

Translation. Only the Danish version is authentic.

Danish Maritime Authority Technical Regulation no. 15 of 20 November 2000

Technical Regulation on Traditional Ships (Ships Worthy of Preservation, Sport Fishing Vessels, etc.)¹

In pursuance of Section 1 (2), Sections 3-5, Section 17 (5), and Section 32 (4) of the Act on Safety at Sea, cf. consolidated act no. 554 of 21 June 2000, and in pursuance of Section 1 (2), Sections 3-8, Section 11 (2), Section 12 (2), and Section 28 of Act no. 98 of 12 March 1980 on Ship Safety, etc., as amended, and after consultation with the Minister for the Environment and Energy, the Faroese Government and the Greenland Home Rule, and on the authorisation of the Minister for Trade and Industry, the following is laid down:

Section 1. This technical regulation shall apply to ships that have been declared worthy of preservation by the Ship Preservation Trust or, in the case of the Faroe islands, by Føroya Formminnisavn, but not to pleasure craft worthy of preservation.

Subsection 2. This technical regulation shall also apply to ships used for training, socio-pedagogical projects, school camps, sport fishing, clubs or similar special purposes other than actual passenger voyages (regular services, etc.) that have been converted for the given purpose before entry into force of this technical regulation.

Subsection 3. Ships converted for purposes mentioned in subsection 2 after the entry into force of this technical regulation and not declared worthy of preservation (cf. subsection 1), shall comply with the provisions of:

1. The technical regulation on Cargo Ships and Fishing Vessels Carrying a Maximum of 12 Passengers if they carry up to and including 12 passengers,
2. Notice D from the Danish Maritime Authority if they carry more than 12 passengers and are engaged on domestic voyages, or
3. Notice B from the Danish Maritime Authority if they carry more than 12 passengers and are engaged on international voyages.

Section 2. Detailed provisions on the structure, equipment, etc. of the ships have been reproduced as an annex to this Technical Regulation.

Subsection 2. In the case of ships worthy of preservation, cf. Section 1 (1), application of the individual provisions shall take account of the ship's original appearance, structure, equipment and materials.

Section 3. Contravention of the provisions of the annex shall be punishable by fine, simple detention or imprisonment for a term not exceeding 1 year.

Subsection 2. The penalty may be increased to simple detention or imprisonment for a term not exceeding 2 years if

1. the contravention has caused or threatened to cause loss of life or damage to health,
2. an injunction or order has previously been issued for the same or equivalent conduct, or
3. the contravening party or another party has achieved or sought to achieve financial gain by the contravention.

Subsection 3. It shall be considered particularly aggravating circumstances if the contravention has caused or threatened to cause loss of life or damage to the health of persons below the age of 18, cf. Subsection 2 (1) above.

1. This Technical Regulation has been notified in draft in accordance with European Parliament and Council Directive 98/34/EC (the Information Procedure Directive), as amended by Directive 98/48/EC.

Subsection 4. If the proceeds of a contravention are not confiscated, particular account shall be taken, when determining fines, including additional fines, of the amount of any financial gain achieved or sought to be achieved.

Subsection 5. Liability to punishment may be imposed on companies, etc. (juridical persons) in accordance with the regulations of Chapter 5 of the Penal Code.

Subsection 6. If the contravention is only covered by the Act on Ship Safety, etc., only a fine or simple detention may be imposed.

Section 4. This technical regulation shall enter into force on 1 January 2000.

Subsection 2. For ships mentioned in Section 1 (1) and (2) constructed before 1 January 2001, the provisions of this technical regulation shall be complied with at the first periodical survey after 1 June 2001 at the latest.

Subsection 3. Technical regulation no. 12 of 15 December 1995 on Ships Worthy of Preservation shall be repealed.

The Danish Maritime Authority, 20 November 2000

Christian Breinholt / Peter Lauridsen

Annex to Technical Regulation on Traditional Ships (Ships Worthy of Preservation, Sport Fishing Vessels, etc.)

Table of Contents

Chapter 1: General Provisions.....	4
Chapter 2-1: Structure – Subdivision, Stability, Machinery, Electrical Installations and Load Lines	7
Chapter 2-2: Structure – Fire Protection, Fire Detection and Fire Extinction.....	12
Chapter 2-3: Accommodation Spaces	14
Chapter 3: Life-Saving Appliances and Life-Saving Arrangements	16
Chapter 4: Radiocommunications	18
Chapter 5: Safety of Navigation	21
Chapters 6-8 have been reserved for later use.....	21
Chapter 9: Safe Ship Management	22
Chapters 10-19 have been reserved for later use.....	23
Chapter 20: Treatment and Storage of Sewage	24
Chapter 21: Prevention of Oil Pollution by Ships	31
Chapters 22-23 have been reserved for later use.....	42
Chapter 24: Prevention of Garbage Pollution	43
Supplement 1: Guidelines for Allocating Service Areas to Special Purpose Ships	48
Supplement 2: Tables	49
Supplement 3: Bilge Pump and Bilge Line	51
Supplement 4: Regulations on Electrical Installations	52
Supplement 5: Furnaces	85
Supplement 6: Liquefied Petroleum Gas Installations in Ships	86
Supplement 7: Machinery Installations	89
Supplement 8: Fire Pumps, Fire Mains, Hydrants and Hoses	113

Chapter 1: General Provisions

Definitions

- 1.1 For the purposes of this annex to the Technical Regulation on Traditional Ships (Ships Worthy of Preservation, Sport Fishing Vessels, etc.), the following definitions shall apply:
- 1) **Operating crew:** The determined minimum manning.
 - 2) **Approved:** Approved by the Danish Maritime Authority, cf. however subsections 1.5-1.6.
 - 3) **Domestic voyage:** Voyages other than international voyages as well as voyages around the Faroe islands within 30 nautical miles of the base line.
 - 4) **Restricted voyages:** Voyages in the North Sea east of 3° eastern longitude and south of 61° northern latitude, and in the Baltic and intermediate waters.
 - 5) **Cargo ship:** A ship that is not a passenger ship.
 - 6) **Length:** 96% of the total length measured on a waterline lying 85% of the least depth above the upper edge of the keel or as the length from the foreside of the stem to the middle of the rudder stock on the said waterline, if this length is greater. In ships designed with trim, the waterline on which the length is measured shall be parallel to the designed waterline.
 - 7) **Passenger:** Any person apart from:
 - a) the master, members of the operating crew and other persons employed or signed on in whatever capacity, and
 - b) children below the age of one year.
 - 8) **Passenger ship:** A ship carrying more than 12 passengers.
 - 9) **Tonnage:**
 - a) Ships the keels of which are laid on or after 18 July 1994 are measured solely in accordance with the Act on Ship Measurement. The tonnage is the gross tonnage stated in the ship's tonnage certificate.
 - b) Ships the keels of which are laid before 18 July 1994:
 - 1) In the case of ships the keels of which are laid on or after 18 July 1982 and measured solely pursuant to the Act on Ship Measurement, the tonnage is the gross tonnage stated in the ship's tonnage certificate.
 - 2) For ships the keels of which are laid on or after 18 July 1982 and measured in accordance with the Act on Ship Measurement, and which are also measured in accordance with the measurement regulations (1947) previously in force, the gross registered tonnage shall be used. This is stated by the issuing body as an addendum in the notes section of the tonnage certificate or in a Danish tonnage certificate.
 - 3) For ships with a length of or above 24 metres that shall have been measured and provided with a tonnage certificate pursuant to the Act on Ship Measurement by 18 July 1994, the gross registered tonnage shall be used. This is stated by the issuing body as an addendum in the notes section of the international tonnage certificate.
 - 4) For ships with a length below 24 metres measured solely pursuant to the measurement regulations (1947) previously in force, the gross registered tonnage shall be used, as stated in the ship's tonnage certificate.
 - 10) **Day voyages:** Voyages where the ship is not at sea for more than six hours between 22.00 and 06.00.
 - 11) **24-hour voyages:** Voyages in addition to day voyages.
 - 12) **Cooking place:** An area on board that is not an actual galley and that has, without using open fire, been arranged for heating food, brewing coffee, etc., and where the total input power does not exceed 4 kW.

Service Area

- 1.2 The service area shall be determined by the Danish Maritime Authority in each individual case. Supplement 1 contains guidelines for the allocation of service areas.

Surveys

- 1.3 A traditional ship shall be subjected to an initial main survey before being put into service in accordance with the provisions of this technical regulation. As early as possible, information shall be provided on the intended use of the ship and on the place of construction or conversion.
- 1.4 Ships covered by this technical regulation and carrying more than 12 passengers shall be subjected to periodical main surveys at intervals of 9 to 15 months. Other ships covered by this technical regulation shall be subjected to periodical main surveys at intervals of 27 to 33 months.

Survey Book

- 1.5 All ships shall be provided with a survey book in which the Danish Maritime Authority's attestation of surveys carried out as well as the master's account of the required inspections, tests and drills shall be given as well as information about other conditions of relevance to the ship as stipulated in more detail in the instructions contained in the book.
- 1.5.2 The survey book shall be written in a form laid down by the Danish Maritime Authority and shall be endorsed by an administrative officer employed by the Danish Maritime Authority. When the survey book is full or can, for some other reason, no longer be used, the master shall see to it that a new book is procured and that it is endorsed. All permits and exemptions contained in the book used so far shall be transferred to the new book, and both books shall, at the first opportunity, be submitted to the Danish Maritime Authority for attestation of that which has been transferred to the new book. Hereafter, the book should be kept on board until the first main survey due has been completed.

