the satisfaction of the Flag state.

A powered fixed fire suppression system shall be powered by both main and emergency power. The emergency power source shall not be located in the space(s) it serves.

A fixed fire suppression system shall meet the manufacturer's installation and maintenance requirements and shall be serviced at minimum on an annual interval or as per manufacturer's recommendations, whichever is more frequent.

Control and power, where appropriate, for a fixed fire suppression system shall be located outside of the battery box or battery room.

Where practicable, due to the design of the fire suppression system, visual and audio alarms shall be activated in the affected space and at the control position(s) prior to release of suppression material.

During a thermal runaway event active ventilation, where installed, shall continue operating if an explosive atmosphere is present.

3.5 Portable Fire Extinguishers

Portable fire extinguishers may only be used as an alternative if installation of a fixed fire suppression system would constitute a safety risk. Any portable fire extinguishers intended for use in battery boxes or battery rooms shall be suitable for such purposes, and provide an equivalent level of safety to the satisfaction of the Flag state.

A minimum of two portable fire extinguishers with a minimum fire rating of 34B shall be readily accessible for the battery box or battery room. Vessel owners/operators shall follow the battery manufacturer's requirements regarding the types of portable fire extinguishers permitted to be used in battery boxes and battery rooms.

Fire ports designed to allow discharge of hand-held extinguishers into a battery box or battery room shall be of an equivalent structural standard to the battery box or battery room. Any opening(s) shall only be used in an emergency and shall be clearly labelled.

Annex 2 – Remotely Operated Unmanned Vessels

This Annex provides additional requirements to be complied with for a Remotely Operated Unmanned Vessel of <24m Load Line Length operating as a workboat. Vessels intending to operate as a Remotely Operated Unmanned Vessel must comply with both this Annex and the main body of the Code.

1

1.1 General Requirements

This Annex applies to Remotely Operated Unmanned Vessels (ROUVs) operating as workboats that operate to sea. It applies to such vessels that are United Kingdom (UK) vessels wherever they may be, and to non-United Kingdom vessels operating from UK ports whilst in UK waters.

Vessel owners/operators wishing to operate a vessel with a mode of operation different to that of Remotely Operated Unmanned Vessels may be considered on a case-by-case basis by the Flag state.

Vessel owners/operators wishing to operate a Remotely Operated Unmanned Vessel which is not able to meet the requirements of this Annex and Code may be considered on a case-by-case basis by the Flag state where the Flag state is satisfied that compliance with the Code is either impracticable or unreasonable in the case of that Remotely Operated Unmanned Vessel.

This Annex does not apply to autonomous underwater vessels.

1.2 Sections of the Workboat Code disapplied for Remotely Operated Unmanned Vessels

The following provisions of the Code do not apply to Remotely Operated Unmanned Vessels:

Section 12A.3.5 – Person Recovery Stability Test

Section 14 – Life Saving Appliances (except for a specific exemption detailed in Section 6.3.2 of this Annex)

Section 16.1.2 – Fire Ports in Engine Boxes

Section 16.2 – Protection of Accommodation Spaces

Section 16.2 – Fire Pumps

Section 16.5 – Fire Blanket

Section 16.6 – Fire Buckets

Section 17.4 – Portable VHF Radio

Section 21 (including 21A and 21B) – Accommodation and Recreational Facilities

Section 22.4 – Industrial Personnel Requirements

Section 23 – Medical Care

Section 25.2 – Lifting Operations

Section 25.3 – Vessels Fitted with Diver Lifts

Section 26.1 – General

Section 26.2 – Towing Arrangements

Section 26.5 – Non-Self-Propelled Vessels

Section 17 – Dedicated Pilot Boats and Workboats with a Pilot Boat Endorsement

Section 29 – Carriage and Transfer of Dangerous Goods

2 Application and Interpretation

The purpose of this section is to clearly summarise functional limitations and additional requirements for workboats operating as a Remotely Operated Unmanned Vessel.

2.1 General Requirements

A Remotely Operated Unmanned Vessel shall not:

- ♦ be fitted with a deck crane or other lifting device;
- ♦ carry a spare portable petrol container;
- ♦ have an engine which can only be hand-started;
- ♦ have open flame appliances or gas installations;
- ♦ have liquid fuelled galley cookers or heating appliances installed;
- ♦ carry a fire bucket(s);
- ♦ be recognised as either a dedicated pilot boat or be a certified workboat with a pilot boat endorsement;
- ♦ be fitted with a diver lift or be used as a diving platform;
- ♦ transfer passengers or industrial personnel;
- ♦ carry dangerous goods; or
- ♦ operate as a mother vessel.

A Remotely Operated Unmanned Vessel shall not tow another vessel or object. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Flag state to undertake towing of survey equipment. Applications for towing operations other than for survey equipment may be considered on a case-by-case basis subject to the approval of the Flag state.

A Remotely Operated Unmanned Vessel shall not be permitted to be fitted with a lifting device.

Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Flag state to be fitted with a lifting device(s) for the lifting of survey equipment. Applications for lifting operations other than for survey equipment may be considered on a case-by-case basis subject to the approval of the Flag state.

A Remotely Operated Unmanned Vessel shall not be permitted to carry dangerous goods. Where necessary, a Remotely Operated Unmanned Vessel may be permitted by the Flag state to carry the following dangerous goods exclusively for the use of the vessel:

- ♦ Class 3 – paint or paint related material; and
- ♦ Class 2 – aerosols (for lubricants).

