

Chapter:	369S	MERCHANT SHIPPING (SAFETY) (CARGO SHIP CONSTRUCTION AND SURVEY) (SHIPS BUILT ON OR AFTER 1 SEPTEMBER 1984) REGULATIONS	Gazette Number	Version Date
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		Empowering section		30/06/1997
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(Cap 369 section 96)

[2 August 1991]

(Originally L.N. 287 of 1991)

Part:	I	GENERAL		30/06/1997
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(Enacted 1991)

Regulation:	1	Citation, interpretation, application and exemption	L.N. 282 of 2006	02/01/2007
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(1) These regulations may be cited as the Merchant Shipping (Safety) (Cargo Ship Construction and Survey) (Ships Built On or After 1 September 1984) Regulations.

(1A)(Omitted as spent)

(2) In these regulations-

" 'A' Class division " ('A'級隔板) means a bulkhead or part of a deck which is defined as such in the Merchant Shipping (Safety) (Fire Protection) (Ships Built On or After 1 September 1984) Regulations (Cap 369 sub. leg. Y);

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

"anniversary date" (周年日期) means the date in each year corresponding to the date of expiry of the cargo ship safety construction certificates;

"auxiliary steering gear" (輔助舵機) 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;

" 'B' Class division of BO standard " (BO標準的'B'級隔板) means a bulkhead, ceiling or lining defined as such in the Merchant Shipping (Safety) (Fire Protection) (Ships Built On or After 1 September 1984) Regulations (Cap 369 sub. leg. Y);

"bulk carrier" (散裝貨輪) means a ship which is constructed generally with single deck, top-side tanks and hopper side tanks in cargo spaces, and is intended primarily to carry dry cargo in bulk, and includes such types as ore carriers and combination carriers; (L.N. 480 of 1996)

"bulkhead deck" (艙壁甲板) means the deck up to which the majority of transverse watertight bulkheads are carried;

"cargo area" (貨物區) 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" (貨物控制站) means a space from which the loading, discharging or transferring of any cargo may be controlled;

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

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

"Certifying Authority" (核證當局) means the Director or any person authorised by the Director where appropriate;

"chemical tanker" (化學品液貨船) means a cargo ship constructed or adapted and used for the carriage in bulk of any liquid product listed in either Chapter 17 of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk adopted by the Maritime Safety Committee by Resolution

- MSC.4(48), or Chapter VI of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk adopted by the Assembly of the International Maritime Organization by Resolution A.212(VII); (L.N. 480 of 1996)
- "combination carrier" (油類/散貨兩用船) means a ship designed to carry either oil or solid cargoes in bulk; (L.N. 480 of 1996)
- "conning position" (指揮位置) means the position from which the navigation of a ship is controlled; (L.N. 107 of 2001)
- "control stations" (控制站) 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" (危險貨物) means goods defined as such in the Merchant Shipping (Safety) (Dangerous Goods) Regulations (Cap 369 sub. leg. V);
- "dead ship condition" (廢船狀態) means that condition under which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power;
- "deadweight" (載重量) 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"(緊急情況) 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" (應急電源) 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" (應急配電板) 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;
- "forward perpendicular" (首垂線) means the perpendicular defined as such in the Merchant Shipping (Safety) (Load Line) Regulations (Cap 369 sub. leg. AD);
- "freeboard deck" (乾舷甲板) means the deck defined as such in the Merchant Shipping (Safety) (Load Line) Regulations (Cap 369 sub. leg. AD);
- "gas carrier" (氣體運輸船) means a cargo ship constructed or adapted and used for the carriage in bulk of any liquefied gas or other product listed in either Chapter 19 of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk adopted by the Maritime Safety Committee by Resolution MSC.5(48) or Chapter XIX of the Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk adopted by the International Maritime Organization by Resolution A.328(IX); (L.N. 480 of 1996)
- "hazardous area" (危險範圍) 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;
- "Hong Kong ship" (香港船舶) means a ship which is registered in Hong Kong;
- "length" (長度) means the length of the ship ascertained in accordance with the requirements of the Merchant Shipping (Safety) (Load Lines) (Length of Ship) Regulations (Cap 369 sub. leg. AF);
- "lightweight" (空載重量) 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;
- "machinery alarm and control centre" (機械警報與控制中心) 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" (機械控制室) means a room from which the propelling machinery and boilers serving the needs of propulsion may be controlled;
- "machinery space" (機艙) 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" (A類機艙) 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" (主發電站) means the space in which the main source of electrical power is situated;

"main source of electrical power" (主電源) 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" (主舵機) 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" (主配電板) 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;

"maximum ahead service speed" (最大前進航度) means the greatest speed which the ship is designed to maintain at sea at her deepest seagoing draught;

"maximum astern speed" (最大後退速度) means the greatest speed which it is estimated the ship can attain at the designed maximum astern power at the deepest sea going draught;

"Merchant Shipping Notice" (商船公告) means a Notice described as such, issued by the United Kingdom Department of Transport; and includes a reference to any document amending or replacing that Notice which is approved by the Director and notified to this effect in the Gazette;

"navigable speed" (可航行速度) means the minimum speed at which the ship can be effectively steered in the ahead direction;

"noise level" (噪音聲級) means 'A' weighted sound pressure level in decibels dB(A) as defined and tabulated in the British Standards specification number BS5969:1981 or other equivalent standard acceptable to the Director;

"normal operational and habitable condition" (正常操作和適居狀況) 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" (燃油機組) 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 1.8 bar gauge;

"oil tanker" (油輪) means an oil tanker defined as such in regulation 1(2) of the Merchant Shipping (Prevention of Oil Pollution) Regulations (Cap 413 sub. leg. A); (L.N. 415 of 1995)

"passenger spaces" (客艙) means all spaces which are provided for the accommodation and use of passengers, excluding baggage, store, provision and mail rooms; (L.N. 415 of 1995)

"post 1992 ship" (1992年後建造的船舶) means a ship to which these regulations apply and having its keel laid on or being at a similar stage of construction on or after 1 February 1992; (L.N. 415 of 1995)

"post 1994 ship" (1994年後建造的船舶) means a ship to which these regulations apply and having its keel laid on or being at a similar stage of construction on or after 1 October 1994; (L.N. 415 of 1995)

"post 1995 ship" (1995年後建造的船舶) means a ship to which these regulations apply and having its keel laid on or being at a similar stage of construction on or after 1 February 1995; (L.N. 415 of 1995)

"power actuating system" (動力驅動系統) 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 rudder stock or components serving the same purpose;

"Reid vapour pressure" (雷德蒸氣壓力) means the vapour pressure of a liquid as determined by laboratory testing in a standard manner in the Reid apparatus;

"service space" (服務艙) 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" (沉澱櫃) means an oil storage tank having a heating surface of not less than 0.183 square metre per tonne of oil capacity;

"similar stage of construction" (相若建造階段) means a stage at which-

- (a) construction identifiable with a specific ship begins; and
- (b) assembly of that ship, comprising at least 50 tonnes or 1% of the estimated mass of all structural material, whichever is the less, has commenced; (L.N. 415 of 1995)

"steering gear control system" (舵機控制系統) means the equipment by which orders are transmitted from the navigating bridge to the steering gear power units. Steering gear control systems comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables;

"steering gear power unit" (舵機動力機組) means-

- (a) in the case of electric steering gear, the electric motor and its associated electrical 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;

"steering position" (操舵位置) means the position from which the ship is being steered; (L.N. 107 of 2001)

"suitable" (適合) in relation to material means approved by the Director as suitable for the purpose for which it is used;

"surveyor" (驗船師) means a surveyor appointed by a Certifying Authority, a marine surveyor of the United Kingdom Department of Transport and a Government surveyor appointed under section 5 of the Ordinance;

"tanker" (液貨船) 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" (噸) means gross tons and a reference to tons-

- (a) in relation to a ship having alternative gross tonnages under paragraph 13 of Schedule 5 of the Merchant Shipping (Registration) (Tonnage) Regulations (Cap 415 sub. leg. C) is a reference to the larger of those tonnages; and
- (b) in relation to a ship having its tonnage determined both under Part II and regulation 16 of those regulations is a reference to its gross tonnage as determined under regulation 16 of those regulations;

"upper deck" (上甲板) 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.

(23 of 1998 s. 2)

(2A) A reference to the Codes referred to in the definitions of "chemical tanker" and "gas carrier" shall be a reference to those Codes as amended from time to time by the International Maritime Organization.

(3) Subject as otherwise provided, these regulations apply to new sea-going Hong Kong cargo ships of 500 tons or over wherever they may be. (L.N. 415 of 1995)

(3A) For the purposes of subregulation (3)-

"cargo ship" (貨船) means a ship which is not a-

- (a) passenger ship;
- (b) troop ship;
- (c) trawler to which Part XII of the Merchant Shipping Ordinance (Cap 281) applies;
- (d) vessel which is for the time being used for any purpose by the Hong Kong Government or any state;
- (e) vessel authorized by virtue of a passenger and safety certificate to carry passengers within River Trade Limits;
- (f) (Repealed 43 of 1999 s. 91)
- (g) ship not propelled by mechanical means;

"new" (新) means in relation to a ship, having its keel laid on or being at a similar stage of construction on or after 1 September 1984. (L.N. 415 of 1995)

(4) The Director may grant exemptions from all or any of the provisions of these regulations (as may be specified in the exemption) for classes of cases or individual cases on such terms (if any) as he may so specify and

may, subject to giving reasonable notice, alter or cancel any such exemption.

(Enacted 1991)

Part:	IIA	CONSTRUCTION-ALL SHIPS	30/06/1997
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(Enacted 1991)

Regulation:	2	Structural strength	30/06/1997
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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. 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.

(Enacted 1991)

Regulation:	3	Peak and machinery space bulkheads and stern tubes	30/06/1997
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(1) Every ship shall be fitted with a collision bulkhead which shall be watertight up to the freeboard deck. This bulkhead shall be located at a distance from the forward perpendicular of not less than 5% of the length of the ship or 10 metres, whichever is the least, and except as may be permitted by the Director not more than 8% of the length of the ship.

(2) Where any part of the ship below the waterline extends forward of the forward perpendicular, such as a bulbous bow, the distances stipulated in subregulation (1) shall be measured from a position either-

- (a) at the mid-length of such extension; or
- (b) forward of the forward perpendicular at a distance of 1.5% of the length of the ship; or
- (c) forward of the forward perpendicular at a distance of 3 metres, whichever is the aftermost position.

(3) The collision bulkhead may have steps or recesses in it provided that they are within the limits prescribed in subregulations (1) and (2). 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. The Certifying Authority 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. All such valves shall be of steel, bronze or other ductile material; valves of ordinary cast iron or similar material shall not be fitted. Doors, manholes, ventilation ducts or any other openings shall not be fitted in the collision bulkhead.