Equivalent, etc.

- 1.6 Where this technical regulation requires that a particular fitting, material, appliance or apparatus, or type thereof, shall be fitted or carried in a ship, or that any specific measure shall be taken, or if specific requirements are made for the construction and design, the Danish Maritime Authority may allow any other fitting, material, appliance or apparatus, or type thereof, to be fitted or carried, or any other measure be taken in that ship, or the ship to be constructed or designed in another fashion if it is satisfied by trial thereof or otherwise that such fitting, material, appliance or apparatus, or type thereof, or measure, or construction and design, is at least as effective as that required by this technical regulation.
- 1.7 The Danish Maritime Authority shall accept tests carried out by recognised test companies, including those in other EU Member States and in countries that are contracting parties to the Agreement on the European Economic Area, that provide suitable and satisfactory guarantees of a technical, expert and independent nature.

Miscellaneous Safety Measures

General

- 1.8 In order to safeguard against accidents during the ship's normal operation, sufficient measures shall have been taken to ensure that persons working or moving about on board, or embarking or disembarking, are not in danger of being injured other than as a result of a lack of due care and attention.
- 1.9 The ship shall carry the necessary spare parts and spare equipment. In the case of ships engaged on other than restricted voyages, the record of the minimum store of spare parts and spare equipment shall be approved by the Danish Maritime Authority.

Embarkation and Disembarkation

- 1.10 Adequate conditions for accessing the ship shall always be established and the ship shall carry suitable means for establishing such conditions of access. In case of permanent quay berths, such means may consist of a shore-based arrangement.
- 1.11 If the distance from the surface of the sea to the point of access to the ship exceeds 1.5 m, a statutory pilot ladder shall be carried on board.

Working Lifejackets and Lifelines

- 1.12 An inflatable working lifejacket or sailor's lifejacket or lifejacket approved in accordance with recognised codes of practice, shall be carried for each member of the watch on deck. The lifejackets shall be provided with a reflector, whistle and light.
- 1.13 A sufficient number of approved lifelines shall be carried on board for persons who are to carry out work in exposed areas.

Fire Watch

- 1.14 If, during the period between 22.00 and 06.00, persons are on board in addition to the operating crew, a fire watch shall be established covering the entire ship.

Safety Instructions, Muster and Drills

- 1.15 Safety instructions shall be given to persons who have embarked recently before the ship leaves port. The safety instructions shall at least include:
- 1.15.1 For ships engaged on day voyages:
- 1) Introduction of the crewmembers.
 - 2) Instructions in the use of personal life-saving appliances, including lifejackets, lifebuoys and, where applicable, immersion suits.
 - 3) Demonstration of the ship's alarm systems and explanation of the meaning of individual alarm signals.
 - 4) Explanation of the aspects of the ship's fire emergency system to which passengers may contribute, such as smoking restrictions and fire alarms.
- 1.15.2 For ships engaged on 24-hour voyages:
- 1) Safety instructions as those applying to ships engaged on day voyages (see 1-4 above).
 - 2) A conducted tour of the ship highlighting and explaining its arrangement, evacuation routes, fire dampers, portable fire-extinguishers, closing of doors, safety signs, notices, etc.
 - 3) Information about the use of the ship's liferafts and lifeboats.

Counting and Registering Persons on Board

- 1.16 The ship shall comply with the provisions of the technical regulation on the Counting and Registering of Persons on Board Passenger Ships issued by the Danish Maritime Authority, irrespective of the number of passengers that the ship carries. In the case of ships without a 24-hour shore-based organisation, the number of persons on board may be made available as agreed with the Danish Maritime Authority, e.g. by reporting to a coast radio station or a telephone-based, automatic reporting system approved by the Danish Maritime Authority.

Chapter 2-1: Structure – Subdivision, Stability, Machinery, Electrical Installations and Load Lines

Structure

- 2-1.1 The hull and superstructure shall be of sufficient strength for the intended purpose and service area. This shall be substantiated, either by means of the allocated class designation if the ship is and will continue to be inspected by a recognised classification society, or by means of an examination of the ship's strength and state of maintenance.
- 2-1.2 Wooden ships allocated a service area outside European waters shall be effectively protected against attack from shipworm.
- 2-1.3 Doors in machinery space bulkheads below the main deck may be permitted only in cases where the Danish Maritime Authority deems that they are compatible with the safety of the ship. Such doors shall be self-closing, and it shall not be possible to secure them in the open position. Doors shall not be permitted between accommodation spaces and machinery spaces.
- 2-1.4 Bulkheads and other partitions of machinery spaces and similar spaces with fixed fire extinguishing systems using fire extinguishing gases shall be suitably gastight.

Ground Tackle – Ships of a Length up to 15 Metres

- 2-1.5 Ships of a length up to 15 metres shall be provided with ground tackle, etc. as stipulated in the following and in Supplement 2 (table 1).
- 2-1.6 The anchor weight may be divided on two anchors, one of which shall, however, weigh at least two-thirds of the stipulated weight. The stipulated anchor weight is based on traditional types of anchor. If special anchors approved and certified by a recognised classification society are used, the anchor weight may be reduced by up to 25%. The anchor weight in vessels with relatively extensive rigging or a long superstructure shall be increased by up to 20% in addition to that stipulated in Supplement 2 (table 1).
- 2-1.7 The ship shall be equipped with at least one chain foreganger of a length and with dimensions as stipulated in Supplement 2 (table 1), and at least one anchor cable.

Ground Tackle – Ships of an Overall Length of 15 Metres and upwards but below 40 Metres

- 2-1.8 Ships with an overall length of 15 metres and upwards but below 40 metres shall be provided with ground tackle, etc. as stipulated in the following and in Supplement 2 (table 2).
- 2-1.9 Anchor weight: The total anchor weight shall be determined in accordance with column 2 of table 2 in Supplement 2, the stipulated weight being based on traditional types of anchor (stock anchors, etc.). The total anchor weight may be divided on several anchors, the largest of which shall at least have a weight as stipulated in column 3. It shall also be possible to couple two or more anchors. If special anchors approved and certified by a recognised classification society are used, the anchor weight may be reduced by up to 25%. If the ship has relatively extensive rigging or a long superstructure, the anchor weight stipulated in columns 2 and 3 shall, in both cases, be increased by up to 20%. Anchors weighing 150 kg and upwards shall be fitted in hawseholes or similar arrangements. If the weight of each of the two largest anchors is below 300 kg, it may be accepted that only one of the anchors is fitted in a hawsehole.
- 2-1.10 Anchor chain: In principle, the ship shall be equipped with two anchor chains, the length and dimensions of each anchor chain being determined in accordance with columns 4 and 5 of table 2 in Supplement 2. If the ship has relatively extensive rigging or a long superstructure, the length of each anchor chain shall be increased by up to 20% in addition to that stipulated in Supplement 2, table 2. Both anchor chains may, however, be replaced by anchor wire with a breaking strength in accordance with column 7 of table 2 in Supplement 2. If the anchor chains are replaced by wire, the length of the wire shall be at least 2.5 times greater than the required chain length, and between the anchor and the wire there shall be a chain foreganger with a diameter equal to that of the anchor chain and with a length of at least 12.5 metres. Ships below a length of 24 metres may, however, instead of chain or wire, use anchor cable with a chain foreganger.
- 2-1.11 Windlasses: Ships equipped with one or two anchor chains of a length as stipulated shall be provided with windlasses fitted with a cable pulley or drum for each anchor located in a

hawsehole, a clutch for releasing each cable pulley or drum from the driving shaft and a brake for each cable pulley or drum. It may not be possible to run the chains to the hawseholes outside of the cable pulleys or drums of the windlass. Additionally, a chain stopper shall be fitted between windlass and hawsehole for each anchor chain. A ship that is restored to its original appearance may be equipped with windlasses of a type used when the ship was operating in its original function. If the ship is equipped with manual windlasses, the crew shall always be sufficiently large for the windlass to be operated.

Ground Tackle – Ships of an Overall Length of 40 Metres and upwards

2-1.12 Ground tackle, etc. in unclassified ships with an overall length of 40 metres and upwards shall be determined in accordance with the design requirements of a recognised classification society. Ground tackle, etc. in classified ships shall be determined in accordance with the regulations of the classification societies.

Mooring Lines

2-1.13 The ship shall be equipped with adequate mooring capabilities. As a rule, the following should apply:

- 1) Ships below 15 metres shall be provided with two mooring lines of a length and breaking strength as stipulated in Supplement 2 (table 1).
- 2) Ships of 15 metres and upwards shall be provided with at least four mooring lines, each of a length and breaking strength as stipulated in Supplement 2 (table 3).

Hawser

2-1.14 Ships upwards of 15 metres in length shall be equipped with at least one hawser of a length and breaking strength as stipulated in Supplement 2 (table 3).

