MERCHANT SHIPPING ACT, 2013

MERCHANT SHIPPING (CARGO SHIP CONSTRUCTION) REGULATIONS, 2014

ARRANGEMENT OF REGULATIONS

regulation

MERCHANT SHIPPING ACT, 2013

MERCHANT SHIPPING (CARGO SHIP CONSTRUCTION) REGULATIONS, 2014

IN EXERCISE of the powers conferred on the Minister under section 336 of the Merchant Shipping Act 2013, these Regulations are made.

PART I - PRELIMINARY

1. Citation

These Regulations may be cited as the Merchant Shipping (Cargo Ship Construction) Regulations 2014.

2. Interpretation

(1) In these Regulations –

"accommodation spaces" means passenger spaces, corridors, lavatories, cabins, offices, crew spaces, hairdressing salons, pantries not containing cooking appliances, lockers and similar spaces;

"Act" means the Merchant Shipping Act 2013;

“Administration” means the Gambia Maritime Administration;

"auxiliary steering gear" means the equipment, other than any part of the main steering gear, necessary to steer the ship in the event of failure of the main steering gear but not including the tiller, quadrant or components serving the same purpose;

"bulkhead deck" means the deck up to which the majority of transverse watertight bulkheads are carried;

"cargo area" means that part of a ship which contains cargo spaces, slop tanks and cargo pump rooms, cofferdams, ballast and void spaces adjacent to cargo tanks and also deck areas throughout the length and breadth of the part of the ship over such spaces;

"cargo control station" means a space from which the loading, discharging or transferring of any cargo may be controlled;

"cargo ship" means a mechanically propelled ship which is not a passenger ship, troop ship, pleasure vessel or fishing vessel;

"cargo pump room" means a room in which any pumps used for loading, discharging or transferring cargoes are located;

"cargo spaces" means all spaces used for cargo, including cargo tanks, and trunks to such spaces;

"chemical tanker" means a tanker constructed or adapted and used for the carriage in bulk of any liquid product of a flammable nature listed in Chapter 17 of the IGC Code;

"Code of Safety for Special Purpose Ships" means the Code annexed to IMO Resolution A.534 (13) and any amendments thereto or replacements thereof;

"Code for the Safe Carriage of Irradiated Nuclear Fuel, Plutonium and High Level Radioactive Wastes on Board Ships" means the Code annexed to IMO Resolution A.748 (18) and any amendments thereto or replacements thereof;

"control stations" means spaces in which radio or main navigating equipment, or the emergency source of power, or the central fire recording, or fire control equipment, or fire extinguishing installations are located or a control room located outside a propelling machinery space;

"dangerous goods" means goods, articles and materials prescribed as dangerous goods in regulations made under section 339 of the Act;

"dead ship condition" means that condition under which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power;

"deadweight" means the difference in tonnes between the displacement of a ship at the summer load waterline in water of a specific gravity of 1.025 and the lightweight of

the ship;

"emergency condition" means a condition under which any services needed for normal operational and habitable conditions are not in working order due to failure of the main source of electrical power;

"emergency source of electrical power" means a source of electrical power intended to supply the emergency switchboard in the event of failure of the supply from the main source of electrical power;

"emergency switchboard" means a switchboard which in the event of failure of the main electrical power supply system, is directly supplied by the emergency source of electrical power or the transitional source of emergency power and is intended to distribute electrical energy to the emergency services;

"equivalent material" where the words are used in the expression "steel or other equivalent material", means any material which by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of an appropriate fire test;

"fishing vessel" means a vessel used for catching fish, whales, seals, walrus or other living resources of the sea;

"forward perpendicular" means the perpendicular defined as such in the Merchant Shipping (Load Line) Regulations 2014;

"freeboard deck" means the deck defined as such in the Merchant Shipping (Load Line) Regulations 2014;

"gas carrier" means a tanker constructed or adapted and used for the carriage in bulk of any liquefied gas or certain other substances of a flammable nature listed in Chapter 19 of the IGC Code;

"Guidelines for the Design and Construction of Offshore Supply Vessels" means the guidelines annexed to IMO Resolution A.469 (XII) and any amendments thereto or replacements thereof;

"hazardous area" means an area in which explosive gas-

air mixtures are, or may be expected to be, present in quantities such as to require special precautions for the construction and use of electrical apparatus or other apparatus which otherwise would constitute a source of ignition;

"high speed craft" is a craft capable of maximum speed in metres per second (m/s) equal to or exceeding –

$$3.7\ \Lambda^{0.1667}\ \text{(m/s)}$$

where

Λ= displacement corresponding to the design waterline (m^3);

"High-Speed Craft Code" means the International Code of Safety for High-Speed Craft adopted by the Maritime Safety Committee of the Organization by Resolution MSC. 36(63) and any amendments thereto or replacements thereof;

"IBC Code" has the meaning given by section 85 of the Shipping (Marine Pollution) Act 2010;

"IGC Code" means the International Code for the Construction and Equipment of Ships carrying Liquefied Gases in Bulk, 1993, and any amendments thereto and replacements thereof;

"IMO" and "Organization" means the International Maritime Organization;

"length" means the length of the ship ascertained in accordance with the Merchant Shipping (Load Lines) Regulations 2010;

"lightweight" means the displacement of a ship in tonnes without cargo, fuel, lubricating oil, ballast water, feed water and fresh water in tanks, consumable stores, passengers and crew and their effects;

"Load Lines Convention" has the meaning given by section 313 of the Act;

"machinery alarm and control centre" means the position from which the propelling and auxiliary machinery can be controlled and where the alarms other than those located

in accommodation spaces and at the navigating bridge, necessary for the safe operation of such machinery are located;

"machinery control room" means a room from which the propelling machinery and boilers serving the needs of propulsion may be controlled;

"machinery space" means any space which contains propelling machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilising, ventilation and air conditioning machinery, and similar spaces; and, where the context so admits, any trunk to such a space;

"machinery spaces of Category A" means a machinery space which contains -

(a) internal combustion type machinery used either for main propulsion purposes, or for other purposes where such machinery has in the aggregate a total power output of not less than 375 kilowatts, or

(b) any oil fired boiler or oil fuel unit;

and any trunk to such a space;

"main generating station" means the space in which the main source of electrical power is situated;

"main source of electrical power" means a source intended to supply electrical power to the main switchboard for distribution to all services necessary for maintaining a ship in normal operational and habitable condition;

"main steering gear" means the machinery, rudder actuators, steering gear power units, if any, and auxiliary equipment and the means of applying torque to the rudder stock, such as the tiller or quadrant, necessary for effecting movement of the rudder for the purpose of steering the ship under normal service conditions;

"main switchboard" means the switchboard which is directly supplied by the main source of electrical power and is

intended to distribute electrical energy to the ship's services;

"MARPOL" means the International Convention for the Prevention of Pollution from Ships 1973, including its protocols, Annex I (but no other Annex) and appendices thereto and any amendments thereof and replacements thereto;

"maximum ahead service speed" means the greatest speed which the ship is designed to maintain at sea at her deepest seagoing draught;

"maximum astern speed" means the greatest speed which it is estimated the ship can attain at the designed maximum astern power at the deepest seagoing draught;

"navigable speed" means the minimum speed at which the ship can be effectively steered in the ahead direction;

"noise level" means "A" weighted sound pressure level in decibels dB(A) as defined and tabulated in the International Electro-Technical Commission standard specification number EN 60651:

"normal operational and habitable condition" is a condition under which the ship as a whole, the machinery, services, means and aids ensuring propulsion, ability to steer, safe navigation, fire and flooding safety, internal and external communications and signals, means of escape and emergency boat winches, as well as the designed comfortable conditions of habitability, are in working order and functioning normally;

"oil fuel unit" means the equipment used for the preparation of oil fuel for delivery to an oil fired boiler or equipment used for the preparation for delivery of heated oil to an internal combustion engine and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure greater than 180 kPa;

"oil tanker" means a ship constructed or adapted primarily to carry oil in bulk in its cargo spaces and includes a combination carrier or a chemical tanker when it is carrying a cargo or part cargo of oil in bulk;

"pleasure vessel" means -

(a) any vessel, including a dive boat, which at the time it is being used is -

(i) in the case of a vessel wholly owned by an individual or individuals, used only for the sport or pleasure of the owner or the immediate family or friends of the owner, or

(ii) in the case of a vessel owned by a body corporate, used only for sport or pleasure and on which the persons are employees or officers of the body corporate, or their immediate family or friends, and

(iii) on a voyage or excursion which is one for which the owner does not receive money for or in connection with operating the vessel or carrying any person, other than as a contribution to the direct expenses of the operation of the vessel incurred during the voyage or excursion; or

(b) any vessel wholly owned by or on behalf of a members' club formed for the purpose of sport or pleasure which, at the time it is being used, is used only for the sport or pleasure of members of that club or their immediate family; and for the use of which any charges levied are paid into club funds and applied for the general use of the club; and

(c) in the case of any vessel referred to in paragraphs (a) or (b) above no other payments are made by or on behalf of users of the vessel, other than by the owner.

In this definition "immediate family" means in relation to an individual, the husband or wife of the individual, and a relative of the individual or the individual's husband or wife, and "relative" means brother, sister, ancestor or lineal descendant;

"power actuating system" means the hydraulic equipment provided for supplying power to turn the rudder stock,

comprising a steering gear power unit or units, together with the associated pipes and fittings, and a rudder actuator. The power actuating systems may share common mechanical components, that is, tiller, quadrant and rudderstock or components serving the same purpose;

"reid vapour pressure" means the vapour pressure of a liquid as determined by laboratory testing in a standard manner in the Reid apparatus;

"similar stage of construction" means a stage at which-

(a) construction identifiable with a specific ship begins; and

(b) assembly of that ship, comprising at least 50 tonnes of 1 per cent of the estimated mass of all structural material, whichever is the less, has commenced;

"service spaces" includes galleys, pantries containing cooking appliances, lockers, species rooms, laundries, store rooms, workshops other than those forming part of machinery spaces and similar spaces and trunks to such spaces;

"settling tank" means an oil storage tank having a heating surface of not less than 0.183 square metre per tonne of oil capacity;

"steering gear control system" means the equipment, comprising transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables by which orders are transmitted from the navigating bridge to the steering gear power units;

"steering gear power unit" means -

(a) in the case of electric steering gear, the electric motor and its associated electric equipment, or

(b) in the case of electro-hydraulic steering gear, the electric motor, its associated electrical equipment and connected pump, or

(c) in the case of steam-hydraulic or pneumatic-

hydraulic steering gear, the driving engine and connected pump;

"suitable" in relation to material means suitable for the purpose for which it is used;

"surveyor" means a surveyor of ships appointed by the Administration;

"tanker" means a cargo ship constructed or adapted for the carriage in bulk of liquid cargoes of a flammable nature and except where the context otherwise requires, includes a gas carrier and a chemical tanker;

"tons" means gross tonnage determined in accordance with tonnage regulations made under section 3b of the Act;

"upper deck" means the uppermost complete deck exposed to the sea and weather fitted as an integral part of the ship's structure, being a deck, openings in the weather portions of which are fitted with permanent means of closing and below which all openings in the sides of the ship are fitted with permanent means of watertight closing;

"watertight" means capable of preventing the passage of water in any direction;

"weathertight" means that in any sea condition water will not penetrate the ship.

(2) Where a sub-heading refers to "requirements" or to "additional requirements" for certain ships, the text following such a subheading -

(a) in that regulation, or until the next sub-heading in that regulation ;and

(b) in that Part or Schedule, or until the next subheading in that Part or Schedule,

shall, unless the context otherwise requires, relate only to such ships.

3. Exemptions

(1) Without prejudice to section 311 of the Act, the Administration may exempt every ship the keel of which was laid before 26 May 1965 from the requirements of these Regulations, except regulation 54 and subparagraphs 9, 10, 11 and 12 of the Fourth Schedule.

(2) In granting such exemption, the Administration shall impose such conditions as it thinks fit.

4. Application

(1) Subject to sub-regulation (3), these Regulations apply to -

(a) sea-going Gambian cargo ships of 500 tons or over wherever they may be;

(b) other sea-going cargo ships of 500 tons or over, while they are within Gambian waters, when engaged on international voyages; and

(c) to other sea-going cargo ships of 500 tons or over when not engaged on international voyages, while they are within Gambian national waters.

(2) A Gambian ship which undergoes repairs, alterations or modifications shall meet the requirements applying to a ship constructed at that time in so far as the Administration deems reasonable and practicable.

(3) Nothing in these Regulations shall apply to –

(a) a ship by reason of her being within Gambia or the territorial waters thereof if she would not have been therein but for stress of weather or any other circumstances that the master, or owner, or the charterer, if any, could not have prevented;

(b) high-speed craft which comply with the High Speed Craft Code, and have been surveyed and certified as provided for in that Code.

5. Approved standards

In complying with the requirements of these Regulations, with respect to the construction or maintenance relating to hull,

machinery, electrical installations and control installations, Gambian ships covered by these Regulation shall comply with the structural, mechanical and electrical requirements of a classification society which is recognised by the Minister for the purposes of these Regulations.

PART II - CONSTRUCTION - ALL SHIPS

6. Structural strength

(1) The structural strength of every ship and the number and disposition of transverse watertight bulkheads shall be adequate for the service for which the ship is intended.

Additional requirements for ships constructed on or after 1 September 1984

(2) The hull, superstructure, structural bulkheads, deck and deckhouses shall be constructed of steel or other equivalent material except that the crowns and casings of machinery spaces of Category A shall be constructed only of steel.

Requirements for ships constructed on or after 1 September 1984

7. Peak and machinery space bulkheads and stern tubes

(1) Every ship shall be fitted with a collision bulkhead which shall be watertight up to the freeboard deck.

(2) This bulkhead shall be located at a distance from the forward perpendicular of not less than 5 per cent of the length of the ship or 10 metres, whichever is the least and, except as may be permitted by the Administration, not more than 8 per cent of the length of the ship.

(3) Where any part of the ship below the waterline extends forward of the forward perpendicular, such as bulbous bow, the distances stipulated in sub-regulation (2) shall be measured from a position -

(a) at the mid-length of such extension; or

(b) forward of the forward perpendicular at a distance of 1.5 per cent of the length of the ship; or

(c) forward of the forward perpendicular at a distance of 3

metres,

whichever is the aftermost position.

(4) The collision bulkhead may have steps or recesses in it provided that they are within the limits prescribed in sub-regulations (1) to (3), and pipes piercing the collision bulkhead shall be fitted with suitable valves operable from above the freeboard deck and the valve chest shall be secured at the bulkhead inside the forepeak.

(5) The Administration may permit the location of such valves on the after side of the collision bulkhead provided that they are readily accessible under all service conditions and the space in which they are located is not a cargo space.

(6) All such valves shall be of steel, bronze or other ductile material; valves of ordinary cast iron or similar material shall not be fitted.

(7) Doors, manholes, ventilation ducts or any other openings shall not be fitted in the collision bulkhead.

(8) In every ship provided with a long forward superstructure the collision bulkhead shall be extended weathertight to the deck immediately above the freeboard deck.

(9) The extension shall, subject to the requirements of sub-regulation (11), be located within the limits prescribed in sub-regulations (1) to (3).

(10)The part of the deck, if any, between the collision bulkhead and its extension shall be weathertight.

(11) In every ship provided with a bow door and a sloping loading ramp that forms part of the extension of the collision bulkhead above the freeboard deck, the part of the ramp which is more than 2.3 metres above the freeboard deck may extend forward of the limits specified in sub-regulations (1) to (3).

(12) The ramp shall be weathertight over its entire length.

(13) The number of openings in the extension of the collision bulkhead above the freeboard deck shall be restricted to the minimum compatible with the design and normal operation of the ship and all such openings shall be capable of being closed

weathertight.

Additional requirements for ships constructed on or after 1 February 1992

(14) In every ship, bulkheads made watertight up to the freeboard deck shall be fitted to separate the machinery space from cargo and accommodation spaces.

(15) In every ship, stern tubes shall be enclosed in a watertight space (or spaces) of moderate volume and other measures may be taken to minimise the danger of water penetrating into the ship in case of damage to stern tube arrangements, subject to the approval of the Administration.

Requirements for ships constructed on or after 1 September 1984

8. Construction and testing of watertight bulkheads, decks and inner bottoms

(1) In every ship, each transverse and longitudinal watertight subdivision bulkhead shall be constructed in such a manner that it shall be capable of supporting the pressure due to the maximum head of water which it might have to sustain in the event of damage to the ship and the head of water shall be at least up to the freeboard deck.

(2) Steps and recesses in the bulkheads shall be watertight and of a strength equivalent to that of the bulkhead.

(3) Frames or beams that pass through a watertight deck or bulkhead shall be made structurally watertight without the use of wood or cement.

(4) Watertight compartments shall be tested either by flooding or by a hose test at the most advanced stage of the fitting out of the ship or by other means acceptable to the certifying Administration, to establish that the watertight bulkheads are effective.

(5) The forepeak, double bottoms, duct keels and inner skins shall be tested by flooding with water to the head prescribed in sub-regulation (1).

(6) Tanks intended to hold liquids and which form part of the subdivision of the ship shall be tested by flooding with water to a head corresponding to the deepest subdivision load line or to two

thirds of the depth from the top of the keel to the freeboard deck whichever is the greater and in no case shall the test head be less than 0.9 metres above the top of the tank.

(7) The tests prescribed in this regulation shall not necessarily be regarded as a test of fitness of any compartment for the storage of oil fuel or for other special purposes for which a test of a superior character may be appropriate.

Requirements for ships constructed on or after 1 September 1984

9. Construction and testing of watertight decks, trunks, tunnels, duct keels and ventilators

(1) In every ship, the watertight decks, trunks, tunnels, duct keels and ventilators shall be of the same strength as the watertight bulkheads at corresponding levels.

(2) The means for making them watertight and the arrangements for closing openings in them shall be to the satisfaction of the certifying Administration.

(3) Watertight ventilators and trunks shall be watertight at least up to the freeboard deck.

(4) Watertight decks shall be subjected to a hose or flooding test after completion.

(5) Watertight trunks, tunnels and ventilators shall be subject to a hose test on completion, or they may be tested by other means acceptable to the certifying Administration.

10. Watertight doors

(1) Except for ships subject to Part III, every watertight door required to maintain the watertight integrity of a bulkhead, shall be made of suitable material and efficiently constructed for its intended duty.

(2) Every watertight door of the sliding type shall be capable of being operated by efficient hand operated gear both at the door itself and from an accessible position above the bulkhead deck.

(3) The operating gear for operating from above the bulkhead deck any sliding watertight door fitted in the bulkhead of a machinery space shall be situated outside the machinery space.

(4) Where there is access from the lower part of a machinery space to a watertight shaft tunnel, the access opening shall be provided with a sliding watertight door which shall be capable of being operated locally from both sides of the door.

(5) Means shall be provided at remote operating positions to indicate when a sliding door is closed.

(6) Watertight doors shall be capable of being operated when the ship is listed up to 15 degrees either way

11. Tests of watertight doors

(1) Each watertight door shall be tested by water pressure equivalent to the head up to the freeboard deck.

(2) The test shall be made before the ship is put into service, either before or after the door is fitted.

12. Ballast and bilge pumping and drainage arrangements

Every ship shall be provided with efficient bilge pumping plant and means of drainage in accordance with the provisions of the First Schedule.

13. Openings in the shell plating below the freeboard deck

(1) The number of sidescuttles, scuppers, sanitary discharges and other openings in the shell plating below the freeboard deck shall be the minimum which is compatible with the design and proper working of the ship.

(2) The arrangement and efficiency of the means for closing every such opening below the freeboard deck shall be consistent with its intended purpose and shall be such as will ensure watertightness.

(3) The design and arrangements of openings in the shell plating below the freeboard deck shall be in accordance with the specifications set out in the Second Schedule.

PART III - STABILITY OF SHIPS OF 80 METRES OR OVER

14. Interpretation

In this Part -

"attained subdivision index" means the attained subdivision index of the ship calculated in accordance with regulation 15;

"subdivision length" means the greatest projected moulded length of that part of the ship at or below deck or decks limiting the vertical extent of flooding with the ship at the deepest subdivision load line;

"subdivision load line" means a waterline used in determining the subdivision of the ship; and

"deepest subdivision load line" means the subdivision load line which corresponds to the draught corresponding to the summer load line assigned to the ship under the Merchant Shipping (Load Lines) Regulations 2014.

15. Application

This Part applies to every ship of 100 metres or over in length constructed on or after 1 February 1992 and to every ship of 80 metres or over in length constructed on or after 1 July 1998, except a ship which complies with -

(a) the IBC Code;

(b) the IGC Code;

(c) the Guidelines for the Design and Construction of Offshore Supply Vessels;

(d) the Code for the Safety of Special Purpose Ships; or

(e) both with the damage stability requirements of regulation 27 of the International Load Line Convention 1966 as modified by IMO Resolutions A.320(IX) and 514(13) and, in the case of ships to which paragraph (9) of that regulation applies, with subparagraph (12)(f) of Resolution A.320(IX).

16. Subdivision indices

(1) The attained subdivision index of every ship shall not be less than the required subdivision index of that ship.

(2) The attained subdivision index of a ship is the value "A" calculated in respect of that ship in accordance with the formula specified in paragraph 3 of the Third Schedule and the required subdivision index for a ship is the value "R" calculated in respect of that ship in accordance with the formula specified in paragraph 2 of that Schedule.

(3) In calculating "A" and "R", account shall be taken of the Explanatory notes to the SOLAS regulations on subdivision and stability of cargo ships of 100 metres in length and over which were adopted by the Organization by resolution A.684(17), and of resolution MSC. 76(69) on Extended Application of those Explanatory Notes, and any amendments thereof or replacements thereto.

17. Stability information

(1) The master of every ship shall be supplied with such reliable information as is necessary to enable him or her by rapid and simple means to determine the stability of the ship under varying conditions of service.

(2) That information shall include -

(a) one of the following -

(i) a curve of minimum operational metacentric height (GM) versus draught which assures compliance with the applicable intact stability requirements of Schedule 6, Part I of the Shipping (Load Lines) Regulations 2014 or with the attained subdivision index of the ship, whichever is the more onerous condition or, where curves representing the requirements cross, the part of each curve which represents the more onerous requirement; or

(ii) a (corresponding) curve of the maximum allowable vertical centre of gravity (KG) versus draught; or

(iii) a tabular or equivalent presentation of either of these curves; and

(b) instructions concerning the operation of cross-flooding arrangements; and

(c) all other data and means of presentation necessary to assist the crew to maintain stability after damage.