(4) In every ship provided with a long forward superstructure the collision bulkhead shall be extended weathertight to the deck immediately above the freeboard deck. The extension shall, subject to the requirements of subregulation (5), be located within the limits prescribed in subregulations (1) and (2). The part of the deck, if any, between the collision bulkhead and its extension shall be weathertight.

(5) 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 subregulations (1) and (2). The ramp shall be weathertight.

(6) 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. All such openings shall be capable of being closed weathertight.

(7) Every post 1992 ship shall be fitted with bulkheads separating the machinery spaces from cargo spaces and passenger spaces forward and aft. The bulkheads shall be watertight up to the freeboard deck. (L.N. 415 of 1995)

(8) For every post 1992 ship, stern tubes shall be enclosed in a watertight space of moderate volume. The Certifying Authority may take other measures to minimize the danger of water penetrating into the ship in case of damage to stern tube arrangements. (L.N. 415 of 1995)

(Enacted 1991)

Regulation:	3A	Double bottoms	30/06/1997
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(1) This regulation applies to post 1992 ships.

(2) In every ship other than tankers, a double bottom shall be fitted extending from the collision bulkhead to the

afterpeak bulkhead, provided that the Certifying Authority may permit a double bottom to be dispensed with in compartments where its fitting would not be compatible with the design and proper working of the ship.

(3) Where a double bottom is required by this regulation to be fitted in a ship, its depth shall be to the satisfaction of the Certifying Authority and the inner bottom shall be continued out to the ship's sides in such a manner as to protect the bottom to the turn of the bilge.

(4) Wells constructed in the double bottom for the purpose of drainage shall not be larger nor extend in depth more than is necessary for such purpose except that a well extending to the outer bottom may be constructed at the after end of the shaft tunnel of the ship.

(5) Wells for purposes other than drainage shall not be constructed in the double bottom. The Certifying Authority may exempt any ship from the requirement of this subregulation in respect of any well which it is satisfied will not diminish the protection given by the double bottom.

(6) Nothing in this regulation shall require a double bottom to be fitted in way of watertight compartments used exclusively for the carriage of liquids, if in the opinion of the Certifying Authority the safety of the ship will not be impaired in the event of bottom damage by reason of the absence of a double bottom in that position.

(L.N. 415 of 1995)

Regulation:	4	Construction and testing of watertight bulkheads, decks and inner bottoms	30/06/1997
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(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, with a proper margin of resistance, the pressure due to the maximum head of water which it might have to sustain in the event of damage to the ship. The head of water shall be at least that due to a head of water up to the freeboard deck.

(2) Steps and recesses in the bulkheads shall be watertight and of 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 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 subregulation (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. In no case shall the test head be less than 0.9 metre 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.

(Enacted 1991)

Regulation:	5	Construction and testing of watertight decks, trunks, tunnels, duct keels and ventilators	30/06/1997
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(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. The means used for making them watertight and the arrangements adopted for closing openings in them shall be to the satisfaction of the Certifying Authority. Watertight ventilators and trunks shall be watertight at least up to the freeboard deck.

(2) Watertight decks shall be subjected to a hose or flooding test after completion. Watertight trunks, tunnels and ventilators shall be subjected to a hose test on completion.

(Enacted 1991)

Regulation:	6	Watertight doors	30/06/1997
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(1) In every ship in which a watertight door is provided to maintain the watertight integrity of a bulkhead or deck, every such watertight door shall be made of suitable material and shall be efficiently constructed for its intended duty.

- (2) (a) 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.
- (b) 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.
- (3) 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.
- (4) Means shall be provided at remote operating positions to indicate when a sliding door is closed.
- (5) Watertight doors shall be capable of being operated when the ship is listed up to 15 degrees either way.
- (Enacted 1991)

Regulation:	7	Tests of watertight doors	30/06/1997
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Each watertight door in every ship shall be tested by water pressure equivalent to the head up to the freeboard deck.

(Enacted 1991)

Regulation:	8	Ballast and bilge pumping and drainage arrangements	30/06/1997
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(1) Every ship shall be provided with efficient bilge pumping plant and means for drainage 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. Wing suctions shall be provided where necessary for this purpose. Efficient means shall be provided whereby water may easily flow to the suction pipes : provided that the Certifying Authority 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.

(2) 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.

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

(4) 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.

(5) 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.

(6) Provision shall be made for the drainage of enclosed cargo spaces situated on the bulkhead deck of any ship; provided that the Certifying Authority may permit the means of drainage to be dispensed with in any particular compartments of any ship, if it is satisfied that, by reasons of the size or internal subdivision of those spaces, the safety of the ship is not thereby impaired. Where the freeboard to the bulkhead deck 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 4 of the Merchant Shipping (Safety) (Load Line) Regulations (Cap 369 sub. leg. AD). 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.

(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 Director considers their provision necessary taking into consideration the quantity and characteristics of the liquids and their location.

(Enacted 1991)

Part:	IIB	CONSTRUCTION-SOME TANKERS	30/06/1997
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(Enacted 1991)

Regulation:	9	General	30/06/1997
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(1) This Part applies to tankers designed to carry-

- (a) crude oil and petroleum products which have a closed flash-point not exceeding 60 degrees Celsius and the Reid vapour pressure of which is below that of atmospheric pressure, or
- (b) 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 1.

(2) 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 A60 standard under regulation 133 of the Merchant Shipping (Safety) (Fire Protection) (Ships Built On or After 1 September 1984) Regulations (Cap 369 sub. leg. Y) shall be constructed only of steel.

(Enacted 1991)

Regulation:	10	Location of spaces	30/06/1997
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(1) Machinery spaces shall be positioned aft of cargo tanks and slop tanks except as otherwise permitted by subregulation (2) and shall be separated from them by a cofferdam, cargo pump room, oil fuel bunker tank or permanent ballast tank and shall be positioned 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; provided that, in the case of a ship not exceeding 25000 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. 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 provided that the fire protection arrangements of those pump rooms are in accordance with regulations 130 and 132 of the Merchant Shipping (Safety) (Fire Protection) (Ships Built On or After 1 September 1984) Regulations (Cap 369 sub. leg. Y) and the fire extinguishing arrangements of those pump rooms are in accordance with regulation 51 of those regulations.

(2) 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 subregulation (1) for machinery spaces positioned aft of such tanks.

(3) Except as otherwise permitted by subregulations (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 subregulation (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 no less than 600 millimetres.

(7) 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. 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. 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.

(8) 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. The isolating arrangements shall be either a valve and a spectacle flange or a spool piece and blank flanges.

(9) 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.

(10) 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 ships' officer.

(11) 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 Certifying Authority may permit the installation of such pipes in ducts which shall be capable of being adequately cleaned and ventilated.

(Enacted 1991)

Regulation:	10A	Access to spaces in the cargo area of oil tanker		30/06/1997
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(1) This regulation applies to oil tankers which are post 1994 ships.

(2) Access to cofferdams, ballast tanks, cargo tanks and other spaces in the cargo area shall be direct from the open deck and such as to ensure their complete inspection. Access to double bottom spaces may be through a cargo pump room, pump room, deep cofferdam, pipe tunnel or similar compartments, subject to consideration of ventilation aspects.

(3) For access through horizontal openings, hatches or manholes, the dimensions shall be sufficient to allow a person wearing a self-contained, air-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. The minimum clear opening should be not less than 600 millimetres by 600 millimetres.

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

(5) For oil tankers of less than 5000 tonnes deadweight, the Certifying Authority may approve smaller access openings in special circumstances if the ability to traverse such openings or to remove an injured person can be proved to its satisfaction.

(L.N. 415 of 1995)

Regulation:	11	Precaution against oil spills		30/06/1997
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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.

(Enacted 1991)

Regulation:	12	Cargo tank ventilation		30/06/1997
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(1) The cargo tank venting systems shall be independent of the ventilation arrangements for any other compartments. 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 minimize 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-

(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.

(3) Every vent system outlet to atmosphere from a valve required by subregulation (2)(b) 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.

(4) By-pass arrangements for the pressure-vacuum valves required by subregulation (2)(b) 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.

(5) Every vent system outlet to atmosphere provided in accordance with subregulation (2)(c) shall-

- (a) 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,
- (b) be so arranged that the vapour mixture is discharged vertically upwards,
- (c) 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. If a fore and aft gangway is provided the outlets from the tanks shall be located at least 6 metres above the gangway if any outlet is less than 4 metres, measured horizontally, from the gangway or is less than 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,
- (d) 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 1 of these regulations, and
- (e) be so arranged as to prevent the design pressure of any cargo tank being exceeded. For the purposes of this regulation 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 at least 1.25.

(6) 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 regulations 49, 55 or 58 of the Merchant Shipping (Safety) (Fire Protection) (Ships Built On or After 1 September 1984) Regulations (Cap 369 sub. leg. Y). Where the arrangements are combined with other cargo tanks, stop valves or other effective means of isolating each cargo tank shall be provided. Stop valves shall be provided with locking arrangements to permit control of their operation. Any cargo tank isolation arrangement provided in accordance with this subregulation shall not prevent the flow of vapour, air or inert gas caused by thermal variations within the tank.

(7) 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 1. The devices for cargo tanks in which the atmosphere is flammable shall be flame arresters 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 regulations 49, 55 or 58 of the Merchant Shipping (Safety) (Fire Protection) (Ships Built On or After 1 September 1984) Regulations (Cap 369 sub. leg. Y) may be flame screens.

(8) The vents shall be connected to the top of each cargo tank and be self-draining to the cargo tanks when the ship is upright, trimmed up to 10 degrees by the stern and when inclined at any angle of list up to and including 15 degrees either way. Other permanently installed drainage arrangements may be permitted where it is not possible to provide self-draining vent lines.

(9) 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.

(10) 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.

(11) 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.

(Enacted 1991)

Regulation:	13	Ventilation of pump rooms and other enclosed spaces		30/06/1997
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(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. The ventilation of these rooms shall have sufficient capacity to minimize the possibility of accumulation of flammable vapours. The number of changes of air shall be at least 20 per hour, based upon the gross volume of the space. The air ducts shall be arranged so that all of the space is effectively ventilated. The ventilation system shall be of the exhaust type.

(2) Ventilation inlets and outlets and other deckhouse and superstructure boundary space openings shall be located clear of the cargo pump room openings. 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.

(3) The cargo spaces and their adjacent enclosed spaces in combination carriers shall be capable of being ventilated by permanently installed or portable fans. A fixed gas detection system shall be provided in cargo pump rooms, pipe ducts and the cofferdams adjacent to slop tanks. 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.

(Enacted 1991)

Regulation:	13A	Seawater ballast tank corrosion prevention system	L.N. 107 of 2001	13/07/2001
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(1) This regulation applies to oil tankers and bulk carriers constructed on or after 1 July 1998.