2.2 Official Log Books, Working Logs and Voyage Data Recording

All Remotely Operated Unmanned Vessels of 25 GT or more shall have an Official Log Book which is completed and kept at the control position.

All Remotely Operated Unmanned Vessels shall have a working log or equivalent which is completed and kept at the control position. Information recorded within a working log or equivalent shall include:

- ♦ completion of pre-departure checks;
- ♦ course (including compass error);
- ♦ weather (including wind, swell and visibility);
- ♦ speed in knots;
- ♦ overboard discharges (if applicable);
- ♦ weight of cargo;
- ♦ duration, time and location of any signal loss, or circumstances where contact could not be re-established with the Remotely Operated Unmanned Vessel;
- ♦ loss of steering, including duration of any steering loss;
- ♦ occurrence of engineering, navigational or safety alarms;
- ♦ impairment of situational awareness (e.g. failed camera or sensor);
- ♦ activation of bilge pumps;
- ♦ completed maintenance activities;
- ♦ a record of test results for critical systems;
- ♦ a record of all accidents involving the Remotely Operated Unmanned Vessel;
- ♦ a record of any near misses. Supporting information to prove that any departure from the COLREGs was necessary to avoid immediate danger shall also be recorded. All near-misses shall be reported;
- ♦ handover information (including watchkeeper's initials and handover time);

- ♦ a record of the Remotely Operated Unmanned Vessel's designated Master;
- ♦ record the change of command; and
- ♦ a record of when a Remotely Operated Unmanned Vessel's control is switched between Remote Operation Centres, or if the vessel transitions to or from manned operations.

The following vessel data parameters, at a minimum, shall be recorded both on board the Remotely Operated Unmanned Vessel and at the Remote Operation Centre:

- date and time;
- vessel position;
- vessel speed;
- vessel heading;
- which Remote Operation Centre is in control of the vessel;
- vessel audio (noise from onboard and in surrounding waters, as appropriate)
- Remote Operation Centre audio;
- camera and sensor outputs;
- visual recording of Remote Operation Centre and workstations;
- audio communications;
- radar data;
- ECDIS data;
- echo sounder data;
- alarms;
- rudder order and response;
- propulsion and thruster order and response;
- opening of any hatches or doors;
- deployment and recovery of payload equipment;
- acceleration;
- hull stresses;
- wind speed and direction;
- rolling motion;
- AIS;
- commands sent to a Remotely Operated Unmanned Vessel. All data shall be retained for a minimum of 30 days.

The owner/operator of a Remotely Operated Unmanned Vessel shall have defined procedures for securing of onboard and onshore data following an accident or incident.

Where the data format used on board a Remotely Operated Unmanned Vessel or at a Remote Operation Centre is individual to the manufacturer of the vessel or equipment used a conversion tool to convert data to Commercial Off The Shelf (COTS) formats shall be made available to the relevant investigating authority. Replay software shall be supplied license free to the relevant investigating authority.

2.3 Safety of Operations

The vessel owner/operator shall produce and maintain a list of critical equipment.

A Remotely Operated Unmanned Vessel shall have redundancies installed for critical equipment.

The vessel owner/operator's contact details shall be clearly displayed on the exterior of a Remotely Operated Unmanned Vessel.

3 Bilge Pumping, Fire Appliances and Alarms

The purpose of this section is to provide a level of safety against the risks of fire or build-up of bilge water.

3.1 Bilge Pumps

A Remotely Operated Unmanned Vessel is not required to comply with Section 11.1.5 of the Code.

All bilge pumps on a Remotely Operated Unmanned Vessel shall be power driven and automatic starting, and all alarms shall be audibly and visually displayed and audible at the control position(s).

A Remotely Operated Unmanned Vessel shall either have:

1. oily water separators fitted to bilge pumps; or
2. oil sensors fitted to bilge pumps

located in all spaces where oil or fuel may be present.

Where oil is detected by an oil sensor, pumping of bilge water shall automatically stop and a visual and audible alarm shall be displayed and audible at the control position(s).

3.2 Fire Containment

Critical equipment of a Remotely Operated Unmanned Vessel, as per Section 2.3.1 of this Annex, shall be compartmentalised to aid in fire containment, except where this is impracticable due to the size of the vessel.

A Remotely Operated Unmanned Vessel is not required to meet the requirements of Section 15.1.1.4 of the Code.

The following shall automatically stop in the event of a fire:

- ♦ fans within machinery space(s);
- ♦ fans feeding machinery space(s);
- ♦ pumps transferring fuel or oil;
- ♦ centrifuges; and
- ♦ any other equipment in areas identified to increase risk of fire acceleration.

3.3 Fixed Fire Extinguishing Systems

A Remotely Operated Unmanned Vessel shall have a fixed fire extinguishing system installed that meets the following requirements:

- ♦ an approved type appropriate to the space to be protected;
- ♦ of appropriate volume; and
- ♦ shall be installed and maintained in accordance with the manufacturer's requirements (see Section 16.4 of the Code).

An alternative arrangement which has an equivalent standard of safety may be considered on a case-by-case basis to the satisfaction of the Flag state.

A fixed fire extinguishing system shall be self-activating.

A Remotely Operated Unmanned Vessel shall either have a delay, or an ability to manually switch off the system, and all alarms from the fixed fire extinguishing system shall provide an on board audible and visual warning.