(3) Where the curve provided or presented in compliance with sub-regulation (2)(a) is based wholly or in part on the attained subdivision index of the ship, the operational GM(KG) values shall be applied in the manner and to the extent specified in paragraph 7 in the Third Schedule.

(4) The information required to be supplied by this regulation shall before it is supplied to the master, be submitted for approval to that Administration to which the information supplied in respect of the ship pursuant to regulation 24 of the Merchant Shipping (Load Lines) Regulations 2014 is required to be submitted in accordance with sub-regulation (5) of that regulation.

(5) In sub-regulation (4), "Administration" has the same meaning as in the Merchant Shipping (Load Line) Regulations 2014.

(6) There shall be permanently exhibited or readily available on the navigating bridge for the guidance of the officer in charge of the ship, plans showing clearly for each deck and hold, the boundaries of the watertight compartments, the openings therein, the means of closure and position of any controls thereof, and the arrangements for the correction of any list due to flooding and in addition, booklets containing this information shall be made available by the owners for the use of the officers of the ship.

18. Openings in watertight bulkheads and internal decks

(1) The number of openings in the boundaries of watertight compartments shall be the minimum compatible with the design and proper working of the ship.

(2) Where penetration of watertight bulkheads and internal decks is necessary for access, piping, ventilation, electrical cables, or for any other purpose, arrangements shall be made to maintain watertight integrity at each such point of penetration.

(3) The Administration may permit openings in compartment

boundaries above the freeboard deck to be weathertight rather than watertight where it is demonstrated that any progressive flooding resulting therefrom can be easily controlled and the safety of the ship would not be impaired.

(4) Doors provided to ensure the watertight integrity of internal openings which are used while the ship is at sea shall be of the sliding watertight type and capable of being remotely closed from the bridge and capable also of being operated locally from each side of the door without the door closing automatically.

(5) Indicators shall be provided at the bridge position showing whether the doors are open or closed, and an audible alarm shall be provided when the door closes.

(6) The power for operating and controlling the doors, indicators and alarms shall be supplied from the emergency switchboard required by regulation 50.

(7) The control system shall be so designed that if the system fails, closure by hand will not be prevented or impeded.

(8) Each power-operated sliding watertight door shall be provided with an individual hand-operated opening and closing mechanism, and means shall be provided at the door itself to open and close the door safely by hand from both sides and from an accessible position above the bulkhead deck.

(9) Access doors and access hatch covers normally closed at sea and intended to ensure the watertight integrity of internal openings, shall be provided locally and on the bridge, with indicators to show whether these doors or hatch covers are open or closed.

(10) A notice shall be affixed to each such door or hatch cover stating that it is not to be left open at sea.

(11)Such doors and hatch covers shall not be used except where access is necessary and is authorised by the officer of the watch.

(12) Watertight doors or ramps of satisfactory construction may be fitted to subdivide large cargo spaces internally where the Administration is satisfied that such doors or ramps are essential.

(13) These watertight doors or ramps may be of the hinged, rolling or sliding type, but shall not be remotely controlled.

(14) They shall be closed before the voyage commences and shall be kept closed throughout the voyage and the time of opening such doors or ramps when the voyage has ended and of closing them before the voyage commences shall be entered in the log book.

(15) Any doors or ramps which may be accessible during the voyage shall be fitted with a device which prevents unauthorised opening.

(16) Every closing appliance which is required to be kept permanently closed at sea to ensure the watertight integrity of a compartment shall be provided with a notice affixed to it stating that it is to be kept closed, except that manholes secured by closely bolted covers need not be so marked.

19. External openings

(1) All external openings which lead to compartments assumed intact for the purposes of calculating the subdivision index "A", and which are below the final waterlines, shall be watertight.

(2) External openings required to be watertight in accordance with sub-regulation (1) shall be of sufficient strength and, except in the case of cargo hatch covers, shall be fitted with indicators on the bridge.

(3) Openings in the shell plating below the deck limiting the vertical extent of damage, shall be kept permanently closed while at sea. Any of these openings which may be accessible during the voyage, shall be fitted with a device which prevents unauthorised opening.

(4) Notwithstanding the requirements of sub-regulation (3), the Administration may authorise the opening of specific doors at the discretion of the master, if it is satisfied that such opening is necessary for the operation of the ship and provided that the safety of the ship would not be thereby impaired.

(5) Every watertight closing appliance which is required to be permanently closed at sea to ensure the integrity of an external opening shall be provided with a notice affixed to it stating that it is to be kept closed at sea; provided that manholes secured by closely bolted covers need not be so marked.

PART IV - DOUBLE BOTTOMS IN SHIPS OTHER THAN TANKERS

20. Requirements for ships, other than tankers, constructed on or after 1 February 1992

(1) A double bottom shall be fitted extending from the collision bulkhead to the after peak bulkhead, so far as this is practicable and compatible with the design and proper working of the ship.

(2) Where a double bottom is required to be fitted, its depth shall be to the satisfaction of the Administration and the inner bottom shall be continued out to the ship's side in such a manner as to protect the bottom to the turn of the bilge.

(3) Small wells constructed in the double bottom, in connection with the drainage arrangements of holds, shall not extend in depth more than necessary.

(4) A well extending to the outer bottom is permissible at the after end of the shaft tunnel of the ship and other wells may be permitted by the Administration, where it is satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation.

(5) A double bottom need not be fitted under watertight compartments used exclusively for the carriage of liquids, provided the safety of the ship in the event of bottom damage is not, in the opinion of the Administration, thereby impaired.

PART V - DAMAGE CONTROL IN DRY CARGO SHIPS

21. Requirements for dry cargo ships constructed on or after 1 February 1992

(1) There shall be permanently exhibited or readily available on the navigating bridge, for the guidance of the officer in charge of the ship, a plan showing clearly for each deck and hold, the boundaries of the watertight compartments, the openings therein with the means of closure and position of any controls thereof, and the arrangements for the correction of any list due to flooding.

(2) In addition, booklets containing this information shall be made available to the officers of the ship.

(3) Indicators shall be provided on the navigating bridge for all sliding doors and for hinged doors in watertight bulkheads to show whether these doors are open or closed.

(4) In addition, shell doors and other openings which, in the opinion of the Administration, could lead to major flooding if left open or not properly secured, shall also be provided with such indicators.

(5) The booklet referred to in sub-regulation (2) shall contain general precautions being a listing of equipment, conditions and operational procedures, considered by the Administration to be necessary to maintain watertight integrity under normal ship operations.

(6) The booklet referred to in sub-regulation (1) shall contain specific precautions being a listing of elements, such as closures, security of cargo, sounding of alarms, considered by the Administration to be vital to the survival of the ship and its crew.

PART VI - CONSTRUCTION - TANKERS

22. General

(1) This Part applies to -

(a) Gambian and other tankers, the keels of which were laid or were at a similar stage of construction, on or after 25 May 1980; and

(b) Gambian and other tankers converted into or adapted to be tankers on or after 25 May 1980.

(2) This Part applies to tankers designed to carry crude oil and petroleum products which have a closed flash-point not exceeding 60℃ and a reid vapour pressure below atmospheric p ressure, or other liquids having a similar fire hazard, except chemical tankers and gas carriers which comply with the constructional requirements specified in the Codes referred to in the definitions of such ships in regulation 2.

(3) In this Part, "fire protection arrangements" and "fire extinguishing arrangements" mean requirements for those matters, so far as relevant, contained in the Merchant Shipping (Fire

Protection) Regulations 2014.

(4) The hull, superstructures, structural bulkheads, decks and deckhouses shall be constructed of steel or other equivalent material except that the crowns and casings of machinery spaces of Category A and the exterior boundaries of superstructures and deckhouses which are required to be insulated to "A-60" standard shall be constructed only of steel.

23. Location and separation of spaces

(1) Machinery spaces shall be positioned-

(a) aft of cargo tanks and slop tanks and shall be separated from them by a cofferdam, cargo pump-room, oil fuel bunker tank or permanent ballast tank; and

(b) aft of such cofferdam or cargo pump-room except that the lower part of a cargo pump-room may be recessed into a machinery space of Category A in order to accommodate pumps subject to the crown of the recess, being not more than one third of the moulded depth above the keel and in the case of a ship not exceeding 25,000 tonnes, deadweight where a recess of such height is not practicable for reasons of access and arrangement of piping, the recess may be increased to a height not exceeding one half of the moulded depth above the keel.

(2) Pump-rooms, other than cargo pump-rooms, containing pumps and fittings for ballasting spaces adjacent to cargo tanks and slop tanks and pumps and fittings for oil fuel transfer may be considered equivalent to a cargo pump-room for the purpose of this regulation on condition that the fire protection arrangements and fire extinguishing arrangements of those pump-rooms are in accordance with the cargo pump-rooms.

(3) Except as otherwise permitted by sub-regulations (4), (5) and (6), accommodation spaces, control stations, main cargo control stations and service spaces other than isolated lockers for cargo handling gear shall be positioned aft of cargo tanks and slop tanks and pump rooms or cofferdams which separate cargo tanks and slop tanks from machinery spaces except that such spaces may be positioned over the recess of a pump room to which subregulation (1) refers.

(4) Accommodation spaces, control stations, main cargo control stations and service spaces may be positioned forward of the cargo area provided that they are separated from the cargo tanks and slop tanks by a cofferdam, pump room, or the whole or part of an oil fuel bunker tank or permanent ballast tank except that such spaces may be positioned over the recess of a pump room to which sub-regulation (1) refers.

(5) Navigating spaces may be positioned above the cargo tanks and slop tanks provided that they are used only for navigating purposes and are separated from the upper deck by means of an open space the height of which shall be not less than 2 metres.

(6) Where accommodation spaces, control stations, cargo stations, and machinery spaces other than machinery spaces of Category A are located over part of an oil fuel bunker tank the horizontal separation of such spaces from cargo tanks or slop tanks shall be to the satisfaction of the Administration.

(7) Means shall be provided to isolate oil spills on the upper deck from accommodation and service spaces and shall take into account stern cargo handling facilities where these are provided.

Additional requirements for ships constructed on or after1t September 1984

(8) Notwithstanding sub-regulation (1), machinery spaces containing internal combustion machinery having an output greater than 375 kilowatts, other than main propulsion machinery, and provided for the safety of the ship and machinery spaces other than machinery spaces of Category A may be positioned forward of the cargo area provided that they are separated from the cargo tanks and slop tanks in the manner specified in sub-regulation (1) for machinery spaces positioned aft of such tanks.

(9) In combination carriers when the slop is carried on dry cargo voyages, the slop tanks shall be surrounded by cofferdams except where the boundaries of the slop tanks are the hull, main cargo deck, cargo pump room bulkhead or oil fuel bunker tank.

(10) Such cofferdams shall not be open to a double bottom, pipe tunnel, pump room or other enclosed space and shall be provided with means of being filled with water and of being drained.

(11) Where the boundary of a slop tank is the cargo pump room bulkhead, the pump room shall not be open to any double bottom, pipe tunnel or other enclosed space except that bolted gas-tight access covers may be permitted.

(12) The piping between the slop tanks and the pump room on combination carriers shall be provided with isolating arrangements located adjacent to the slop tanks or, where such an arrangement is impracticable, within the pump room at the position where the piping penetrates the bulkhead and the isolating arrangements shall be either a valve and a spectacle flange or a spool piece and blank flanges.

(13) A separate pumping arrangement shall be provided on combination carriers for discharging the contents of the slop tanks to a connection located above the main deck.

(14) The slop tank hatches and cleaning openings on combination carriers shall be on the open deck and, unless such openings are closed by bolted watertight plates, shall be provided with locking arrangements which shall be under the control of a ship's officer.

(15) Cargo oil pipes installed below deck on combination carriers shall be located within wing cargo tanks except that when cargo wing tanks are not provided, the Administration may permit the installation of such pipes in ducts which shall be capable of being adequately cleaned and ventilated.

Additional requirements for ships constructed on or after 1 July 1998

(16) Where there is permanent access from a pipe tunnel to the main pump-room, a watertight door shall be fitted complying with the requirements of regulation 18(2) and, in addition to bridge operation, the watertight door shall be capable of being manually closed from outside the main pump-room entrance.

(17) The watertight door referred to in sub-regulation (16) above shall be kept closed during normal operations of the ship except when access to the pipe tunnel is required.

24. Cargo tank ventilation

Requirements for tankers constructed on or after 1 September 1984

(1) The cargo tank venting systems shall be independent of the ventilation arrangements for any other compartments and the arrangement and position of the openings in the cargo tank deck from which the emission of flammable vapours can occur shall be such as to minimise the possibility of flammable vapours being admitted into enclosed spaces containing a source of ignition or collecting in the vicinity of machinery and equipment which may constitute an ignition hazard.

(2) The cargo tank venting arrangements shall be in accordance with the provisions of the Fourth Schedule.

25. Ventilation of pump rooms and other enclosed spaces

Requirements for tankers constructed on or after 25 May 1980

(1) Cargo pump rooms and pump rooms having a similar hazard shall be mechanically ventilated and discharges from the exhaust fans shall be led to a safe place on the open deck.

(2) The ventilation of these rooms shall have sufficient capacity to minimize the possibility of accumulation of flammable vapours.

(3) The number of changes of air shall be at least 20 per hour, based upon the gross volume of the space.

(4) The air ducts shall be arranged so that all of the space is effectively ventilated.

(5) The ventilation system shall be of the exhaust type, using fans of the non-sparking type.

(6) Ventilation inlets and outlets and other deckhouse and superstructure boundary space openings shall be located clear of the cargo pump room openings and openings for machinery space ventilation shall be located as far aft as practicable taking into consideration the location of any stern loading and discharging facilities provided.

Additional requirements for tankers constructed on or after 1 September 1984

(7) The cargo spaces and their adjacent enclosed spaces in combination carriers shall be capable of being ventilated by permanently installed or portable fans.

(8) A fixed gas detection system shall be provided in cargo pump rooms, pipe ducts and the cofferdams adjacent to slop tanks.

(9) Arrangements shall be provided to detect the presence of flammable vapours in all other spaces within the cargo tank area from the open deck or other easily accessible positions.

Requirements for tankers constructed on or after 1 October 1994

26. Inerting, ventilation and gas measurement

(1) Double hull and double bottom spaces shall be fitted with suitable connections for the supply of air.

(2) On oil tankers required to be fitted with inert gas systems –

(a) double hull spaces shall be fitted with suitable connections for the supply of inert gas;

(b) where hull spaces are connected to a permanently fitted inert gas distribution system, means shall be provided to prevent hydrocarbon gases from the cargo tanks entering the double hull spaces through the system; and

(c) where such spaces are not permanently connected to an inert gas distribution system, appropriate means shall be provided to allow connection to the inert gas main.

(3) Suitable portable instruments for measuring oxygen and flammable vapour concentrations shall be provided and in selecting these instruments, due attention shall be given to their use in combination with the fixed gas-sampling line system referred to in sub-regulation (4).

(4) Where the atmosphere in double hull spaces cannot be reliably measured using flexible gas-sampling hoses, such spaces shall be fitted with permanent gas sampling lines and the configuration of such line systems shall be adapted to the design of

such spaces.

(5) The materials of construction and the dimensions of gas sampling lines shall be such as to prevent restriction and where plastic materials are used, they shall be electrically conductive.

27. Access to spaces in the cargo tank area of oil tankers

(1) Access to cofferdams, ballast tanks, cargo tanks and other spaces in the cargo area shall be direct from the open deck and be such as to ensure their complete inspection and access to double bottom spaces may be through a cargo pump-room, deep cofferdam, pipe tunnel or similar compartments, provided adequate ventilation for safety can be ensured.

(2) For access through horizontal openings, hatches or manholes, the dimensions shall be sufficient to allow a person wearing a self-contained breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also to provide a clear opening to facilitate the hoisting of an injured person from the bottom of the space and the minimum clear opening shall be not less than 600 millimetres×600 millimetres.

(3) For access through vertical openings, or manholes providing passage through the length and breadth of the space, the minimum clear opening shall be not less than 600 millimetres×800 millimetres at a height of not more than 600 millimetres from the bottom shell plating unless gratings or other footholds are provided.

(4) For oil tankers of less than 5,000 tonnes, deadweight smaller dimensions may be approved by the Administration, in special circumstances, if the ability to traverse such openings or to remove an injured person can be proved to the satisfaction of the Administration.

PART VII - MACHINERY INSTALLATION

28. General

(1) In every ship, the machinery, boilers and other pressure vessels, and associated piping systems and fittings, shall be of a design and construction adequate for the service for which they are intended and shall be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards.

(2) The design shall have regard to the materials used in

construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.

Additional requirements for ships constructed on or after 1 September 1984

(3) Where the arrangements of the main propulsion machinery are unconventional, the Administration may require a separate source of propulsion power to be provided sufficient to give the ship a navigable speed.

(4) Means shall be provided whereby the normal operation of propulsion machinery can be sustained or restored when there is a breakdown of –

(a) a generating set which serves as a main source of electrical power;

(b) the source of steam supply;

(c) the boiler feed water system;

(d) the fuel oil supply systems for boilers or engines;

(e) the sources of lubricating oil pressure;

(f) the sources of water pressure;

(g) a condensate pump and the arrangements to maintain vacuum in condensers;

(h) the mechanical air supply for boilers;

(i) an air compressor and receiver for starting or control purposes; and

(j) the hydraulic, pneumatic or electrical means for control of main propulsion machinery including controllable pitch propellers,

or any other auxiliary system essential for propulsion, the Administration may for the purposes of this sub-regulation, where it is safe so to do, permit a partial reduction in propulsion capability from normal operation.

(5) Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the ship shall be designed to operate when the ship is upright and when inclined at any angle of list up to and including 15 degrees either way under static conditions and 22.5 degrees either way under dynamic conditions (rolling) and simultaneously inclined dynamically (pitching) 7.5 degrees by bow or stern.

(6) The Administration may permit a reduction in these angles taking into consideration the type, size and service conditions of the ship.

(7) Access shall be provided to facilitate the cleaning, inspection and maintenance of main propulsion and auxiliary machinery including boilers and pressure vessels.

(8) Non-metallic expansion joints in piping systems, if located in a system which penetrates the ship's side and both the penetration and the non-metallic expansion joint are located below the deepest load waterline, shall be replaced as necessary, and at an interval recommended by the manufacturer.

(9) Operating and maintenance instructions and engineering drawings for ship machinery and equipment essential to safe operation of the ship shall be written in a language understandable by those officers and crew members who are required to understand such information in the performance of their duties.

Additional requirements for ships constructed on or after 1 July 1998

(10) Location and arrangement of vent pipes for fuel oil service, settling and lubrication oil tanks shall be such that in the event of a broken vent pipe, this shall not directly lead to the risk of ingress of seawater splashes or rainwater and two fuel oil service tanks for each type of fuel used on board necessary for propulsion and vital systems or equivalent arrangements shall be provided for each new ship, with a capacity of at least 8 hours at maximum continuos rating of the propulsion plant and normal operating load at sea of the generator plant.

29. Machinery

(1) The main and auxiliary machinery essential for the propulsion and safety of the ship shall be provided with effective means of control and means shall be provided such as starting batteries,

compressed air or the emergency generator, to ensure that the machinery can be brought into operation from the dead ship condition without external aid.

(2) In ships constructed on or after 1 July 1998, main and auxiliary machinery essential for the propulsion, control and safety of the ship shall be provided with effective means for its operation and control and all control systems essential for the propulsion, control and safety of the ship shall be independent or designed such that failure of one system does not degrade the performance of another system.

(3) Where risk from over-speeding of machinery would otherwise exist, two independent means of control shall be provided to ensure that the safe speed is not exceeded; provided that the Administration may permit a single means of limiting the speed of machinery where it considers it safe so to do.

(4) Where main or auxiliary machinery or any parts of such machinery are subject to internal pressure, those parts shall before being put into service for the first time, be subjected to a hydraulic test to a pressure suitably in excess of the working pressure having regard to -

(a) the design and the material of which they are constructed;

(b) the purpose for which they are intended to be used; and

(c) the working conditions under which they are intended to be used,

and such parts shall be maintained in an efficient condition.

Additional requirements for ships constructed on or after 1 September 1984

(5) The propulsion machinery systems shall be designed, constructed and installed so that undue stress due to vibration is not induced during normal operation.

(6) All gearing and every shaft and coupling used for transmission of power essential for the propulsion and safety of the ship or for the safety of persons on board shall be so designed and constructed that they will withstand the maximum working stresses which they will be subjected to in all service conditions taking into

account the type of engines by which they are driven or of which they form part.

(7) Every internal combustion engine having a cylinder diameter of 200 millimetres or greater or a crankcase volume of 0.6 cubic metres or greater shall be provided with crankcase explosion relief valves of a suitable type having sufficient area to relieve abnormal pressure in the crankcase.

(8) The explosion relief valves shall be arranged or provided with means to ensure that any discharge from them is so directed as to minimize the possibility of injury to personnel.

(9) Every main propulsion turbine and where applicable, main internal combustion propulsion machinery and auxiliary machinery shall be provided with automatic shut-off arrangements that will operate in the case of failures, such as a lubricating oil supply failure, which could lead rapidly to complete breakdown, serious damage or explosion.

(10) The Administration may permit arrangements that over-ride the automatic shut-off devices.

30. Means of manoeuvring and going astern

(1) Every ship shall have sufficient power for going astern to secure proper control of the ship in all normal circumstances and the ability of the machinery to reverse the direction of thrust of the propeller in sufficient time and so to bring the ship to rest from maximum ahead service speed shall be demonstrated and recorded.

Ships constructed on or after 1 September 1984

(2) The effectiveness of any supplementary means of stopping or manoeuvring the ship shall be demonstrated and recorded.

(3) Every ship with multiple propellers shall undergo trials to determine the ability of the ship to manoeuvre with one propeller inoperative.

(4) The trial records required by sub-regulations (1), (2) and (3) shall be available on the ship.

31. Boilers and other pressure vessels

(1) In every ship, every boiler or other pressure vessel and its respective mountings shall before being put into service for the first time, be subjected to a hydraulic test to a pressure suitably in excess of the working pressure which will ensure that the boiler or other pressure vessel and its mountings are adequate in strength and design for the service for which it is intended and having regard to -

(a) the design and the material of which it is constructed;

(b) the purpose for which it is intended to be used; and

(c) the working conditions under which it is intended to be used,

and every such boiler or other pressure vessel and its respective mountings shall be maintained in an efficient condition.