(2) All dedicated seawater ballast tanks shall have an efficient corrosion prevention system, such as hard protective coatings or equivalent. The coatings should preferably be of a light colour. The scheme for the selection, application and maintenance of the system shall be approved by the Director, based on the guidelines adopted by the International Maritime Organization. Where appropriate, sacrificial anodes shall also be used.

(L.N. 107 of 2001)

Part:	III	MACHINERY INSTALLATION		30/06/1997
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(Enacted 1991)

Regulation:	14	General		30/06/1997
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Section I

(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. 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.

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

(3) 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 Certifying Authority may for the purposes of this subregulation, if it is safe so to do, permit a partial reduction in propulsion capability from normal operation.

(4) The main and auxiliary machinery essential for the propulsion and safety of the ship shall be provided with effective means of control and the machinery shall be capable of being brought into operation when initially no power is available in the ship.

(5) 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 Certifying Authority may permit a single means of limiting the speed of machinery where it considers it safe so to do.

(6) 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.

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

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

(Enacted 1991)

Regulation:	15	Machinery	30/06/1997
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(1) In every ship to which these regulations apply the propulsion machinery systems shall be designed, constructed and installed so that undue stress due to vibration is not induced during normal operation.

(2) 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 to 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.

(3) 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. 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.

(4) 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. The Certifying Authority may permit arrangements that over-ride the automatic shut-off devices.

(Enacted 1991)

Regulation:	16	Means of manoeuvring and going astern	30/06/1997
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(1) Every ship shall have sufficient power for going astern to secure proper control of the ship in all normal circumstances. 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.

(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 including the records required by subregulations (1), (2) and (3) shall be available on the ship.

(Enacted 1991)

Regulation:	17	Boilers and other pressure vessels	30/06/1997
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(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) Means shall be provided which will 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. The Director 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 he is satisfied that adequate protection against overpressure is provided.

(3) 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.

(4) 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.

(5) Every water tube boiler serving turbine machinery shall be fitted with a higher water level alarm.

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

(Enacted 1991)

Regulation:	18	Boiler feed systems	30/06/1997
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(1) Every boiler which provides services essential for the safety of the ship and which could 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. Means shall be provided which will prevent overpressure in any part of the systems.

(2) If 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.

(3) 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. 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. The feed pipes shall be adequately supported.

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

(Enacted 1991)

Regulation:	19	Steam pipe systems	30/06/1997
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(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 the foregoing, 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 subregulation (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 which will 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 so as 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) If a steam pipe may receive steam from 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.

(Enacted 1991)

Regulation:	20	Air pressure systems	30/06/1997
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(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) (a) The parts of every such compressed air system which are 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, and every air pressure pipe or fitting in such 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.

(b) Means shall be provided to prevent overpressure in any part of any 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.

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

(d) 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.

(Enacted 1991)

Regulation:	21	Cooling water systems	30/06/1997
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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.

(Enacted 1991)

Regulation:	22	Oil and gaseous fuel installations	30/06/1997
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(1) In every ship oil fuel provided for use in boilers or machinery shall have a flash point of not less than 60 °C (closed cup test): provided that the Director may, subject to such conditions as he may impose-

(a) permit any ship to use oil fuel having a flash point of not less than 55 °C in boilers, or oil fuel having a flash point of not less than 43 °C 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 °C below the flash point of the fuel oil,

(b) permit the use of fuel oil with a flash point of less than 43 °C provided that it is not stored in any machinery space,

(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.

Nothing in this subregulation shall apply to fuel provided for use in a generator provided in accordance with regulation 45(4).

(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. The arrangements shall comply at least with the following provisions-

- (a) oil fuel systems containing heated fuel oil at a pressure exceeding 1.8 bar gauge 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 Certifying Authority may permit other arrangements;
- (b) 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 flash point of less than 60 °C. Where it is impracticable to meet the requirements of this subparagraph, the Director may permit other arrangements;
- (c) 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;
- (d) oil fuel tanks shall not be situated directly above boilers or other heated surfaces;
- (e) oil fuel shall not be carried in forepeak tanks;
- (f) 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;
- (g) 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;
- (h) 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;
- (i) in the case of ships other than post 1992 ships:
 - (i) 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;
 - (ii) in the case of post 1992 ships: 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. As a general rule, sounding pipes shall not terminate in machinery spaces. However, where the Certifying Authority considers that these latter requirements are impracticable, it may permit termination of sounding pipes in machinery spaces on condition that all the following requirements are met-
 - (A) in addition, an oil-level gauge is provided such that its failure or over-filling of the tank shall not permit release of fuel oil into the space. The use of cylindrical gauge glasses is prohibited. The Certifying Authority may permit the use of oil-level gauges with flat glasses and self-closing valves between the gauges and fuel tanks;
 - (B) 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; and

- (C) the termination 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. Provisions shall be made so as to ensure that any spillage of oil through the control cock involves no ignition hazard. Other means of ascertaining the amount of fuel oil may be permitted in place of sounding pipes provided it complies with sub-subparagraph (A). The oil-level gauges so provided shall be maintained in the proper condition to ensure their continued accurate functioning in service; (L.N. 415 of 1995)
- (j) 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;
- (k) every oil fuel pipe shall be made of steel or other suitable material except that flexible pipes may be permitted in positions where the Certifying Authority is satisfied that they are necessary; such flexible pipes and their attachments shall be constructed to the satisfaction of the Certifying Authority;
- (l) 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 utilisation 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;
- (m) 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.

(Enacted 1991)

Regulation:	23	Lubricating and other oil systems	30/06/1997
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(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) The arrangements for the storage, distribution and utilisation of lubricating oil in machinery spaces of Category A shall comply with the requirements of paragraphs (a), (d), (g), (h), (i), (j) and (k) of regulation 22(2) 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. Alternative arrangements may be permitted in machinery spaces other than machinery spaces of Category A where the Certifying Authority is satisfied that the safety of the ship is not impaired.

(3) The arrangements for the storage, distribution and utilisation 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 paragraphs (d), (g), (i), (j) and (k) of regulation 22(2) 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.

(4) Lubricating oil and other flammable oils shall not be carried in fore peak tanks.

(Enacted 1991)

Regulation:	24	Machinery controls	30/06/1997
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(1) In every ship effective means for the operation and control of main and auxiliary machinery essential for the propulsion and safety of the ship shall be provided.

(2) In every ship provided with remote control of the propulsion machinery from the navigating bridge the following provisions shall apply-

- (a) 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,
- (b) the remote control shall be performed, for each independent propeller, by a control device so designed and constructed that its operation does not require particular attention to the operational details of the machinery. Where multiple propellers are designed to operate simultaneously, they may be controlled by one control device,
- (c) propulsion machinery movements selected at the navigating bridge shall be indicated in the main machinery control room or at the manoeuvring platform as appropriate,

- (d) 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 by this regulation,
- (e) 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,
- (f) means shall be provided to control the propulsion machinery locally in the event of failure of the remote control system,
- (g) 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 Certifying Authority may waive this requirement where other essential features of the system design render compliance impracticable, subject to such alternative provisions as it may require,
- (h) indication shall be given on the navigating bridge of-
 - (i) propeller speed and direction of rotation in the case of fixed pitch propellers,
 - (ii) propeller speed and pitch position in the case of controllable pitch propellers,
- (i) 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,
- (j) 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.

(3) 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. In particular, the arrangements and controls shall be designed, equipped and installed in accordance with regulations 33, 37, 40 and 41, where appropriate.

(4) 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.

(Enacted 1991)

Regulation:	25	Steering Gear		30/06/1997
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(1) Every ship shall be provided with an efficient main steering gear and, subject to subregulation (7), an efficient auxiliary steering gear. 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.

- (2) (a) 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.
- (b) 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 Certifying Authority considers it appropriate.
- (c) 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.

(3) Steering gears other than of the hydraulic type shall achieve equivalent standards to those required by this regulation.

(4) The main steering gear and rudder stock shall-

- (a) be of adequate strength and sufficient to steer the ship at maximum ahead service speed,

- (b) 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,
 - (c) be operated by power if necessary to meet the requirements of paragraph (b) 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, and
 - (d) be designed so that they will not be damaged at maximum astern speed.
- (5) The auxiliary steering gear shall-
- (a) be of adequate strength and capable of being brought speedily into action in an emergency,
 - (b) 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 seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater, and
 - (c) be operated by power if necessary to meet the requirements of paragraph (b) 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.
- (6) Main and auxiliary steering gear power units shall-
- (a) be arranged to re-start automatically when power is restored after a power failure,
 - (b) be capable of being brought into operation from a position on the navigating bridge, and
 - (c) 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.
- (7) An auxiliary steering gear need not be fitted if-
- (a) two or more identical steering gear power units are fitted which when operating simultaneously are capable of operating the rudder in accordance with the requirements of subregulation (4)(b), and
 - (b) 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 paragraph may be permitted by the Certifying Authority on ships the keel of which was laid before 1 September 1986.
- (8) (a) 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 subregulation (7). A single hydraulic telemotor control system may be permitted by the Certifying Authority on any ship other than a tanker, chemical tanker or gas carrier of 10000 tons or over. The steering wheel or steering lever need not be duplicated.
- (b) 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.
- (9) Every main and auxiliary steering gear control system shall-
- (a) if 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,
 - (b) be provided in the steering gear compartment with means for disconnecting the control system from the steering gear it serves,
 - (c) be capable of being brought into operation from a position on the navigating bridge,
 - (d) 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
 - (e) be provided only with short circuit protection for the electric supply circuits.
- (10) The electric power circuits and the steering gear control system with the associated components, cables and pipes required by this regulation and regulation 26 shall be separated as far as is practicable throughout their length.
- (11) A means of communication shall be provided between the navigating bridge and the steering gear compartment.
- (12) 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.

- (13) Hydraulic power operated steering gear shall be provided with-
- (a) arrangements to maintain the cleanliness of the hydraulic fluid taking into consideration the type and design of the hydraulic system,
 - (b) 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
 - (c) 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.

(14) 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.

(15) 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.

(16) 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 subregulation (5)(b) and 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 10000 tons or over and at least 10 minutes of continuous operation in any other ship.

(17) In every tanker of 10000 tons or over and every other ship of 70000 tons or over the main steering gear shall have two or more identical power units complying with the requirements of subregulation (7)(a).

(18) The main steering gear in every tanker of 10000 tons or over shall, subject to the requirements of subregulations (19) and (20), 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-

- (a) 2 independent and separate power actuating systems each capable of meeting the requirements of subregulation (4)(b), or
- (b) at least 2 identical power actuating systems which shall be capable of meeting the requirements of subregulation (4)(b) 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.