Stability

2-1.15 An inclining test shall be carried out under the control of the Danish Maritime Authority to determine the elements of the ship's stability. The master shall be supplied with such information, approved by the Danish Maritime Authority, as might be necessary to enable him, by rapid and simple procedures, to obtain accurate guidance as to the stability of the ship under various operating conditions. The final calculations shall be approved by the Danish Maritime Authority before the ship is put into service. The ship's stability will be assessed on the basis of the following:

- 1) All conditions of loading shall satisfy the following stability criteria after appropriate correction for the free surface of liquids in tanks under the preconditions of Resolution A.167(IV) (supplement I) or equivalent. The area beneath the curve for the righting stability lever (the GZ curve) shall be at least:

0.055 radian metres up to an angle of heel of 30°.

0.09 radian metres up to an angle of heel of 40° or the angle of admission, i.e. the angle of heel at which openings in hull, superstructures and deckhouses that cannot be shut weathertight are under water, if this is less than 40°.

0.03 radian metres between the angles of heel of 30° and 40° or between 30° and the angle of admission if this is less than 40°.

The righting stability lever GZ shall be at least 0.20 m at an angle of heel of 30° or more.

The maximum righting stability lever GZ shall preferably occur at an angle of heel of more than 30° and at least at 25°.

The initial metacentric height athwartships shall be at least 0.15 metres.

The conditions of loading to be taken into account to demonstrate compliance with the above stability conditions shall at least cover the conditions stipulated in supplement II to IMO Resolution A.167(IV).

- 2) In the case of sailing ships, stability calculations shall also be carried out under sailing load. The maximum angle of heel may not exceed 15° at a wind pressure of 110 N/m² sail area. (110 N/m² corresponds to the wind pressure at a wind speed of 12 m/sec).
- 3) Sailing ships shall have an arrangement facilitating rapid reefing or other rapid reduction of the canvas.

- 2-1.16 The Danish Maritime Authority may, if no reliable measurement of the hull (sheer drawing) is available, permit the inclining test and general stability calculations for a specific ship to be waived and replaced by a so-called dynamometer test,² provided that it is demonstrated to the Danish Maritime Authority that reliable stability data for the exempted ship may be derived from these results and that the stability criteria are satisfied under the worst operating condition occurring in practice.
- 2-1.17 If changes are made to a ship that significantly affect the stability data with which the master is provided, corrected stability data shall be obtained. If necessary, the ship shall be subjected to a new inclining test.
- 2-1.18 On ships carrying more than 12 passengers, a lightweight survey shall be carried out at maximum intervals of five years to check whether changes have been made to the ship's lightweight and longitudinal centre of gravity. The ship shall be subjected to a new inclining test if comparison with the approved stability data establishes or anticipates a deviation in the ship's lightweight of more than 2% or a deviation in its longitudinal centre of gravity of more than 1% of the ship's length.
- 2-1.19 The Danish Maritime Authority may permit the inclining test for a given ship to be waived if stability data from an inclining test carried out on a sister ship are available and it is justified to the Danish Maritime Authority that reliable stability data for the exempted ship can be derived from these data.

Machinery

- 2-1.20 Electrical installations in ships with a tonnage of 150 and upwards shall generally comply with the relevant provisions of Sections 137, 138 and 173 of Supplement 4 deriving from the now repealed Order no. 173 of 21 May 1965 on Regulations for the Construction, Equipment, etc. of Ships, as amended.
- 2-1.21 Electrical installations in ships with a tonnage below 150 shall generally comply with the provisions of Sections 137, 138, 174, 175 (c), 176, 177 and 178 of Supplement 2 deriving from the now repealed Order no. 173 of 21 May 1965 on Regulations for the Construction, Equipment, etc. of Ships, as amended.
- 2-1.22 Oil-fired central heating boilers shall mean boilers whose chamber for the liquid that is to be circulated in the central heating system is in non-closable communication with the atmosphere, and such boilers shall, in respect of their design and fitting, satisfy the provisions of the Danish Maritime Authority in force at any time.

Oil Fires

- 2-1.23 Oil fires shall be installed in accordance with the relevant guidelines of Danish Shipping Inspectorate Notices no. 257 hereon, which is reproduced in Supplement 5.

Gas Installations

- 2-1.24 Gas installations shall comply with the provisions of Order no. 372 of 7 August 1970 on Liquefied Petroleum Gas Systems in Ships, which is reproduced in Supplement 6.

Other Machinery

- 2-1.25 Other machinery shall satisfy the provisions of Supplement 7 deriving from the now repealed Order no. 387 of 7 July 1969. However, machinery need not satisfy Section 11 (d) and Section 12 (b) of the Supplement.

Pumping Arrangement – General

- 2-1.26 An effective bilge pumping arrangement shall be provided, which is, under all conditions, able to pump from and empty any watertight space, except for spaces intended solely for storing freshwater, water ballast, fuel oil or liquid cargo, and for which other effective pumping arrangement is available. Effective means of emptying water from insulated cargo spaces shall also be provided.
- 2-1.27 All suction pipes shall be made of steel, copper or other suitable material and shall be fitted with strainers. Strainers may be omitted if a suction filter has been placed directly above the outlet of the suction pipe so that it is easily accessible for cleaning.

2. Cf. Danish Maritime Authority Guideline on Approval of Intact Stability.

- 2-1.28 Bilge pumps shall be resistant to fire and mechanical damage, and valves, diaphragms, etc. shall not be made of natural rubber.
- 2-1.29 If diaphragm pumps are used which can be quickly opened and closed, the strainer or suction filter may be omitted if the Danish Maritime Authority deems it appropriate.
- 2-1.30 The bilge pumping system shall be designed so that water from the sea is prevented from penetrating into any space in the ship or from one space to another via the bilge pumping system.
- 2-1.31 All bilge pumping systems shall be provided with at least two non-return valves between the suction point and the overboard feed line, one of which shall be fitted on the suction side.

Pumping Arrangement – Number of Bilge Pumps and their Capacity

- 2-1.32 Ships with a tonnage of 150 and upwards shall be provided with at least two mechanically driven bilge pumps independent of the propelling engine. A prescribed fire pump may not be used as a prescribed bilge pump.
- 2-1.33 Ships with a tonnage below 150 shall be provided with at least two mechanically driven bilge pumps, one of which shall be independent of the propelling engine. One bilge pump may be a portable, diesel-driven emergency fire pump, provided that this can be moved to suck from all watertight spaces and provided that the Danish Maritime Authority finds the arrangement otherwise appropriate.
- 2-1.34 The bilge pump capacity shall be such that each pump can generate a water velocity in the bilge line of 2 m/sec, the internal diameter of the bilge line being calculated as follows:
 - $d = 25 + 1.68\sqrt{L \times (B + D)}$ where:
 - d = internal diameter of the line in mm
 - B = ship's breadth in m
 - L = ship's length in m
 - D = ship's depth (moulded) to the bulkhead deck in m.
- 2-1.35 However, the internal diameter of the bilge line shall always be at least 50 mm.
- 2-1.36 The table in Supplement 3 shall be used to calculate the bilge line and the pump capacity. The bilge pump capacity shall be at least 15 m³/h in all cases.

Freeboard

- 2-1.37 The ship shall be provided with bulwarks or rails of an appropriate design and with a height of at least 0.9 m above the deck's upper edge. If rails are used, the distance between the stanchions may not exceed 1.5 m and they shall be connected either with strong protective netting or with bars with a mutual spacing of not more than 380 mm, although the opening beneath the lowest bar may not exceed 230 mm. If the ship did originally have bulwarks below a height of 0.9 m and is restored to its original appearance, the Danish Maritime Authority may, under specific conditions, permit lower bulwarks.
- 2-1.38 It shall be possible to rig up lifelines or other satisfactory means of safeguarding those on board.
- 2-1.39 If there are bulwarks, these shall be provided with a clearing area sufficient for the deck to be quickly emptied of water.
- 2-1.40 The freeboard and conditions related hereto shall be determined by the Danish Maritime Authority on the basis of the provisions of the International Convention on Load Lines (1966) relating to cargo ships. The following shall also apply:
 - 1) The freeboard shall be determined on the basis of the deepest load waterline and the stability requirements.
 - 2) In the case of ships with a length of 24 metres and upwards, the freeboard may never be less than the freeboard that may be assigned in application of the provisions of the International Convention on Load Lines (1966).
 - 3) In the case of ships with a length below 24 metres, the freeboard may never be below 0.6 m. However, if the ship originally had a freeboard below 0.6 metres and has been restored to its original appearance, the Danish Maritime Authority may, under specific conditions, permit a freeboard below 0.6 m.

2-1.41 In the case of ships not holding an International Load Line Certificate, the freeboard shall be marked amidships from a deck line applied level with the upper edge of the deck at the ship's side to a load line running through the centre of an annulus. The load line for navigation in freshwater shall be obtained by reducing the assigned summer freeboard by $\frac{1}{48}$ the draught. The marking of the freeboard shall be verified by an entry in the ship survey book under section II.