(2) In every such ship, provision shall be made to facilitate the cleaning and inspection of every pressure vessel.

(3) Means shall be provided to prevent overpressure in any part of boilers and other pressure vessels, and in particular every boiler and every unfired steam generator shall be provided with not less than two safety valves.

(4) The Administration may having regard to the output or any other feature of any boiler or unfired steam generator, permit only one safety valve to be fitted if it is satisfied that adequate protection against overpressure is provided.

Additional requirements for ships constructed on or after 1 September 1984

(5) Every unattended oil fired boiler shall be provided with arrangements to shut off the fuel supply and give an alarm at an attended location in the event of low boiler water level, combustion, air supply failure or flame failure.

(6) Every boiler designed to contain water at a specific level shall be provided with at least two means for indicating the water level, at least one of which shall be a direct reading gauge glass.

(7) Every water-tube boiler serving turbine machinery shall be fitted with a high water level alarm.

(8) Means shall be provided to test and control the quality of the water in boilers.

32. Boiler feed systems

(1) Every boiler which provides services essential for the safety of the ship and which would be rendered dangerous by the failure of its feed water supply shall be provided with not less than two efficient and separate feed water systems so arranged that either of such systems may be opened for inspection or overhaul without affecting the efficiency of the other and means shall be provided which will prevent overpressure in any part of the systems.

(2) Every feed check valve, fitting, or pipe through which feed water passes from a pump to such boilers shall be designed and constructed to withstand the maximum working stresses to which it may be subjected, with a factor of safety which is adequate having regard to the material of which it is constructed and the working conditions under which it will be used.

(3) Every such valve, fitting, or pipe shall, before being put into service for the first time, be subjected to a hydraulic test suitably in excess of the maximum working pressure of the boiler to which it is connected or of the maximum working pressure to which the feed line may be subjected, whichever shall be the greater, and shall be maintained in an efficient condition.

(4) The feed pipes shall be adequately supported.

(5) Where in any ship it is possible for oil to enter the feed water system of a boiler, the arrangements for supplying boiler feed water shall provide for the interception of oil in the feed water.

Additional requirements for ships constructed on or after 1 September 1984

(6) Means shall be provided to test and control the quality of the feed water to boilers.

33. Steam pipe systems

(1) In every ship, every steam pipe and every fitting connected thereto through which steam may pass shall be so designed and

constructed as to withstand the maximum working stresses to which it may be subjected, with a factor of safety which is adequate having regard to –

(a) the material of which it is constructed; and

(b) the working conditions under which it will be used.

(2) Without prejudice to the generality of sub-regulation (1), every steam pipe or fitting shall before being put into service for the first time, be subjected to a test by hydraulic pressure to a pressure suitably in excess of the working pressure to be determined having regard to the requirements of sub-regulations (1)(a) and (b) and every such steam pipe or fitting shall be maintained in an efficient condition.

(3) Steam pipes shall be adequately supported.

(4) Provision shall be made to avoid excessive stress likely to lead to the failure of any such steam pipe or fitting, whether by reason of variation in temperature, vibration or otherwise.

(5) Efficient means shall be provided for draining every such steam pipe to ensure that the interior of the pipe is kept free of water and that water hammer action will not occur under any condition likely to arise in the course of the intended service of the ship.

(6) Where a steam pipe is connected to any source at a higher pressure than it can otherwise withstand with an adequate factor of safety, an efficient reducing valve, relief valve and pressure gauge shall be fitted to such pipe.

34. Air pressure systems

(1) In every ship in which machinery essential for the propulsion and safety of the ship or of persons on board is required to be started, operated or controlled solely by compressed air, there shall be provided an efficient air system which shall include a sufficient number of air compressors and compressed air storage vessels to ensure that an adequate supply of compressed air is available under all conditions likely to be met in service.

(2) Every part of a compressed air system subjected to air pressure shall be designed and constructed to withstand, with an adequate factor of safety, the maximum working stresses to which they may be subjected.

(3) Every air pressure pipe or fitting in such a system other than a pneumatic control system shall, before being put into service for the first time, be subject to a hydraulic test suitably in excess of the maximum working pressure to which it may be subjected and be maintained in an efficient condition.

(4) Means shall be provided to prevent overpressure in any part of such compressed air system and where water jackets or casings of air compressors and coolers might otherwise be subjected to dangerous overpressure due to leakage into them from air pressure parts, suitable pressure relief arrangements shall be provided.

(5) Provision shall be made to reduce to a minimum entry of oil into any such compressed air system and to drain the system and provision shall also be made to protect the system from the effects of internal explosion.

(6) All discharge pipes from starting air compressors shall lead directly to the starting air receivers, and all starting air pipes from the air receivers to main or auxiliary engines shall be entirely separate from the compressor discharge pipe system.

35. Cooling water systems

In every ship in which cooling water services are essential for the running of the propelling machinery, there shall be at least two means of operating such water services.

36. Oil and gaseous fuel installations

(1) In every ship, oil fuel provided for use in boilers or machinery shall have a flash point of not less than 60℃ (clo sed cup test): provided that the Administration may, subject to such conditions as it may impose –

(a) permit any ship to use oil fuel having a flash point of not less than 55℃ in boilers, or oil fuel having a flash point of not less than 43℃ in internal combustion type machinery, provided that the ambient temperature of the machinery space in which such fuel oil is stored or used is at least 10℃ below the flash point of the fuel oil;

(b) permit the use of fuel oil with a flash point of less than

43℃, provided that it is not stored in any machinery space; and

(c) permit the use of gaseous fuel in ships designed for the carriage of liquefied gas if such fuel results solely from evaporation of the cargo carried.

(2) Nothing in sub-regulation (1) shall apply to fuel provided for use in a generator provided in accordance with subparagraph 1.7 of the Twelfth Schedule.

(3) In every ship in which oil or gaseous fuel is used, the arrangement for storage, distribution and utilisation of fuel shall comply at least with the provisions of the Sixth Schedule.

37. Lubricating and other oil systems

(1) In every ship in which oil for lubrication, cooling or operation of the main propelling machinery and its ancillary services is circulated under pressure, provision shall be made so that in the event of the failure of a pump an alternative means of circulating such oil is available.

(2) In ships constructed on or after 1 September 1984, lubricating oil and other flammable oils shall not be carried in forepeak tanks.

38. Remote control of propulsion machinery from the navigation bridge

Every Gambian ship constructed on or after 1 May 1981 operating with unmanned machinery spaces, and every other ship constructed on or after 1 September 1984, shall be provided with -

(a) effective means for the operation and control of main auxiliary machinery essential for the propulsion and safety of the ship; and

(b) remote control of the propulsion machinery from the navigating bridge in accordance with the provisions of the Seventh Schedule.

39. Steering gear

Every ship shall be provided with the means for steering in accordance with the provisions of the Eighth and Ninth Schedule.

40. Ventilating systems in machinery spaces

(1) Machinery spaces of Category A in every ship shall be ventilated so that an adequate supply of air is maintained for the safety and well-being of personnel and the operation of machinery, including boilers, at full power in all weather conditions.

(2) Any other machinery space shall be adequately ventilated having regard in particular, to the prevention of an accumulation of oil vapour under all normal conditions.

41. Protection against noise

(1) In every ship, measures shall be taken to reduce noise levels in machinery spaces as far as is reasonable and practical, and on completion of a ship, noise levels in machinery spaces shall be measured and a record of the measurements taken shall be retained on the ship.

(2) Noise levels and their measurement shall be in accordance with the provisions of the Tenth Schedule.

42. Communication between navigating bridge and machinery space

(1) Every ship shall be provided with two means for communicating orders from the navigating bridge to the position in the machinery space or machinery control room from which the main engines are normally controlled and one of the means shall be an engine room telegraph.

Additional requirements for ships constructed on or after 1 September 1984

(2) The means for communicating orders referred to in sub-regulation (1) shall be independent of each other, and in addition, means of communication shall be provided to any other position from which the main engines may be controlled.

Additional requirements for ships constructed on or after 1 October 1994

(3) Appropriate means of communication shall be provided from the navigating bridge and the engine-room to any other position from which the speed or direction of thrust of the propellers may be controlled.

43. Engineer's alarm

Every ship shall be provided with an engineers' alarm which shall be clearly audible in the engineers' accommodation when operated from a position in the machinery space or machinery control room from which the engines are normally controlled.

44. Spare gear

Every ship shall be provided with sufficient spare gear having regard to the intended service of the ship.

Requirements for ships constructed on or after 1 May 1981

45. Periodically unattended machinery spaces

Every ship with machinery spaces containing machinery used or essential for propulsion and intended to be periodically unattended under any sailing condition, including manoeuvring, shall comply with the provisions of the Eleventh Schedule.

Requirements for tankers constructed on or after 25 May 1980 and to other ships constructed on or after 1 September 1984.

46. Closing of openings

(1) In every ship, the number of skylights, doors, ventilators, openings in funnels for exhaust ventilation and other openings, to machinery spaces shall be the minimum compatible with the proper working and safety of the ship.

(2) The skylights to machinery spaces of Category A shall be constructed of steel and their flaps shall be capable of being closed and opened from a suitable position outside the space in the event of fire and adequate arrangements shall be made to permit the release of smoke in the event of fire.

(3) Windows shall not be fitted in machinery space boundaries but this requirement shall not preclude the use of glass in control rooms located within the machinery space boundaries.

(4) Any machinery space of Category A which is accessible from an adjacent shaft tunnel shall be provided with a light-weight steel fire-screen door in addition to any water tight door and the fire-screen door shall be operable from each side and shall be located

at the shaft tunnel side of the bulkhead.

PART VII - ELECTRICAL INSTALLATIONS

47. General

(1) In every ship, the electrical installation shall be such that –

(a) all electrical auxiliary services necessary for maintaining the ship in normal operational and habitable conditions will be ensured without recourse to the emergency source of electrical power; and

(b) the electrical services essential for safety will be ensured under emergency conditions.

(2) The electrical equipment and installations, including any electrical means of propulsion, shall be such that the ship and all persons on board are protected against electrical hazards.

48. Main source of electrical power and main switchboard

(1) Every ship in which electrical power is the only power for maintaining auxiliary services essential for the propulsion or safety of the ship shall be provided with two or more generating sets of such power that these services can be operated when any one of the sets is out of service.

(2) Load shedding or other equivalent arrangements shall be provided to protect the generators required by sub-regulation (1) against sustained overload.

Additional requirements for ships constructed on or after 1 September 1984

(3) A main source of electrical power shall be provided in every such ship with sufficient capacity to supply all the services required by regulation 47(1)(a) and (b) and this main source of electrical power shall consist of at least two generating sets.

(4) The main source of electrical power shall be arranged so that such services can be maintained regardless of the speed and direction of rotation of the propulsion machinery or shafting.

(5) The arrangement of the generating sets required by sub-regulation (4) shall be such that with any one of the sets out of

service –

(a) normal operational conditions of propulsion and safety of the ship and minimum comfortable conditions of habitability including those for cooking, heating, domestic refrigeration, mechanical ventilation, sanitary and fresh water can be maintained; and

(b) from a dead ship condition, the remaining sets are capable of providing the electrical services necessary to start the main propulsion plant and the emergency source of electrical power may be used for this purpose if it is capable of simultaneously supplying the emergency supplies required by Part 3 in the Twelfth Schedule, or it is capable of supplying such services when combined with any other source of electrical power.

(6) Any transforming equipment supplying an electrical system referred to in this regulation shall be arranged to ensure the same continuity of supply as that required for generating sets by this regulation.

(7) The main switchboard shall be located in the same main fire zone and watertight compartment as the main generating sets in any ship with only one generating station.

(8) Where there is more than one generating station and only one main switchboard, that switchboard shall be located in the same main fire zone and watertight compartment as one of the generating stations.

(9) The Administration may permit other arrangements where other essential features of the ship render the application of this requirement impracticable subject to such alternative provisions as it may require.

(10) For the purposes of this regulation, an environmental enclosure for the main switchboard such as a machinery control room within the main boundary of the space, does not provide separation between the generating sets and switchboards.

(11) The main busbars shall be subdivided in every ship in which the total installed electrical power of the main generating sets exceeds 3 megawatt.

(12) Each section of the busbars shall be interconnected by removable links or other suitable means such that the main generating sets and any supplies to duplicated services which are directly connected to the busbars are, so far as it is practicable, equally divided between the sections.

(13)The Administration may permit other arrangements which provide equivalent system redundancy.

Additional requirements for ships constructed on or after 1 July 1998

(14) Where the main source of electrical power is necessary for propulsion and steering of the ship, the system shall be so arranged that the electrical supply to equipment necessary for propulsion and steering and to ensure safety of the ship will be maintained or immediately restored in the case of loss of any one of the generators in service.

(15) Where the main source of electrical power is necessary for propulsion of the ship, the main busbar shall be subdivided into at least two parts, which shall normally be connected by circuit breakers or other approved means and so far as is practicable, the connection of generating sets and other duplicated equipment shall be equally divided between the parts.

(16) A ship complying with sub-regulation (8) need not comply with sub-regulation (7).

Requirements for ships constructed on or after 1st September 1984

49. Lighting systems

(1) The main source of electrical power in every ship shall be capable of illuminating any part of the ship normally accessible to and used by the passengers or the crew.

(2) The emergency electric lighting shall be arranged so that a fire or other casualty in spaces containing the emergency source of electrical power, the associated transformers, if any, the emergency switchboard and the emergency lighting switchboard will not render inoperative the main electric lighting system as required by sub-regulation (1).

(3) Lighting fittings shall be arranged to prevent rises in temperature which would be damaging to the fitting or the electric

wiring or which would result in a risk of fire.

50. Emergency and transitional sources of electrical power and emergency switchboards

(1) Every ship shall be provided, in a position above the uppermost continuous deck and outside the machinery casings, with a self-contained emergency source of electrical power so arranged as to ensure its functioning in the event of fire or other casualty causing failure of the main electrical installation.

(2) The emergency and transitional source of electrical power and emergency switchboards shall be in accordance with the provisions of the Twelfth Schedule.

Additional requirements for ships constructed on or after 1 July 1998

(3) Where electrical power is necessary to restore propulsion, the capacity shall be sufficient to restore propulsion to the ship in conjunction with other machinery, as appropriate, from a dead ship condition within 30 minutes after blackout.

Requirements for ships constructed on or after 1 September 1984

51. Location and construction of cables

(1) All electrical cables external to equipment shall be flame retardant and shall be installed so that their flame retarding or equivalent properties are not impaired.

(2) The Administration may permit installation of cables which do not comply with the foregoing for particular purposes, such as radio frequency cables, where compliance would be impracticable.

(3) Cables shall be installed and supported in such a manner as to avoid chafing and other damage and all metal sheaths and metal armour of electric cables shall be electrically continuous and earthed except that the Administration may permit such earthing to be omitted for particular purposes.

(4) Cables serving emergency services shall not, so far as is practicable, be routed through galleys, laundries, machinery spaces of Category A and their casings or other high risk areas except insofar as it is necessary to provide emergency services in such areas and cables connecting fire pumps to the emergency

switchboard shall be of a fire resistant type where they pass through high fire risk areas.

(5) Cables serving emergency services shall, where practicable, be installed in such a manner as to preclude them being rendered unserviceable by the effect of a fire in an adjacent space and subsequent heating of the dividing bulkhead.

(6) The electrical, mechanical, flame retarding and, where applicable, fire resisting properties of the terminations and joints in any conductor shall be at least equivalent to those of the conductor.

52. General precautions against shock, fire and other hazards

(1) In every ship, all electrical equipment shall be constructed and installed so that it will not cause injury when handled or touched in a proper manner.

(2) The precautions to be taken shall at least be in accordance with those set out in the Thirteenth Schedule.

Requirements for ships constructed on or after 1st September 1984

53. Electrical equipment in hazardous areas and spaces

Electrical equipment shall not be installed in any hazardous area except in accordance with the requirements set out in the Fourteenth Schedule.

PART IX – MISCELLANEOUS

54. Anchors, anchor handling equipment and chain cables

Every ship shall be provided with such anchors, anchor handling equipment together with such anchors and chain cables as are sufficient in number, weight and strength having regard to the size of the ship and this equipment shall be tested and certified by the Administration.

55. Emergency towing arrangements

(1) Tankers, including oil tankers, chemical tankers and gas carriers, of not less than 20,000 tonnes deadweight shall be fitted with an emergency towing arrangement at both ends of the ship and for tankers constructed before 1 January 1996 such an

arrangement shall be fitted at the first scheduled dry-docking or by 1 January 1999, whichever is the earlier.

(2) The design and construction of the towing arrangement shall be guided by the provisions contained in the Fifteenth Schedule.

56. Safe access to tanker bows

(1) Every tanker shall be provided with the means to enable the crew to gain safe access to the bows even in severe weather conditions.

(2) The means of access shall be in accordance with the Sixteenth Schedule.

Requirements for oil tankers and bulk carriers constructed on or after 1 July 1998

57. Corrosion prevention of seawater ballast tanks

(1) All dedicated seawater ballast tanks shall have an efficient corrosion prevention system, such as hard protective coatings or equivalent.

(2) The scheme for the selection, application and maintenance of the system shall be the Seventeenth Schedule.

58. Combustible gas indicators

(1) All tankers shall be equipped with at least one portable instrument for measuring flammable vapour concentrations, together with a sufficient set of spares.

(2) Suitable means shall be provided for the calibration of such instruments.

59. Materials used in construction

(1) Every overboard scupper, sanitary discharge or other inlet or outlet installed in a location where the failure of any such inlet or outlet could cause flooding in the event of fire shall be constructed of materials that are not readily rendered ineffective by heat.

(2) Pipes intended to convey oil or other flammable liquids shall be made of a suitable material having regard to risk of fire and they shall not be installed in accommodation and service spaces unless

the Administration considers their installation necessary and adequate precautions are taken, having regard to the risk of fire.

(3) The surface of any insulation shall be impervious to oil or oil vapours in any space where the penetration of oil or oil products would otherwise be possible.

(4) Asbestos or any material containing asbestos shall not be installed in any part of the ship, except that white asbestos may be used in machinery when a substitute material is not available.

Requirements for ships constructed on or after 1 September 1984

60. Gas welding, flame cutting and domestic gaseous fuel installations

In every ship, gas welding, flame cutting or domestic gaseous fuel installations shall be designed, constructed and installed so that the safety of the ship and of the persons on board is not impaired.

PART X - EQUIVALENTS, PENALTIES AND DETENTION

61. Alternative construction, equipment and machinery

Where these Regulations require that –

(a) the hull or machinery of a ship shall be constructed in a particular manner;

(b) particular equipment shall be provided; or

(c) particular provisions shall be made,

the Administration may permit the hull or machinery of the ship to be constructed in any other manner, or any other equipment to be provided or other provision made, if it is satisfied that such other construction, equipment or provision is at least as effective as that required by these Regulations.

62. Penalties

An owner or a master who contravenes these Regulations commits an offence and is liable on conviction to a fine not exceeding two million dalasis, or imprisonment not exceeding two years, or both.

63. Power to detain

In any case where a ship does not comply with the requirements of these Regulations, the ship shall be liable to be detained and section 383 of the Act shall have effect in relation to the ship, subject to the modification that the words "this Act" wherever they appear, shall be substituted with the words "the Merchant Shipping (Cargo Ship Construction) Regulations 2014".

FIRST SCHEDULE

(regulation 12)

BALLAST AND BILGE PUMPING AND DRAINAGE ARRANGEMENTS

Requirements for all Ships

1.1 Every ship shall be provided with efficient bilge pumping plant and means for drainage which is so arranged that water entering any part of the hull, up to the bulkhead deck, other than a space permanently appropriated for the carriage of fresh water, water ballast, oil fuel or liquid cargo and for which other efficient means of pumping or drainage are provided, can be pumped out through at least one suction pipe when the ship is on an even keel or is listed not more than 5 degrees either way.

1.2 Wing suctions shall be provided where necessary for this purpose.

1.3 Efficient means shall be provided whereby water may easily flow to the suction pipes; the Administration may allow the means of pumping or drainage to be dispensed with in particular compartments of any ship, if it is satisfied that the safety of the ship is not thereby impaired.

Additional requirements for ships constructed on or after 25 May 1980

2.1 Provision shall be made for the drainage of enclosed cargo spaces situated on the freeboard deck of any ship; the Administration may permit the means of drainage to be dispensed with in any particular compartments of any ship if by reasons of the size or internal subdivision of those spaces, the safety of the ship is

not thereby impaired.

2.2 Where the freeboard is such that the deck edge is not immersed when the ship heels 5 degrees either way, the required drainage shall be by means of a suitable number and size of deck scuppers discharging directly overboard fitted in accordance with paragraph 12 of Schedule 3 of the Shipping (Load Line) Regulations 2010. In all other cases, internal drainage shall be led to a suitable space or spaces of adequate capacity, having a high water-level alarm and provided with suitable arrangements for discharge overboard.

Additional requirements for ships constructed on or after 1September 1984

3. At least two power pumps connected to the main bilge system shall be provided, one of which may be driven by the propulsion machinery. Sanitary, ballast and general service pumps may be accepted as power bilge pumps if provided with the necessary connections to the bilge pumping system.

4. All bilge pipes used in or under coal bunkers or fuel storage tanks or in machinery spaces shall be made of steel or other suitable material.

5. The bilge and ballast pumping systems shall be so arranged as to prevent water passing from the sea or from water ballast spaces into the cargo spaces or into the machinery spaces or from one watertight compartment to another. Provision shall be made to prevent any deep tank having bilge and ballast connections being inadvertently flooded from the sea when it contains cargo or being discharged through a bilge pipe when it contains water ballast.

6. The distribution boxes and manually operated valves provided in connection with the bilge pumping arrangements shall be in positions which are accessible under ordinary circumstances. The valves shall be clearly marked for identification.

7. The scuppers of cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion shall not be led to machinery or other spaces where sources of ignition may be present.

8. The bilge pumping arrangements for cargo spaces intended to contain flammable or toxic liquids shall be designed so that inadvertent pumping of such liquids through the main bilge system

or any other system connected to a pump located in a machinery space can be prevented. Additional means of draining such spaces shall be provided if the Administration considers their provision necessary taking into consideration the quantity and characteristics of the liquids and their location.