(19) In any tanker of 10000 tons or over but of less than 100000 tonnes deadweight the main steering gear may be constructed in such a way that the single failure criterion required by subregulation (18) is not applied to the rudder actuator or actuators provided that -

- (a) 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
- (b) the design, construction and testing of the rudder actuator is in accordance with the requirements of Schedule 2 if only one actuator is provided.

(Enacted 1991)

Regulation:	26	Electric and electro-hydraulic steering gear	30/06/1997
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(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 Certifying Authority may approve and on the navigating bridge.

(2) Every such steering gear shall, subject to subregulation (3)-

- (a) be served by at least 2 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
- (b) be provided with short circuit protection and an overload alarm for the protection of the circuits and motors; 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 paragraph 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.

(3) 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 Certifying Authority may permit arrangements for such motors other than those required by subregulation (2)(b) and regulation 25(6)(a) and (b) if it considers it safe so to do.

(Enacted 1991)

Regulation:	27	Ventilating systems in machinery spaces		30/06/1997
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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. 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.

(Enacted 1991)

Regulation:	28	Protection against noise		30/06/1997
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(1) In every ship, measures shall be taken to reduce noise levels in machinery spaces as far as is reasonable and practical. On completion of a ship noise levels in machinery spaces shall be measured in accordance with Schedule 3 and a record of the measurements taken shall be retained on the ship.

(2) Noise levels in machinery spaces shall not exceed 110 dB(A) provided that the Director 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.

(3) 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.

(4) Every entrance to a machinery space in which the noise level exceeds 85 dB(A) shall be provided with a warning notice comprising a symbol complying with British Standards Institution specification number BS 5378:1980 or other equivalent standard acceptable to the Director and a supplementary sign stating 'High Noise Levels. Use Ear Protectors'. Sufficient ear protectors shall be provided for use in such spaces.

(Enacted 1991)

Regulation:	29	Communication between navigating bridge and machinery space		30/06/1997
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(1) Every ship, other than a post 1994 ship, shall be provided with two independent 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. One of the means shall be an engine room telegraph. Means of communication shall also be provided to any other position from which the main engines may be controlled.

(2) Every post 1994 ship shall be provided with at least two independent means for communicating orders from the navigating bridge to the position in the machinery space or in the control room from which the speed and direction of thrust of the propellers are normally controlled: one of the means shall be an engine room telegraph which provides

visual indication of the orders and responses both in the machinery spaces and on the navigating bridge. 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.

(L.N. 415 of 1995)
(Enacted 1991)

Regulation:	30	Engineers' alarm	30/06/1997
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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.

(Enacted 1991)

Regulation:	31	Spare gear	30/06/1997
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Every ship shall be provided with sufficient spare gear having regard to the intended service of the ship.

(Enacted 1991)

Regulation:	32	Periodically unattended machinery spaces	30/06/1997
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Section II

This Section applies only to ships with machinery spaces containing machinery used or essential for propulsion, which are intended to be periodically unattended under any sailing condition, including manoeuvring.

(Enacted 1991)

Regulation:	33	General	30/06/1997
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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.

(Enacted 1991)

Regulation:	34	Operation and documentation	30/06/1997
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In every ship, the Certifying Authority 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 Certifying Authority 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.

(Enacted 1991)

Regulation:	35	Alarms systems	30/06/1997
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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-

- (a) 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;
- (b) 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 Certifying Authority may permit equivalent alternative arrangements;
- (c) 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;

- (d) as far as practicable be designed to indicate an alarm condition should a failure of the alarm and monitoring system occur;
- (e) 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;
- (f) 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
- (g) 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.

(Enacted 1991)

Regulation:	36	Safety system	30/06/1997
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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.

(Enacted 1991)

Regulation:	37	Communication	30/06/1997
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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.

(Enacted 1991)

Regulation:	38	Control of propulsion machinery	30/06/1997
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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-

- (a) 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,
- (b) propulsion machinery movements selected at the navigating bridge shall be indicated at the machinery alarm and control centre,
- (c) 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.

(Enacted 1991)

Regulation:	39	Machinery, boilers and electrical installations	30/06/1997
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(1) An automatic control system, and an alarm system shall be provided to the satisfaction of the Certifying Authority 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.

(2) 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. 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 stand-by 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.

(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.

(Enacted 1991)

Regulation:	40	Fire safety	30/06/1997
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(1) In every ship every fuel oil and lubricating oil pressure pipe provided 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.

(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 flash point of the oil fuel therein can be exceeded.

(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.

(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.

(5) All air supply casings and uptakes of boilers and scavenge air belts or 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 Certifying Authority waives the requirement for such provisions.

(Enacted 1991)

Regulation:	41	Protection against flooding	30/06/1997
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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 Certifying Authority.

(Enacted 1991)

Part:	IV	ELECTRICAL INSTALLATIONS	30/06/1997
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(Enacted 1991)

Regulation:	42	General	30/06/1997
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(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. The electrical equipment and installations shall comply with the requirements specified in Merchant Shipping Notice No. M 1133.

(Enacted 1991)

Regulation:	43	Main source of electrical power and main switchboard	30/06/1997
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(1) A main source of electrical power shall be provided in every ship of sufficient capacity to supply all the services required by regulation 42(1)(a) and (b). This main source of electrical power shall consist of at least two generating sets. 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.

(2) The arrangement of the generating sets required by subregulation (1) 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. The emergency source of electrical power may be used for this purpose if it is capable of simultaneously supplying the emergency supplies required by regulation 47 or it is capable of supplying such services when combined with any other source of electrical power.

(3) Load shedding or other equivalent arrangements shall be provided to protect the generators required by subregulation (1) against sustained overload.

(4) 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.

(5) The main switchboard shall be located in the same space as the main generating sets in any ship with only one generating station. Where there is more than one generating station and only one main switchboard, that switchboard shall be located in the same space as one of the generating stations. The Certifying Authority 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. For the purposes of this paragraph 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.

(6) The main busbars shall be subdivided in every ship in which the total installed electrical power of the main generating sets exceeds 3 megawatts. 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. The Certifying Authority may permit other arrangements which provide equivalent system redundancy.

(Enacted 1991)

Regulation:	44	Lighting Systems	30/06/1997
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(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 subregulation (1).

(3) Lighting fittings shall be arranged to prevent rises in temperature which would be injurious to the fitting or the electric wiring or which would result in a risk of fire.

(Enacted 1991)

Regulation:	45	Emergency and transitional source of electrical power and emergency switchboards	30/06/1997
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(1) 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.

(2) The emergency source of electric power, the associated transforming equipment, any transitional source of emergency power required by subregulation (4)(b), the emergency switchboard and the emergency lighting switchboard shall be-

- (a) located above the uppermost continuous deck,
 - (b) readily accessible from the open deck,
 - (c) located aft of the collision bulkhead,
 - (d) 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
 - (e) 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.
- (3) The emergency source of electrical power shall be a generating set complying with the requirements of subregulation (4) or an accumulator battery complying with the requirements of subregulation (6).
- (4) Where the emergency source of electrical power is a generator it shall-
- (a) be driven by internal combustion machinery with an independent fuel supply having a flash point of not less than 43°C (Closed Cup Test), and
 - (b) 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 subregulation (7); 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 subregulation (7)(c) and (d) 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.
- (5) 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.
- (6) Where the emergency source of electrical power is an accumulator battery it shall be-
- (a) capable of supplying the emergency electrical load without being recharged, whilst maintaining the voltage of the battery throughout the required discharge period within 12% of its nominal voltage,
 - (b) automatically connected to the emergency switchboard in the event of the failure of the main source of electrical power,
 - (c) capable of immediately supplying the services specified in subregulation (7)(c) and (d).
- (7) The transitional source of emergency electrical power shall-
- (a) 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% of its nominal voltage,
 - (b) be arranged to supply automatically the services required by paragraphs (c) and (d) for at least half an hour in the event of the failure of either the main or emergency source of electrical power,
 - (c) supply the lighting required by regulation 47(1)(a), (b) and (d)(i) 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
 - (d) supply the services required by regulation 47(1)(c)(i), (ii) and (iii) unless a suitably located independent accumulator battery is provided capable of supplying such services for the period of time required by the aforesaid regulation.
- (8) 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 regulation 47(1)(c) shall be indicated at the appropriate control station.
- (9) The emergency switchboard shall be situated as near as practicable to the emergency source of electrical power. 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. For the purposes of this subregulation an environmental enclosure within the main boundaries of the space does not provide separation between the emergency generator and the emergency switchboard. Any accumulator battery required by this regulation shall not be installed in the same space as the emergency generator.
- (10) The emergency switchboard shall be supplied during normal operation from the main switchboard by an interconnector feeder which shall be-
- (a) adequately protected at the main switchboard against overload and short circuit;

- (b) disconnected automatically at the emergency switchboard upon the failure of the main source of electrical power, and
- (c) 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.

(11) 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.

(12) Means shall be provided for testing the complete emergency system periodically including any automatic starting arrangements provided.

(Enacted 1991)

Regulation:	46	Starting arrangements for emergency generating sets		30/06/1997
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(1) Emergency generating sets shall be capable of being readily started at a temperature of 0°C. If temperatures below 0°C are anticipated provision shall be made for heating the engine so that it will start readily.

(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.

- (3) The stored energy required for starting shall be maintained at all times-
 - (a) in electrical and electro-hydraulic systems, from the emergency switchboard, and
 - (b) 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.
- (4) Any emergency generating set arranged to be automatically started shall-
 - (a) be equipped with a starting system having sufficient stored energy for 6 consecutive starts, and
 - (b) be provided with an additional source of stored energy independent of the starting system required by paragraph (a) capable of producing a further six starts within 30 minutes unless an alternative and independent starting system is provided or effective manual starting can be demonstrated.
- (5) Any emergency generator that is not arranged for automatic starting shall either-
 - (a) be provided with starting arrangements in accordance with the requirements of subregulation (4) except that the starting may be initiated manually, or
 - (b) be started manually by cranking, inertia starters or manually charged hydraulic accumulators provided that at least six starts can be accomplished within 30 minutes.