All alarms from the fixed fire extinguishing system shall be: visually displayed and audible at the control position(s).

Where the fixed fire extinguishing system has been activated an audible and visual alarm shall be activated on board the Remotely Operated Unmanned Vessel.

A fixed fire extinguishing system shall be designed and installed to extinguish fires, and to prevent a fire from spreading to other areas.

In event of a fire, a Remotely Operated Unmanned Vessel shall either:

- ♦ remain responsive to commands from the Remote Operation Centre; or
- ♦ automatically enter a defined safe state.

Where size allows, critical equipment shall be protected from areas identified as being of high risk from fire.

Emergency power and back-up critical equipment shall be located separately from main systems, located above the damage waterline and shall be protected from fire.

Cameras and sensors shall be installed within engine, machinery and battery spaces to provide adequate situational awareness during emergency situations such as a fire, except where the installation of cameras and sensors is impracticable due to the size of the vessel. Outputs from cameras and sensors shall be displayed at the control position(s).

All fuel shut-offs and ventilation closures shall be self-activating or automatic.

3.4 Alarms and Alerts

All navigational and engineering alerts shall be visually displayed and audible at the control position(s) in a timely manner and shall be classed appropriately as:

- ♦ emergency alarms;
- ♦ alarms;
- ♦ warnings; or
- ♦ cautions

Sufficient alerts, monitoring, diagnostic tools and controls shall be available in the Remote Operation Centre to aid identification and resolution of engineering faults, failures or unexpected events.

Alarms and warnings for anchoring or dynamic positioning systems shall be audibly and visually displayed and audible at the control position(s).

4 Connectivity, Pre-Departure Checks and Responding to Distress

The purpose of this section is to set carriage requirements for radiocommunications and vessel locating appliances, including installation, operation, testing and maintenance specific for workboats operating as Remotely Operated Unmanned Vessels.

4.1 Pre-Departure Checks

Pre-departure checks including the following shall be carried out for a Remotely Operated Unmanned Vessel prior to each voyage:

- ♦ propulsion and steering;
- ♦ fuel and power;
- ♦ communications;
- ♦ command-and-control-link;
- ♦ navigational lights, shapes and sounds;
- ♦ situational awareness; and
- ♦ system(s) to put the Remotely Operated Unmanned Vessel into a safe state.

The weathertight integrity of a Remotely Operated Unmanned Vessel, including doorways, hatchways, accessways, windows and port lights as appropriate, shall be secured prior to departure for the duration of the voyage.

4.2 Connectivity between a Remotely Operated Unmanned Vessel and Remote Operation Centre

A Remotely Operated Unmanned Vessel shall meet the carriage requirements for radiocommunication equipment set out in section 16 of the Code. All radiocommunication information shall be displayed and audible at the Remote Operation Centre via a reliable communications link.

A continuous radio watch shall be carried out in the vicinity of the Remotely Operated Unmanned Vessel by replicating radiocommunication signals at the Remote Operation Centre.

The communications link shall enable the Remote Operation Centre operator(s) to use the radiocommunications equipment on-board the Remotely Operated Unmanned Vessel for both incoming and outgoing communications in a timely manner in the following directions:

- ♦ ship-to-shore;
- ♦ shore-to-ship;
- ♦ ship-to-ship; and
- ♦ ship-to-ROC-to-ship.

A Remotely Operated Unmanned Vessel must have a secondary communications system which can be used if the primary communication system fails. This secondary communications system shall be available and be able to enable vessel locating information and basic vessel functionality including, at a minimum, the ability to:

- ♦ command the vessel to enter a safe state;
- ♦ activate not-under-command lights; and
- ♦ receive and respond to critical alarms.

Where, due to the size of the vessel, it is impracticable to fit a secondary command-and-control link system, a vessel with only a primary command- and-control link system may be considered on a case-by-case basis where the Flag state is satisfied that compliance with such provision is either impracticable or unreasonable in the case of that Remotely Operated Unmanned Vessel.

4.3 Responding to Distress

Remote Operation Centre operators shall be able, where applicable, to relay distress call information to the Coastguard.

All Remotely Operated Unmanned Vessels are required to comply with the Merchant Shipping (Safety of Navigation) Regulations 2020.

A radio system shall include a speaker system to allow Remote Operation Centre operators to provide auditory updates to persons in distress.

All Remotely Operated Unmanned Vessels shall have lighting, cameras or sensors to assist, as far as is practicable, in the locating of persons in distress.

An owner/operator of a Remotely Operated Unmanned Vessel may voluntarily carry other life-saving appliances to provide support in response to a distress call (for example flotation devices or liferafts which can be remotely launched) appropriate to the size and/or stability of the vessel. All life-saving appliances carried shall meet the requirements of Section 14 of the Code and be ready for use at all times.

5 Navigational and Anchoring Equipment

The purpose of this section is to provide means of safe navigation and anchoring of Remotely Operated Unmanned Vessels.

5.1 Vessel Headings and Bearings

A Remotely Operated Unmanned Vessel shall be fitted with means of determining the vessel's heading and correcting headings and bearings to true; and this shall be displayed at the control position(s) at all times.

A back-up power supply to the equipment in Section 5.1 of this Annex shall be available in the event of failure of the main electrical power supply.