Additional requirements for ships constructed on or after 1 February 1992

9. Where the freeboard is such that the edge of the freeboard deck is immersed when the ship heels 5 degrees or less, the drainage of the enclosed cargo spaces on the freeboard deck required by paragraph 2 shall be led to a suitable space, or spaces, of adequate capacity, having a high water level alarm and provided with suitable arrangements for discharge overboard. In addition it shall be ensured that -

(a) the number, size and disposition of the scuppers are such as to prevent unreasonable accumulation of free water;

(b) the pumping arrangements take account of the requirements for any fixed pressure water-spraying fire-extinguishing system;

(c) water contaminated with petrol or other dangerous substances is not drained to machinery spaces or other spaces where sources of ignition may be present or where it could pose a health and safety hazard to persons; and

(d) where the enclosed cargo space is protected by a carbon dioxide fire-extinguishing system the deck scuppers are fitted with means to prevent the escape of the smothering gas.

SECOND SCHEDULE

(regulation 13)

OPENINGS IN THE SHELL PLATING BELOW THE FREEBOARD DECK

1. The number of openings in the shell plating shall be reduced to the minimum compatible with the design and proper working of the

ship.

2. The arrangement and efficiency of the means for closing any opening in the shell plating shall be consistent with its intended purpose and the position in which it is fitted and generally to the satisfaction of the Administration.

3. Subject to the requirements of the Load Lines Convention, no sidescuttle shall be fitted in such a position that its sill is below a line drawn parallel to the freeboard deck at side and having its lowest point 2.5% of the breadth of the ship above the deepest subdivision load line, or 500 mm, whichever is the greater.

3.1 All sidescuttles the sills of which are below the freeboard deck, as permitted by paragraph 3 shall be of such construction as will effectively prevent any person opening them without the consent of the master of the ship.

3.1.1 Where in a between-decks, the sills of any of the sidescuttles referred to in paragraph 3.1 are below a line drawn parallel to the freeboard deck at side and having its lowest point 1.4 m plus 2.5% of the breadth of the ship above the water when the ship departs from any port, all the sidescuttles in that between-decks shall be closed watertight and locked before the ship leaves port, and they shall not be opened before the ship arrives at the next port. In the application of this paragraph the appropriate allowance for fresh water may be made when applicable.

3.1.2 The time of opening such sidescuttles in port and of closing and locking them before the ship leaves port shall be entered in such log-book as may be prescribed by the Administration.

3.1.3 For any ship that has one or more sidescuttles so placed that the requirements of paragraph 3.1.1 would apply when it was floating at its deepest subdivision load line, the Director-General may indicate the limiting mean draught at which these sidescuttles will have their sills above the line drawn parallel to the freeboard deck at side, and having its lowest point 1.4 m plus 2.5% of the breadth of the ship above the waterline corresponding to the limiting mean draught, and at which it will therefore be permissible to depart from port without previously closing and locking them and to

open them at sea on the responsibility of the master during the voyage to the next port. In tropical zones as defined in the Load Lines Convention, this limiting draught may be increased by 0.3 m.

4. Efficient hinged inside deadlights so arranged that they can be easily and effectively closed and secured watertight, shall be fitted to all sidescuttles except that abaft one eighth of the ship's length from the forward perpendicular and above a line drawn parallel to the freeboard deck at side and having its lowest point at a height of 3.7 m plus 2.5% of the breadth of the ship above the deepest subdivision load line, the deadlights may be portable in passenger accommodation other than that for steerage passengers, unless the deadlights are required by the Load Lines Convention to be permanently attached in their proper positions. Such portable deadlights shall be stowed adjacent to the sidescuttles they serve.

5. Sidescuttles and their deadlights which will not be accessible during navigation shall be closed and secured before the ship leaves port.

6. No sidescuttles shall be fitted in any spaces which are appropriated exclusively to the carriage of cargo or coal.

6.1 Sidescuttles may, however, be fitted in spaces appropriated to the carriage of cargo but they shall be of such construction as will effectively prevent any person opening them or their deadlights without the consent of the master.

6.2 Where cargo is carried in such spaces, the sidescuttles and their deadlights shall be closed watertight and locked before the cargo is shipped and such closing and locking shall be recorded in such log-book as may be prescribed by the Administration.

7. Automatic ventilating sidescuttles shall not be fitted in the shell plating below the freeboard deck without the special sanction of the Administration.

8. The number of scuppers, sanitary discharges and other similar openings in the shell plating shall be reduced to the minimum either by making each discharge serve for as many as possible of the sanitary and other pipes, or in any other satisfactory manner.

9. All inlets and discharges in the shell plating shall be fitted with

efficient and accessible arrangements for preventing the accidental admission of water into the ship.

9.1 Subject to the requirements of the Load Lines Convention , and except as provided in paragraph 9.3, each separate discharge led through the shell plating from spaces below the freeboard deck shall be provided with either one automatic non-return valve fitted with a positive means of closing it from above the freeboard deck or with two automatic non-return valves without positive means of closing, provided that the inboard valve is situated above the deepest subdivision load line and is always accessible for examination under service conditions. Where a valve with positive means of closing is fitted, the operating position above the freeboard deck shall always be readily accessible and means shall be provided for indicating whether the valve is open or closed.

9.1.1 The requirements of the Load Lines Convention shall apply to discharges led through the shell plating from spaces above the freeboard deck.

9.2 Machinery space main and auxiliary sea inlets and discharges in connection with the operation of machinery shall be fitted with readily accessible valves between the pipes and the shell plating or between the pipes and fabricated boxes attached to the shell plating. The valves may be controlled locally and shall be provided with indicators showing whether they are open or closed.

9.3 All shell fittings and valves required by this Schedule shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. All pipes to which this Schedule refers shall be of steel or other equivalent material to the satisfaction of the Administration.

10.1 Gangway, cargo and coaling ports fitted below the freeboard deck shall be of sufficient strength. They shall be effectively closed and secured watertight before the ship leaves port, and shall be kept closed during navigation.

10.2 Such ports shall in no case be so fitted as to have their lowest point below the deepest subdivision load line.

11.1 The inboard opening of each ash-chute, rubbish-chute, etc,

shall be fitted with an efficient cover.

11.2 Where the inboard opening is situated below the freeboard deck, the cover shall be watertight, and in addition an automatic non-return valve shall be fitted in the chute in an easily accessible position above the deepest subdivision load line. When the chute is not in use both the cover and the valve shall be kept closed and secured.

THIRD SCHEDULE

(regulation 16)

Subdivision and Damage Stability of Cargo Ships of 80m in Length and Over

1. Definitions

For the purpose of this Schedule, unless expressly provided otherwise-

1.1 *Subdivision Load Line* is a waterline used in determining the subdivision of the ship.

1.2 *Deepest subdivision load line* is the subdivision load line which corresponds to the summer draught to be assigned to the ship.

1.3 *Partial load line* is the light ship draught plus 60% of the difference between the light ship draught and deepest subdivision load line.

1.4 *Subdivision length of the ship* (‘Ls”) is the greatest projected moulded length of that part of the ship at or below deck or decks limiting the vertical extent of flooding with the ship at the deepest subdivision load line.

1.5 *Mid-length* is the mid point of the subdivision length of the ship.

1.6 *Aft terminal* is the aft limit of the subdivision length.

1.7 *Forward terminal* is the forward limit of the subdivision length.

1.8. *Breadth ("B")* is the greatest moulded breadth of the ship at or below the deepest subdivision load line.

1.9. *Draught ("d")* is the vertical distance from the moulded baseline at mid-length to the waterline in question.

1.10. *Permeability ("□")* of the space is the proportion of the immersed volume of that space which can be occupied by water.

2. *Required subdivision index* R

2.1 The degree of subdivision to be provided shall be determined by the required subdivision index "R", as follows:

2.1.1 for ships over 100m in length L;

$R = (0.002 + 0.0009Ls)^{1/3}$; and

2.1.2 for ships of 80m in length and upwards, but not exceeding l00m in length;

$$R = 1 - \left[1 - \left(1 + \frac{L_s}{100} . \frac{R_o}{1 - R_o}\right)\right]$$

where R_0 is the value R as calculated in accordance with the formula in subparagraph 2.1.1, and "Ls" is the length of the ship in metres.

3*. Attained subdivision index* A

3.1 The attained subdivision index "A" shall be calculated for the ship by the following formula-

$$A = \sum p_i s_i$$

where:

i represents each compartment or group of compartments under consideration,

p_i accounts for the probability that only the compartment or group of compartments under consideration may be

flooded, disregarding any horizontal subdivision,

s_i accounts for the probability of survival after flooding the compartment or group of compartments under consideration, including the effects of any horizontal subdivision.

3.2 In calculating “A”, level trim shall be used.

3.3 This summation covers only those cases of flooding which contribute to the value of the attained subdivision index “A”.

3.4 The summation indicated by the above formula shall be taken over the ship’s length for all cases of flooding in which a single compartment or two or more adjacent compartments are involved.

3.5 Wherever wing compartments are fitted, contribution to the summation indicated by the formula shall be taken for all cases of flooding in which wing compartments are involved; and additionally, for all cases of simultaneous flooding of a wing compartment or compartments and the adjacent inboard compartment or compartments, assuming a rectangular penetration which extends to the ship’s centreline, but excludes damage to any centreline bulkhead.

3.6 The assumed vertical extent of damage is to extend from the baseline upwards to any watertight horizontal subdivision above the waterline or higher. However, if a lesser extent will give a more severe result, such extent is to be assumed.

3.7 Where pipes, ducts or tunnels are situated within assumed flooded compartments, arrangements are to be made to ensure that progressive flooding cannot thereby extend to compartments other than those assumed flooded. However, the Administration may permit minor progressive flooding if it is demonstrated that its effects can be easily controlled and the safety of the ship is not impaired.

3.8 In the flooding calculations carried out according to the regulations, only one breach of the hull need be assumed.

4. Calculation of the factor “p_i ”

4.1. The factor p_i shall be calculated according to paragraph 4.1.1 as appropriate, using the following notations-

x_1 = the distance from the aft terminal of "Ls" to the foremost portion of the aft end of the compartment being considered;

x_2 = the distance from the aft terminal of "Ls" to the aftermost portion of the forward end of the compartment being considered;

$E_1 = x_1 / Ls$

$E_2 = x_2 / Ls$

$E = E_1 + E_2 - 1$

$J = E_2 - E_1$

$J' = J - E$, if $E \exists 0$

$J' = J + E$, if $E < 0$

The maximum non dimensional damage length, $J_{max} = 48/L_s$, but not more than 0.24.

The assumed distribution density of damage location along the ship's length

$a = 1.2 + 0.8E$, but not more than 1.2

The assumed distribution function of damage location along the ship's length

$F = 0.4 + 0.25E (l.2 + a)$

$y = J/J_{max}$

$p = F_1 J_{max}$

$q = 0.4 F_2 (J_{max})^2$

$F_1 = y^2 - \frac{y^3}{3}$, if y <1,

$F_1 = y - \frac{1}{3}$ otherwise;

$F_2 = \frac{y^3}{3} - \frac{y^4}{12}$, if y <1,

$F_2 = \frac{y^3}{2} - \frac{y}{3} + \frac{1}{12}$ otherwise.

4.1.1 The factor p_i is determined for each single compartment:

4.1.1.1 Where the compartment considered extends over the entire ship length, L_s

$p_i = 1$

4.1.1.2 Where the aft limit of the compartment considered coincides with the aft terminal:

$p_i = F + 0.5ap + q$

4.1.1.3 Where the forward limit of the compartment considered coincides with the forward terminal:

$p_i = 1 - F + 0.5ap$

4.1.1.4 When both ends of the compartment considered are inside the aft and forward terminals of the ship length, "L_s":

pi = ap

4.1.1.5 In applying the formulae of paragraphs 4.1.1.2, 4.1.1.3 and 4.1.1.4, where the compartment considered extends over the "mid-length", these formulae values shall be reduced by an amount determined according to the formula for *q*, in which "F_2" is calculated taking *y* to be J' /J_{max}

4.2. Wherever wing compartments are fitted, the p_i - value for a wing compartment shall be obtained by multiplying the value, as determined in paragraph 4.3, by the reduction factor *r* according to subparagraph 4.2.2, which represents the probability that the inboard spaces will not be flooded.

4.2.1 The p_i - value for the case of simultaneous flooding of a wing and adjacent inboard compartment shall be obtained by using the formulae of paragraph 3, multiplied by the factor (1 - *r*).

4.2.2 The reduction factor *r* shall be determined by the following formulae:
For J $\geq$ 0.2 b/B:

$r = \frac{b}{B}(2.3 + \frac{0.08}{J + 0.02}) + 0.1,$ if b/B $\leq$ 0.2

$r = (\frac{0.016}{J + 0.02} + \frac{b}{B} + 0.36),$ if *b*/B > 0.2

For J <0.2 b/B the reduction factor *r* shall be determined by linear interpolation between

r = 1 for J = 0

and

r = as for the case where $J \geq 0.2b/B$, for $J = 0.2\ b/B$,

where:

b = the mean transverse distance in metres measured at right angles to the centreline at the deepest subdivision load line between the shell and a portion of and parallel to that part of the longitudinal bulkhead which extends between the longitudinal limits used in calculating the factor p_i.

4.3. To evaluate p_i for compartments taken singly the formulae in paragraphs .1 and .2 shall be applied directly.

4.3.1 To evaluate the p_i-values attributable to groups of compartments the following applies-

for compartments taken by pairs:

$p_i = p_{12} - p_1 - p_2$

$p_i = p_{23} - p_2 - p_3$, etc.

for compartments taken by groups of three:

$p_i = p_{123} - p_{12} - p_{23} + p_2$

$p_i = p_{234} - p_{23} - p_{34} + p_3$, etc.

for compartments taken by groups of four:

$p_i = p_{1234} — p_{123} — p_{234} + p_{23}$

$p_i = p_{2345} - p_{234} - p_{345} + p_{34}$, etc.

where:

p_{12}, p_{23}, p_{34}, etc,

p_{123}, p_{234}, p_{345}, etc and

p_{1234}, p_{2345}, p_{3456}, etc

shall be calculated according to the formulae in paragraphs 4.1 and

4.2 for a single compartment whose nondimensional length "J" corresponds to that of a group consisting of the compartments indicated by the indices assigned to *p.*

4.3.2 The factor p_i for a group of three or more adjacent compartments equals zero if the nondimensional length of such a group minus the nondimensional length of the aftermost and foremost compartments in the group is greater than "J_{max}".

5. Calculation of factor "s_i"

5.1. The factor s_i shall be determined for each compartment or group of compartments according to the following:

5.1.1 in general for any condition of flooding from any initial loading condition "s" shall be

$$s = C\sqrt{0.5(GZ_{\max})(range)}$$

with C=1, if $\theta e \leq 25^0$

with C=0, if $\theta e > 30^0$

$$C = \sqrt{\frac{30 - \theta e}{5}}$$ otherwise

GZ_{max} = maximum positive righting lever (in metres) within the range given below but not more than 0.lm;

range = range of positive righting levers beyond the angle of equilibrium (in degrees) but not more than 200; however, the range shall be terminated at the angle where openings not capable of being closed weathertight are immersed;

θe = final equilibrium angle of heel (in degrees);

5.1.2 *s* = 0 where the final waterline taking into account sinkage, heel and trim, immerses the lower edge of openings through which progressive flooding may take place. Such opening shall include air pipes, ventilators and openings which are closed by means of weathertight doors or hatch covers, and may exclude those openings closed by means of watertight manhole covers and flush scuttles, small watertight hatch covers which maintain the high integrity of the deck, remotely operated sliding watertight doors, access doors and access hatch covers, of watertight integrity, normally closed at sea and sidescuttles of the non-opening type. However, if the compartments so flooded are taken into account in the calculations the requirements of this regulation shall be applied.

5.1.3 For each compartment or group of compartments *si* shall be weighted according to draught considerations as follows-

$$s_i = 0.5s_l + 0.5\ s_p$$

where

s_l is the *s*-factor at the deepest subdivision load line
s_p is the *s*-factor at the partial load line.

5.2. For all compartments forward of the collision bulkhead, the *s*-value, calculated assuming the ship to be at its deepest subdivision load line and with assumed unlimited vertical extent of damage is to be equal to 1.

5.3. Wherever a horizontal subdivision is fitted above the waterline in question the following applies.

5.3.1 The *s*- value for the lower compartment or group of compartments shall be obtained by multiplying the value as determined in subparagraph 5.1.1 by the reduction factor *v* according to subparagraph 5.3.3, which represents the probability that the spaces above the horizontal subdivision will not be flooded.

5.3.2 In cases of positive contribution to index "A" due to simultaneous flooding of the spaces above the horizontal subdivision, the resulting *s*-value for such a compartment or group of compartments shall be obtained by an increase of the value as determined by subparagraph 5.3.1 by the *s*-value for simultaneous flooding according to subparagraph 5.1.1, multiplied by the factor (1-*v*).

5.3.3 The probability factor v_i shall be calculated according to:

$v_i = \frac{H - d}{H_{\max} - d}$, for the assumed flooding up to the horizontal subdivision above the subdivision load line, where "H" is to be restricted to a height of "H_{max}",

$v_i = 1$, if the uppermost horizontal subdivision in way of the assumed damaged region is below "H_{max}",

where:

"H" is the height of the horizontal subdivision above the baseline (in metres) which is assumed to limit the vertical extent of damage,

"H_{max}" is the maximum possible vertical extent of damage above the baseline (in metres), or

$$H_{max} = d + 0.056 L_s (1 - \frac{L}{500})$$ if Ls ≤ 250m;

H_{max} = d +7, if Ls > 250m

whichever is less.

6. Permeability

For the purpose of the subdivision and damage stability calculations of the regulations, the permeability of each space or part of a space shall be as follows-

Spaces	Permeability
Appropriated to stores	0.60
Occupied by accommodation	0.95
Occupied by machinery	0.85
Void spaces	0.95
Dry cargo spaces	0.70
Intended for liquid	0 or 0.95[1]

[1]Whichever results in the more severe requirements.

7. Stability Information

7.1 In providing the information and when determining the overall GM (or KG) values-

7.1 .1 in the case where intact stability requirements are more onerous they shall apply.

7.1.2 in the case where values determined from considerations solely related to the subdivision index are more onerous then-

(a) the limiting GM value shall be varied linearly between the deepest subdivision load line and the partial load line; and

(b) for draughts below the partial load line the GM value shall be assumed constant.

7.1.3 in the case where values determined from both intact

stability and the subdivision index apply then-

(a) the limiting GM shall be varied linearly between the deepest subdivision load line and the partial load line; and

(b) for draughts below the partial load line the GM value shall be assumed constant where the subdivision index is more onerous otherwise intact stability requirements apply.

FOURTH SCHEDULE

(regulation 24)

CARGO TANK VENTING ARRANGEMENTS

1. The cargo tank venting arrangements shall -

(a) be so designed and constructed as to ensure that the pressure, above or below that of the atmosphere, within the tanks does not exceed the design pressures;

(b) include pressure-vacuum valves capable of providing for the flow of vapour, air or inert gas mixtures caused by thermal variations within the cargo tank; and

(c) be capable of providing for the flow of vapour, air or inert gas mixtures whilst the tank is being loaded, ballasted or discharged at the highest rate.

2. Every vent system outlet to atmosphere from a valve required by paragraph 1.1 shall be located as high and at the furthest distance from a source of ignition as is practicable and in no case shall it be located less than 2 metres above the cargo tank deck or less than 5 metres from air intakes or openings to enclosed spaces containing a source of ignition or from machinery and equipment which may constitute an ignition hazard.

3. By-pass arrangements for the pressure-vacuum valves required by paragraph 1.2 may be fitted if the valves are located in a vent main or masthead riser. Indicators showing whether the by-pass is open or shut shall be provided.

4. Every vent system outlet to atmosphere provided in accordance with paragraph 1.3 shall -

4.1 permit the free flow of vapour mixtures, or be so designed that the discharge velocity of the vapour mixtures is at least 30 metres per second;

4.2 be so arranged that the vapour mixture is discharged vertically upwards;

4.3 where the system permits the free flow of vapour mixtures, be such that the outlets to atmosphere are located at least 6 metres above the cargo tank deck and at least 10 metres measured horizontally, from the nearest air intake or opening to an enclosed space containing a source of ignition and from machinery and equipment which may constitute an ignition hazard. Any outlet less than 4 metres, measured horizontally, from a fore and aft gangway shall be located at least 6 metres above the gangway;

4.4 where the system is so designed that the discharge velocity of the vapour mixtures is at least 30 metres per second, be such that the outlets to atmosphere are located at least 2 metres above the cargo tank deck and at least 10 metres, measured horizontally, from the nearest air intake or opening to an enclosed space containing a source of ignition and from machinery and equipment which may constitute an ignition hazard. Such outlets shall be provided with high velocity vents designed and constructed in accordance with Schedule 5; and

4.5 be so arranged as to prevent the design pressure of any cargo tank being exceeded. For the purposes of this Schedule the system shall be designed on the basis of the maximum designed cargo loading rate of any tank or group of tanks multiplied by a factor of at least 1.25.

5.1 The venting arrangement of each cargo tank may be independent or combine with other cargo tanks and may be connected to the inert gas piping required by the Merchant Shipping (Fire Protection) Regulations 2010.

5.2 Where the arrangements are combined with other cargo

tanks, stop valves or other effective means of isolating each cargo tank shall be provided.

5.3 Stop valves shall be provided with locking arrangements to permit control of their operation. Any cargo tank isolation arrangement provided in accordance with this paragraph shall not prevent the flow of vapour, air or inert gas caused by thermal variations within the tank.

6. The venting system shall be provided with devices to prevent the passage of flame into the cargo tanks. The design, construction, location and testing of these devices shall be in accordance with Schedule 3. The devices for cargo tanks in which the atmosphere is flammable shall be flame arrestors or high velocity vents. The devices for cargo tanks in which the atmosphere is rendered non-flammable by a fixed inert gas system provided in accordance with the Merchant Shipping (Fire Protection) Regulations 2010 may be flame screens.

7. The vents shall be connected to the top of each cargo tank and be self-draining to the cargo tanks. Other permanently installed drainage arrangements may be permitted where it is not possible to provide self-draining vent lines.

8. High level alarms or overflow control systems or other equivalent means together with cargo tank content gauges and filling procedures shall be provided to protect the tanks from excess pressure due to overfilling.