(Enacted 1991)

Regulation:	47	Emergency supplies	L.N. 223 of 2001	26/10/2001
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(1) The emergency source of electric power required by regulation 45(1) shall be capable of simultaneously supplying the following services, including any starting currents, for the periods specified-

- (a) for a period of 3 hours, emergency lighting required to be provided at the muster and embarkation stations and alleyways, stairways and exits giving access to the muster and embarkation stations, and at each survival craft, its launching appliance, and the area of water into which the survival craft is to be launched; (L.N. 154 of 2001)
- (b) for a period of 18 hours, emergency lighting-
 - (i) in all service and accommodation alleyways, stairways, exits, lifts and lift shafts,
 - (ii) in machinery spaces and main generating stations including the control positions,
 - (iii) in control stations, machinery control rooms and at each main and emergency switchboard,
 - (iv) at the stowage positions for firemen's outfits,
 - (v) at the steering gear, and
 - (vi) at the fire pump, sprinkler pump and emergency bilge pump and at their starting positions;
- (c) for a period of 18 hours, unless they have an equivalent independent supply from a suitably located accumulator battery-
 - (i) the general alarm,
 - (ii) the fire detection and fire alarm system,
 - (iii) the daylight signalling lamps, ship's whistle and manually operated call points, intermittently, and

- (iv) the navigational equipment, required by regulation 3 of the Merchant Shipping (Safety) (Navigational Equipment) Regulations (Cap 369 sub. leg. AJ) on ships of 5000 tons or more;
- (d) for a period of 18 hours-
 - (i) the navigation lights and other lights required by the Merchant Shipping (Safety) (Signals of Distress and Prevention of Collisions) Regulations (Cap 369 sub. leg. N), (L.N. 129 of 1992)
 - (ii) any fire pumps provided in compliance with regulation 29, 40, 41 or 44 of the Merchant Shipping (Safety) (Fire Protection) (Ships Built On or After 1 September 1984) Regulations (Cap 369 sub. leg. Y) that depend upon the emergency generator for their source of power, and (L.N. 129 of 1992)
 - (iii) in the case of post 1995 ships, the VHF radio installations required by section 7(1)(a) and (b) of the Merchant Shipping (Safety) (GMDSS Radio Installations) Regulation (Cap 369 sub. leg. AR) and where appropriate- (L.N. 415 of 1995)
 - (A) the radio installations required by sections 9(1)(a) and (b) and 10(1)(b) and (c);
 - (B) the ship earth station required by section 10(1)(a); and
 - (C) the radio installations and equipment required by sections 10(2)(a) and (b) and 11(1), of that Regulation; (L.N. 129 of 1992)
 - (e) for the time required by regulation 25(16), the steering gear.

(2) The Director may permit a reduction of the periods of time specified in subregulation (1)(b), (c) and (d) to not less than 12 hours in any ship plying regularly on voyages of short duration.

(Enacted 1991)

Regulation:	48	Location and construction of cables		30/06/1997
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(1) All electric cables external to equipment shall be flame retardant and shall be installed so that their flame retarding or equivalent properties are not impaired. The Certifying Authority 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.

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

(3) 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 fire risk areas except insofar as it is necessary to provide emergency services in such areas. Cables connecting fire pumps to the emergency switchboard shall be of a fire resistant type where they pass through high fire risk areas.

(4) 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.

(5) 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.

(Enacted 1991)

Regulation:	49	General precautions against shock, fire and other hazards	L.N. 107 of 2001	13/07/2001
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(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-

- (a) 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; or (L.N. 107 of 2001)
- (b) supplied at a voltage not exceeding 250 volts RMS, a.c. by safety isolating transformers supplying only one consuming device; or
- (c) of double insulation construction.

(2) All electrical apparatus shall be constructed and installed so that it will not cause injury when handled or touched in the normal manner. When electric lamps, welding equipment, tools or other apparatus are used in confined

or damp spaces or spaces with 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. Such spaces shall at least include open decks and machinery spaces.

(3) Every main and emergency switchboard shall be so arranged as to give easy access as may be necessary for operation and sufficient access for maintenance without danger to any person. 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. 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. (L.N. 107 of 2001)

(4) Subject to subregulations (4A) and (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 and over. (L.N. 415 of 1995)

(4A) In the case of a post 1994 ship, the requirement of subregulation (4) does not preclude the use of limited and locally earthed systems, provided that any possible resulting current does not flow directly through any hazardous areas. (L.N. 415 of 1995)

(5) The requirements of subregulations (4) and (6) do not preclude the use of-

- (a) impressed current cathodic protection system,
- (b) limited and locally earthed systems, and
- (c) insulation monitoring devices with a maximum circulation current of 30 milli-amperes.

(6) The final sub-circuits of any hull return system of distribution shall be two wire.

(7) (a) Except in the case of a post 1994 ship, 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.

(b) Post 1994 ships shall comply with the following requirements-

- (i) except as permitted by subparagraph (ii), earthed distribution shall not be used in a tanker;
- (ii) the requirement of subparagraph (i) does not preclude the use of earthed intrinsically safe circuits and, in addition, the use of the following earthed systems under conditions approved by the Certifying Authority-
 - (A) 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 amperes in both normal and fault conditions; or
 - (B) limited and locally earthed systems, provided that any possible resulting current does not flow directly through any hazardous areas; or
 - (C) alternating current power networks of 1000 volts root mean square (line to line) and over, provided that any possible resulting current does not flow directly through any hazardous areas. (L.N. 415 of 1995)

(8) The insulation of any distribution system that is not earthed shall be continuously monitored by a system capable of giving audible and visual indication of abnormally low insulation values.

(9) Every separate electrical circuit shall be protected against short circuit.

(10) 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 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.

(11) 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.

(12) 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 regulation 50(1), 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.

(13) 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.

(Enacted 1991)

Regulation:	50	Electrical equipment in hazardous areas and spaces	30/06/1997
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(1) Electrical equipment shall not be installed in any hazardous area unless the Certifying Authority is satisfied that such equipment is-

- (a) essential for operational or safety purposes,
- (b) of a type that is certified for use in the flammable dusts, gases or vapours to which it may be subjected, and
- (c) appropriate to the space concerned.

(2) Cables passing through any hazardous areas or serving electrical equipment in such areas shall-

- (a) be appropriate for use in the dusts, gases or vapours to which they may be subjected, and (L.N. 415 of 1995)
- (b) 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) (a) The electrical equipment in enclosed cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their propulsion and in any ventilation trunk for such spaces shall be of a type that is certified for use in explosive petrol and air mixtures.

- (b) 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.

(5) Electrical equipment and cables shall not be installed in enclosed cargo spaces or open vehicle deck spaces intended for the carriage of packaged dangerous goods, other than those of Classes 4.1, 4.2, 4.3, 5.1, 5.2 and 7, as detailed in regulation 7(2) of the Merchant Shipping (Safety) (Dangerous Goods) Regulations (Cap 369 sub. leg. V); or the carriage of solid dangerous goods in bulk, other than those of Classes 6.1, 7 and 8 as detailed in the aforesaid regulations unless the Director considers their location therein essential. If permitted any electrical equipment installed in such spaces shall be certified for, and the cables shall be appropriate for, use in the flammable dusts, gases or vapours to which they may be exposed. Cable penetrations of the decks and bulkheads of such spaces shall be sealed against the passage of gas or vapour. The Director may permit the isolation of electrical equipment and cables which do not comply with the foregoing for particular applications provided such equipment and cables are capable of being electrically isolated by the removal of links or the operation of lockable switches.

(Enacted 1991)

Part:	V	MISCELLANEOUS	30/06/1997
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(Enacted 1991)

Regulation:	51	Anchors, anchor handling equipment and chain cables	30/06/1997
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Every ship shall be provided with such anchors, anchor handling equipment and chain cables as are sufficient in number, strength and, in the case of anchors and cables, weight having regard to the size and intended service of the ship.

(Enacted 1991)

Regulation:	52	Means of escape	30/06/1997
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(1) In every ship stairways and ladderways shall be arranged so as to provide ready means of escape to the lifeboat embarkation deck from all accommodation spaces, service spaces and other spaces in which the crew are normally employed. In particular the following shall be complied with-

- (a) at all levels of accommodation there shall be provided at least two widely separated means of escape from each restricted space or group of spaces;
- (b) below the lowest open deck such means of escape shall be by stairways except that one of these

- stairways may be replaced by a trunked vertical ladder;
- (c) above the lowest open deck the means of escape shall be stairways or doors to an open deck or a combination thereof;
- (d) one of the means of escape may be dispensed with in an exceptional case having regard to the nature and location of the space and to the number of persons who normally might be accommodated or employed there;
- (e) no dead-end corridors having a length of more than 7 metres shall be permitted. A dead-end corridor is a corridor or part of a corridor from which there is only one escape route;
- (f) the width and continuity of the means of escape shall be to the satisfaction of the Director;
- (g) if a radio office station has no direct access to the open deck, two means of escape from such station shall be provided; the Director may permit one of these escapes to be an opening type window or sidescuttle of sufficient size.

(2) In all cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion where the crew is normally employed the number and locations of escape routes to the open deck shall be to the satisfaction of the Director but shall in no case be less than two and shall be as widely separated as possible.

(3) In every ship there shall be provided from each machinery space of Category A two means of escape. In particular one of the following provisions shall be complied with-

- (a) two sets of steel ladders as widely separated as possible leading to doors in the upper part of the space similarly separated and from which access is provided to the lifeboat or liferaft embarkation deck or decks. One of these ladders shall be provided with continuous fire shelter from the lower part of the space to a safe position outside the space. The shelter shall be of steel, insulated where necessary, and be provided with a self-closing steel door at the lower end; or
- (b) one steel ladder leading to a door in the upper part of the space from which access is provided to the lifeboat or liferaft embarkation deck or decks and additionally, in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being operated from each side and which provides access to a safe escape route from the lower part of the space to such embarkation deck.

(4) In a ship of less than 1000 tons the Director may permit one of the means of escape required by subregulation (3) to be dispensed with having regard to the size and disposition of the upper part of the space.

(5) From machinery spaces other than machinery spaces of Category A, escape routes shall be provided to the satisfaction of the Director having regard to the nature and location of the space and the number of persons normally employed in that space.

(6) Lifts shall not be considered as a means of escape for the purposes of this regulation.

(Enacted 1991)

Regulation:	53	Means for stopping machinery and closing of openings	30/06/1997
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(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) Means shall be provided for stopping ventilating fans serving machinery, accommodation and cargo spaces. For machinery and cargo spaces there shall be provided means for closing all skylights, doorways, ventilators, annular spaces around funnels and other openings to such spaces. Such means shall be capable of being operated from positions outside the said spaces which would not be made inaccessible by a fire within such spaces.

(3) 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. Adequate arrangements shall be made to permit the release of smoke in the event of fire.

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

(5) Machinery driving forced and induced draught fans, oil fuel transfer pumps, oil fuel with pumps and other similar fuel pumps shall be fitted with remote controls situated outside the spaces in which such machinery or pumps are situated. Such controls shall be capable of stopping such machinery or pumps in the event of fire in the said spaces.

(6) 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 watertight door. The fire-screen door shall be operable from each side and shall be located at the shaft tunnel side of the bulkhead. (80 of 1997 s. 102)

(Enacted 1991)

Regulation:	54	Materials used in construction		30/06/1997
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(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 of a suitable material having regard to the risk of fire. Such pipes should not be installed in accommodation and service spaces unless adequate precautions are taken having regard to the risk of fire and the Certifying Authority considers their installation necessary.

(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.