Chapter 2-2: Structure – Fire Protection, Fire Detection and Fire Extinction

Structural Fire Protection

- 2-2.1 Galleys located below deck shall be fire-insulated on the galley side using e.g. 50 mm thick mineral wool batt (ca. 110 kg/m³) corresponding to A-60. The insulation covering shall be fire retardant. Doors shall have the same fire resistance as the bulkhead and shall be self-closing.
- 2-2.2 If galleys are located above deck, they shall be clad with non-combustible plate in the areas closest to the source of heat.
- 2-2.3 Sound absorbing material for machinery spaces or engine casing shall be of a type acceptable to the Danish Maritime Authority.
- 2-2.4 Accommodation executed in combustible material shall be fitted with a manually operated, open sprinkler system covering all spaces and supplemented by smoke detectors, cf. 2-2.25.
- 2-2.5 If accommodation structures are primarily of approved non-combustible material, an approved automatic fire-detection system shall be installed, irrespective of the furnishing, covering all spaces.
- 2-2.6 The use of combustible materials for bulkheads, lining, ceiling, padding, etc. shall be limited as much as possible. In the case of ships worthy of preservation, however, account may be taken of the ship's original arrangement.
- 2-2.7 There shall be at least two means of exit from all large spaces or groups of spaces, one of which may be an emergency exit with a free passage of at least 60 × 60 cm, which can be opened directly from both sides. In the case of special spaces, one exit may be omitted, provided the Danish Maritime Authority considers that only one exit is satisfactory in respect of safety. If openings are locked in port and there are persons on board, it shall be possible to open the openings from below without using tools.

Fire Detection and Fire Extinction

- 2-2.8 All ships shall be provided with suitable installations and equipment for detecting and extinguishing fire. The installations and equipment shall always be in place, in working order and ready for immediate use when the ship is manned.

Fire Pumps

- 2-2.9 At least two mechanically driven fire pumps shall be provided, one of which shall be an emergency pump. They shall be installed so that a fire in any given space cannot put both pumps out of operation at the same time.
- 2-2.10 In ships with a tonnage below 100, the emergency pump may be a portable, diesel-driven pump or a submersible pump, provided that it can be driven by a source of power outside the machinery space.

Capacity and Pressure of Fire Pumps

- 2-2.11 In ships with a tonnage of 500 and upwards, the capacity and pressure of the fire pumps shall be in accordance with the provisions relating to cargo ships in Notice B from the Danish Maritime Authority (chapter II-2, regulation 4), which are reproduced in Supplement 8.
- 2-2.12 In ships with a tonnage of 20 and upwards but below 500, each fire pump shall have a capacity of at least 24 m³/hour and shall be able to maintain a pressure of 2.6 bar when fire hoses are used with 12 mm jet nozzles at the two hydrants furthest away from the pump.

Hydrants and Fire Hoses

- 2-2.13 The number and location of hydrants and fire hoses shall be determined by the Danish Maritime Authority in each individual case. In general, the ship shall be provided with hydrants, fire hoses and jet pipes to an extent that makes it possible to reach any part of the ship accessible to the crew with a jet of water emanating from a single length of hose. In ships with a tonnage of 150 and upwards, any part of the ship accessible to the crew shall be reachable with two jets of water, one of which emanates from a single length of hose.
- 2-2.14 Fire hoses and jet pipes shall be of an approved type.

Portable Fire Extinguishers

- 2-2.15 At least one portable fire extinguisher shall be provided for the propelling machinery.
- 2-2.16 In spaces containing internal combustion engines with a total output of more than 375 kW, a 45 kg foam extinguisher or another fire extinguisher with a corresponding capacity shall also be available.
- 2-2.17 In service and accommodation spaces, a suitable number of fire extinguishers shall be available to the satisfaction of the Danish Maritime Authority.
- 2-2.18 Portable fire extinguishers shall preferably be located at the entrances to the spaces that they protect.
- 2-2.19 For each type of portable fire extinguisher required on board, at least two additional fire extinguishers shall be available. If there is only one fire extinguisher of a given type, it shall be sufficient to have one additional extinguisher of this type.

Fire-Extinguishing Systems for Deep Fat Fryers

- 2-2.20 All deep fat fryers shall be provided with an approved, fixed fire-extinguishing system.

Fireman's Outfits

- 2-2.21 Ships with a tonnage of 150 and upwards shall carry at least two approved fireman's outfits.

Fixed Fire-Extinguishing Systems

- 2-2.22 In machinery spaces containing propelling machinery or auxiliary machinery necessary for the safe operation of the ship, an approved, fixed fire-extinguishing system shall be available. The fixed fire-extinguishing system shall, in respect of design and installation, satisfy the regulations laid down in Notice from the Danish Maritime Authority.

Fire-Extinguishing Systems in Accommodation and Service Spaces

- 2-2.23 In ships with passenger cabins, a manually operated sprinkler system that satisfies the provisions of Notice B from the Danish Maritime Authority (chapter II-2, regulation 37.1.3.1) shall be installed to protect accommodation and service spaces. The system shall be divided into sections in accordance with the size of the ship. In ships with a gross tonnage below 150, the sprinkler system may be supplied with water from one of the prescribed fire pumps, provided that the pump can simultaneously provide the quantity of water required as a fire pump and a sprinkler pump.

Fixed Fire Detection and Fire Alarm Systems

- 2-2.24 All ships shall be fitted with fixed fire detection and fire alarm systems that satisfy the provisions of Notice B from the Danish Maritime Authority (chapter II-2, regulation 13).
- 1) The system shall be divided into sections in accordance with the size of the ship, but there shall always be dedicated sections for the propelling machinery space and for the accommodation area.
 - 2) Smoke detectors shall be used in the accommodation area, whilst a combination of smoke detectors and thermal detectors may be used in machinery spaces.
 - 3) The general alarm shall automatically sound if there is no acknowledgement within two minutes of an alarm that has been received.

Chapter 2-3: Accommodation Spaces

Operating Crew Accommodation

- 2-3.1 If the original, approved crew accommodation is to be preserved, the Danish Maritime Authority shall assess in each individual case the extent to which the existing accommodation may be accepted for the new purpose. It shall be assumed that the number of persons does not exceed that for which the accommodation was originally intended.
- 2-3.2 Crew accommodation shall be designed in accordance with the provisions of Order no. 67 of 28 February 1977 on Crew Accommodation in Ships, as amended. The basic requirements are as follows:
- 1) The floor area, including fixed furniture, shall be at least 3 m² for one person and 4 m² for two persons.
 - 2) The free height below deck beams shall be at least 1.98 m.
 - 3) Berths shall be at least 1.98 x 0.80 m.
 - 4) Electric lighting shall be provided and, wherever possible, access to daylight.
 - 5) Adequate heating and ventilation shall be provided.
 - 6) In ships with a gross tonnage of 50 and upwards, there shall be a toilet with wash basin running freshwater and, wherever possible, a bathroom with shower running hot and cold freshwater.
 - 7) In ships with a gross tonnage of 200 and upwards, there shall be a separate galley and a separate mess for the crew.
- 2-3.3 In the case of ships permitted to operate only between 06.00 and 22.00, it shall generally be sufficient to fit up accommodation spaces (rest rooms) without any actual berths.
- 2-3.4 Ships regularly engaged on voyages between 30° N and 30° S shall, irrespective of their size, be equipped with an air conditioning system satisfying the provisions of Section 6 (9), Sections 9, 10 and 11 and Section 25 of Order no. 67 of 28 February 1977 on Crew Accommodation in Ships, as amended.
- 2-3.5 Ships that regularly visit mosquito-ridden areas shall have mosquito netting over all ventilation openings, external doors and openable windows and portholes. If the ship is equipped with a statutory air conditioning system, the requirement for mosquito netting may be waived.
- 2-3.6 There shall be adequate facilities for storing provisions.

Accommodation for Others than the Operating Crew – General Provisions

- 2-3.7 The spaces shall be appropriately and properly fitted up.
- 2-3.8 The spaces shall be provided with electric lighting.
- 2-3.9 Exits shall be clearly marked with lights that are either switched on from the control station or are permanently switched on when there are persons on board in addition to the crew.
- 2-3.10 If the ship operates during the period from 1 October to 30 April, there shall be enclosed spaces for all those on board.
- 2-3.11 The free height below deck beams shall, wherever possible, be at least 1.98 m. However, if it cannot be avoided, a lower height below deck beams may be acceptable.

Accommodation for Others than the Operating Crew – Ships Used for Overnight Accommodation

- 2-3.12 In the case of ships used for overnight accommodation, the following shall also apply:
- 1) Each person shall have an enclosed space with 0.85 m² free floor area.
 - 2) Each person shall have a fixed table and chair.
 - 3) Each person shall have a berth, sofa or hammock. If hammocks are used, the Danish Maritime Authority shall approve a plan of the position of the hammocks. Hammocks

may only be fitted one deep and may not be fitted so as to prevent free passage to evacuation routes. Such passages shall be at least 0.6 m wide.

- 4) There shall be a suitable number of toilets with WC and wash basin running freshwater.
- 5) There shall be suitable washrooms.
- 6) There shall be adequate ventilation for the spaces.
- 7) Galleys and suitable storerooms shall be fitted up, taking into account, however, the number of persons on board and other arrangements.