9. Isolation of the slop tanks containing oil or oil residue in combination carriers from other cargo tanks shall be by blank flanges, which shall remain in position at all times when cargoes other than oil cargoes are carried.

10. The master shall be provided with information regarding the maximum permissible loading rate for each cargo tank and, in the case of combined venting systems, for each group of cargo tanks.

FIFTH SCHEDULE

Schedule 4 Paragraphs 4(d) and 6

THE DESIGN, CONSTRUCTION, LOCATION AND TESTING OF DEVICES TO PREVENT THE PASSAGE OF FLAME INTO CARGO TANKS IN OIL TANKERS

Part 1- Definitions

In this Schedule -

"flame arrestor" means a device to prevent the passage of flame, complying with all relevant requirements of this Schedule. Its flame arresting mechanism is based on the principle of quenching;

"flame screen" means a device utilizing wire mesh to prevent the passage of unconfined flames, complying with all relevant requirements of this Schedule;

"flame speed" means the speed at which a flame propagates along a pipe or other system;

"flash-back" means the transmission of a flame through a device;

"high velocity vent" means a device to prevent the passage of flame consisting of a mechanical valve which adjusts the opening available for flow in accordance with the pressure at the inlet of the valve in such a way that the efflux velocity cannot be less than 30 metres per second and complying with all relevant requirements of this Schedule;

"pressure/vacuum valve" means a device designed to maintain pressure and vacuum in a closed container with preset limits.

Part 2- Design

2.1 Devices, other than flame screens, shall be capable of performing one or more of the following functions -

Flame arrestors and high velocity vents

.

1 permitting the gas to pass through passages without flash-back and without ignition of the gases on the protected side when the device is subjected to heating for the period of time specified in paragraph 5(c)(ii) and

6(c)(ii);

High velocity vents

.2 maintaining an efflux velocity in excess of the flame speed for the gas irrespective of the geometric configuration of the device and without the ignition of gases on the protected side when the device is subjected to heating; and

Flame arrestors and high velocity vents

.3 preventing an influx of flame when conditions of vacuum occur within the cargo tanks.

2.2 Devices shall allow for efficient drainage of moisture without impairing their efficiency to prevent the passage of flame.

2.3 The casting, element and gasket materials shall be capable of withstanding the highest pressure and temperature to which the device may be exposed under both normal and fire test conditions.

2.4 Elements, gaskets and seals shall be of material resistant to corrosion by both sea water and the cargo.

2.5 The casing or housing shall be capable of withstanding the hydrostatic pressure test required by paragraph 4.9

2.6 In line devices shall be able to withstand without damage or permanent deformation the internal pressure resulting from detonation when tested in accordance with paragraph 7.

2.7 Devices shall be designed to minimize the effect of fouling under normal operating conditions.

2.8 Devices shall be capable of operating in freezing conditions and any device provided with heating arrangements so that its surface temperature exceeds 85^0C shall be tested at the highest operating temperature.

2.9 The clear area through flame arrestors shall be at least 1.5 times the cross-sectional area of the vent lines.

2.10 High velocity vents shall be capable of opening in such a way that an efflux velocity of 30 metres per second is immediately initiated, maintained at all flow rates and be capable of closing in

such a way that this minimum velocity is maintained until the valve is fully closed.

Part 3- Construction

The devices shall be of a construction adequate for the service for which they are intended, in particular -

31 the casing or housing of devices shall be of material meeting at least the same standards of strength, heat resistance and corrosion resistance as the pipe to which it is attached;

3.2 the devices shall allow ease of inspection and removal of internal elements for replacement, cleaning or repair;

3.3 all flat joints of the housing shall be machined true and shall provide an adequate metal-to-metal contact;

3.4 flame arrestor elements shall fit in the housing in such a way that flame cannot pass between the element and the housing;

3.5 resilient seals may be installed only if their design is such that if the seals are damaged or burned, the device is still capable of effectively preventing the passage of flame;

3.6 devices shall be so constructed as to direct the efflux vertically upwards;

3.7 fastenings essential to the operation of the device such as screws, shall be protected against loosening;

3.8 means shall be provided to establish that if any valve is fitted it lifts easily without remaining in the open position;

3.9 high velocity vents shall have a width of the contact area of the valve seat of at least 5 millimetres;

3.10 devices shall not be capable of being by-passed or held open unless they are tested in the bypassed or open position in accordance with paragraph 4,5,6 or 7,

as appropriate;

3.11 Flame screens shall be -

(a) such that they cannot be inserted improperly in the opening; and

(b) securely fitted so that flames cannot circumvent the screen;

3.12 each device shall be labelled or marked to indicate -

(a) the manufacturer's name or trademark, the style, type, model, or other manufacturer's designation for the device;

(b) the size of the outlet for which the device is approved;

(c) the approved location for installation including the maximum or minimum length of pipe, if any, between the device and atmosphere;

(d) the direction of flow through the device; and

(e) the test laboratory and its report number.

Part 4- Performance tests (General)

4.1 Devices shall be tested by an approved laboratory to show that they meet the requirements of this Schedule.

4.2 Performance characteristics such as flow rates, operating sensitivity, flow resistance and velocity shall be demonstrated.

4.3 Flame screens shall be tested in accordance with paragraph 5(b).

4.4 Flame arrestors shall be tested in accordance with paragraph 5 or 7 as appropriate.

4.5 High velocity vents shall be tested in accordance with paragraph 6.

4.6 Only one prototype device shall be submitted for each test. The device tested shall have the same dimensions, with the most

unfavourable tolerances allowed, as the design of the production model.

4.7 Gasoline vapour (a non-leaded petroleum distillate consisting essentially of aliphatic hydrocarbon compounds with a boiling range of approximately 650^0C to 750^0C) or technical propane is to be used for the tests to establish that the devices are suitable for the explosive atmospheres that these requirements refer to.

4.8 A corrosion test shall be carried out. A complete device including a section of the pipe to which it is fitted shall be exposed to a 20 per cent sodium chloride solution spray at a temperature of 25^0C for a period of 240 hours, and allowed to dry for 48 hours. All movable parts shall thereafter operate properly and there shall be no corrosion deposits which cannot be washed off. Other equivalent tests may be accepted.

4.9 A hydrostatic pressure test shall be carried out in which the casing or housing of the device shall withstand the following pressures -

Device	Pressure (kPa)
(i)End of Line	900
(ii)In line up to and including 200 mm pipe	1,500
(iii)In line, above 200 mm and up to and including 300mm pipe diameter	1,800
(iv)In line, above 300mm pipe diameter	to the satisfaction of the Director-General

4.10 The laboratory report of the test conducted shall contain the following information -

(a) detailed and dimensioned drawings of the device;

(b) the types of tests conducted and the results obtained;

(c) specific advice on the approved attachments;

(d) the types of cargo for which the device is suitable;

(e) drawings of the test rig;

(f) in the case of high velocity vents, the pressures at which the device opens and closes and the efflux velocity; and

(g) the markings on the device.

Part 5- Test procedures for flame screens and flame arrestors located at openings to the atmosphere

5.1 The test rig shall consist of an apparatus producing an explosive mixture, a small tank with a diaphragm, a flanged prototype of the device, a plastic foil bag and an ignition source in three positions. A suitable test rig is shown at Figure 1. Other test rigs may be used, providing that the tests can be shown to be equivalent.

5.2 A flash-back test shall be carried out as follows -

5.2.1 the tank and the plastic foil bag shall be filled with the most easily ignitable propane/air mixture, the plastic foil bag enveloping the prototype device. The dimensions of the plastic foil bag are dependent on the dimensions of the device but for those normally used on tankers the foil bag shall have a circumference of 2 metres and a length of

2.5 metres and a wall thickness of 0.05 millimetres. Three ignition sources shall be installed in the bag, one close to the device, one as far away as possible therefrom, and the third at the midpoint between those two. These three sources shall be ignited in succession during the three tests;

5.2.2 if a flash-back occurs, the tank diaphragm will burst and this will be audible and visible the operator by the emission of a flame. Flame, heat and pressure sensors may be installed as an alternative method of detecting a flash-back.

5.3 An endurance burning test shall be carried out as follows, in addition to the flash-back test for flame arrestors at outlets where flows of explosive mixtures are foreseen -

5.3.1 the test rig referred to in paragraph 5.1 may be used, without the plastic foil bag.The flame arrestor shall be so installed that the mixture emission is vertical. In this position the mixture shall be ignited. Thermo-couples shall be installed on the flame arresting element;

5.3.2 flash-back shall not occur during this test. Endurance burning shall be achieved by using the most easily ignited gasoline vapour/air mixture with the aid of a pilot flame at the outlet. When the highest obtainable temperature of the exposed parts of the element is reached by varying the proportions of the flammable mixture and the flow rate the temperature shall be maintained for 10 minutes after which the flow shall be stopped and the condition of the device observed.

Part 6 - Test procedures for high velocity vents

6.1 The test rig shall be capable of producing the required flow rate. Suitable test rigs are shown at Figures 2 and 3. Other test rigs may be used provided equivalent tests are achieved.

6.2 A flow condition test shall be carried out with high velocity vents using compressed air or gas at agreed flow rates. The following characteristics shall be recorded -

6.2.1 the flow rate. Where air or a gas other than cargo vapours with which the vent is to be used is employed in the test, the flow rates achieved shall be corrected to reflect the vapour density of such cargoes;

6.2.2 the pressure before the vent opens. The pressure in the tank on which the device is located shall not rise at a rate greater than 10 kPa;

6.2.3 the pressure at which the vent opens;

6.2.4 the pressure at which the vent closes; and

6.2.5 the efflux velocity measured at the outlet.

6.3 The following fire safety tests shall be conducted using a mixture of gasoline vapour and air which produces the most easily ignitable mixture at the point of ignition. This mixture shall be ignited with the aid of a permanent pilot flame at the outlet -

6.3.1 flash-back tests shall be carried out with the vent in the upright position and then inclined at 10 degrees to the vertical. For some vent designs further tests with greater inclinations of the vent may be required. In each of these tests the flow shall be reduced until the vent closes and the flame is extinguished and each test shall be carried out at least 50 times. The influx side of combined valves shall be tested in accordance with the requirements of paragraph 5.2 with the vacuum valve held open; and

6.3.2 an endurance burning test as prescribed in paragraph 5.3 shall be carried out. In this test the main flame shall be extinguished and, with the pilot light on, small quantities of the most easily ignitable mixture shall be allowed to escape for a period of 10 minutes during which time flash-back shall not occur. For this test the soft seals or seats shall be removed.

Part 7- Test procedures for flame arrestors located in-line

7.1 A flame arrestor shall be installed at the end of a pipe of suitable length and of the same diameter as the flange of the flame arrestor. A plastic foil bag shall be secured to the exposed flange. The dimensions of the plastic foil bag shall be at least 4 metres circumference, 4 metres length and material wall thickness of 0.05 millimetres. The pipe shall be filled with the most easily ignitable mixture of propane and air, which shall then be ignited. The velocity of the flame near the flame arrestor shall be measured and shall have a value of that for the detonation velocity.

7.2 A typical test rig is shown at Figure 4. Other test rigs may be used provided the tests are equivalent.

7.3 Three detonation tests shall be conducted. No flash-back shall occur through the device and no part of the flame arrestor shall be damaged or show permanent deformation.

Part 8- Location and installation of devices

8.1 The devices installed shall preclude excess pressures in cargo tanks during loading or discharging. The following shall be taken into account in their selection -

8.1.1 cargo loading and discharge rates;

8.1.2 gas evolution;

8.1.3 pressure drop across the device taking into account the resistance coefficient;

8.1.4 pressure drop in the vent piping system;

8.1.5 pressure at which the vent opens if a high velocity vent is selected; and

8.1.6 density of the saturated vapour/air mixture.

8.2 Means shall be provided to enable personnel to reach devices situated more than 2 metres above deck to facilitate maintenance, repair and inspection.

8.3 Devices shall be located at the outlets to atmosphere unless tested and approved for in-line installation. Devices for in-line installation shall not be fitted at the outlets to atmosphere unless they have been tested and approved for that position.

8.4 Flame screens shall be protected against mechanical damage.

8.5 Cowls, weatherhoods, nozzles, deflectors, tee-pieces, bends or orifice plates shall not be installed after flame arrestors unless the devices are tested and approved in association with these attachments. The distance between flame arrestors and the open ends of the pipes in which they are fitted shall be such that neither stationary flames nor heating leading to a flash-back can occur.

Part 9- Manufacturer's instruction manual

9.1 Devices shall have an instruction manual supplied by the manufacturer. This manual shall be kept on board the tanker and shall include the following information -

9.1.1 installation instructions;

9.1.2 operating instructions;

9.1.3 maintenance requirements including the frequency and method of cleaning; and

9.1.4 a copy of the laboratory report.

Figure: 1
Test Rig for Flash Back Test

1 - bursting diaphragm (plastic)
2 - explosive mixture inlet
3 - tank
4 - flame arresting device
5 - plastic foil bag
6 - ignition sources

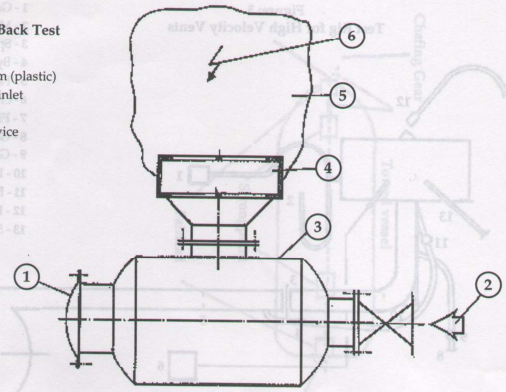
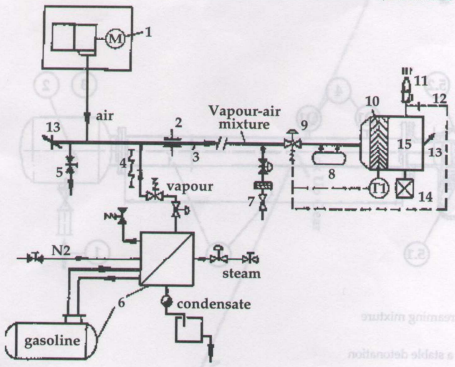


Figure: 2
Schematic Plan of the Test Plant for High Velocity Vents (endurance burning test only)



1 - fan with variable speed
2 - volume rate indicator
3 - pipe (500 mm diameter), length - 30 m
4 - heated vapour pipe
5 - air bypass
6 - evaporator and liquid storage tank
7 - vapour/air-mixture bypass
8 - extinguishing agents
9 - control and quick action valve
10 - explosion arresting crimped ribbon with temperature control for the safety of the test plant
11 - high velocity valve to be tested
12 - flame detector
13 - bursting diaphragm
14 - concentration indicator
15 - tank

SIXTH SCHEDULE

(regulation 36(2)

STORAGE AND DISTRIBUTION OF OIL AND GASEOUS FUEL

Part 1- Fuel

1. In every ship in which oil or gaseous fuel is used in engines or boilers for the propulsion or safety of the ship, the arrangements for the storage, distribution and utilization of the fuel shall be such that the effective use of the engines can be maintained under all conditions likely to be met by the ship in service.

2. In every ship in which oil or gaseous fuel is used, the arrangements for the storage, distribution and utilization of the fuel shall be such that, having regard to the hazard of fire and explosion which the use of such fuel may entail, the safety of the ship and of persons on board is preserved.

3. Every oil fuel installation which serves a boiler supplying steam for the propulsion of the ship shall include not less than two oil fuel units.

Additional requirements for ships constructed on or after 1st September 1984

4. In every ship in which oil or gaseous fuel is used, the arrangements for storage, distribution and utilization of fuel shall comply at least with the following provisions -

4.1 oil fuel systems containing heated fuel oil at a pressure exceeding 180 kPa shall be in illuminated locations so that defects and leakage can be readily observed. Where it is impracticable to meet the requirements of this subparagraph the Administration may permit other arrangements;

4.2 oil fuel tanks shall be part of the ships structure and shall be located outside machinery spaces of Category A. When oil fuel tanks, except double bottom tanks, are necessarily located adjacent to or within machinery spaces of Category A at least one of their vertical sides shall be contiguous to the machinery space boundaries and, if practicable, they shall have a boundary common with the double bottom tanks. The area of the tank boundary common with the machinery space shall be kept to a minimum. Any oil fuel tank located within

the boundaries of machinery spaces of Category A shall not contain fuel having a flashpoint of less than 600C. Where it is impracticable to meet the requirements of this subparagraph, the Administration may permit other arrangements;

4.3 every oil fuel tank shall, where necessary, be provided with save-alls or gutters which will catch any oil which may leak from the tank;

4.4 oil fuel tanks shall not be situated directly above boilers or other heated surfaces;

4.5 oil fuel shall not be carried in forepeak tanks;

4.6 means shall be provided for the removal of water from fuel oil. Such means shall include the fitting of water drain valves to daily service tanks, settling tanks and where practicable, to other oil fuel tanks. Where the removal of water by drain valves is impracticable water separators shall be fitted in the supply lines to propulsion machinery;

4.7 save-alls or gutters and screens shall be provided to prevent oil fuel that may leak under pressure from any pump, filter or heater from coming into contact with boilers or other heated surfaces;

4.8 every pipe connected to any oil fuel storage, settling, or daily service tank, not being a double bottom tank, which if damaged would otherwise permit discharge of the contents so as to cause a fire hazard shall be fitted with a valve or cock which shall be secured to the tank to which it is connected and be capable of being closed from a readily accessible position outside the space in which the tank is situated provided that in the case of any inlet pipe to such a tank, a non-return valve similarly secured to the tank may be substituted. In the case of an oil fuel deep tank traversed by any shaft or pipe tunnel, in addition to the valve or cock secured to the tank, a valve or valves may be fitted on the pipe line or lines outside the tunnel or tunnels to enable control to be exercised in the event of fire;

4.9 provision shall be made which will prevent overpressure in any oil fuel tank, oil fuel filling pipe or

any part of the oil fuel system. Air and overflow pipes and relief valves shall discharge to a position where there will be no risk of fire or explosion from the emergence of oil or oil vapour; and

4.10 every oil fuel pipe shall be made of steel or other suitable material except that flexible pipes may be permitted in positions where the Administration is satisfied that they are necessary; such flexible pipes and their attachments shall be constructed to the satisfaction of the Administration.

5. Safe and efficient means of ascertaining the amount of oil fuel contained in any oil fuel tank shall be provided. Sounding pipes shall not terminate in any space where the risk of ignition of spillage therefrom could arise. In particular, sounding pipes shall not terminate in passenger spaces or crew spaces. Other means of ascertaining the amount of oil fuel may be permitted provided that the failure of such means or overfilling of the tanks will not permit release of oil fuel.

Requirements for ships constructed on or after 1st February 1992

6. Sounding pipes shall not terminate in machinery spaces. However where the Administration considers that impracticable it may permit the termination of sounding pipes in machinery spaces on condition that -

6.1 an oil level gauge is provided meeting the requirements of paragraph 6.4;

6.2 the sounding pipes terminate in locations remote from ignition hazards unless precautions are taken, such as the fitting of effective screens to prevent the oil fuel in the case of spillage through the terminations of the sounding pipes from coming into contact with a source of ignition;

6.3 the terminations of sounding pipes are fitted with self-closing blanking devices and with a small diameter self-closing control cock located below the blanking device for the purpose of ascertaining before the blanking device is opened that oil fuel is not present. Provision shall be made so as to ensure that any spillage of oil through the control cock involves no ignition hazard; and

6.4 oil level gauges may be used in place of sounding pipes. Such gauges shall be such that their failure, or

the over-filling of the tank, shall not permit release of fuel into the machinery spaces. The use of cylindrical gauge glasses is prohibited. The Administration may permit this use of oil-level gauges with flat glasses and self-closing valves between the gauges and fuel tank. Oil-level gauges shall be maintained in proper condition to ensure their continued accurate functioning in service.

Part 2- Lubricating and other oil systems

Requirements for ships constructed on or after 1 September 1984

7.1 The arrangements for the storage, distribution and utilization of lubricating oil in machinery spaces of Category A shall comply with the requirements of paragraph 4.1, 4.4, 4.7, 4.8, 4.9, 4.10 and paragraphs 5 and 6 as applicable as they apply to oil fuel installations except that tank gauges of the flat glass type, provided with self-closing valves at each tank connection and sight flow glasses having an acceptable degree of fire resistance may be permitted.

7.2 Alternative arrangements may be permitted in machinery spaces other than machinery spaces of Category A where the Administration is satisfied that the safety of the ship is not impaired.

8. The arrangements for the storage, distribution and utilization of flammable oils, other than fuel and lubricating oil, used in power transmission control and activating systems and heating systems shall be such as to ensure the safety of the ship and persons on board. In enclosed spaces containing a source of ignition the arrangements shall comply with paragraph 4.4, 4.7, 4.9, 4.10 and paragraphs 5 and 6 as they apply to oil fuel installations except that tank gauges of the flat glass type provided with self-closing valves at each tank connection may be permitted.

Part 3- Arrangements for oil fuel systems

9. Ships constructed before 1 July 1998 shall comply with the requirements of paragraphs 10, 11 and 12 not later than 1 July 2003; except that a suitable enclosure on engines having an output of 375 kW or less having fuel injection pumps serving more than one injector may be used as an alternative to the jacketed piping system in paragraph 10.

10. All external high pressure fuel delivery lines between the

high pressure fuel pumps and fuel injectors shall be protected with a jacketed piping system capable of containing fuel from a high pressure line failure. A jacketed pipe incorporates an outer pipe into which the high pressure fuel pipe is placed forming a permanent assembly. The jacketed piping system shall include a means for collection of leakages and arrangements shall be provided for an alarm to be given of a fuel line failure.

11. All surfaces with temperatures above 220 degrees which may be impinged as a result of a fuel system failure shall be properly insulated.

12. Oil fuel lines shall be screened or otherwise suitably protected to avoid as far as practicable oil spray or oil leakages onto hot surfaces, into machinery air intakes, or other sources of ignition. The number of joints in such piping systems shall be kept to a minimum.