(Enacted 1991)

Regulation:	55	Gas welding, flame cutting and domestic gaseous fuel installations		30/06/1997
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(1) In every ship every gas welding, flame cutting or domestic gaseous fuel installation shall be designed, constructed and installed so that the safety of the ship and of the persons on board is not impaired.

(2) Every domestic liquefied petroleum gas installation shall be at least in accordance with Merchant Shipping Notice No. M 984.

(Enacted 1991)

Regulation:	55A	Damage control		30/06/1997
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(1) This regulation applies to all post 1992 ships other than tankers.

(2) 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. In addition, booklets containing the afore-mentioned information shall be made available by the owners for the use of the officers of the ship.

(3) Indicators shall be provided for all sliding doors and for hinged doors in watertight bulkheads. Indication showing whether the doors are open or closed shall be given on the navigating bridge. In addition, shell doors and other openings which in the opinion of the Certifying Authority could lead to major flooding if left open or not properly secured, shall be provided with such indicators.

(L.N. 415 of 1995)

Regulation:	55B	Emergency towing arrangements		30/06/1997
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(1) This regulation applies to tankers having a deadweight of 20000 tons or over.

(2) In the case of tankers built before the commencement of this regulation, an emergency towing arrangement shall be fitted at the first scheduled dry-docking after the commencement of this regulation and in any case not later than 1 January 1999.

(3) In the case of tankers built on or after the commencement of this regulation, an emergency towing arrangement shall be fitted at the time of building.

(4) The emergency towing arrangement shall be subject to the approval of the Director, based on the guidelines developed or amended from time to time by the International Maritime Organization.

(L.N. 480 of 1996)

Part:	VA	NAVIGATION BRIDGE VISIBILITY	L.N. 107 of 2001	13/07/2001
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Regulation:	55C	Navigation bridge visibility	L.N. 107 of 2001	13/07/2001
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(1) Subject to subregulation (3), every ship of not less than 45 metres in length constructed on or after 1 July 1998 shall meet the following requirements-

- (a) the view of the sea surface from the conning position shall not be obscured by more than two ship lengths, or 500 metres, whichever is the less, forward of the bow to 10° on either side under all conditions of draught, trim and deck cargo;
- (b) blind sector caused by cargo, cargo gear or other obstructions outside of the wheelhouse forward of the beam which obstructs the view of the sea surface as seen from the conning position, shall not exceed 10° and the total arc of blind sectors shall not exceed 20°. The clear sectors between blind sectors shall be at least 5°. However, in the view described in paragraph (a), each individual blind sector shall not exceed 5°;
- (c) from the conning position the horizontal field of vision shall extend over an arc of at least 225°, that is from right ahead to not less than 22.5° abaft the beam on either side of the ship;
- (d) from each bridge wing the horizontal field of vision shall extend over an arc of at least 225°, that is from at least 45° on the opposite bow through right ahead and then from right ahead to right astern through 180° on the same side of the ship;
- (e) from the main steering position the horizontal field of vision shall extend over an arc from right ahead to at least 60° on each side of the ship;
- (f) the ship's side shall be visible from the bridge wing;
- (g) the height of the lower edge of the navigation bridge front windows above the bridge deck shall be kept as low as possible. In no case shall the lower edge present an obstruction to the forward view as described in this regulation;
- (h) the upper edge of the navigation bridge front windows shall allow a forward view of the horizon, for a person with a height of eye of 1800 millimetres above the bridge deck at the conning position, when the ship is pitching in heavy seas. The Director, if satisfied that a 1800 millimetres height of eye is unreasonable and impractical, may allow reduction of the height of eye but not to less than 1600 millimetres;
- (i) windows shall meet the following requirements-
 - (i) framing between navigation bridge windows shall be kept to a minimum and not be installed immediately forward of any workstation;
 - (ii) to help avoid reflections, the bridge front windows shall be inclined from the vertical plane top out, at an angle of not less than 10° and not more than 25°;
 - (iii) polarized and tinted windows shall not be fitted; and
 - (iv) at all times regardless of weather conditions, at least two of the navigation bridge front windows shall provide a clear view, and in addition depending on the bridge configuration, an additional number of windows shall provide a clear view.

(2) Every ship of not less than 45 metres in length constructed before 1 July 1998 shall meet the requirements of subregulation (1)(a) and (b) where practicable. However, in complying with such requirements, structural alterations or additional equipment is not required to be made or fitted, as the case may be.

(3) Where the Director considers that a ship of unconventional design, which is not less than 45 metres in length constructed on or after 1 July 1998, cannot comply with subregulation (1), the owner and master of the ship shall provide arrangements to achieve a level of visibility to the satisfaction of the Director.

(L.N. 107 of 2001)

Part:	VI	SURVEYS		30/06/1997
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(Enacted 1991)

Regulation:	56	Initial surveys	L.N. 123 of 2000	01/05/2000
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(1) The structure, machinery and equipment of a ship shall be subject to an initial survey before the ship is put in service or before a cargo ship safety construction certificate is issued in respect of the ship for the first time.

(2) The initial survey shall include a complete inspection of the structure, machinery and equipment including an inspection of the outside of the ship's bottom. The survey shall ensure that the arrangements, materials, scantlings

and workmanship of the structure, boilers and other pressure vessels, their appurtenances, main and auxiliary machinery including steering gear and associated control systems, electrical installations and other equipment comply with the requirements of these regulations, are in satisfactory condition and are fit for the service for which the ship is intended. In the case of tankers, the survey shall also include an inspection of the pump rooms, cargo spaces, bunker and ventilation piping systems and associated safety devices.

(3) Upon completion of an initial survey of a ship, and on the application of the owner, agent or master of the ship, if the Director is satisfied that the ship complies with the requirements of these regulations, he may issue in respect of the ship a cargo ship safety construction certificate. The certificate shall be valid for 5 years from the date of issue or for such shorter period as may be specified in the certificate.

(L.N. 33 of 2000)

Regulation:	57	Renewal surveys	L.N. 123 of 2000	01/05/2000
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(1) The structure, machinery and equipment of a ship shall be subject to a renewal survey at intervals specified by the Director which shall not exceed 5 years for the renewal of a cargo ship safety construction certificate.

(2) The renewal survey shall include an inspection of the structure, machinery and equipment referred to in regulation 56(2), to ensure that they comply with the requirements of these regulations, are in satisfactory condition and are fit for the service for which the ship is intended.

(3) Upon completion of a renewal survey of a ship, and on the application of the owner, agent or master of the ship, if the Director is satisfied that the ship complies with the requirements of these regulations, he may issue in respect of the ship a cargo ship safety construction certificate. The certificate shall be valid for 5 years from the date of issue or for such shorter period as may be specified in the certificate.

(4) Where a renewal survey of a ship in respect of which an extension of a cargo ship safety construction certificate is granted under regulation 59C is completed, the new cargo ship safety construction certificate issued in consequence of the survey shall be valid for 5 years from the date of expiry of the existing certificate before the extension was granted or for such shorter period as may be specified in the certificate or, if the Director considers it is appropriate in the special circumstances of the case, valid for 5 years from the date of completion of the survey or for such shorter period as may be specified in the certificate.

(L.N. 33 of 2000)

Regulation:	58	Intermediate surveys	L.N. 123 of 2000	01/05/2000
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(1) The structure, machinery and equipment of a ship in respect of which a cargo ship safety construction certificate has been issued shall be subject to an intermediate survey within 3 months before or after the second anniversary date or within 3 months before or after the third anniversary date of the certificate, which shall take the place of an annual survey to be carried out in the same year in which the intermediate survey is carried out.

(2) The intermediate survey shall include an inspection of the structure, boilers and other pressure vessels, machinery and equipment, the steering gear and associated control systems and electrical installations to ensure that they remain in satisfactory condition and are fit for the service for which the ship is intended. In the case of tankers, the survey shall also include an inspection of the pump rooms, cargo spaces, bunker and ventilation piping systems and associated safety devices and the testing of insulation resistance of electrical installations in dangerous zones.

(3) If an intermediate survey is completed before the period specified in subregulation (1) then-

- (a) a new date, which shall not be more than 3 months after the date on which the survey was completed, shall be endorsed by the surveyor on the cargo ship safety construction certificate to be the date for ascertaining subsequent anniversary dates;
- (b) the subsequent annual survey required under regulation 59 shall be carried out at the intervals prescribed by that regulation using the new date in paragraph (a) as the anniversary date; and
- (c) the expiry date of the certificate may remain unchanged provided one or more annual surveys are carried out so that the maximum intervals between the surveys prescribed by regulation 59(1) are not exceeded.

(4) If the ship is not surveyed in accordance with this regulation, the Director may cancel its cargo ship safety construction certificate. The Director shall notify the owner of the ship in writing of the cancellation specifying the grounds therefor and the date on which it takes effect.

(L.N. 33 of 2000)

Regulation:	59	Annual surveys	L.N. 123 of 2000	01/05/2000
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(1) The structure, machinery and equipment of a ship in respect of which a cargo ship safety construction certificate has been issued shall be subject to an annual survey within 3 months before or after each anniversary date of the certificate.

(2) The annual survey shall include a general inspection of the structure, machinery and equipment referred to in regulation 56(2), to ensure that they have been maintained in accordance with the requirements of these regulations, and that they remain in satisfactory condition and are fit for the service for which the ship is intended, and to ensure that the ship in all respects remains fit to proceed to sea without danger to the ship or persons on board.

(3) If an annual survey is completed before the period specified in subregulation (1) then-

- (a) a new date, which shall not be more than 3 months after the date on which the survey was completed, shall be endorsed by the surveyor on the cargo ship safety construction certificate to be the date for ascertaining subsequent anniversary dates;
- (b) the subsequent intermediate or annual survey required under regulation 58 or this regulation shall be carried out at the intervals prescribed by that regulation or this regulation using the new date in paragraph (a) as the anniversary date; and
- (c) the expiry date of the certificate may remain unchanged provided one or more intermediate or annual surveys, as appropriate, are carried out so that the maximum intervals between the surveys prescribed by regulation 58(1) or subregulation (1) are not exceeded.

(4) If the ship is not surveyed in accordance with this regulation, the Director may cancel its cargo ship safety construction certificate. The Director shall notify the owner of the ship in writing of the cancellation specifying the grounds therefor and the date on which it takes effect.

(L.N. 33 of 2000)

Regulation:	59A	Enhanced surveys	L.N. 123 of 2000	01/05/2000
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(1) The owner of every bulk carrier and oil tanker shall cause the bulk carrier or oil tanker to be subjected to an enhanced programme of inspections in accordance with the guidelines adopted or amended from time to time by the International Maritime Organization.

(2) The inspection mentioned in subregulation (1) shall be completed at every renewal survey as required by regulation 57. (L.N. 33 of 2000)

(L.N. 480 of 1996)

Regulation:	59B	Bottom inspections	L.N. 123 of 2000	01/05/2000
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(1) The outside of a ship's bottom including the sea connections, overboard discharge valves and other ship side fittings and the rudder shall be subject to a minimum of 2 inspections during any 5-year period, and the intervals between any 2 inspections shall not exceed 36 months.