5.2 Sensors and Cameras

Sensors (e.g. radar, AIS, microphone, vibration) and cameras (e.g. normal, low-light, infrared) shall be installed to provide horizontal and vertical arcs of visibility to meet requirements for watchkeeping and all operational activities to the satisfaction of the Flag State (see Section 7.4.1 of this Annex, and see Section 9.1 of the Code) and watchkeeping requirements shall be to the satisfaction of the Flag state.

The provision of a proper lookout is required by the International Regulations for the Prevention of Collisions at Sea.

All Remotely Operated Unmanned Vessels shall have an AIS transceiver installed. The AIS transceiver shall be operable from the Remote Operation Centre.

It shall be demonstrated to the satisfaction of the Flag State that sensors and cameras installed on a Remotely Operated Unmanned Vessel are able to work effectively either separately, or in conjunction with each other, without causing interference. All systems and equipment installed on board a Remotely Operated Unmanned Vessel shall be designed to not affect the functioning of sensors and cameras.

Sensors and cameras shall be located in a position not likely to be damaged, obstructed, or have their situational awareness compromised by flooding or other environmental conditions (e.g. weather or bird fouling) during normal operations.

Sensors and cameras shall be suitable for marine use, be designed to operate in all anticipated conditions and situations, and shall be demonstrated to the satisfaction of the Flag State.

5.3 Watchkeeping Visibility

Camera and sensor visibility shall not be restricted by any cargo or payload when in the secured stowed position.

A Remote Operator shall carry out duties at the control position(s) as both look-out and helmsperson and shall have:

- ♦ unobstructed all-round vision;
- ♦ no impairment of night-vision; and
- ♦ no other impediments to keeping a proper look-out.

5.4 Signalling and Searchlight

A Remotely Operated Unmanned Vessel shall be equipped with a remotely operable waterproof electric lamp suitable for signalling which can be operated from the Remote Operation Centre.

A Remote Operator shall be provided with suitable sensors and camera outputs to be able to interpret signals from other water users.

A Remotely Operated Unmanned Vessel shall be equipped with a searchlight which can be operated from the Remote Operation Centre. The searchlight may be the lamp required in Section 5.4

5.5 Anchors and Dynamic Positioning

A Remotely Operated Unmanned Vessel shall meet one of the following requirements:

- ♦ carriage of suitable anchors and cables (as set out in Section 19 of the Code). Remote deployment of the anchor(s) shall be demonstrated to the satisfaction of the Flag State;
- ♦ installation of a dynamic positioning system which is able to accurately maintain a vessel's position. The dynamic positioning system shall be demonstrated to the satisfaction of the Flag State. In this Annex, dynamic positioning shall mean a system which, at a minimum, can implement station keeping or position holding;
- ♦ carriage of a sea anchor drogue. Remote deployment of the sea anchor drogue shall be demonstrated to the satisfaction of the Flag State; or
- ♦ anchoring systems other than anchors or dynamic positioning systems may be accepted on a case-by-case basis subject to the approval of the Flag state.

A dynamic position system shall be able to achieve and maintain position in all anticipated weather and operational conditions.

A plan detailing contingency measures if anchoring or dynamic positioning fails shall be kept at the control position(s).

5.6 Tow Line

A Remotely Operated Unmanned Vessel may carry a tow line to allow it to be towed by another vessel. Where a Remotely Operated Unmanned Vessel carries a towline it shall meet the requirements of Table 25.2 of the Code.

6 Personnel Health, Safety and Medical Care

The purpose of this section is to set out the medical care facilities and health and safety requirements for all personnel involved in the operation or maintenance of Remotely Operated Unmanned Vessels.

6.1 Personnel Health and Safety

Operators located on board a manned vessel whilst operating a Remotely Operated Unmanned Vessel are regulated under the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997.

All remote operations controlled by shore-based operators are regulated under all relevant health and safety legislation.

Shore-based Remote Operators shall complete the same training and practice vessel drills as required of crew by section 13.11 of the Code. Records of training shall be recorded in the Official Log Book and kept in the Remote Operation Centre.

The following provisions for shore-based Remote Operators are regulated under all relevant legislation, including legislation relevant to the following:

- ♦ minimum hours of rest;
- ♦ working time provisions;
- ♦ conditions of employment of young persons.

6.2 Performance Testing and Maintenance of Remotely Operated Unmanned Vessels

A Remotely Operated Unmanned Vessel shall be able to complete its entire voyage (or legs between ports) without requiring routine maintenance. An effective monitoring programme of critical equipment shall be implemented.

All maintenance personnel shall be appropriately trained in accordance with the risks likely to be encountered when carrying out maintenance of Remotely Operated Unmanned Vessels.

Remotely Operated Unmanned Vessels must be maintained out of the water, or whilst the vessel meets the requirements of Section 6.3.1 of this Annex while the vessel is alongside in port.

Specific maintenance task(s) which cannot be completed whilst the vessel is stationary may be permitted on a case-by-case basis to be completed whilst the vessel is in motion where a support vessel is present, subject to approval of the Flag state.

6.3 Boarding of, and Safe Movement on, Remotely Operated Unmanned Vessels

A Remotely Operated Unmanned Vessel which meets the safety requirements of Section 21.2 of the Code, has suitable buoyant stability to enable safe boarding, and has structures including guard rails, handrails and non-slip surfaces may be maintained in the water and boarded:

- ♦ to carry out maintenance;
- ♦ to carry out an inspection;
- ♦ to download data;
- ♦ to prepare the vessel for a voyage; or
- ♦ in an emergency.