SEVENTH SCHEDULE

(regulation 38)

REMOTE CONTROL OF PROPULSION MACHINERY FROM THE NAVIGATING BRIDGE

1. In every ship provided with remote control of the propulsion machinery from the navigating bridge the following provisions shall apply -

1.1 the speed, direction of thrust and, if variable, the pitch of the propeller shall be fully controllable from the navigating bridge under any sailing condition including manoeuvring;

1.2 the remote control from the navigating bridge shall be performed by a single control device for each independent propeller; each such device shall, where necessary, be provided with means of preventing overload of the propulsion machinery; provided that multiple propeller installations may be controlled by a single control device;

1.3 propulsion machinery movements selected at the navigating bridge shall be indicated in the main machinery control room or at the manoeuvring platform as appropriate;

1.4 the main propulsion machinery shall be provided with an emergency stopping device, located on the navigating bridge, which shall be independent of the controls otherwise required;

1.5 remote control of the propulsion machinery shall be possible from only one location at a time. Inter-connected control units may be permitted at such locations. There shall be provided at each location an indicator showing which location is in control of the propulsion machinery. Transfer of control between the navigating bridge and the machinery spaces shall only be possible from the machinery space or the main machinery control room. The control system shall be arranged so that the propeller thrust does not alter significantly when control is transferred from one station to another;

1.6 means shall be provided to control the propulsion machinery locally in the event of failure of the remote control system;

1.7 the design of the propulsion machinery remote control system shall be such that in the event of its failure an alarm will be given and the preset speed and direction of thrust maintained until local control is in operation; the Administration may waive this requirement where other essential features of the system design render compliance impracticable, subject to such alternative provisions as it may require;

1.8 indication shall be given on the navigating bridge of -

1.8.1 propeller speed and direction of rotation in the case of fixed pitch propellers; and

1.8.2 propeller speed and pitch position in the case of controllable pitch propellers;

1.9 the number of automatic and consecutive attempts which fail to start any internal combustion propulsion engine shall be limited so as to maintain sufficient air pressure for further attempts under local control; and

1.10 an alarm shall be provided on the navigating bridge

and in the machinery space to indicate low starting air pressure at a level which still permits main propulsion machinery starting operations.

2. Every ship provided with means of remote or automatic control of the main propulsion machinery and its associated machinery, including the sources of main electric supply, enabling that machinery to be operated and supervised from a control room shall be as safe as if the machinery were under direct supervision.

3. Any automatic starting, operating or control system shall be so designed that the failure of any part of such systems shall not prevent their operation manually.

EIGHTH SCHEDULE

(regulation 39)

STEERING GEARS

Part 1- General

1.1 Every ship shall be provided with an efficient main steering gear and, subject to paragraph 1.5, an efficient auxiliary steering gear: Provided that if duplicate steering gear power units and their connections are fitted to the satisfaction of the Administration and each power unit complies with the requirements of paragraph 1.4 no auxiliary steering gear shall be required.

1.2 The main steering gear and the auxiliary steering gear shall be arranged so that the failure of one of them will not render the other one inoperative.

1.3 The main steering gear and rudder stock shall -

1.3.1 be of adequate strength and sufficient to steer the ship at maximum ahead service speed;

1.3.2 be capable of putting the rudder over from 35 degrees on one side to 35 degrees on the other side with the ship running ahead at maximum service speed and under the same conditions, from 35 degrees on either side to 30 degrees on the other side in not more than 28 seconds; and

1.3.3 be designed so that they will not be damaged at

maximum astern speed.

1.4 The auxiliary steering gear shall -

1.4.1 be of adequate strength and capable of being brought speedily into action in an emergency; and

1.4.2 be of sufficient power to enable the ship to be steered at navigable speed, and in any such ship in which a rudder stock of over 355.6 millimetres in diameter in way of the tiller is required to comply with the requirements of paragraph 1.3.1 and 1.3.3, the auxiliary steering gear shall be operated by power.

1.5 Notwithstanding subparagraph 1.1 an auxiliary steering gear need not be fitted if -

1.5.1 two or more identical steering gear power units are provided which when operating simultaneously are capable of operating the rudder in accordance with the requirements of paragraph 1.3.2; and

1.5.2 the main steering gear is so arranged that after a single failure in its piping system or in one of the power units the defect can be isolated so that steering capability can be maintained or speedily regained. A steering gear with a proven record of reliability that does not comply with this subparagraph may be permitted by the Administration on ships the keel of which was laid before 1 September 1986.

1.6 In every ship which is fitted with a power operated steering gear the position of the rudder shall be indicated at the principal steering station.

1.7 Simple operating instructions with a block diagram showing the change over procedures for remote steering gear control systems and steering gear power units shall, where applicable, be permanently displayed on the navigating bridge and in the steering gear compartment.

Additional Requirements for ships constructed on or after 1 September 1984

1.8.1 The steering gear components and the rudder stock shall be of sound and reliable construction. In particular single essential

components such as tillers and hunting gear shall be designed and constructed to withstand, with an adequate factor of safety, the maximum working stresses to which they may be subjected. Any bearings for such essential components shall be of a suitable type which shall be permanently lubricated or provided with lubrication fittings.

1.8.2 The design pressure for steering gear components and piping subject to internal hydraulic pressure shall be at least 1.25 times the maximum working pressure anticipated when the steering gear is operating taking into account any pressure which may exist in the low pressure side of the system. Fatigue criteria, taking into account pulsating pressure due to dynamic loads, shall be taken into account for the design of piping and components if the Administration considers it appropriate.

1.8.3 Relief valves shall be fitted to any part of the hydraulic system which can be isolated and in which pressure can be generated from a power unit or from external forces. The pressure at which relief valves operate shall not exceed the design pressure. The valves shall be of adequate size so as to avoid an undue rise in pressure above the design pressure.

1.9 The main steering gear and rudder stock shall be operated by power if necessary to meet the requirements of paragraph 1.3.2 and in any case when the diameter of the rudder stock in way of the tiller is required to be greater than 120 millimetres excluding additional strengthening for navigation in ice.

1.10 The auxiliary steering gear shall -

1.10.1 be capable of putting the rudder over from l5 degrees on one side to 15 degrees on the other side in not more than 60 seconds with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater; and

1.10.2 operated by power if necessary to meet the requirements of paragraph 1(j)(i) and in any case when the diameter of the rudder stock in way of the tiller is required to be greater than 230 millimetres excluding additional strengthening for navigation in ice.

1.11 The angular position of the rudder shall be indicated in the

steering gear compartment and, if the main steering gear is power operated, at the steering station on the navigating bridge. The rudder angle indicator system shall be independent of any steering gear control system.

1.12 Steering gears other than of the hydraulic type shall achieve equivalent standards to those required by this Schedule.

1.13 Main and auxiliary steering gear power units shall -

1.13.1 be arranged to re-start automatically when power is restored after a power failure;

1.13.2 be capable of being brought into operation from a position on the navigating bridge; and

1.13.3 be provided with an audible and visual alarm on the navigating bridge that will operate in the event of a power failure to any steering gear power unit.

1.14.1 Main steering gear control shall be provided on the navigating bridge and in the steering gear compartment. Two independent control systems operable from the navigating bridge shall be provided for a steering gear arranged in accordance with paragraph 1(e). A single hydraulic telemotor control system may be permitted by the Administration on any ship other than a tanker, chemical tanker or gas carrier of 10,000 tons or over. The steering wheel or steering lever need not be duplicated.

1.14.2 Auxiliary steering gear control shall be provided in the steering gear compartment and, if the auxiliary steering gear is power operated, from the navigating bridge. Any auxiliary steering gear control system provided on the navigating bridge shall be independent of the control system for the main steering gear.

1.15 Every main and auxiliary steering gear control system shall-

1.15.1 where electric, be served by its own separate circuit supplied from a steering gear power circuit from a point within the steering gear compartment or directly from switchboard busbars supplying that steering gear power circuit at a point on the switchboard adjacent to the supply to the steering gear power circuit;

1.15.2 be provided in the steering gear compartment with

means for disconnecting the control system from the steering gear it serves;

1.15.3 be capable of being brought into operation from a position on the navigating bridge;

1.15.4 be provided with an audible and visual alarm on the navigating bridge that will operate in the event of a failure of the electric power supply to the control system; and

1.15.5 be provided only with short circuit protection for the electric supply circuits.

1.16 Electric power circuits and the steering gear control system with their associated components, cables and pipes shall be separated as far as is practicable throughout their length.

1.17 A means of communication to both order and respond to steering commands shall be provided between the navigating bridge and the steering gear compartment.

1.18 Hydraulic power operated steering gear shall be provided with -

1.18.1 arrangements to maintain the cleanliness of the hydraulic fluid taking into consideration the type and design of the hydraulic system;

1.18.2 a low level alarm for each hydraulic fluid reservoir arranged to give audible and visual alarms on the navigating bridge and in the machinery space in the event of leakage of the hydraulic fluid; and

1.18.3 a fixed storage tank having sufficient capacity to recharge at least one power actuating system, including the reservoir, where the main steering gear is required to be power operated. The storage tank shall be provided with a contents gauge and shall be permanently connected by piping in such a manner that the hydraulic systems can be readily recharged from a position within the steering gear compartment.

1.19 The steering gear compartment shall be readily accessible and, as far as is practicable, separated from the machinery spaces.

Handrails and gratings or other non-slip surfaces shall be provided to ensure suitable working conditions at the steering gear machinery and controls in the event of hydraulic fluid leakage.

1.20 An alternative power supply shall be provided in every ship where the diameter of the rudder stock is required to be 230 millimetres or more excluding any strengthening for navigating in ice. The alternative power supply shall be provided automatically within 45 seconds either from the emergency source of electric power or from an independent source of power located in the steering gear compartment. The independent source of power shall be used for this purpose only. The alternative power supply shall be at least sufficient to provide power for the steering gear to comply with the performance requirements of paragraph 1.10.1and for its associated control system and rudder angle indicator. The alternative power supply shall have a capacity sufficient for at least 30 minutes of continuous operation in every ship of 10,000 tons or over and at least 10 minutes of continuous operation in any other ship.

1.21 In every tanker of 10,000 tons or over and every other ship of 70,000 tons or over the main steering gear shall have two or more identical power units complying with the requirements of subparagraph 1.5.

1.22 The main steering gear in every tanker of 10,000 tons or over shall, subject to the requirements of paragraph 1.23, be so arranged that in the event of loss of steering capability due to a single failure in any part of one of the power actuating systems, other than seizure of a rudder actuator, steering capability shall be regained in not more than 45 seconds after the loss of one power actuating system. The main steering gear shall comprise either -

1.22.1 two independent and separate power actuating systems each capable of meeting the requirements of paragraph 1.3.2, or

1.22.2 at least two identical power actuating systems which shall be capable of meeting the requirements of paragraph 1.3.2, when acting simultaneously in normal operation. Interconnection of the hydraulic power actuating systems shall be provided, if necessary for compliance with this requirement. The loss of hydraulic fluid from one system shall be capable of being detected and the defective system automatically isolated so that the other actuating

system or systems remain fully operational.

1.23 In any tanker of 10,000 tons or over but of less than 100,000 tonnes deadweight the main steering gear may be constructed in such a way that the single failure criterion required by subparagraph 1.22 is not applied to the rudder actuator or actuators provided that -

1.23.1 steering capability shall be regained within 45 seconds of a single failure of any part of the piping system or in one of the power units; and

1.23.2 the design, construction and testing of the rudder actuator is in accordance with the requirements of Schedule 9 if only one actuator is provided.

Part 2- Electric and electro-hydraulic steering gear

2.1 Every ship which is fitted with electric or electro-hydraulic steering gear shall be provided with indicators which will show when the power units of such steering gear are running. These indicators shall be situated in the machinery control room or in such other position or positions as the Administration may approve, and on the navigating bridge.

2.2 In every ship of 5,000 tons or over and in every ship constructed on or after 1 September 1984, steering gear shall, subject to paragraph 22.3

2.2.1 be served by at least two exclusive circuits fed from the main switchboard one of which may pass through the emergency switchboard; each circuit shall have adequate capacity for supplying all the motors which are normally connected to it and which operate simultaneously, and if transfer arrangements are provided in the steering gear compartment to permit either circuit to supply any motor or combination of motors, the capacity of each circuit shall be adequate for the most severe load condition; the circuits shall be separated as widely as is practicable throughout their length; an auxiliary electric or electro-hydraulic steering gear may be connected to one of the circuits supplying the main steering gear; and

2.2.2 be provided with short circuit protection and an overload alarm for the protection of the circuits and

motors. In the case of ships constructed on or after 1 September 1984 any protection provided against excess current shall be capable of conducting at least twice the full load current of the motor or motors taking into consideration the motor starting currents; when a three phase supply is used an alarm shall be provided that will indicate the failure of any one of the supply phases; the alarms required by this subparagraph shall be both audible and visual and located in a conspicuous position in the main machinery space or in the control room from which the main machinery is normally controlled;

2.3 In every ship of under 5000 tons in which the electrical power is the sole source of power for both main and auxiliary steering gear, the arrangement shall comply with the requirements of the preceding paragraph, except that if the auxiliary steering gear is powered by a motor primarily intended for other services, suitable overload protection shall be fitted. Only short circuit protection need be provided for the motor and power circuits of any electrically or electro-hydraulically operated main steering gear fitted in any ship of less than 5000 tons.

2.4 The main steering gear in any ship of less than 1600 tons may be fed by one circuit from the main switchboard if the auxiliary steering gear is not electrically powered or is powered by an electric motor primarily intended for other purposes. The Administration may permit arrangements for such motors other than those required by paragraphs 1.13.1, 1.13.2, and 2.2.2 if it considers it safe so to do.

Part 3- Steering gear in tankers

3.1 In addition to requirements otherwise imposed by Parts 1 and 2 every tanker, the keel of which was laid or which was at a similar stage of construction before 1 September 1984, shall comply with the requirements of paragraphs 3.2 to 3.4

Tankers of 10,000 tons or over

3.2 In every tanker (including chemical tankers and gas carriers) of 10,000 tons or over -

3.2.1 two steering gear control systems shall be provided, each of which shall be capable of being operated separately from the navigating bridge. Duplication of

the steering wheel or lever is not required;

3.2.2 in the event of failure of the steering gear control system in operation, the other system shall be capable of being brought into immediate operation from a position on the navigating bridge;

3.2.3 each steering gear control system, if electric, shall be served by its own separate circuit supplied from a steering gear power circuit from a point within the steering gear compartment or directly from switchboard busbars supplying that steering gear power circuit at a point on the switchboard adjacent to the supply to the steering gear power circuit;

3.2.4 in the event of failure of electrical power supply to a steering gear control system, an alarm shall be given on the navigating bridge which shall be audible and visual and situated where it can be readily observed;

3.2.5 means for control of the main steering gear shall be provided in the steering gear compartment;

3.2.6 means shall be provided in the steering gear compartment to disconnect the steering gear control system from the steering gear it serves;

3.2.7 means of communication shall be provided between the navigating bridge and the steering gear compartment;

3.2.8 the rudder angle indication system on the navigating bridge shall be independent of the steering gear control system;

3.2.9 the angular position of the rudder shall be recognisable in the steering gear compartment;

3.2.10 a low level alarm shall be provided for each hydraulic fluid reservoir to give the earliest practicable indication of hydraulic fluid leakage. Audible and visual alarms shall be given on the navigating bridge and in the machinery space where they can be readily observed;

3.2.11 a fluid storage tank shall be provided having

sufficient capacity to recharge at least one power actuating system including the reservoir. The storage tank shall be permanently connected by piping in such a manner that the hydraulic systems can be readily recharged from a position within the steering gear compartment and shall be provided with a contents gauge; and

3.2.12 the steering gear compartment shall be provided with suitable arrangements to ensure working access to the steering gear machinery and controls. These arrangements shall include handrails and gratings or other non-slip surfaces to ensure suitable working conditions in the event of hydraulic fluid leakage.

Tankers of 40,000 tons or over

3.3 In every tanker (including chemical carriers and gas carriers) of 40,000 tons or over the steering gear shall be so arranged that, in the event of a single failure of the piping or of one of the power units, steering capability can be speedily regained. This shall be achieved by -

3.3.1 an independent means of restraining the rudder; or

3.3.2 fast acting valves, which may be manually operated, to isolate the actuator or actuators from the external hydraulic piping together with a means of directly refilling the actuators by a fixed independent power-operated pump and piping system; or

3.3.3 an arrangement such that, where hydraulic power systems are interconnected, loss of hydraulic fluid from one system shall be detected and the defective system isolated either automatically or from the navigating bridge so that the other system remains fully operational.

Tankers constructed on or after 1 June 1979

3.4 The provisions of paragraph 3.5,3.6,3.7 and 3.8 shall apply to every tanker (except chemical tankers and gas carriers) of 10,000 tons or over -

3.4.1 for which the building contract was placed after 1

June 1979; or

3.4.2 in the absence of a building contract, the keel of which was laid or which was at a similar stage of construction after 1 January 1980; or

3.4.3 the delivery of which was after 1 June 1982; or

3.4.4 which has undergone an alteration or modification of a major character -

.1 for which the contract was placed after 1 June 1979; or

.2 in the absence of a contract, the construction work of which was begun after 1 January 1980; or

.3 which was completed after 1 June 1982.

3.5 The main steering gear shall comprise two or more identical power units and it shall be capable of operating the rudder as required by paragraph 1(c)(ii) while operating with one or more power units. As far as is reasonable and practicable, the main steering gear shall be so arranged that a single failure in its piping or in one of the power units will not impair the integrity of the remaining part of the steering gear. All mechanical components which are part of the steering gear and the mechanical connection with any steering gear control system, if any, shall be of sound construction.

3.6 The main steering gear power units shall be arranged to start automatically when power is restored after a power failure.

3.7 In the event of failure of any of the steering gear power units, means shall be provided to ensure that an alarm shall be given on the navigating bridge. Every steering gear power unit shall be capable of being brought into operation either automatically or manually from a position on the navigating bridge.

3.8.1 An alternative power supply, at least sufficient to supply a steering gear power unit so as to enable it to move the rudder as specified below, and also to supply its associated steering gear control system and the rudder angle indicator shall be provided automatically, within 45 seconds either from the emergency source of electrical power, or from another independent source of power located in the steering gear compartment.

3.8.2 This independent source of power shall be used only for this purpose and shall have a capacity sufficient for half an hour of continuous operation.

3.8.3 The steering gear power unit, when being supplied by the alternative power supply, shall at least be capable of putting the rudder over from 15 degrees on one side to 15 degrees on the other side in not more than 60 seconds with the ship at its deepest sea-going draught while running at one half of its maximum service speed ahead or 7 knots whichever is the greater.

NINTH SCHEDULE

(eighth Schedule Paragraph 1.23.2)

CONSTRUCTION OF RUDDER ACTUATORS FOR CERTAIN TANKERS

Materials of Construction

1. Rudder actuator components subject to internal hydraulic pressure or for transmitting mechanical forces to the rudder stock shall be constructed of ductile materials which have been tested to establish their mechanical properties. Such materials shall not have an elongation less than 12 per cent on a gauge length of five times the diameter of the test piece or an ultimate tensile strength greater than 650 Newtons per square millimetre.

Design and Stress Analysis

2. Subject to paragraph 4, detailed calculations, including a stress analysis of the pressure retaining parts of the actuator, shall be provided so that the Administration can establish that the design of the rudder actuator is suitable for its intended purpose. A fatigue analysis and a fracture mechanics analysis shall be undertaken if the Administration considers it necessary due to the complexity of the design or the method of manufacture. Such analyses shall take all foreseen dynamic loads into account and shall be supplemented by experimental stress analysis if the Administration considers it necessary.

Allowable Stresses

3. For the purpose of determining the scantlings of rudder actuator components subject to internal hydraulic pressure the allowable

stresses shall not exceed -

$$\sigma m \leq f$$
$$\sigma t \leq 1.5f$$
$$\sigma h \leq 1.5f$$
$$\sigma t + \sigma b \leq 1.5f$$
$$\sigma m + \sigma b \leq 1.5f$$

where -

σm is the equivalent primary general membrane stress,

σt is the equivalent primary local membrane stress,

σb is the equivalent primary bending stress,

$f = \sigma \frac{B}{A} or \sigma \frac{Y}{B}$ whichever is smaller, where—

σB is the specified minimum tensile strength of material at ambient temperature, and

σY is the specified minimum yield stress or 0.2% proof stress of material at ambient temperature

A and B being in accordance with the following table -

Material	Forged Steel	Cast Steel	Nodular Cast Iron
A	4	4.6	5.8
B	2	2.3	3.5

Burst Test

4. Rudder actuator components subject to internal hydraulic pressure that have not been subject to a detailed stress analysis in accordance with paragraph 2 may be accepted by the Administration on the basis of a satisfactory burst test. The minimum bursting pressure shall be determined by the formula-

$$P_b = P.A.\frac{\sigma Ba}{\sigma B}$$

where -

P_b is the minimum bursting pressure;

P is the design pressure as specified in paragraph 1.8.2 of the Sixth Schedule;

A is the appropriate number taken from the table in paragraph 3;

□Ba is actual tensile strength; and

□B is the specified minimum tensile strength of the material at ambient temperature.

Construction

5.1 Local concentrations of stress shall be minimised.

5.2 All welded joints within the pressure boundary of a rudder actuator or connecting parts transmitting mechanical loads shall be the full penetration type or be of equivalent strength. The weld details and welding procedure shall be to the satisfaction of the Administration.

5.3 Oil seals between stationary components that form any part of the external pressure boundary shall be of the metal to metal type or equivalent.

5.4 At least two oil seals shall be provided between components having relative movement to each other that form any part of the external pressure boundary so that the failure of one will not render the actuator inoperative. The Administration may permit other arrangements providing equivalent protection against leakage.

5.5 Isolating valves, directly mounted on the actuator, shall be provided at every pipe connection to the actuator.

5.6 The relief valves for the rudder actuator required by paragraph 1.8.3 shall have a discharge capacity of at least the total capacity of the pumps which provide power for the actuator increased by 10 per cent. Under such conditions the rise in pressure above the set pressure shall not exceed 10 per cent, due consideration being given to the effect of foreseen ambient conditions on the viscosity of the oil.

Testing

6.1 The rudder actuator shall be completely examined for surface and volumetric flaws by non destructive testing techniques and procedures acceptable to the Administration. Fracture mechanics analysis may be accepted for determining the maximum allowable flaw size.

6.2 Pressure parts of the actuator shall be tested hydrostatically to 1.5 times the design pressure. The rudder actuator shall be subjected to a further hydrostatic test and a running trial when it is installed in the ship.

TENTH SCHEDULE

(regulation 41(2)

PROTECTION AGAINST NOISE

1. Noise levels in machinery spaces shall not exceed 110 dB(A) provided that the Administration, may, under such conditions as he may specify, permit higher noise levels having regard to the size of the ship and the type of machinery installed.