(2) Notwithstanding the requirement of subregulation (1), if the ship in respect of which a cargo ship safety construction certificate has been issued-

- (a) is on the date when the certificate expires, not in Hong Kong nor in a port in which it is to be surveyed; or
- (b) is registered in Hong Kong and engaged on short voyages,

and in each case the Director has granted an extension of the certificate, the 5-year period under subregulation (1) may be extended to coincide with the extended period of validity of the certificate.

(3) The inspection under subregulation (1) shall ensure that the outside of the ship's bottom including the sea connections, overboard discharge valves and other ship side fittings and the rudder remain in satisfactory condition and are fit for the service for which the ship is intended.

(L.N. 33 of 2000)

Regulation:	59C	Extension of certificate	L.N. 123 of 2000	01/05/2000
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Where a ship in respect of which a cargo ship safety construction certificate has been issued is registered in Hong Kong and engaged on short voyages, and the certificate has not been extended under section 29 of the

Ordinance nor this regulation, the Director may, on the application of the owner, agent or master of the ship, grant an extension of the certificate for a period not exceeding 1 month from the date of expiry of the certificate.

(L.N. 33 of 2000)

Regulation:	60	General	L.N. 123 of 2000	01/05/2000
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(1) Every application for a survey of a ship under regulation 56, 57, 58, 59, 59A or 59B shall be made by or on behalf of the owner of the ship to the Certifying Authority and shall be accompanied by such information relating to the ship as the Certifying Authority may require for the purposes of the survey. (L.N. 480 of 1996)

(2) The Certifying Authority shall, on receipt of the application and of any fee payable on such application, cause the survey to be carried out by a qualified surveyor.

(3) On completion of a survey in accordance with the requirements of these regulations, the surveyor shall, where he is so satisfied-

- (a) in the case of a survey before the issue of a cargo ship safety construction certificate as required by regulation 56 or 57, forward to the Certifying Authority a declaration of survey containing such particulars of the ship as are required by the Certifying Authority to enable it to issue a cargo ship safety construction certificate in respect of the ship;
- (b) in the case of an intermediate survey as required by regulation 58, forward a report on the survey to the Certifying Authority and endorse on the cargo ship safety construction certificate;
- (c) (Repealed L.N. 33 of 2000)
- (d) in the case of an annual survey as required by regulation 59, endorse on the cargo ship safety construction certificate; (L.N. 480 of 1996)
- (e) in the case of an enhanced programme of inspections as required by regulation 59A, issue a condition evaluation report or endorse it, as appropriate, and forward it to the Certifying Authority; (L.N. 480 of 1996)
- (f) in the case of an inspection of the outside of a ship's bottom as required by regulation 59B, endorse on the cargo ship safety construction certificate. (L.N. 33 of 2000)

(L.N. 33 of 2000)

(Enacted 1991)

Part:	VII	RESPONSIBILITIES OF OWNER AND MASTER		30/06/1997
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(Enacted 1991)

Regulation:	61	Responsibilities of owner and master	23 of 1998	01/07/1997
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Remarks:

Adaptation amendments retroactively made-see 23 of 1998 s. 2

- (1) The owner or master of every ship shall ensure that-
 - (a) the condition of the ship and its equipment is maintained so as to comply with the relevant provisions of these regulations and the structural fire protection provisions of the Merchant Shipping (Safety) (Fire Protection) (Ships Built On or After 1 September 1984) Regulations (Cap 369 sub. leg. Y),
 - (b) after any survey required by these regulations has been completed, no material change shall be made in the structural arrangement, machinery, equipment and other items subject to such survey, without the approval of the Certifying Authority, and
 - (c) whenever an accident occurs to a ship or a defect is discovered either of which affects the safety of the ship or the efficiency or completeness of its equipment, it shall be reported at the earliest opportunity to the Director and to the Certifying Authority responsible for issuing the relevant certificate, which shall cause investigations to be initiated to determine whether a survey by a surveyor is necessary and shall in that event require such a survey to be carried out. If the ship is in a port outside Hong Kong the master or owner shall in addition, make such a report immediately to the appropriate authorities of the country in which the port is situated. (23 of 1998 s. 2)
- (2) The Certifying Authority shall ascertain from the appropriate authorities of the country in which the port is situated that the reports referred to in subregulation (1)(c) have been made. The Certifying Authority shall return the

certificate issued in relation to the ship to the master.

(3) Where the ship is not within Hong Kong and corrective action in accordance with subregulation (2) has not been taken, the Certifying Authority shall in addition immediately notify the appropriate authorities of the country in which the port is situated.

(Enacted 1991)

Regulation:	62	Procedure to be adopted when repairs or renewals are necessary		30/06/1997
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(1) In any case where the Certifying Authority determines that the condition of the ship or its equipment does not correspond with the particulars of the cargo ship safety construction certificate or is such that the ship is not fit to proceed to sea without danger to the ship or persons on board, the Certifying Authority shall advise the owner or master of the corrective action which in its opinion is required, and shall notify the Director.

(2) If such corrective action is not taken within such period (being a reasonable period) as the Certifying Authority may specify, the Certifying Authority shall, at the end of the time, immediately notify the Director who may, on receipt of such notification, suspend the validity of the cargo ship safety construction certificate issued in relation to the ship and shall give notice of any such suspension to the owner and to the Certifying Authority.

(3) The master shall thereupon deliver up the certificate issued in relation to the ship to the Certifying Authority on demand and the owner shall on receipt of notice of suspension deliver up the duplicate certificate to the Director.

(4) When the Certifying Authority is satisfied that corrective action has been taken it shall notify the Director. The Director shall thereupon, in any case where the validity of the certificate has been suspended-

- (a) restore the validity of the certificate,
- (b) give notice thereof to the Certifying Authority and the owner, and
- (c) return the duplicate certificate to the owner.

(Enacted 1991)

Part:	VIII	EQUIVALENTS AND PENALTIES		30/06/1997
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(Enacted 1991)

Regulation:	63	Alternative construction, equipment and machinery		30/06/1997
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Where these regulations require that the hull or machinery of a ship shall be constructed in a particular manner, or that particular equipment shall be provided, or that particular provisions shall be made, the Director 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 he is satisfied by trial thereof or otherwise that such other construction, equipment or provision is at least as effective as that required by these regulations.

(Enacted 1991)

Regulation:	64	Penalties	L.N. 107 of 2001	13/07/2001
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Expanded Cross Reference:

2, 3, 3A, 4, 5, 6, 7, 8, 9, 10, 10A, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55

(1) If a ship fails to comply with regulations 2 to 8, 9 to 13, 13A, 14 to 31, 33, 35 to 41, 42 to 50, 51 to 55, 55B, 55C and 61(1) the owner and master of the ship commit an offence and each is liable to a fine not exceeding \$20000 and to imprisonment for a term not exceeding 2 years. < * Note - Exp. X-Ref.: Regulations 2, 3, 3A, 4, 5, 6, 7, 8, 9, 10, 10A, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55 * > (L.N. 107 of 2001)

(2) The owner of a ship (including, where relevant, a tanker) who fails to cause a survey of that ship to be conducted as required by regulations 56, 57, 58, 59, 59A and 59B commits an offence and is liable on conviction to a fine not exceeding \$20000 and to imprisonment for a term not exceeding 2 years. (L.N. 33 of 2000)

(3) The owner or master of a ship who fails to comply with a requirement imposed upon him by regulation 62(3) commits an offence and is liable on conviction to a fine not exceeding \$20000.

(L.N. 480 of 1996)
(Enacted 1991)

Regulation:	65	(No provision)		30/06/1997
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No provision.

(Enacted 1991)

Schedule:	1	THE DESIGN, CONSTRUCTION, LOCATION AND TESTING OF DEVICES TO PREVENT THE PASSAGE OF FLAME INTO CARGO TANKS IN OIL TANKERS		30/06/1997
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[regulation 12(5)(d)&(7)]

1. Definitions

"flame arrester" (消焰器) means a device to prevent the passage of flame, complying with all relevant requirements of this Schedule. Its flame arresting element is based on the principle of quenching.

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

"flame speed" (火焰速度) means the speed at which a flame propagates along a pipe or other system.

"flash-back" (回火) means the transmission of a flame through a device.

"high velocity vent" (高速排氣口) 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" (壓力真空閥) means a device designed to maintain pressure and vacuum in a closed container with preset limits.

2. Design

(1) Devices, other than flame screens, shall be capable of performing one or more of the following functions-
Flame arresters and high velocity vents;

(a) 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 paragraphs 5(3)(b) and 6(3)(b).

High velocity vents;

(b) 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.

Flame arresters and high velocity vents;

(c) preventing an influx of flame when conditions of vacuum occur within the cargo tanks.

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

(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.

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

(5) The casing or housing shall be capable of withstanding the hydrostatic pressure test required by paragraph 4(9).

(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.

(7) Devices shall be designed to minimize the effect of fouling under normal operating conditions.

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

(9) The clear area through flame arresters shall be at least 1.5 times the cross sectional area of the vent lines.

(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.

3. Construction

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

(1) 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.

(2) The devices shall allow ease of inspection and removal of internal elements for replacement, cleaning or repair.

(3) All flat joints of the housing shall be machined true and shall provide an adequate metal-to-metal contact.

(4) Flame arrester elements shall fit in the housing in such a way that flame cannot pass between the element and the housing.

(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.

(6) Devices shall be so constructed as to direct the efflux vertically upwards.

(7) Fastenings essential to the operation of the device such as screws, shall be protected against loosening.

(8) Means shall be provided to establish that any valve fitted lifts easily without remaining in the open position.

(9) High velocity vents shall have a width of the contact area of the valve seat of at least 5 millimetres.

(10) Devices shall not be capable of being by-passed or held open unless they are tested in the by-passed or open position in accordance with paragraph 4, 5, 6 or 7, as appropriate.

(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.

(12) Each device shall be labelled or marked to indicate-

(a) the manufacturer's name or trademark,

(b) the style, type, model, or other manufacturer's designation for the device,

(c) the size of the outlet for which the device is approved,

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

(e) the direction of flow through the device, and

(f) the test laboratory and its report number.

4. Performance Tests (General)

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

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

(3) Flame screens shall be tested in accordance with paragraph 5(2).

(4) Flame arresters shall be tested in accordance with paragraph 5 or 7 of this Schedule as appropriate.

(5) High velocity vents shall be tested in accordance with paragraph 6.

(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.

(7) Gasoline vapour (a non leaded petroleum distillate consisting essentially of aliphatic hydrocarbon compounds with a boiling range of approximately 65°C to 75 °C) 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.