A Remotely Operated Unmanned Vessel which meets the requirements of section 6.3 of this Annex shall:

- ♦ have a manned override to prevent the vessel from being remotely operated if persons are on board the vessel;
- ♦ be put into a safe state;
- ♦ have emergency escape provisions (see Section 14.7 of the Code);
- ♦ have an appropriate level of fire safety (see sections 14 of the Code); and
- ♦ have appropriate life saving appliances (see Section 13 of the Code).

A vessel which does not meet the requirements of section 6.3 of this Annex:

- ♦ shall be maintained out of the water,

- ♦ shall have arrangements made for the recovery of the vessel without a need for persons to board; and
- ♦ is only permitted to be boarded in an emergency (such as to prevent risk to human life).

The vessel owner/operator is responsible for providing, where appropriate, a safe means of access to and from a Remotely Operated Unmanned Vessel.

A risk assessment shall be carried out by the vessel owner/operator to assess the health and safety of all persons requiring access to and from the Remotely Operated Unmanned Vessel during the normal course of their responsibilities.

6.4 Medical Care

Remotely Operated Unmanned Vessels are not required to carry medical equipment.

Where a Remotely Operated Unmanned Vessel is boarded from another vessel anywhere other than in port, a portable medical kit (meeting, at a minimum, the requirements of Annex 3 of MSN 1905, as amended) shall be made available at the point of boarding. Additional medical supplies may be required to be carried depending on the specific risks associated with the vessel and the intended activities of persons boarding the vessel.

Where maintenance of a Remotely Operated Unmanned Vessel is carried out either alongside a berth or out of the water a shore-based medical kit shall be available.

Medical care requirements for shore-based personnel shall be regulated under all relevant health and safety legislation.

7 Remote Control of Remotely Operated Unmanned Vessels

The purpose of this section is to detail the minimum requirements for the safe operation of a Remotely Operated Unmanned Vessel.

7.1 Manning Requirements

A Remotely Operated Unmanned Vessel shall not carry any crew, industrial personnel or passengers.

The manning requirements of a Remotely Operated Unmanned Vessel shall be met by the personnel located within the Remote Operation Centre(s) (see Section 7.2 of this Annex and Section 28 of the Code).

A Remotely Operated Unmanned Vessel is exempted from the requirement to physically carry at least one person qualified for distress and safety radio communication.

A Remote Operation Centre shall be manned with at least one person qualified for distress and safety radio communication per watch, who shall hold a valid GMDSS Radio Operator's Certificate issued by the relevant authority.

7.2 Manning of Remote Operation Centres

There shall be an appropriate number of personnel with appropriate experience to be able to respond effectively during both normal operations (day and night- time) and emergency situations and shall, at a minimum, include the following roles:

- ♦ Remote Operator(s);
- ♦ a Master; and
- ♦ engineering personnel.

The responsibilities of a Remote Operator shall, at a minimum, include the following activities:

- ♦ operation and monitoring of all critical equipment;
- ♦ carry out navigation;
- ♦ monitor and make communications; and
- ♦ compliance with VTS and traffic requirements.

Training and certification requirements for manned vessels are applicable to operators of Remotely Operated Unmanned Vessels.

A Remote Operator shall:

- ♦ be appropriately trained and qualified for the remote operation of all
- ♦ vessels they are required to operate; and
- ♦ act as the Officer of the Watch.

7.3 A Remote Operator shall only manage one Remotely Operated Unmanned Vessel at a time.

A Remote Operator may be permitted on a case-by-case basis to manage multiple Remotely Operated Unmanned Vessels at once, subject to the approval of the Flag state. The vessel owner/operator shall submit a risk assessment to the Flag state which details the maximum number of vessels which can be safely managed by a single Remote Operator and meets the following criteria:

- ♦ the minimum personnel, in addition to the Remote Operator, required to ensure safe manning levels and safe operation of each Remotely Operated Unmanned Vessel during both normal operation and emergency situations;
- ♦ controls and data for each Remotely Operated Unmanned Vessel shall be available in a consistent format which is designed and located to prevent accidental or inadvertent operation;
- ♦ all alerts and alarms shall be available in a format which is designed and located to prevent accidental or inadvertent operation; and
- ♦ means to clearly indicate in a consistent format to the Remote Operator which Remotely Operated Unmanned Vessels they have command and control over at any given time.

A Remote Operator shall have a clear escalation route and shall report to the Master.

A Master may be responsible for multiple vessels at the same time.

A Master must be appropriately qualified, at a minimum, for the Remotely Operated Unmanned Vessel they are responsible for which is operating in the most onerous area category of operation.

All information and data at the Remote Operation Centre shall be presented in a language understood by all persons working at the Remote Operation Centre.