2. Any machinery space in which the noise level exceeds 90 dB(A) and which is required to be manned shall be provided with a designated refuge from noise where the noise level does not exceed 75dB(A).

3. Every entrance to a machinery space in which the noise level exceeds 85 dB(A) shall be provided with a warning notice comprising an appropriate symbol and a supplementary sign stating “High Noise Levels. Use Ear Protectors”. Sufficient ear protectors shall be provided for use in such spaces.

4. Noise levels in machinery spaces shall be measured when the largest number of machines that operate simultaneously in service are at their normal service loads. Measurements taken during sea trials at normal ahead service speed of the ship will be accepted.

5. The equipment and procedures for measuring and recording noise levels in machinery spaces shall be generally in accordance with the provisions of the “The Code on Noise Levels in Ships” adopted by the Organization by Resolution. A 468 (XII), or any amendment thereof or replacement thereto.

ELEVENTH SCHEDULE
(regulation 45)

PERIODICALLY UNATTENDED MACHINERY SPACES

General

1. Every ship shall be provided with effective means for control of, and arrangements for monitoring the operation of, the machinery used or essential for propulsion, so that the safety of the ship in all sailing conditions, including manoeuvring is not less than that of a ship with continuously manned machinery spaces.

Operation and documentation

2. In every ship, the Administration shall ensure that the equipment provided for operating the ship with the machinery spaces containing machinery used or essential for propulsion periodically unattended, is functioning in a reliable manner before the ship is permitted to operate with those machinery spaces unattended. The Administration shall ensure that satisfactory arrangements are made for periodic inspections and routine tests on such equipment to ensure continuous and reliable operation and shall issue documentary evidence indicating that it is satisfied that the ship and its equipment is suitable for operation in the said conditions.

Alarm systems

3. Every ship shall be provided with an alarm system which shall indicate any fault in the unattended machinery or unattended machinery spaces requiring attention. The alarm system shall -

3.1 indicate each separate alarm condition visually at the machinery alarm and control centre and provide an audible alarm at that centre and in the machinery spaces;

3.2 be connected to the engineers' public rooms and to each of the duty engineers' cabins so that at least one of the duty engineers' cabin is connected to the alarm system at any time. The Administration may permit equivalent alternative arrangements;

3.3 be connected to an audible and visual alarm on the navigating bridge which shall be activated for any

situation which requires the action of, or should be brought to the attention of, the officer of the watch;

3.4 as far as practicable be designed to indicate an alarm condition should a failure of the alarm and monitoring system occur;

3.5 activate an alarm that is clearly audible in the engineers' accommodation if an alarm condition has not received attention at the machinery alarm and control centre within a reasonable time;

3.6 in the event of a loss of the normal power supply, be supplied automatically from a stand-by power supply; the failure of the normal power supply shall be indicated on the alarm system; and

3.7 be able to indicate multiple faults simultaneously; the acceptance of any fault on the alarm system shall not inhibit other alarms; acceptance of the alarm at the machinery alarm and control centre shall be indicated at the other positions where the alarm condition is shown; alarms shall be maintained until they are accepted and the visual indication of individual alarms shall remain until the fault has been corrected when the alarm system shall automatically be reset to its normal operating condition.

Safety system

4. A safety system shall be provided so that malfunction in the machinery which presents an immediate danger shall initiate the automatic shut-down of the defective machinery and give an alarm. The main propulsion machinery shall not be automatically shut down except when continued operation would cause serious damage, complete breakdown or an explosion. Arrangements for overriding the automatic shut-down of the main propulsion machinery may be permitted, provided that the operating arrangements preclude inadvertent operation. Visual indication shall be provided to show whether or not the override has been activated. A suitable notice, warning of the possible effect of overriding shall be displayed at the override position.

Communication

5. Every ship shall be provided with a means of vocal

communication between the propelling engine room, main machinery control room or manoeuvring platform as appropriate, the navigating bridge and the engineers' accommodation.

Control of propulsion machinery

6. In every ship the speed of rotation, direction of thrust and, if applicable the pitch of the propeller shall be fully controllable from the navigating bridge and the following provisions shall apply -

6.1 the remote control from the navigating bridge shall be performed by a single control device for each independent propeller with automatic performance of all associated services including where necessary means of preventing overload of the propulsion machinery;

6.2 propulsion machinery movements selected at the navigating bridge shall be indicated at the machinery alarm and control centre; and

6.3 means of controlling the propulsion machinery and other machinery essential for the propulsion of the ship locally in the event of failure of any part of the automatic or remote control systems shall be provided.

Machinery, boilers and electrical installations

7.1 An automatic control system, and an alarm system shall be provided to the satisfaction of the Administration for all important functions including pressures, temperatures and fluid levels. The control system shall be such that through the necessary automatic arrangements the services needed for the operation of the main propulsion machinery and its auxiliaries are ensured.

7.2.1 In every ship of 1600 tons or over, and, where practicable, in ships of less than 1600 tons, where the electrical power is normally supplied by one generator, there shall be provided suitable load shedding arrangements to ensure the integrity of supplies to services required for propulsion, steering and to ensure the safety of the ship.

7.2.2 There shall be adequate provision, in the event of loss of the generator in operation, for automatically starting and connecting to the main switchboard a standby generator of sufficient capacity to sustain propulsion, steering and to

ensure the safety of the ship, and automatic restarting of the essential auxiliaries including, where necessary, sequential operation.

7.3 Where stand-by machinery is necessary to ensure continuity of services essential for propulsion, automatic changeover devices shall be provided. An alarm shall be given on automatic changeover.

Fire safety

8.1 Every fuel oil and lubricating oil pressure pipe shall where necessary, be screened or otherwise suitably protected to prevent oil, in the event of a failure of that pipe, coming into contact with hot surfaces or entering machinery air intakes. High pressure fuel oil pipes of compression ignition engines shall, additionally, be provided with means of collecting, at a safe location, any such oil and indicating the fault on the alarm system.

8.2 Every oil fuel tank that directly supplies the main propulsion machinery or its auxiliaries and which is arranged to be filled automatically or by remote control shall be provided with means to prevent overflow and spillage. Every such tank and settling tank fitted with oil fuel heating arrangements shall be provided with a high temperature alarm if the flashpoint of the oil fuel therein can be exceeded.

8.3 The equipment (such as oil fuel purifiers) for preparing flammable liquids for use in boilers or machinery shall have arrangements to prevent overflow and spillages and, so far as it is reasonable and practicable, be installed in a space appropriated solely for such equipment and their heaters.

8.4 All internal combustion engines having an output of 2250 kilowatts or above or having cylinders of 300 millimetres bore or above shall be provided with crankcase oil mist detectors or engine bearing temperature detectors or other equivalent means which shall give an alarm on the alarm system in the event of an incipient dangerous condition.

8.5 All air supply casings and uptakes of boilers and scavenge air belts of main propulsion engines shall be provided with detectors which shall give an alarm on the alarm system in the event of incipient fire occurring therein, unless the Administration waives the requirement for such provisions.

Protection against flooding

9.1 The machinery space bilge wells shall be so located that an accumulation of liquid at normal angles of heel and trim may be detected and a liquid level alarm shall be provided. The machinery space bilge wells shall have sufficient capacity to accommodate normal drainage during unattended periods. Ships with automatic bilge pumping shall be provided with a means of indicating when the bilge pump is operating more frequently than during normal operation. When automatic bilge pumping is provided smaller bilge wells may be permitted by the Administration.

9.2 The location of the controls of any valve serving a sea inlet, a discharge below the waterline or a bilge injection system shall be so sited as to allow adequate time for operation in the case of influx of water to the space, having regard to the time likely to be required to reach and operate such controls. If the level to which the space could become flooded with the ship in the fully loaded condition so requires, arrangements shall be made to operate the controls from a position above such a level.

TWELFTH SCHEDULE

(regulations 48(4) and 50(2)

EMERGENCY AND TRANSITIONAL SOURCE OF ELECTRICAL POWER

Part 1- Emergency and transitional source of electrical power

1.1 In every ship the emergency source of electrical power shall be capable of operating simultaneously for a period of at least 6 hours the following services -

1.1.1 the emergency lighting required by the Merchant Shipping (Life Saving Appliances for Ships) Regulations 2010 as appropriate;

1.1.2 an emergency lighting system which shall be provided in the main machinery spaces, the space containing the ship's main electric generating plant, on the navigating bridge and in the chartroom;

1.1.3 the general alarm, if electrically operated;

1.1.4 the ship's navigation lights if solely electric; and

1.1.5 the daylight signalling lamp if it is operated by the ship's main source of electrical power;

except that in ships of under 5000 tons the period shall be of at least 3 hours and paragraphs 1.1.2 and 1.1.5 do not apply.

1.2.1 In every ship the emergency source of electrical power shall be either accumulator (storage) batteries capable of complying with the requirements of paragraph 1.1 without being recharged or suffering an excessive voltage drop, or a generator driven by internal combustion type machinery with an independent fuel supply and with efficient starting arrangements and the fuel provided for such machinery shall have a flashpoint of not less than 43^0C.

1.2.2 The emergency source of electrical power shall be so arranged that it will operate efficiently when the ship is listed 22 1/2 degrees and when the trim of the ship is 10 degrees from an even keel.

1.2.3 Provision shall be made for periodically testing the emergency source of power and its associated circuits.

Ships constructed on or after 1 September 1984

1.3 Notwithstanding paragraph 1.1 and 1.2, every ship constructed on or after 1 September 1984 shall comply with paragraphs 1.4 to 1.15.

1.4 Every ship shall be provided with a self-contained emergency source of electrical power which shall be so designed and arranged that it will operate at full rated power when the ship is listed 22 1/2 degrees and when the trim of the ship is 10 degrees from an even keel or any combination of or up to these limits.

1.5 The emergency source of electric power, the associated transforming equipment, any transitional source of emergency power required by paragraph 1(g)(ii) the emergency switchboard and the emergency lighting switchboard shall be -

1.5.1 located above the uppermost continuous deck;

1.5.2 readily accessible from the open deck;

1.5.3 located aft of the collision bulkhead;

1.5.4 so arranged that a fire or other casualty in the spaces containing the main source of electrical power, the associated transforming equipment and the main switchboard or in any machinery space of Category A will not interfere with the supply control and distribution of emergency supplies; and

1.5.5 located where practicable in a space which is not contiguous to the boundaries of a machinery space of Category A or any other space containing the main source of electrical power, the main switchboard or any associated transforming equipment.

1.6 The emergency source of electrical power shall be a generating set complying with the requirements of paragraph 1(g) or an accumulator battery complying with the requirements of paragraph 1.9.

1.7 Where the emergency source of electrical power is a generator it shall -

1.7.1 be driven by internal combustion machinery with an independent fuel supply having a flashpoint of not less than 43^0C (Closed Cup Test); and

1.7.2 be started automatically upon the failure of the main source of electrical power supply unless a transitional source of emergency electrical power is provided in accordance with paragraph 1.10; if the emergency generator is arranged for automatic starting, the generator and the services that would otherwise be supplied from the transitional source of emergency electrical power in compliance with the requirements of paragraph 1.10.3and 1.10.4 shall be automatically connected to the emergency switchboard so that such services will be supplied within 45 seconds of the failure of the main source of electrical power.

1.8 The emergency generator may be used to supply services other than emergency supplies exceptionally for short periods provided that the independent operation of the emergency source of electrical power is safeguarded in all circumstances.

1.9 Where the emergency source of electrical power is an

accumulator battery it shall be -

1.9.1 capable of supplying the emergency electrical load without being recharged, whilst maintaining the voltage of the battery throughout the required discharge period within 12 per cent of its nominal voltage;

1.9.2 automatically connected to the emergency switchboard in the event of the failure of the main source of electrical power; and

1.9.3 capable of immediately supplying the services specified in paragraph 1.10.3 and l.10.4.

1.10 The transitional source of emergency electrical power shall -

1.10.1 consist of an accumulator battery capable of supplying the required services, without being recharged, whilst maintaining the voltage of the battery throughout the required discharge period within 12 per cent of its nominal voltage;

1.10.2 be arranged to supply automatically the services required by subparagraph 1.10.3 and 1.10.4 for at least half an hour in the event of the failure of either the main or emergency source of electrical power;

1.10.3 supply the lighting required by paragraph 3.2.1, 3.2.2 and 3.2.4.1 except that permanently fixed, individual, automatically charged, relay operated accumulator lamps may be permitted for the transition phase in machinery, service and accommodation spaces; and

1.10.5 supply the services required by paragraph (b)(iii)(aa), 3(b)(iii)(bb) and 3(b)(iii)(cc) unless a suitably located independent accumulator battery is provided capable of supplying such services for the period of time required by the those subparagraphs.

1.11 Discharge of accumulator batteries that constitute either the emergency or transitional source of electrical power shall be indicated on the main switchboard or in the machinery control room. Discharge of any independent accumulator batteries provided in compliance with paragraph 3.2.3 shall be indicated at the appropriate control station.

1.12.1 The emergency switchboard shall be situated as near as practicable to the emergency source of electrical power.

1.12.2 If the emergency source of electrical power is a generator the emergency switchboard shall be situated in the same space as the generator unless the operation of the emergency switchboard would be thereby impaired.

1.12.3 For the purposes of this paragraph an environmental enclosure within the main boundaries of the space does not provide separation between the emergency generator and the emergency switchboard.

1.12.4Any accumulator battery required by this Schedule shall not be installed in the same space as the emergency generator.

1.13 The emergency switchboard shall be supplied during normal operation from the main switchboard by an interconnector feeder which shall be -

1.13.1 adequately protected at the main switchboard against overload and short circuit;

1.13.2 disconnected automatically at the emergency switchboard upon the failure of the main source of electrical power; and

1.13.3 be at least protected against short circuit at the emergency switchboard if the system is arranged for the main switchboard to be supplied from the emergency switchboard.

1.14 Arrangements shall be made to disconnect non-emergency circuits automatically from the emergency switchboard, if necessary, to ensure that electric power will be available for the required emergency supplies.

1.15 Means shall be provided for testing the complete emergency system periodically including any automatic starting arrangements provided.

Part 2 - Starting arrangements for emergency generating sets

Requirements for ships constructed on or after 1 September 1984

2.1 Emergency generating sets shall be capable of being readily started at a temperature of 0^0C. If temperatures below 0^0C are anticipated provision shall be made for heating the engine so that it will start readily.

2.2 The starting, charging and energy storing devices, which shall not be used for any purpose other than the operation of the emergency generating set, shall be located in the emergency generator space except that the air receiver of the emergency generator set may be supplied from the main or auxiliary compressed air system through a non-return valve located in the emergency generator space.

2.3 The stored energy required for starting shall be maintained at all times -

2.3.1 in electrical and electro-hydraulic systems, from the emergency switchboard; and

2.3.2 in compressed air systems, by the main or auxiliary compressed air system or by an emergency air compressor which, if it is electrically driven, shall be supplied from the emergency switchboard.

2.4 Subject to paragraph 2(f), any emergency generating set, arranged to be automatically started shall -

2.4.1 be equipped with a starting system having sufficient stored energy for three consecutive starts; and

2.4.2 be provided with an additional source of stored energy independent of the starting required by paragraph 2(d)(i) capable of producing a further three starts within 30 minutes unless an alternative and independent starting system is provided or effective manual starting can be demonstrated.

2.5 Any emergency generator that is not arranged for automatic starting shall either -

2.5.1 be provided with starting arrangements in accordance with the requirements of paragraph 2(d) except that the

starting may be initiated manually; or

2.5.2 be able to be started manually by cranking, inertia starters or manually charged hydraulic accumulators, provided that at least three starts can be accomplished within 30 minutes.

Additional requirements for ships constructed on or after 1 October 1994

2.6 The following requirements shall apply instead of paragraph 2.4 -

2.6.1 any emergency generating set arranged to be automatically started shall -

2.6.1.1 be equipped with a starting system having sufficient stored energy for three consecutive starts. The source of stored energy shall be protected to preclude critical depletion by the automatic starting system, unless a second independent source of energy is provided; and

2.6.2 be provided with a second source of stored energy for an additional three starts within 30 minutes, unless an alternative and independent starting system capable of three starts within 30 minutes is provided or effective manual starting can be demonstrated.

THIRTEENTH SCHEDULE

(regulation 52)

GENERAL PRECAUTIONS AGAINST SHOCK, FIRE AND OTHER HAZARDS

1. In every ship, all electrical equipment shall be so constructed and installed that there will be no danger of injury to any person handling it in a proper manner. Exposed metal parts of electrical equipment which are not intended to have a voltage above that of earth but which may have such a voltage under fault conditions shall be earthed unless such equipment is -

1.1 supplied at a voltage not exceeding 50 volts direct current or 50 volts root mean square alternating

current between conductors, hereinafter referred to as "RMS a.c.", from a source other than an auto-transformer;

1.2 supplied at a voltage not exceeding 250 volts RMS a.c. by safety isolating transformers supplying only one consuming device; or

1.3 of double insulation construction.

2.1 All electrical apparatus shall be constructed and installed so that it will not cause injury when handled or touched in the normal manner.

2.2 When electric lamps, welding equipment, tools or other apparatus are used in confined damp spaces or spaces with a large exposed conductive surface, special provision shall be made so far as is practicable, to ensure that the danger of electric shock is reduced to a minimum.

2.3 Such spaces shall at least include open decks and machinery spaces.

3.1 Every main and emergency switchboard shall be so arranged as to give easy access for operation and sufficient access for maintenance without danger to any person.

3.2 Every such switchboard shall be suitably guarded and a non-conducting mat or grating shall be provided at the back and the front where necessary.

3.3 No exposed parts which may have a voltage between conductors or to earth exceeding 250 volts direct current or 50 volts RMS a.c. shall be installed on the face of any switchboard or control panel.

4. Subject to paragraph 5, the hull return system of distribution shall not be used for any purpose in a tanker, chemical tanker or gas carrier or for power, heating or lighting in any other ship of 1600 tons or over.

5. The requirements of paragraphs 4 and 6 do not preclude the use of -

5.1 impressed current cathodic protection system;

5.2 limited and locally earthed systems provided that, in the case of ships constructed on or after 1 October 1994, any possible resulting current does not flow directly through hazardous areas; and

5.3 insulation monitoring devices with a maximum circulation current of 30 milliamperes.

6. The final sub-circuits of any hull return system of distribution shall be two wire.

7. Every separate electrical circuit shall be protected against short circuit.

8. Each separate electrical circuit, other than a circuit which operates the ship's steering gear or any other circuit in respect of which the Director-General grants an exemption shall be protected against overload. There shall be clearly and permanently indicated on or near each overload protective device the current carrying capacity of the circuit which it protects and the rating or setting of the device.

9. Accumulator batteries shall be housed in boxes or compartments which are constructed to protect the batteries from damage and are ventilated to minimise the accumulation of explosive gas. Subject to paragraph 1 of Schedule 14 electrical or other equipment which may constitute a source of ignition of flammable vapours shall not be installed in any compartment assigned to accumulator batteries. Accumulator batteries shall not be installed in sleeping accommodation spaces.

10. Every electric space-heater forming part of the equipment of a ship shall be fixed in position and shall be so constructed as to reduce the risk of fire to a minimum. No such heater shall be constructed with an element so exposed that clothing, curtains, or other material can be scorched or set on fire by heat from the elements.

Additional requirements of ships constructed on or after 1 September 1984

11. Subject to paragraph 14, earthed distribution systems shall not be installed in any tanker, chemical tanker or gas carrier except that the neutral of an alternating current distribution system with a line voltage of 3000 volts or over may be earthed if any current therefrom does not flow directly through any hazardous areas.

12. The insulation of any distribution system that is not earthed shall be continuously monitored by a system capable of giving audible or visual indication of abnormally low insulation values.

13. All lighting and power circuits terminating in a bunker or cargo space shall be provided with a multiple pole switch outside the space for disconnecting all such circuits.

Additional requirements for ships constructed on or after 1 October 1994

14. The following requirements shall apply instead of paragraph 11 -

14.1 except as permitted by subparagraph (b), earthed distribution systems shall not be used in a tanker;

14.2 the requirement of subparagraph (a) does not preclude the use of earthed intrinsically safe circuits and in addition, under conditions approved by the Certifying Authority, the use of the following earthed systems -

14.2.1 power-supplied control circuits and instrumentation circuits where technical or safety reasons preclude the use of a system with no connection to earth, provided the current in the hull is limited to not more than 5 A in both normal and fault conditions; or

14.2.2 limited and locally earthed systems, provided that any possible resulting current does not flow directly through any of the hazardous areas; or

14.2.3 alternating current power networks of 1,000 volts RMS (line to line) or over, provided that any possible resulting current does not flow directly through any of the hazardous areas.

FOURTEENTH SCHEDULE

(regulation 53)

ELECTRICAL EQUIPMENT IN HAZARDOUS AREAS AND SPACES

Requirements for ships constructed on or after 1 September 1984

1. Electrical equipment shall not be installed in any hazardous area unless the Administration is satisfied that such equipment is -

1.1 essential for operational or safety purposes;

1.2 of a type that is certified for use in the flammable dusts, gases or vapours to which it may be subjected; and

1.3 appropriate to the space concerned.

2. Cables passing through any hazardous areas or serving electrical equipment in such areas shall -

2.1 be appropriate for use in the dusts, gases or vapours to which they may be subject; and

2.2 unless they form part of intrinsically safe circuits, include a metallic sheath or a braid or wire armour for earth leakage detection, unless they are enclosed in a gas-tight steel conduit. Additional protection against mechanical damage shall be provided in locations where such damage may occur.

3.1 The electrical equipment in enclosed cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their propulsion in any ventilation trunk for such spaces shall be of a type that is certified for use in explosive petrol and air mixtures.

3.2 Electrical equipment that is enclosed and protected to prevent discharge of sparks may be installed in such cargo spaces more than 450 millimetres above any deck on which vapours may accumulate if the atmosphere within the cargo space is changed at least ten times per hour.

4. The cables installed in enclosed cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their

propulsion and in any ventilation trunks to such spaces shall be appropriate for use in explosive petrol and air mixtures.

FIFTEENTH SCHEDULE

(regulation 55)

EMERGENCY TOWING ARRANGEMENTS FOR TANKERS

Purpose

1. New and existing tankers of 20,000 tonnes deadweight and above shall be fitted with an emergency towing arrangement, the design and construction of which shall be approved by the Administration.