Accommodation for Others than the Operating Crew – Ships not Used for Overnight Accommodation

2-3.13 In the case of ships **not** used for overnight passenger accommodation, the following shall apply instead of 2-3.12:

- 1) Each passenger shall have an enclosed space with 0.85 m² free floor area. During the period from 1 May to 30 September, the Danish Maritime Authority may, taking into account the type, use and service area of the ship, also permit passengers to be carried on open deck, in which case each passenger shall have at least 0.55 m² free deck area. Where this is permissible, there shall be enclosed spaces with 0.85 m² free floor area for at least one-sixth of the total number of passengers.
- 2) There shall be at least one toilet with WC and wash basin running freshwater.
- 3) There shall be adequate ventilation for all enclosed spaces.

Hoist Stretcher

2-3.14 In ships with a gross tonnage of 150 and upwards, a hoist stretcher of appropriate type shall be available.

Drinking Water

2-3.15 Drinking-water tanks shall satisfy the following provisions:

- 1) Fixed tanks shall have cofferdams against tanks intended for other liquids. In riveted ships, the ship's side shall not form the boundary of a drinking water tank.
- 2) Tanks shall be fitted with the necessary manholes and shall, as far as possible, be accessible for both external and internal inspection. If their design and size do not permit access to the inside, they shall be provided with an adequate number of cleaning holes. Manholes and cleaning holes shall be designed so as to prevent the accumulation of impurities. Horizontal openings shall be provided with coamings of a height of at least 50 mm.
- 3) Feeding pipes to tanks that are fed from shore-based facilities shall be led up to approx. 400 mm above deck and be provided with a screw cap with chain.
- 4) Openings for air pipes on drinking water tanks shall be provided with fine-mesh netting. In ships with a tonnage of 150 and upwards, at least two air pipes shall be fitted as far apart as possible.
- 5) It shall be possible to fully empty tanks, either by suction from the tank's lowest point or via a bottom valve.
- 6) Tanks shall be provided with standpipes or other approved sounding device fitted so that pollution cannot be introduced to the water via this route.
- 7) Pipes may not be carried through drinking water tanks, nor shall pipes in the drinking water system lead through other tanks.
- 8) Measures shall be taken to ensure that drinking water is not mixed with other liquids in the pipe system.
- 9) Treatment of the internal surfaces of tanks, pipes, etc. shall only be carried out using materials approved for this purpose by the Danish Maritime Authority.

Chapter 3: Life-Saving Appliances and Arrangements

Lifejackets

- 3.1 Approved lifejackets shall be carried for all persons on board and additional lifejackets corresponding to 5% of the number of persons on board.
- 3.2 If children are carried, there shall also be children's lifejackets corresponding to 10% of the number of persons on board, but in any case at least a number corresponding to the actual number of children on board. Children shall mean persons weighing up to 32 kg.
- 3.3 Lifejackets shall be provided with an approved light, unless the ship only operates between sunrise and sunset.
- 3.4 Lifejackets shall be kept on deck in boxes or cupboards clearly marked "LIFEJACKETS" or with an approved pictogram. Approved instructions for putting on lifejackets shall be posted in appropriate places.

Immersion Suits

- 3.5 Ships equipped with life nets shall carry an approved immersion suit for use with the net.
- 3.6 Ships equipped with a rescue boat shall carry an approved immersion suit or protective suit for each person appointed to man the boat.

Thermal Protective Aid

- 3.7 Ships sailing during the period from 30 September to 1 May shall carry thermal protective aid for all persons on board.

Lifebuoys

- 3.8 At least two approved lifebuoys shall be carried on board. However, ships with a tonnage upwards of 150 gross tonnes shall carry four such lifebuoys. The lifebuoys shall be positioned appropriately throughout the ship. A lifebuoy shall be provided with a 30-metre line that can float on water. Other lifebuoys shall be provided with self-igniting lights.

Embarkation Arrangements

- 3.9 The embarkation arrangements shall be such that all persons on board can be evacuated within ten minutes.
- 3.10 It shall be possible to secure liferafts and rescue boats at the embarkation station until the total complement of persons has embarked.
- 3.11 In ships where the height from the surface of the sea to the embarkation deck exceeds 1.5 metres, an embarkation ladder designed like a pilot ladder shall be available at each embarkation station.
- 3.12 In ships where the height from the surface of the sea to the embarkation station on the ship exceeds 4.5 metres, it shall be possible to launch the liferafts with the total complement of persons using a davit or crane.

Liferafts

- 3.13 The ship shall be provided with approved liferafts of sufficient total capacity to accommodate all persons on board, plus an extra capacity of 25%. There shall be at least two liferafts. Furthermore, the number of liferafts shall be such that, if a lifeboat is lost or becomes unusable, it is possible to carry all the persons on board in the remaining liferafts.
- 3.14 Under special conditions, e.g. voyages of short duration and only in favourable weather conditions, the Danish Maritime Authority may permit the number of persons on board to correspond to the capacity of the life-saving appliances, i.e. with no liferaft overcapacity.
- 3.15 Ships engaged on voyages that are not restricted shall have liferafts on each side of the ship with a capacity to accommodate all persons on board. Ships engaged on day voyages may be exempted from the requirement for drinking water in the liferafts.
- 3.16 Liferafts shall be equipped in accordance with the provisions for equipping liferafts in cargo ships engaged on domestic voyages.

- 3.17 Liferrafts shall be mounted on ramps with a 20° inclination towards the sides, free from rails and other obstructions, so that, when the lashings are removed, they roll into the water of their own accord. The painter (release line) shall be fastened to the ship. If liferaft lashings are used, they shall be provided with a hydrostatic release unit approved by the Danish Maritime Authority so that the liferaft floats freely to the surface and is inflated automatically if the ship sinks.
- 3.18 Liferrafts and hydrostatic release units shall be checked at an approved service station at maximum intervals of 12 months.
- 3.19 Liferrafts may be wholly or partly replaced by lifeboats mounted under davits. In such cases, the lifeboats shall satisfy the provisions relating to lifeboats, lifeboat arrangements and launching appliances in Notice B from the Danish Maritime Authority.

Rescue Arrangements

- 3.20 Ships that the Danish Maritime Authority considers suitable for manoeuvring up to persons to retrieve them from the water may be exempted from being equipped with lifeboats. Such ships shall be equipped with an approved life net, a ladder designed like a pilot ladder and an approved immersion suit.
- 3.21 Ships with a gross tonnage of 50 and upwards that are not exempt from the lifeboat requirement pursuant to the provisions of 6.20 shall be equipped with lifeboats in accordance with the provisions of Section 297 of Order no. 173 of 21 May 1965 on Regulations for the Construction, Equipment, etc. of Ships, as amended.

Emergency Lighting

- 3.22 Ships carrying passengers during the period between 18.00 and 06.00 and all ships with a gross tonnage of 150 and upwards shall be provided with emergency lighting that is able to effectively illuminate life-saving appliances during preparation and launching and the area of the sea into which they are launched.

Distress Flares

- 3.23 The ship shall carry 12 rocket parachute flares and two orange smoke signals. The flares and signals shall be of an approved type and shall be renewed in accordance with the manufacturer's instructions four years after the date of manufacture at the latest. Ships that are engaged on voyages only between sunrise and sunset shall be required to carry only six rocket parachute flares and two orange smoke signals.

Chapter 4: Radiocommunications

Application

- 4.1 This chapter shall apply to new and existing ships covered by these regulations, with the exception of ships engaged on voyages of not more than 1/2 hour's duration at sea.

Entry into Force

- 4.2 The provisions shall be satisfied by 1 February 2002 at the latest, although ships operating exclusively within sea area A1 may postpone compliance with the requirements of this chapter until 1 February 2003. (In Denmark, sea area A1 covers Danish internal waters and the North Sea to approximately 25 nautical miles from the coast).
- 4.3 The provisions of this chapter shall not preclude a ship or survival craft in an emergency from using whatever means at its disposal to attract attention, make its position known and get help.

Terms and Definitions

- 4.4 The following definitions shall apply within the meaning of this Chapter:

- .1 "DSC" shall mean digital selective calling, which is a technique using digital codes which enables a radio station to establish contact with, and transfer information to, another station or group of stations and complying with the relevant recommendations of the International Radio Consultative Committee (ITU-R).
- .2 "INMARSAT" shall mean the organisation established by the Convention on the International Maritime Satellite Organization (Inmarsat) adopted on 3 September 1976.
- .3 "EPIRB" (Emergency Position Indicating Radio Beacon) shall mean a satellite emergency radio direction finder.
- .4 "MMSI" (Maritime Mobile Service Identity) shall mean a 9-digit number identifying the ship in, among others, DSC equipment and EPIRBs.
- .5 "Float-free EPIRB" shall mean an EPIRB fitted in a holder designed so that the EPIRB is activated automatically and floats free of the ship if it sinks.
- .6 "SART" (Search And Rescue Transponder) shall mean a transmitter/receiver activated by signals from a 3-cm radar and emitting signals registered by 3-cm radars. It shall be used for locating in emergencies.
- .7 "NAVTEX" shall mean a receiver for automatically receiving English-language maritime safety information (MSI) on 518 kHz.
- .8 "Sea area A1" shall mean an area within the radiotelephone coverage of at least one VHF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government.
- .9 "Sea area A2" shall mean an area, excluding sea area A1, within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government.
- .10 "Sea area A3" shall mean an area, excluding sea areas A1 and A2, within the coverage of an INMARSAT geostationary satellite in which continuous alerting is available.
- .11 "Sea area A4" shall mean an area outside sea areas A1, A2 and A3.
- .12 "Continuous watch" shall mean that the radio watch concerned shall not be interrupted other than for brief intervals when the ship's receiving capability is impaired or blocked by its own communications or when the facilities are under periodical maintenance or checks.