7.4 Requirements for Remote Operation Centres

- ♦ All Remotely Operated Unmanned Vessel alarm, camera, sensor, radar and communication outputs are to be displayed and audible at the Remote Operation Centre, and shall:
- ♦ identify all objects and information to aid safe navigation, including when the vessel is pitching and rolling;
- ♦ appropriately group all data required for the safe operation of a Remotely Operated Unmanned Vessel;
- ♦ enable identification and recognition of different vessel types including lights, shapes, sound and light signals (as detailed in parts C and D of COLREGS, 1972);
- ♦ enable identification of, at an appropriate range, the speed, course and distance of an oncoming vessel;
- ♦ provide situational awareness for Remote Operators to effectively control, and plan actions for, a Remotely Operated Unmanned Vessel;
- ♦ provide situational awareness to be able to detect person(s) in or on the water;
- ♦ monitor the health and operation of critical equipment;
- ♦ monitor vessel motion;
- ♦ have sufficient noise cancelling properties to aid accurate sound perception by Remote Operators (e.g. minimise the impact of the background noise from the Remotely Operated Unmanned Vessel);
- ♦ provide critical and non-critical alarms in clearly accessible audible and visual formats;
- ♦ have visual alarms visible under all lighting conditions; and
- ♦ auditory alarms shall be audible in all Remote Operation Centre conditions (including, but not limited to, the use of headsets and loudspeakers).

A Remote Operation Centre shall have an emergency source of power which, at a minimum, is able to power all critical equipment or put the vessel into a safe state (see Section 2.3 of this Annex).

A Remote Operation Centre shall have a suitable emergency plan.

A Remote Operation Centre must comply with the cyber security requirements set out in Section 31.3 of the Code.

No single failure of systems at the Remote Operation Centre shall result in a Remotely Operated Unmanned Vessel entering an unsafe state.

A Remote Operation Centre shall have means to display the status of each Remotely Operated Unmanned Vessel. The status of a vessel shall include all the information required to safely and successfully operate a Remotely Operated Unmanned Vessel.

7.5 Remote Operation Centre Workstations

Remote Operator Centre workstations shall be set-up so that the remote operator at all times:

- ♦ has a sufficient size of screens to display critical information at all times (e.g. alarm, camera and sensor outputs);

- ♦ is able to view or hear, as appropriate, all critical alarm, camera and sensor outputs from a single seated position;
- ♦ is able to operate navigation lights, sound appliances and day signals (see Section 18 of the Code);
- ♦ has a minimum 225° front view with a pan-tilt-zoom function, from the perspective of the Remotely Operated Unmanned Vessel;
- ♦ is able to monitor a 360° total field of view with a pan-tilt-zoom function;
- ♦ is able to monitor critical equipment;
- ♦ is able to detect degradation in sensor performance and overall situational awareness;
- ♦ is able to intervene to manage the safe control of the vessel (except during loss of connection between the Remote Operation Centre and Remotely Operated Unmanned Vessel); and
- ♦ is alerted when data has not been refreshed within an acceptable timeframe.
- ♦ A Remote Operation Centre workstation shall:
 - ♦ display all essential information required for safe remote operation at all times, even when a single or probable combination of failures has occurred at the workstation; and
 - ♦ be designed so that the failure of a single connection, processor or display unit shall not result in unsafe or misleading data being displayed to the Remote Operator.

Controls for a Remote Operation Centre workstation which are critical equipment, shall be:

- ♦ designed and located to prevent accidental or inadvertent operation (e.g. dedicated levers); and
- ♦ designed and accessible for rapid use in an emergency.

When in use a Remote Operation Centre workstation shall, as minimum, display the following navigational and operational data at an update rate and level of detail to ensure safe operation:

- ♦ speed;
- ♦ heading and track;
- ♦ position; and
- ♦ camera and sensor outputs.

Remote Operation Centre workstations shall be digitally locked when not in active use, and shall display that the lock is engaged.

7.6 Connectivity between the Remotely Operated Unmanned Vessel and Remote Operation Centre

The vessel owner/operator shall provide evidence to the satisfaction of the Flag State and to the approval of the Flag state that the Remotely Operated Unmanned Vessel receives and responds to commands from the Remote Operation Centre and:

- ♦ the Remotely Operated Unmanned Vessel reacts in a correct and timely manner to instructions in all intended weather conditions and intended distances from the Remote Operation Centre;
- ♦ latency and data bandwidth requirements will not exceed the connectivity capabilities in all intended weather conditions and distances from the Remote Operation Centre; and provide real-time functionality and operations;
- ♦ latency does not result in an unsafe condition;
- ♦ safely operate within all anticipated weather and sea state conditions;
- ♦ communications and command-and-control equipment is adequately protected from electromagnetic interference;
- ♦ alarm and emergency data from the Remotely Operated Unmanned Vessel is correctly displayed and audible at the Remote Operation Centre; and
- ♦ connectivity and signal strength between a Remotely Operated Unmanned Vessel and Remote Operation Centre can be monitored at a frequency appropriate to the nature of the vessel's operation, communications equipment and command-and-control link system.

Where practicable, a Remotely Operated Unmanned Vessel shall send a notification to the Remote Operation Centre when a command has been received and actioned.

A command-and-control link between a Remotely Operated Unmanned Vessel and Remote Operation Centre shall be divided into essential and operational and shall:

- ♦ not be corrupted;
- ♦ have redundancies;
- ♦ be designed to facilitate real-time monitoring of critical equipment
- ♦ health and functionality;
- ♦ be designed so that any single or common cause failure in command- and-control link(s) shall not affect the safe operation of the Remotely Operated Unmanned Vessel; and
- ♦ enable remote troubleshooting.

Data received from Remotely Operated Unmanned Vessel shall be considered in an order of priority as follows:

- ♦ emergency and back-up system control;
- ♦ remote control commands for critical systems;
- ♦ situational awareness information;
- ♦ supervision data;
- ♦ maintenance data.