(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% sodium chloride solution spray at a temperature of 25°C 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.

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

- (a) end of line devices of all sizes-0.9 newtons per square millimetre,
- (b) in line devices up to and including 200 millimetres pipe diameter-1.5 newtons per square millimetre,
- (c) in line devices above 200 millimetres and up to and including 300 millimetres pipe diameter-1.8 newtons per square millimetre;
- (d) in line devices above 300 millimetres diameter-to the satisfaction of the Director.

(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.

5. Test Procedures for Flame Screens and Flame Arresters Located at Openings to the Atmosphere

(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 are deemed to be equivalent by the Director.

(2) A flash-back test shall be carried out as follows-

- (a) The tank and the plastic foil bag shall be filled with the most easily ignitable propane/air mixture so that the plastic foil bag envelopes the prototype device. The dimensions of the plastic foil bag are dependent on those of the device but for the devices 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.
- (b) if a flash-back occurs, the tank diaphragm will burst and this will be audible and visible to 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.

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

- (a) The test rig referred to in paragraph 5(1) may be used, without the plastic foil bag. The flame arrester shall be so installed that the mixture emission is vertical. In this position the mixture shall be ignited. Thermocouples shall be installed on the flame arresting element.
- (b) 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.

6. Test Procedures for High Velocity Vents

(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.

(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-

- (a) 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,
 - (b) 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 0.01 newtons per square millimetre per minute,
 - (c) The pressure at which the vent opens,
 - (d) The pressure at which the vent closes, and
 - (e) The efflux velocity measured at the outlet.
- (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 -
- (a) 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.
 - (b) 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.

7. Test Procedures for Flame Arresters Located In-Line

(1) A flame arrester shall be installed at the end of a pipe of suitable length and of the same diameter as the flange of the flame arrester. 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 arrester shall be measured and shall have a value of that for the detonation velocity.

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

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

8. Location and Installation of Devices

(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-

- (a) cargo loading and discharge rates,
- (b) gas evolution,
- (c) pressure drop across the device taking into account the resistance coefficient,
- (d) pressure drop in the vent piping system,
- (e) pressure at which the vent opens if a high velocity vent is selected, and
- (f) density of the saturated vapour/air mixture.

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

(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.

(4) Flame screens shall be protected against mechanical damage.

(5) Cowls, weatherhoods, nozzles, deflectors, tee-pieces, bends or orifice plates shall not be installed after flame arresters unless the devices are tested and approved in association with these attachments. The distance between flame arresters 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.

9. Manufacturer's Instructional Manual

The manufacturer shall supply a copy of the instruction manual for devices. This manual shall be kept on board the tanker and shall include the following information-

- (1) installation instructions,
- (2) operating instructions,
- (3) maintenance requirements including the frequency and method of cleaning, and
- (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

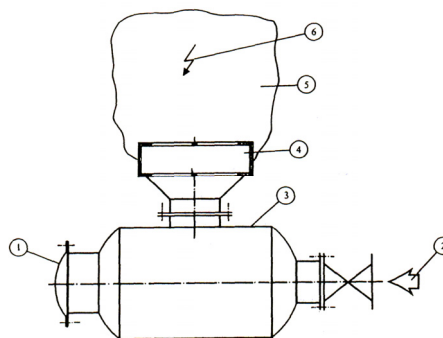
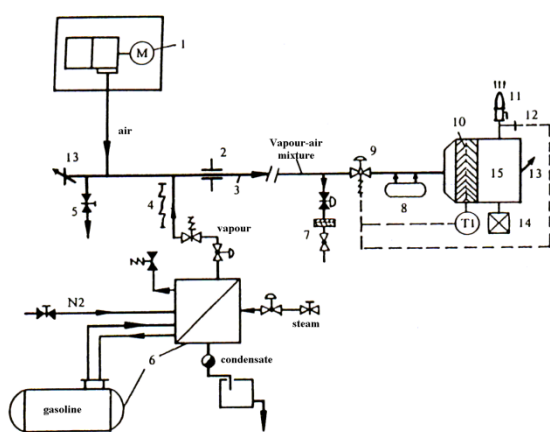
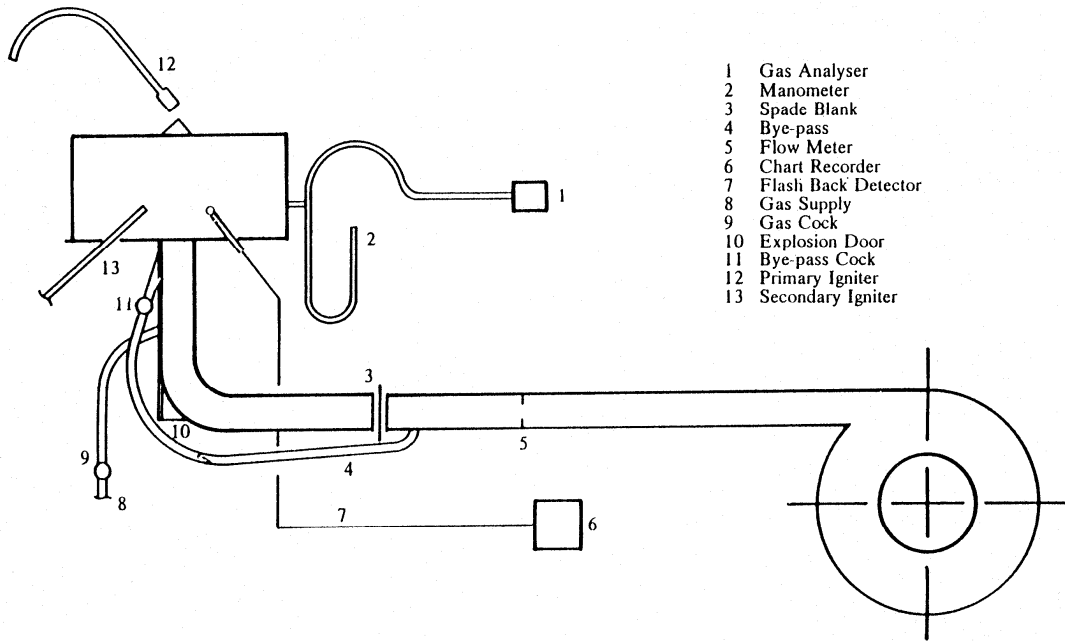


Figure 2
Schematic Plan of the Test Plant for High Velocity Vents
(endurance burning test only)



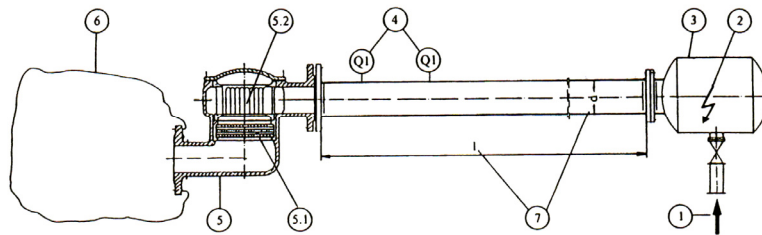
- 1 fan with variable speed
- 2 volume rate indicator
- 3 pipe (500 mm diameter), length- 30m
- 4 heated vapour pipe
- 5 air bypass
- 6 evaporator and liquid storage tank
- 7 vapour/air-mixture bypass
- 8 extinguishing agents
- 9 control and quick action valve
- 10 explosion arresting crimped ribbon 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

Figure 3
Test Rig for High Velocity Vents



- 1 Gas Analyser
- 2 Manometer
- 3 Spade Blank
- 4 By-pass
- 5 Flow Meter
- 6 Chart Recorder
- 7 Flash Back Detector
- 8 Gas Supply
- 9 Gas Cock
- 10 Explosion Door
- 11 By-pass Cock
- 12 Primary Igniter
- 13 Secondary Igniter

Figure 4
Test Rig for Flame Arresters Located In Line



- 1 - explosives mixture inlet
- 2 - ignition source; ignition within nonstreaming mixture
- 3 - tank
- 4 - measuring system for flame speed of a stable detonation
- 5 - flame arrester located in-line
- 5.1 - flame arrester element
- 5.2 - shock wave absorber
- 6 - plastic foil bag
- 7 - $1/d = 100$

(Enacted 1991)

Schedule:	2	CONSTRUCTION OF RUDDER ACTUATORS FOR CERTAIN TANKERS		30/06/1997
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[regulation 25(19)(b)]

1. Materials of Construction

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% 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.

2. Design and Stress Analysis

Subject to paragraph 4 detailed calculations, including a stress analysis of the pressure retaining parts of the actuator, shall be provided so that the Certifying Authority 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 Certifying Authority 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 Certifying Authority considers it necessary.

3. Allowable Stresses

For the purpose of determining the scantlings of rudder actuator components subject to internal hydraulic pressure the allowable stresses shall not exceed

$$\begin{aligned}\sigma_m &\cong f \\ \sigma_t &\cong 1.5f \\ \sigma_b &\cong 1.5f \\ \sigma_t + \sigma_b &\cong 1.5f \\ \sigma_m + \sigma_b &\cong 1.5f\end{aligned}$$

where σ_m is the equivalent primary general membrane stress,

σ_t is the equivalent primary local membrane stress,

σ_b is the equivalent primary bending stress,

$$f = \frac{\sigma_B}{A} \text{ or } \frac{\sigma_Y}{B} \text{ whichever is the smaller, where}$$

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

σ_Y 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

4. Burst Test

Rudder actuator components subject to internal hydraulic pressure that have not been subject to a detailed stress analysis in accordance with paragraph 2 of this Schedule may be accepted by the Certifying Authority 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 regulation 25,

A is the appropriate number taken from the table in paragraph 3 of this Schedule,

σ_{Ba} is actual tensile strength, and

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

5. Construction

(1) Local concentrations of stress shall be minimised.

(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 Certifying Authority.

(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.

(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 Certifying Authority may permit other arrangements providing equivalent protection against leakage.

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

(6) The relief valves for the rudder actuator required by regulation 25(2)(c) shall have a discharge capacity of at least the total capacity of the pumps which provide power for the actuator increased by 10%. Under such conditions the rise in pressure above the set pressure shall not exceed 10%, due consideration being given to the effect of foreseen ambient conditions on the viscosity of the oil.

6. Testing

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

(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.

(Enacted 1991)

Schedule:	3	MEASUREMENT OF NOISE LEVELS IN MACHINERY SPACES		30/06/1997
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[regulation 28]

1. 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.

2. The equipment and procedures for measuring and recording noise levels in machinery spaces shall be generally in accordance with the provisions of the United Kingdom publication entitled "The Code of Practice for Noise Levels in Ships" published by Her Majesty's Stationery Office, or other equivalent standard acceptable to the Director.

(Enacted 1991)

Schedule:	4	(Repealed L.N. 33 of 2000)	L.N. 123 of 2000	01/05/2000
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