Equipment Requirements

- 4.5 Ships shall be equipped with radio equipment as shown in the following table:

Sea Area	VHF-DSC	MF-DSC	HF-DSC	Inmarsat-C	EPIRB Float-free	SART	Portable VHF	NAVTEX
A1	1				1 ¹	1	1	1
A2	1	1			1	1	1	1

- .1 Insofar as concerns functional requirements for the individual radio equipment in the above table and its installation, the provisions of the radiocommunications chapter of Notice B (IV) from the Danish Maritime Authority shall apply. Reference is made to these regulations.

The VHF-DSC equipment shall be of class A, B or D, and the MF-DSC equipment of class A, B or E.

- .2 In the case of navigation in Greenland waters, the Danish Maritime Authority may exempt vessels, if they are engaged on voyages exclusively within sea area A2, from the requirements for VHF-DSC provided that, if practicable, they keep a continuous watch on VHF channel 16.
- .3 The radio installation shall be provided with reliable, fixed electric lighting, providing sufficient light for the operational facilities of the radio installation.
- .4 The radio installation shall be clearly marked with the ship's name, call signal and MMSI number. There shall also be a notice at the radio installation giving non-technical instructions for a distress situation on how to start the radio equipment and transmit a distress call.

Watches

- 4.6 All ships shall, while at sea, maintain a continuous watch:
- .1 on VHF DSC channel 70 if the ship is equipped with VHF-DSC;
 - .2 on the distress and safety DSC frequency 2187.5 kHz if the ship is equipped with MF-DSC;
 - .3 for satellite shore-to-ship distress alerts if the ship is fitted with an Inmarsat-C station.
- 4.7 All ships shall, while at sea, maintain a radio watch for broadcasts of maritime safety information (MSI) on the appropriate frequency or frequencies on which such information is broadcast for the area in which the ship is navigating.
- 4.8 Until 1 February 2005, all ships shall, while at sea, maintain, when practicable, a continuous listening watch on VHF channel 16. This watch shall be kept at the position from which the ship is normally navigated.

Sources of Energy

- 4.9 At all times while the ship is at sea, a supply of electrical energy shall be available sufficient to operate the radio installations and to charge any batteries used as part of a reserve source or sources of energy for the radio installations.
- 4.10 The radio installations shall be connected to the ship's main source of energy and, via an automatic switch, to a separate radio battery.
- 4.11 There shall be an alarm at the radio installation that sounds when the radio installation is only powered by the separate radio battery.
- 4.12 The lighting required by regulation 4.5 and any navigational equipment connected to the ship's radio installation shall be connected to the same source of energy as the radio installation.
- 4.13 At the same time it must be possible for the radio battery to supply the following radio equipment for at least six hours:
- .1 VHF-DSC and MF-DSC if the ship is engaged on voyages in sea area A2.

1. Requirements for EPIRB and NAVTEX receivers do not apply to operations in protected waters of class D, cf. chapter 1 of Notice D from the Danish Maritime Authority.

Maintenance

- 4.14 Adequate technical documentation shall be provided on board for the equipment to be properly operated and maintained.
- 4.15 Adequate spares and tools shall be provided for the equipment to be maintained.
- 4.16 The equipment shall be kept in an operational state.

Radio Personnel

- 4.17 All ships shall carry personnel qualified for distress and safety radiocommunication purposes. The personnel shall hold the relevant radio certificates. A specified person among the personnel shall be appointed to the primary responsibility for radiocommunications in cases of emergency.

Radio Record Book – Ship’s Logbook

- 4.18 All incidents connected with the radiocommunications service that appear to be of importance to the safety of life at sea shall be recorded in the Ship’s Logbook if one is required to be kept.

Chapter 5: Safety of Navigation

Navigation, etc.

- 5.1 The ship shall carry adequate and up-to-date charts and nautical publications, etc. to the extent necessary for the given service area.
- 5.2 Binoculars, barometers, watch clocks, echo sounders and radar installations shall be provided. In the case of wooden ships with a tonnage below 150, an effective radar reflector is recommended.
- 5.3 The ship shall be equipped with a class A compass, which is electrically illuminated. At intervals of not more than 12 months, the deviation of the compass shall be fully determined and any compensation made.
- 5.4 The ship shall be provided with lights, shapes and means of giving sound signals pursuant to the provisions of the International Regulations for Preventing Collisions at Sea, 1972 (COLREG) and Danish Shipping Inspectorate Notices no. 380.
- 5.5 Ships engaged on voyages outside European waters shall have electronic position-fixing equipment for the area of navigation, a spare class A compass, sextant, chronometer, stop watch, logbook, the international signal code, international signal flags and spare lights.

Chapters 6-8 have been reserved for later use

Chapter 9: Safe Ship Operation

Safety Management System

- 9.1 Ships permitted to carry more than 12 passengers and shipping companies managing such ships shall establish and maintain a Safety Management System (SMS) in the shipping company's shore-based organisation, if any, as well as on the company's individual ships, with a view to achieving safe operation and statutory maintenance and preventing pollution. The Safety Management System shall comply with the ISM Code.

Definitions

- 9.2 The following definitions shall also apply in connection with the safety management system:
- 1) **Departure:** An observed situation in which objective proof indicates failure to comply with a stipulated requirement.
 - 2) **Audit:** A systematic and independent examination of safety management activities and the results produced hereby with a view to establishing that these measures are being carried out in an effective manner and are suitable for the purpose.
 - 3) **Safety Management Certificate:** A certificate issued to a ship as evidence that it is managed in accordance with the approved safety management system.
 - 4) **Serious departure:** An identifiable departure, which constitutes a serious threat to the crew, the safety of the ship or the environment, and which requires immediate remedy; failure to effectively and systematically implement the requirements of the ISM Code shall also be considered a serious departure.
 - 5) **ISM Code:** The International Code for Safe Management of Ships and Prevention of Pollution (International Safety Management Code) as adopted by the International Maritime Organization (IMO), as amended.
 - 6) **Shore-based shipping company operations:** Administrative operations directly connected with the shipping company's safety management system and performed from shore-based facilities.
 - 7) **Document of Compliance:** A document issued to a shipping company as evidence that the shipping company's shore-based operations are being performed in compliance with the approved safety management system. In shipping companies where there are no actual shore-based operations, a Safety Management Certificate is issued only to the company's ships.
 - 8) **Shipping company:** The owner of the ship or any other organisation or person, e.g. the operator or bareboat charterer which/who has taken over responsibility for management of the ships from the owner of the ship and which/who, having assumed such responsibility, has declared its/his consent to taking over all the duties and areas of responsibility imposed by these regulations.
 - 9) **Safety Management System (SMS):** A structured and documented system enabling the shipping company's personnel to effectively implement the company's safety and environmental protection policy.

9.3 Certification and Control

- 1) Following a satisfactory audit of shipping companies with shore-based operations, the Danish Maritime Authority shall issue a Document of Compliance. The document shall be valid for five years at a time.
- 2) Following a satisfactory audit of a passenger ship, the Danish Maritime Authority shall issue a Safety Management Certificate. The certificate shall be valid for five years at a time.
- 3) The shipowner shall be responsible for ensuring that shipping companies covered by 1 above and passenger ships covered by 2 above hold equivalent, valid certificates.
- 4) The shipping company shall carry out internal audits of its safety management system (SMS) at least once every 12 months. It shall be possible to present the necessary documentation hereof to the Danish Maritime Authority.

- 5) The Danish Maritime Authority shall, once a year, be called to carry out annual audits of shipping companies covered by 1 above. The annual audits shall, insofar as possible, be carried out at 12-month intervals, calculated from the date of issue of the Document of Compliance in question.
 - 6) The Danish Maritime Authority shall be called to carry out at least one intermediate audit of passenger ships during the course of the five-year period referred to in 2 above. This intermediate audit shall be carried out between 24 and 36 months after the date of issue of the Safety Management Certificate in question.
 - 7) The Danish Maritime Authority may, if it deems it necessary, carry out extraordinary audits.
- 9.4 For newly established shipping companies, in the event of significant changes in a ship's use, major conversions, purchase of ships or supply of newly built ships, the Danish Maritime Authority may, under specific conditions, issue a temporary Document of Compliance or a Safety Management Certificate with a period of validity of up to six months.
- 9.5 A Document of Compliance or a Safety Management Certificate may be withdrawn by the Danish Maritime Authority if serious departures from the safety management system are found or if annual or intermediate audits are not ordered. If a Document of Compliance is withdrawn, the Safety Management Certificate for the shipping company's ship(s) shall be withdrawn at the same time.