Data transferred between the Remotely Operated Unmanned Vessel and Remote Operation Centre shall be validated to ensure that:

- ♦ the data is not corrupted;
- ♦ the data is received in order; and

- ♦ all commands received by the Remotely Operated Unmanned Vessel
- ♦ are correctly interpreted and implemented.

Critical equipment shall be able to be remotely restored from the Remote Operation Centre.

A Remotely Operated Unmanned Vessel shall be controllable and manoeuvrable under all anticipated operating conditions including:

- ♦ transfers between workstations within the same Remote Operation Centre;
- ♦ transfer between Remote Operation Centres; and
- ♦ high data latency.

During transfer between Remote Operation Centre workstations:

- ♦ the in-command workstation shall be clearly identifiable to all on-duty
- ♦ Remote Operators;
- ♦ the in-command workstation shall have suitable functionality to be able to respond appropriately to emergency situations;
- ♦ positive control must be maintained;
- ♦ the transfer process shall not result in an unsafe condition.

Command and control functions shall not be split between multiple Remote Operation Centre workstations. Transfer of command and control functions between Remote Operation Centre workstations shall be documented.

A Remotely Operated Unmanned Vessel shall be under control at all times, including during switchover between data-link channels. Switchover between data-link channels shall not lead to an unsafe condition.

All commands sent to a Remotely Operated Unmanned Vessel shall be:

- ♦ automatically logged; and
- ♦ un-editable.

7.7 General Requirements for Safe Operation

A Failure Modes and Effects Analysis (FMEA) or Fault Tree Analysis (FTA) shall be developed detailing identified hazards, potential failures and incidents, and their likely impacts. Action plans shall be developed to provide on-duty employees with the actions and equipment required to effectively resolve identified potential failures and incidents.

7.8 Safe Operation of Remotely Operated Unmanned Vessels

A risk assessment shall be carried out by the owner/operator of a Remotely Operated Unmanned Vessel to assess acceptable period(s) of loss of capacity of critical systems or connectivity with due consideration of the vessel's intended area of operation and shall be submitted for the approval of the Flag state. The risk assessment shall, at a minimum, consider the following:

- ♦ loss of propulsion capacity;
- ♦ loss of steering capacity;

- ♦ loss of connectivity from the Remote Operation Centre;
- ♦ loss of connectivity to the Remote Operation Centre;
- ♦ risks associated with connectivity loss in all area categories of operation;
- ♦ risks to all other water users;
- ♦ inability to re-establish connectivity between the Remote Operation Centre and Remotely Operated Unmanned Vessel
- ♦ loss of control from the Remote Operation Centre; and
- ♦ all identified risks to a Remotely Operated Unmanned Vessel and appropriate safeguards.

Where loss of capacity or critical equipment cannot be resolved within the accepted period(s) set out in the risk assessment, the vessel shall enter a safe state appropriate to the intended conditions of operation (e.g. initiating dynamic positioning and shutting down non-essential systems, reducing speed or emitting audio and visual warnings to other water users).

All instances where contact between the Remote Operation Centre and Remotely Operated Unmanned **Vessel** is lost for longer than the accepted period(s) determined in Section 7.8 of this Annex shall be recorded within the Official Log Book (see Section 2.2 of this Annex), highlighting:

- ♦ when the connection was re-established;
- ♦ duration of loss of contact;
- ♦ the method of recovery; and
- ♦ whether any emergency procedures were carried out.

The cargo and systems on board a Remotely Operated Unmanned Vessel shall not:

- ♦ cause interference (e.g. electro-magnetic) to connectivity with the
- ♦ Remote Operation Centre; and
- ♦ adversely affect the operation and/or control of the Remotely Operated Unmanned Vessel.

Where a Remotely Operated Unmanned Vessel loses connectivity with the Remote Operation Centre the vessel shall display or emit "not under command" sounds and visual signals to alert other water users that the vessel is not under command and may not give way.

7.9 Safe Operation of Remote Operation Centres

Remote Operation Centre operators shall have regular training for emergency situations (see Section 8.3 of this Annex). Action plans shall be provided to operators detailing appropriate actions to be taken during emergency situations (including but not limited to display failures, fire, power disruption or a cyber- attack).

Critical equipment shall have primary and emergency power supplies. Emergency power supplies (e.g. generators or battery systems) shall have a regular testing and maintenance programme in place.

A Remotely Operated Unmanned Vessel handover procedure shall be developed. The procedure shall include but not be limited to:

- ♦ requirements to enable safe transfer of a vessel between workstations and Remote Operation Centres;

- ♦ handover information when transferring vessels between Remote Operators;
- ♦ means to clearly identify the in-command workstation or Remote Operation Centre;
- ♦ means to ensure positive control is maintained at all times; and
- ♦ measures to ensure that a vessel's control position is known and recorded at all times.

Handover between workstations or Remote Operation Centres shall not result in an unsafe condition.

In the event of the Remote Operation Centre becoming inoperable a back-up Remote Operation Centre shall be available. The back-up shall:

- ♦ be able to replicate, at a minimum, camera and sensor outputs and other relevant information for effective operation of Remotely Operated Unmanned Vessels;
- ♦ be readily accessible;
- ♦ have a testing programme to assess suitability of systems and personnel responses (such as emergency drills); and
- ♦ have its systems, databases and server regularly updated (where applicable).