Requirements for the Arrangements and Components

General

2.1 The emergency towing arrangements shall be so designed as to facilitate salvage and emergency towing operations on tankers primarily to reduce the risk of pollution. The arrangements shall at all times be capable of rapid deployment in the absence of main power the ship to be towed and easy connection to the towing vessel. Figure 1 shows arrangements which may be used as reference.

Towing components

2.2 The major components of the towing arrangements shall consist of the following -

	Forward of ship	**Aft of ship**	**Strength requirements**
Pick-up gear		Yes	
Towing pennant	optional	Yes	-----
Chafing gear	optional	Depending on design	Yes
Fairlead	Yes	Yes	Yes
Strongpoint	Yes	Yes	Yes
Roller pedestal	Yes	Depending on design	-----

Strength of the towing components

2.3.1 Towing components as specified in paragraph 2.2 for strength shall have a working strength of at least 1,000 kN for tankers of 20,000 tonnes deadweight or over but less than 50,000 tonnes deadweight, and at least 2,000 kN for tankers of 50,000 tonnes deadweight or over (working strength is defined as one half ultimate strength). The strength shall be sufficient for all relevant angles of towline, i.e. up to 90 degrees from the ship's centreline to port and starboard and 30 degrees vertical downwards.

2.3.2 Other components shall have a working strength sufficient to withstand the load to which such components may be subjected during the towing operation.

Length of towing pennant

2.4 The towing pennant shall have a length of at least twice the lightest seagoing ballast freeboard at the fairlead plus 50 metres.

Location of strongpoint and fairlead

2.5 The bow and stem strongpoint and fairleads shall be located so as to facilitate towing from either side of the bow or stem and minimize the stress on the towing system.

Strongpoint

2.6 The inboard end fastening shall be a stopper or bracket or other fitting of equivalent strength. The strongpoint can be designed integral with the fairlead.

Fairleads

Size

2.7.1 Fairleads shall have an opening large enough to pass the largest portion of the chafing gear, towing pennant or towing line.

Geometry

2.7.2 The fairlead shall give adequate support for the towing pennant during towing operation which means bending 90 degrees to port and to starboard side and 30 degrees vertical downwards. The bending ratio (towing pennant bearing surface diameter to towing pennant diameter) should be not less than 7 to 1.

Vertical location

2.7.3 The fairlead shall be located as close as possible to the deck and, in any case, in such a position that the chafing chain is approximately parallel to the deck when it is under strain between the strongpoint and the fairlead.

Chafing chain

2.8 The chafing gear shall have the following characteristics -

Type

2.8.1 The chafing chain shall be stud link chain;

Length

2.8.2 The chafing chain shall be long enough to ensure that the towing pennant remains outside the fairlead during the towing operation. A chain extending from the strongpoint to a point at least 3 metres beyond the fairlead should meet this criterion;

Connecting limits

2.8.3 One end of the chafing chain shall be suitable for connection to the strongpoint. The other end shall be fitted with a standard pear-shaped open link allowing connection to a standard bow shackle; and

Stowage

2.8.4 The chafing chain shall be stowed in such a way that it can be rapidly connected to the strongpoint.

Towing connection

2.9 The towing pennant shall have a hard eye-formed termination allowing connection to a standard bow shackle.

Prototype test

2.10 Designs of emergency towing arrangements in accordance with these Guidelines shall be prototype tested to the satisfaction of the Director-General.

Ready Availability of Towing Arrangements

3. To facilitate approval of such equipment and to ensure rapid deployment, emergency towing arrangements shall comply with the following criteria -

3.1 the aft emergency towing arrangement shall be pre-rigged and be capable of being deployed in a controlled manner in harbour conditions in not more than 15 minutes;

3.2 the pick-up gear for the aft towing pennant shall be designed for manual operation by one person taking into account the absence of power and the potential for adverse environmental conditions that may prevail during such emergency towing operations. The pick-up gear shall be protected against the weather and other adverse conditions that may prevail;

3.3 the forward emergency towing arrangement shall be capable of being deployed in harbour conditions in not more than 1 hour;

3.4 the forward emergency towing arrangement shall have be designed at least with a means of securing a towline to the chafing gear using a suitably positioned pedestal roller to facilitate connection of the towing pennant;

3.5 forward emergency towing arrangements which comply with the requirements for aft emergency towing arrangements may be accepted;

3.6 all emergency towing arrangements shall be clearly marked to facilitate safe and effective use even in darkness and poor visibility; and

3.7 all emergency towing components shall be inspected by ship personnel at regular intervals and maintained in good working order.

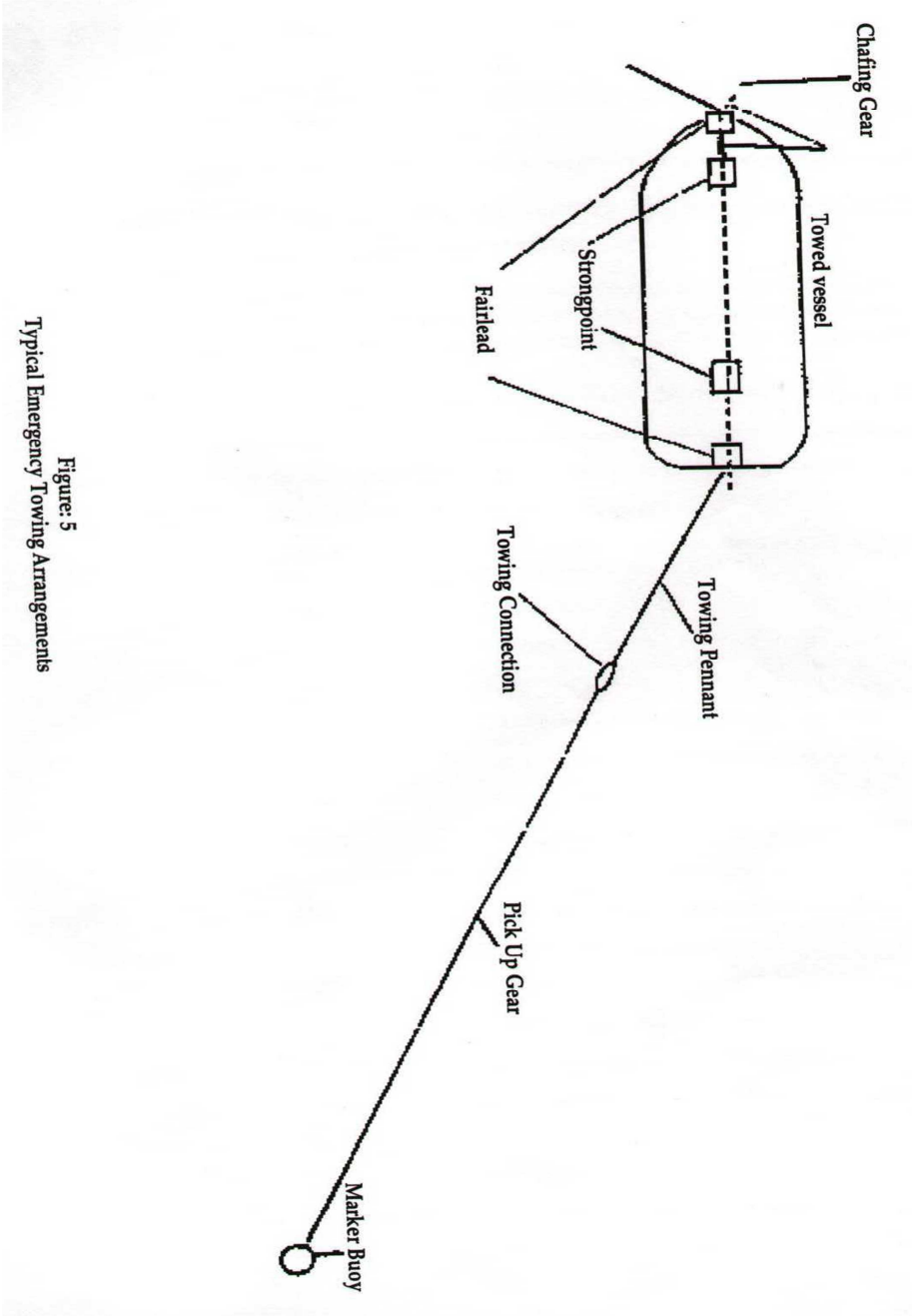


Figure: 5
Typical Emergency Towing Arrangements

SIXTEENTH SCHEDULE

(regulation 55)

GUIDELINES FOR SAFE ACCESS TO TANKER BOWS

1. GANGWAYS AND ACCESS

1.1 Tankers, including oil tankers, chemical tankers and gas carriers shall be provided with means to enable the crew to gain safe access to the bow even in severe weather conditions. For tankers instructed on or after 1 July 1998, the access should be by means of either a walkway on the deck or a permanently constructed gangway of substantial strength at or above the level of the superstructure deck or the first tier of a deckhouse which should-

1.1 be not less than 1 m in width, situated on or as near as practicable to the centre line of the ship and located so as not to hinder easy access across working areas of the deck;

1.2 be fitted at each side throughout its length with a footstop and guard rails supported by stanchions. Such rails should consist of no less than 3 courses, the lowest being not more than 230 mm and the uppermost being at least 1 m above the gangway or walkway, and no intermediate opening should be more than 380 mm in height. Stanchions should be at intervals of not more than 1.5 m;

1.3 be constructed of fire resistant and non-slip material;

1.4 have openings, with ladders where appropriate, to and from the deck. Openings should not be more than 40 m apart;

1.5 if the length of exposed deck to be traversed exceeds 70 m, have shelters of substantial construction set in way of the gangways or walkways at intervals not exceeding 45 m. Every such shelter should be capable of accommodating at least one person and be so constructed as to afford weather protection on the forward, port and starboard sides; and

1.6 if obstructed by pipes or other fittings of a permanent nature, be provided with means of passage over such

obstruction.

1.7 The Director-General may accept alternative or modified arrangements for tankers with space constraint, such as small tankers, or tankers with large freeboard, such as gas carriers, provided that such alternative or modified arrangements achieve an equivalent level of safety for access to the bow.

1.8 Arrangements already approved by the Administration for the tankers constructed before 1 July 1998 may be accepted, provided that such existing arrangements achieve an equivalent level of safety for access to the bow.

SEVENTEENTH SCHEDULE

(regulation 57)

GUIDELINES FOR THE SELECTION, APPLICATION AND MAINTENANCE OF CORROSION PREVENTION SYSTEMS OF DEDICATED SEAWATER BALLAST TANKS

1. GENERAL

1.1 The purpose of these guidelines is to recommend general criteria for the selection, application and maintenance of corrosion prevention systems of dedicated seawater ballast tanks. They apply to new oil tankers and bulk carriers.

1.2 The guidelines are not intended to replace the technical aspects of any specific coating system, to be covered by the product and job specifications, which are at the discretion and under the responsibility of shipowners, manufacturers and shipyards.

1.3 The owner should select and maintain a system which will ensure an adequate level of corrosion prevention of the seawater ballast tanks.

1.4 Coating manufacturers should give evidence of the quality of the product and its ability to satisfy the owner’s requirements.

1.5 The shipyard and/or its subcontractors should provide clear evidence of their experience in coating application. The coating standard, job specification, inspection, maintenance and repair criteria should be agreed by the shipyard and/or its subcontractors,

owner and manufacturer, in consultation with the Administration or an organization recognized by the Administration, before the ship's construction.

2. DEFINITIONS

2.1 *Anode* is an electrode through which direct current enters an electrolyte.

2.2 *Ballast tank* is a tank which is used for water ballast and includes segregated ballast tanks, ballast double bottom spaces and peak tanks.

2.3 *Cathodic protection* is a way of protecting a steel surface from corrosion by installing sacrificial anodes, in contact with the steel in the electrochemical seawater corrosion cell.

2.4 *Dewpoint* is the temperature at which air is saturated with moisture.

2.5 *DFT* is the nominal dry film thickness.

2.6 *Hard Coating* is a coating which chemically converts during its curing process, normally used for new constructions or non-convertible air drying coating which may be used for maintenance purposes. Hard coating can be either inorganic or organic.

2.7 *LEL* is the lower explosive limit.

2.8 *Light colour* is a colour of coating easily distinguishable from rust.

2.9 *Primer coat* is the first coating applied in the shipyard (to differentiate it from shop-primer.

2.10 *Shop-primer* means prefabrication thin primer coating applied to steel plates, often in automatic plants.

2.11 *Solvent* means a volatile liquid capable of completely dissolving a given binder.

2.12 *Thinner* means a volatile liquid that does not necessarily dissolve the binder, but which is capable of reducing the viscosity of the binder solution (vehicle), for example in reducing the viscosity of a paint to spraying consistency.

2.13 *TLV* means threshold limit value.

3. COATING

3.1 *General*

3.1.1 The lifetime of a coating applied to a new construction may be influenced by several aspects which include coating selection, application, and maintenance scheme.

3.1.2 Use of hard coating is the most common practice in present technology. The effectiveness of a hard coating can be achieved only if the manufacturer's technical product data sheet and job specifications are carefully followed.

3.1.3 Multi-coat treatments with coating layers of contrasting colours are recommended. The last layer of coat should preferably be of a light colour in order to facilitate in-service inspections.

3.1.4 Coating performance can be improved by adopting measures at the design stage such as reducing scallops, using rolled profiles, and ensuring that the structural configuration permits easy access with tools and facilitates cleaning, drainage and drying of tanks.

3.1.5 Where coating is supplemented by cathodic protection, the coating must be compatible with the cathodic protection system.

3.2 *Coating selection*

3.2.1 The selection of a coating should be considered by the parties involved with respect to the service conditions and planned maintenance.

3.2.2 The following aspects, *inter ali*a, should be considered-

.1 location of tank relative to heated surfaces;
.2 frequency of ballasting/deballasting operations;
.3 required surface condition;
.4 required surface cleanliness and dryness; and
.5 supplementary cathodic protection, if any.

3.2.3 Coating manufacturers should have products with documented satisfactory performance records and technical data sheets. The manufacturers should also be capable of rendering adequate technical assistance.

3.2.4 For products without satisfactory performance records, coating selection should be supported by appropriate data on tests carried out in accordance with recognized standards in order to verify their suitability to the service conditions (eg immersion, accelerated hot salt spray and adhesion tests).

3.2.5 Coatings for application underneath sun-heated decks or on bulkheads forming boundaries of heated cargo spaces should be able to withstand constant or repeated heating without becoming brittle.

3.2.6 Due regard should be given to the possible poor edge covering properties of hard coatings with a high solid content.

3.3 *Surface preparation*

3.3.1 Surface preparation by appropriate methods should be in accordance with the coating manufacturer's specifications and recommendations. The actual sequence of surface preparation and coating application depends on the standard selected.

3.3.2 The steel surface should be prepared so that the coating selected can achieve an even distribution at the required dry film thickness and have an adequate adhesion by removing sharp edges, grinding weld beads, and removing weld spatter and by other surface contaminants.

3.3.3 Cleaning to near white metal or equivalent may be carried out either on incoming materials (plates and profiles), immediately before the ship-primer application, or after completion of tanks before the application of the primer coating.

3.3.4 If blast cleaning techniques are to be employed after completion of tanks, the conditions under which blast cleaning is carried out should preclude condensation. In this respect, it is not recommended to carry out blasting when-

(a) the relative humidity is above 85%; or

(b) the surface temperature of steel is less than 3C above the dewpoint; or

(c) there is any possibility that the surface of the steel is wet, or there are traces of moisture, or condensation occurs before the primer coat is applied.

3.3.5 Blasting abrasives and dust should be completely removed by means of vacuum cleaning, compressed air and brushes after blasting operations have finished. The abrasive used for blasting should be dry and free from dirt, oil, grease or chlorides, and suitable for producing the standard of cleanliness and profile specified by the manufacturer.

3.4 *Checking of surface preparation*

Checks of the steel surface cleanliness and roughness profile should be carried out at the end of the surface preparation and before the application of the primer coat, in accordance with the manufacturer's specifications.

3.5 *Coating application*

3.5.1 The application of a coating should be a well-planned activity, integrated in the shipyard's construction plans, and carried out under controlled conditions in order to avoid conflicts with other yard operations.

3.5.2 Coatings, including the primer and intermediate coats, should be applied on surfaces prepared and checked according to the provisions of 3.3 and 3.4.

3.5.3 Coatings should be applied by spraying under controlled humidity and surface temperature conditions, in accordance with manufacturer's recommendations. Additional stripe coats, if required by the job specifications, should be applied by brush or roller to welds, edges and areas not easily accessible.

3.5.4 Areas where the ship-primer is damaged in any way may be touched up in accordance with the manufacturer's specifications.

3.5.5 Each coating layer should have the maximum/minimum thicknesses in accordance with the coating specification. An 80/20 practice may be adopted, which means that 80% of all thickness measurements should be greater than or equal to the nominal DFT, and none of the remaining 20% is below 80% of the DFT.

3.5.6 Care should be taken to avoid increasing the thickness in an exaggerated way. Excessive thickness could lead to dangerous consequences, such as solvent and thinner retention, film cracks, gas pockets, etc. Wet coating thickness should be checked during application.

3.5.7 Each coating layer should be adequately cured before application of the next coat, in accordance with the manufacturer's recommendations. Intermediate coats must not be contaminated with dirt, grease, dust, salt, overspray, etc. Job specifications should include the dry-to-re-coat times given by the manufacturer.

3.6 *Ventilation*

Adequate ventilation is necessary for the proper curing of coating. Ventilation should be maintained throughout the application process and for a period after application is completed, as recommended by the coating manufacturer.

3.7 *Testing of coating*

3.7.1 Destructive tests should be avoided.

3.7.2 Dry film thickness tests should be carried out after each coat, not just at the end of the coating application, by using appropriate thickness gauges.

3.8 *Inspection*

3.8.1 Inspections relevant to surface preparation and coating application should agreed upon between the shipowner and shipyard under the manufacturer's advice. Clear evidence of all the above-mentioned inspections should be reported in an agreed format. Such reports should be at the disposal of all the interested parties, including the Administration or an organization recognized by the Administration.

3.8.2 The activities that should be overseen, *inter ali*a, are-

(a) working conditions, eg illumination, access, staging, etc;
(b) environmental conditions, eg temperature and moisture;
(c) removing of sharp edges;
(d) blast cleaning/mechanical cleaning;
(e) cleaning up after blast cleaning;
(f) Shielding of painted surfaces from blasting operations;
(g) coating application equipment;
(h) curing times for individual coats in relation to temperature and humidity;
(i) thickness of each coat;
(j) use and quantity of specified thinner;

(k) continuity of coatings;
(l) storing of coating materials and abrasives;
(m) cleaning of coated surfaces before application of next coat;
(n) handling/storing/transport of coated objects; and
(o) coating repairs, when damaged.

3.8.3 Any defective areas, eg pinholes, bubbles, voids, etc, should be marked up and appropriate repairs effected. All such repairs should be rechecked for any uncoated areas.

3.9 *Safety precautions*

3.9.1 Most paints contain flammable solvents, and some contain materials which can harm the skin or damage the health if swallowed or inhaled. Precautions should be taken to reduce health risks and fire and explosion risks, in accordance with the appropriate safety regulations, to ensure that safe working conditions are achieved.

3.9.2 Health risks may include-

(a) gases or vapours, i.e. solvent evaporation during the drying period, or formed during the heating of the painted object, which may exceed the permissible exposure limits;

(b) liquids in the paint, ie solvents or binders, which may be toxic if swallowed or inhaled as spray droplets, or if in contact with the skin;

(c) fumes, powders or dust formed during heating painted objects (eg flame-cutting or welding painted steel), or present in powder formed during sanding operation, or in the spray mist.

3.9. Precautions should be taken to reduce health risks, fire and explosion risks and other safety risks, in accordance with relevant enactments of The Gambia.

4. *CATHODIC PROTECTION*

4.1 Cathodic protection by means of sacrificial anodes may be used in combination with the coating to prevent or reduce pitting corrosion starting from local defects in the coating.

4.2 The anodes should be designed in terms of size, weight and distribution to give an adequate life commensurate with the service period. The anode distribution, type, weight and dimensions should be shown in relevant documents and be available for maintenance purposes.

4.3 Once their number and size has been determined, the anodes should be distributed evenly over all the structure with some emphasis on horizontal surfaces likely to retain water. In particular, they should be installed close to the bottom plates of tanks which are seldom completely dry.

4.4 Cathodic protection is without effect when the tank is empty, and it requires some time (a day or more) to become effective after the tank has been filled.

4.5 The following aspects should be considered-

(a) size and shape of tanks and areas to be protected;

(b) extent and location of coated and uncoated surfaces;

(c) frequency of ballasting/deballasting operations, including the percentage of time the tank is filled and level of filling; and

(d) the resistivity of water, its temperature, etc.

4.6 The anode renewal should be carried out well before the old anodes are fully consumed. The renewal periods should be based on in-service experience.

5. *ALTERNATIVE METHODS*

Alternative corrosion prevention systems may be used, provided they give the same levels of corrosion prevention accomplished by means of hard coatings.

6. *MAINTENANCE*

6.1 Maintenance of the corrosion prevention system should be included in the overall ship's maintenance scheme. The effectiveness of the corrosion prevention system should be verified during the ship's life by the Administration or an organization recognized by the Administration, in accordance with the Guidelines on the Enhanced Programme of Inspections During

Surveys of Bulk Carriers and Oil Tankers (resolution A.744(18)).

6.2 The most efficient way to preserve the corrosion prevention system is to repair any defects found during the in-service inspections (eg spot rusting, local breakdown at edges of stiffeners, etc.). Re-coating of all the defective surfaces should be carried out in accordance with the manufacturer's specifications.

6.3 A type of hard coating compatible with the one used for construction should be applied. This compatibility should be checked by the owner and the manufacturer involved in re-coating operations.

6.4 Where the required conditions for the application of the original coating are not achievable, a coating more tolerant of a lower quality of surface treatment, humidity and temperature conditions may be considered, provided that it is applied and maintained in accordance with the manufacturer's specifications.

6.5 When coating is supplemented with cathodic protection, the maintenance scheme should include the replacement of the sacrificial anodes and the inspection of coating around the anode supports.

MADE THIS …….DAY OF …… 2014

……..
BALLA GARBA JAHUMPA
MINISTER OF WORKS, CONSTRUCTION AND INFRASTRUCTURE