Chapters 10-19 have been reserved for later use

Chapter 20: Treatment and Storage of Sewage

Regulation 1: Definitions

For the purposes of this regulation, the following definitions shall apply:

- 1.1 "Sewage":
 1. drainage and other waste from any form of toilet, urinal and WC drain,
 2. drainage from hospital spaces (pharmacy, infirmary, etc.) via wash basins, wash tubs and drains located in such spaces,
 3. drainage from spaces containing live animals, or
 4. other sewage when mixed with the drainage defined above.
- 1.2 "Storage tank": A tank used to collect and store sewage.
- 1.3 "Approved": Approved by the Administration or by an authority or organisation approved by the Administration.
- 1.4 "Baltic Area": As defined in Act no. 476 of 30 June 1993 on Protection of the Marine Environment.
- 1.5 "Danish territorial waters": As determined by international law.

Regulation 2: Application

- 2.1 The provisions of this technical regulation shall apply to ships holding a sailing permit for the Baltic Area and for Danish territorial waters, and
 1. which have a gross tonnage of 200 and upwards,
 2. which have a gross tonnage below 200 and are approved to carry more than ten persons, and
 3. which do not have a measured gross tonnage and are approved to carry more than ten persons.

Regulation 3: Discharge of Sewage

- 3.1 Sewage may be discharged into the sea only provided that
 1. the discharging is effected using an approved sewage treatment plant and the effluent, when discharged, does not leave visible traces in the sea, or
 2. the sewage is comminuted and disinfected in an approved system and discharged at a distance of at least four nautical miles from the nearest coast, or
 3. the discharging is effected at a distance of at least 12 nautical miles from the nearest coast. If the discharging is effected from a tank for collecting and storing sewage, the ship's speed shall also be at least 4 knots and the discharging shall be effected at a moderate rate.

Regulation 4: Pipeline and connecting flange for drainage to reception facilities

- 4.1 The ship shall be equipped with a pipeline and pump for draining sewage to shore-based reception facilities. The pipeline shall be fitted with a connecting flange with dimensions as given below, although other means of connection may be used for ships engaged on regular and domestic voyages.
- 4.2 Standard connecting flange dimensions

Description	Dimension
External diameter	210 mm
Internal diameter	According to pipe diameter
Bolt circle's diameter	170 mm
Slots in flange	Four holes, 18 mm in diameter, spaced equidistantly on a bolt circle of the above diameter, slotted to the flange periphery. The breadth of the slot shall be 18 mm.
Flange thickness	16 mm
Bolts and nuts: Quantity and diameter	Four, each of 16 mm diameter and of suitable length.

The flange shall be designed to accept pipes up to a maximum internal diameter of 100 mm and shall be made of steel or other similar material with a even surface. The flange and its gasket shall be able to withstand a working pressure of 600 kPa.

Regulation 5: Surveys

- 5.1 The ship shall be subjected to an initial survey before it is put in service or before the certificate referred to in regulation 6 is issued for the first time. The survey shall be so comprehensive as to ensure,
1. if the ship is equipped with a sewage treatment plant, that the plant satisfies operational requirements based on standards and tests recommended by the Helsinki Commission*, and that the system is approved,
 2. if the ship is equipped with a system for comminution and disinfection of sewage, that the system satisfies operational requirements based on standards and tests recommended by the Helsinki Commission*, and that the system is approved,
 3. if the ship is equipped with a holding tank, that the capacity of the tank is approved by the Danish Maritime Authority for the storage of sewage, taking into account the ship's use, the number of persons on board and other relevant factors, and that the tank satisfies operational requirements based on standards and tests recommended by the Helsinki Commission*,
 4. that the ship is equipped with a pipeline to discharge sewage to shore-based reception facilities, which pipeline shall be fitted with a standard flange in accordance with the provisions of 4.2 or, in the case of ships engaged on regular and domestic voyages, an alternative connecting option, and
 5. that equipment, accessories, systems and materials fully satisfy the relevant provisions of these regulations.
- 5.2 The ship shall be subjected to periodical surveys at intervals of five years ensuring that equipment, fittings, systems and materials fully satisfy the relevant provisions of these regulations.
- 5.3 When a survey of a ship has been completed, no change shall be made in the equipment, fittings, systems or materials covered by the survey, apart from direct replacement of such equipment and fittings, without the approval of the Danish Maritime Authority.

Regulation 6: Issue of Certificate

- 6.1 When a survey has been carried out in accordance with the provisions of regulation 5, a Sewage Pollution Prevention Certificate shall be issued by the Danish Maritime Authority to ships approved to carry more than 50 persons engaged on voyages in the Baltic Area.
- 6.2 The certificate shall be issued for a period of five years.
- 6.3 The certificate shall cease to be valid if major changes are made to equipment, accessories, systems or requisite materials without the approval of the Danish Maritime Authority, with the exception of direct replacement of equipment or accessories.

*. The Convention on the Protection of the Marine Environment of the Baltic Area.

Annex A: Guidelines for Type-Testing and Approval of Sewage Treatment and Storage Plants

These guidelines have been drawn up on the basis of the International Convention for the Prevention of Pollution from Ships, 1973, Annex IV (MARPOL 73/78, Annex IV) and the Recommendation on International Effluent Standard and Guidelines for Performance Tests for Sewage Treatment Plants (IMO Resolution MEPC. 2 (VI)). The guidelines shall apply to sewage treatment plants installed on ships pursuant to the regulations of the Helsinki Convention (Baltic Sea Convention).

1. Application

These guidelines shall apply to three different systems, as shown in the following table, where "yes" means that the given system is covered by the given section and "no" means that it is not covered.

Section	Sewage Treatment Plant	System for Comminution and Disinfection	Holding tank
2	Yes	yes, except subsection 2.2.10	no
3	yes, except subsections 3.7 and 3.8	yes, except subsection 3.1	no
4	Yes	yes	no
5	yes, except subsection 5.7	yes	yes, except subsection 5.6
6	yes, except subsections 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10 and 6.11	yes, except subsections 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10 and 6.11	yes
7	yes	yes, except subsection 7.3.6	yes, except subsections 7.3.4, 7.3.5 and 7.3.6

2. Application for type-approval

The application and enclosures shall be submitted to the Danish Maritime Authority in duplicate.

2.1 The application shall contain the following:

1. description of the plant's processing principle and function, including schematic drawings;
2. description of materials, including those which are in contact with the waste water and any chemicals;
3. installation guidelines;
4. operating instructions;
5. maintenance instructions;
6. record of the most important components in the treatment process;
7. any documentation of experience using the system in ships;
8. proposed test programme in accordance with these guidelines;
9. name of the institute which the applicant recommends should carry out testing; and
10. name of the laboratory which the applicant recommends should carry out water analyses.

2.2 The instructions required in subsections 2.1.3, 2.1.4 and 2.1.5 shall be those normally supplied with each system and shall, among others, contain the following information:

1. type of waste water (black, grey, or recirculation);
2. type of flushing water (fresh or salt);
3. plant capacity: normal, maximum and minimum (number of persons, flow volume/system/hour);
4. maximum duration at maximum capacity;
5. designed organic loading;
6. chemicals used and their concentrations;
7. instructions and warnings relating to the use of chemicals;

8. diagram of the sewage route through the plant and an electrical diagram;
9. simple arrangement for checking treated waste water; and
10. instructions for storing or treating excess sludge.

3. Type-Approval Test

- 3.1 The test shall be carried out in accordance with the provisions of IMO Resolution MEPC. 2 (VI).
- 3.2 The test programme shall be approved by the Danish Maritime Authority.
- 3.3 The plant shall be installed in accordance with the manufacturer's instructions (subsections 2.1.3, 2.1.4 and 2.1.5) and to the satisfaction of the Danish Maritime Authority.
- 3.4 The testing and analysis shall be carried out by an institute and a laboratory approved by the Danish Maritime Authority.
- 3.5 All parts of the plant that will contain waste water or have waste water passing through them shall be pressure tested in accordance with the provisions of the Danish Maritime Authority.
- 3.6 If there is good reason to doubt the suitability of a plant after it has been installed in a ship (even if it has been tested with satisfactory results in accordance with subsection 3.1), the Danish Maritime Authority shall, before issuing the final type-approval, check the plant after a suitable operational period on board the ship to establish whether it is operating satisfactorily.
- 3.7 Systems for comminuting and disinfecting sewage or equivalent systems shall meet the following standards:
 1. Faecal coliform bacteria in the effluent may not exceed 1,000/100 cm³ M.P.N.
 2. After a sample quantity of 1 litre has passed through a U.S. Sieve No. 12 (mesh size 1.68 mm), the material retained on the sieve shall be dried at 103°C in an oven until the weight is constant. Subsequently, the residual quantity may not exceed 10% (but maximum 50 mg) of the total content of solids.
- 3.8 Comminution and disinfection systems shall be tested pursuant to the provisions of IMO Resolution MEPC. 2 (VI), Annex B, but with the following modifications:
 1. Wherever possible, testing shall be carried out once the system has been installed on board a ship.
 2. The duration of the test shall be at least 48 hours.
 3. Ten samples of effluent shall be taken for analysis.
 4. Subsections 2.5 and 2.8 of the Resolution shall not apply.