Where the connection between the Remotely Operated Unmanned Vessel and Remote Operation Centre fails the vessel shall enter, and remain in, a safe state until connection is either re-established with the Remote Operation Centre or established with a back-up Remote Operation Centre.

7.10 Emergency Systems

The Remotely Operated Unmanned Vessel shall have a system installed which ensures that the vessel enters a safe state following loss of contact with the Remote Operation Centre. The system shall be connected to a primary and secondary power source and can be overridden once the emergency or problem has been resolved.

A Remote Operation Centre workstation shall have means to enable the Remote Operator to rapidly shut off, and re-initialise, fuel or power to the Remotely Operated Unmanned Vessel's engine(s) and shall:

- ♦ be designed and located to prevent accidental or inadvertent operation;
- ♦ be designed and accessible for rapid use in an emergency; and
- ♦ have means to indicate to the Remote Operator when the shut-off has been activated.

7.11 Tenders

A Remotely Operated Unmanned Vessel may operate as either a Type 1 or Type 2 tender but is not permitted to have any persons on board.

8 Safety Management System and Contingency Measures

The purpose of this section is to outline the Safety Management System and contingency measure requirements to ensure the safety of other water users, the safety and integrity of the Remotely Operated Unmanned Vessel and the safety of the marine environment. A number of requirements are given to protect Remotely Operated Unmanned Vessels and Remote Operation Centres from risks associated with cyber-attacks.

8.1 Safety Management System and Cyber Security

All documents relating to the Safety Management System shall be available at the control position(s).

Cyber security measures for Remotely Operated Unmanned Vessels shall:

- ♦ provide secure connections between a Remotely Operated Unmanned Vessel and the Remote Operation Centre; and
- ♦ where possible protect against successful cyber-attacks and cyber- incidents on Remotely Operated Unmanned Vessels or Remote Operation Centres.

The owner/operator of a Remotely Operated Unmanned Vessel shall develop procedures for the following:

- ♦ authorisation for connections between a Remotely Operated Unmanned Vessel and Remote Operation Centre;
- ♦ authorisation for direct connections to a Remotely Operated Unmanned Vessel;
- ♦ recovery plan(s) for the successful recovery of systems following a cyber-attack;
- ♦ measures to initiate a safe state for a Remotely Operated Unmanned Vessel in an emergency; and
- ♦ contingency plans to respond to the loss of critical systems.

Following disruption to, or re-establishment of, connection between a Remotely Operated Unmanned Vessel and Remote Operation Centre the health and security of the connection shall be tested.

Internal audits of the Remote Operation Centre, its functions, internal operating standards and record-keeping shall be carried out on an annual basis and shall be made available for review by an authorised person during survey and inspection of the Remotely Operated Unmanned Vessel.

The owner/operator of a Remotely Operated Unmanned Vessel shall comply with applicable legislation within all states that the Remotely Operated Unmanned Vessel and Remote Operation Centre intend to operate in.

8.2 Operating Procedures and Risk Assessments

A risk assessment shall be conducted for a Remotely Operated Unmanned Vessel in their intended area category of operation, particularly where operating within congested areas.

The owner/operator of a Remotely Operated Unmanned Vessel shall develop a risk assessment to identify potential risks to the vessel, shore-side personnel and maintenance crew. The risk assessment shall include deviations from normal operating conditions.

Shore-based procedures shall be developed to test equipment and connectivity prior to, and during, a voyage.

8.3 Emergency Situations and Safeguards

Clear procedures for responding to emergency situations shall be understood by all personnel, and shall include:

- ♦ the emergency situations listed in Section 29.1.10 of the Code;

- ♦ loss of contact between a Remotely Operated Unmanned Vessel and the Remote Operation Centre;
- ♦ failure of cameras and/or sensors;
- ♦ failure of anchors or dynamic positioning system(s) (see Section 5.5);
- ♦ failure or fault at the Remote Operation Centre;
- ♦ cyber-attack; and
- ♦ unauthorised boarding.

8.4 Fire and Safety Procedure

A fire and safety procedure for a Remotely Operated Unmanned Vessel shall, at a minimum, include the following:

- ♦ fire prevention and suppression appliances;
- ♦ fire detection equipment and materials; and
- ♦ systems and openings which shall be remotely closed or switched off in event of a fire.

8.5 Critical Equipment

Propulsion and steering systems shall be designed to control and maintain minimum safe speed and direction in all anticipated conditions.

A minimum of three hours of back-up power shall be provided for critical systems. Back-up power supplies may also be provided for propulsion and steering systems.

8.6 Programmable Electronic Systems, Software and Version Control

Version control shall be implemented for all Remotely Operated Unmanned Vessel and Remote Operation Centre software.

Programmable Electronic Systems (PES) shall be designed to operate safely in all anticipated conditions and reasonably foreseeable misuse situations.

In the event of a failure the affected PES shall enter, or remain in, a safe state. Auditory and visual alarms shall be activated in the affected space and at the control position(s).

Vessel equipment shall not interfere with the protective functions of PES during normal operations or emergency situations.

Records of remote access shall be recorded for audit purposes.

All persons authorised to carry out remote access shall have a level of access appropriate to their function and qualifications.

Data, software and hardware shall be protected from unauthorised or accidental modification.



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