4. Structural Requirements

- 4.1 The plant shall be designed so as to withstand the mechanical and environmental effects to which it will be exposed during operation on board ship.
- 4.2 The plant shall operate effectively at an angle of 15° in relation to any plane.
- 4.3 The plant shall be designed for automatic operation and shall be fitted with an alarm warning of any malfunctions.
- 4.4 The plant shall be provided with openings of suitable size for emptying, cleaning, inspection and maintenance.
- 4.5 The plant shall be provided with air pipes leading to the open deck from all parts where malodorous or explosive gases may be released.
- 4.6 It shall be easy to take samples for analysis.
- 4.7 The electrical equipment shall be executed in accordance with the provisions of the Danish Maritime Authority.
- 4.8 The system shall be provided with a durable plate stating the manufacturer's name, the type designation of the plant, its serial number, capacity, the date of manufacture and the name of the Administration that has type-approved the system.

5. Description of Installation

- 5.1 A description of the installation covering each individual system shall be submitted for the information of the Danish Maritime Authority and shall include the following:
1. system type;
 2. flushing water type (fresh or salt);
 3. capacity (normal, maximum and minimum load and maximum load for maximum time);
 4. number of persons for which the system is to be used;
 5. drawings of the installation, including schematic drawings of pipe systems with all details necessary to check the system;
 6. manufacture and type designation; and
 7. Holding tank capacity.

6. Installation Requirements

- 6.1 The installation shall be designed so that the system is suitable for its purpose and is resistant to the media to which it is exposed during operation on board ship (in accordance with national standards).
- 6.2 Air pipes shall be fitted with wire netting to prevent any ignition of flammable gases spreading to the system.
- 6.3 There shall be adequate space around the components of the system requiring inspection.
- 6.4 The holding tank shall be resistant to the media to which it is exposed.
- 6.5 The holding tank and its fittings shall be capable of operating at a list of 15° and a trim of 7°.
- 6.6 The holding tank shall be fitted with an alarm that sounds when the tank is 3/4 full.
- 6.7 The holding tank shall be designed so that it is resistant to waste water.
- 6.8 The holding tank shall be provided with openings for emptying, cleaning, inspection and maintenance.
- 6.9 The holding tank shall be provided with equipment for rinsing and emptying.
- 6.10 The holding tank shall be fitted with air pipes leading to the open air.
- 6.11 The holding tank shall be designed for the maximum possible pressure.
- 6.12 There shall be a pipeline and pump for draining sewage to shore-based reception facilities. The connection shall be fitted with a connecting flange with dimensions as stipulated in the Technical Regulation on Treatment and Storage of Sewage. Other connection options may be used on ships engaged on regular and domestic voyages.

7. Surveys

- 7.1 Before they are put into service, all systems shall be pressure tested under the supervision of a representative of the Danish Maritime Authority or a person authorised by the Danish Maritime Authority. All parts of the system through which sewage will pass shall be pressure tested.
- 7.2 The system shall be surveyed before being put into service and subsequently every five years by a representative of the Danish Maritime Authority or a person authorised by the Danish Maritime Authority.
- 7.3 The survey shall cover the following:
1. a check that the system has been installed in accordance with the installation plan and the manufacturer's instructions;
 2. a check of any cathodic protection;
 3. a check of alarm functions;
 4. a check that the system's main components are functioning in accordance with the manufacturer's instructions (subsection 2.1.6);

5. a check of whether the dosing of disinfectants is correct; and
6. a check of any other chemical concentrations.

8. Explanatory Notes

- 8.1 The term "survey", which occurs in subsection 3.6, shall not generally cover sampling for analysis.
- 8.2 If chlorine is used as a disinfectant, the residual quantity in the treated sewage shall be as small as possible and may, under no circumstances, exceed 0.5 mg/litre.
- 8.3 The angle of 15° stipulated in connection with certain tests in subsections 4.2 and 6.5 accords with the IMO regulations for sewage, but it should be noted that the IMO regulations for oil separators give 22.5°.
- 8.4 Permanent ventilation of holding tanks should be considered in connection with future amendments of regulations, but it should be emphasised that holding tanks and their pipelines shall be thoroughly ventilated and the atmosphere checked before persons enter the tank.

Annex B: Guidelines for Calculating the Capacity of Sewage Systems

These guidelines shall apply when calculating the size of sewage treatment and storage plants.

The guidelines contain regulations for both black and grey sewage. Black sewage is defined in part 1 of the technical regulation mentioned above. Grey sewage is the designation of sewage originating from galleys, laundries, bathrooms, etc. Only black sewage needs to be treated in accordance with the regulations, but since the sanitary systems on many ships are designed so that both black and grey sewage is carried to the same system or tank, the following table also gives calculation values for these systems.

The most common systems used on board ship are the conventional system and the vacuum system, although recirculation systems are also used on individual ships.

The figures in the following table are given in litres per person per day for the three systems.

System	Black water	Black/grey water
Conventional	70	230
Vacuum	25	185
Recirculation	2	-

The figures stipulated may be waived for any other toilet systems.

Ships with a system for comminuting and disinfecting sewage shall also be equipped with a suitable holding tank.

As a rule, holding tanks shall be large enough to hold the sewage produced during 24 hours of operation.

Chapter 21: Prevention of Oil Pollution from Ships

Part I: General Provisions

Regulation 1: Definitions

For the purposes of this chapter, the following definitions shall apply:

- (1) "Oil": Any kind of mineral oil, including crude oil, fuel oil, oil sludge, oil refuse and refined products (but not including petrochemicals covered by the provisions of Annex II of the MARPOL Convention). The definition shall also cover the substances listed in supplement I, although this shall not be interpreted as a limitation of the scope of this definition.
- (2) "Oily mixture": A mixture containing oil.
- (3) "Fuel oil": Any type of oil used as fuel for propulsion and auxiliary machinery in ships carrying such oil.
- (4) "New ship": New and existing ships as well as conversions, as defined in chapter I.
- (5) "Nearest land": The term "from the nearest land" shall mean from the base line from which the outer territorial waters of the territory in question are determined in accordance with international law, it being understood that in the MARPOL Convention "from the nearest land" means off Australia's north-east coast from a line extended from the point 11° latitude S, 142° 08' longitude E on the Australian coast to the point 10° 35' latitude S, 141° 55' longitude E,
thereafter to the point 10° 00' latitude S, 142° 00' longitude E
thereafter to the point 9° 10' latitude S, 143° 52' longitude E
thereafter to the point 9° 00' latitude S, 144° 30' longitude E
thereafter to the point 13° 00' latitude S, 144° 00' longitude E
thereafter to the point 15° 00' latitude S, 146° 00' longitude E
thereafter to the point 18° 00' latitude S, 147° 00' longitude E
thereafter to the point 21° 00' latitude S, 153° 00' longitude E
thereafter to the point 24° 42' latitude S, 153° 15' longitude E on the Australian coast.
- (6) "Special sea area": A sea area where, bearing in mind the area's oceanographic and ecological conditions and its special traffic, it is necessary for recognised technical reasons to introduce special obligatory methods for preventing oil pollution of the sea. Special sea areas shall cover those listed in regulation 10.
- (7) "Instantaneous oil discharge rate": Oil discharge rate in litres per hour at a given moment divided by the ship's speed in knots at the same given moment.
- (8) "Tank": An enclosed space formed by the ship's fixed structure and designed to carry liquids in bulk.
- (9) "Wing tank": Any tank adjoining the ship's side plating.
- (10) "Centre tank": Any tank within a longitudinal bulkhead.
- (11) "Segregated ballast": Ballast water added to a tank that is fully segregated from the cargo oil and fuel oil system and that is permanently used for carrying ballast or for carrying ballast or cargoes not comprising oil or dangerous goods as defined in various places in the Annexes to the MARPOL Convention.

S Regulation 2: Application

- (1) Unless expressly provided otherwise, this chapter shall apply to all ships.

S Regulation 3: Equivalents

- (1) The Administration may permit any accessory, material, furnishing or apparatus to be installed in a ship as an alternative to that prescribed in this chapter, provided such accessory, material, furnishing or apparatus is at least as effective as that prescribed. This authorisation for the Administration shall not extend to using operational methods for carrying out checks

on the discharging of oil as a substitute for the design and structural features prescribed in this chapter.

- (2) The Administration permitting the installation of equipment, material, furnishings or apparatus as an alternative to that prescribed in this chapter shall provide the Organization (IMO) with detailed information hereof, which shall be forwarded to the parties to the convention for information and, if necessary, further action.

S Regulation 4: Surveys

- (1) All ships with a gross tonnage of 400 and upwards shall be subjected to the surveys detailed below:

- (a) An initial survey before the ship is put into service or before the certificate prescribed in regulation 5 is issued for the first time. This shall include a complete survey of its structure, equipment, installations, fittings, appliances and materials insofar as the ship is covered by this chapter.

This survey shall ensure that the structure, equipment, installations, fittings, appliances and materials fully satisfy the relevant provisions of this chapter.

- (b) Periodic surveys at intervals laid down by the Administration, but not exceeding five years, except where regulation 8 (2, 5, 6 or 7) applies. The periodic survey shall ensure that the structure, equipment, installations, fittings, appliances and materials fully satisfy the provisions of this chapter.
- (c) An intermediate survey within three months before or after the 2-year anniversary or within three months before or after the 3-year anniversary of the issuing of the certificate. This survey shall be carried out at the same time as one of the annual surveys specified in 1 (d) of this regulation. The survey shall ensure that the equipment and associated pump and pipe systems, including systems for recording and checking oil discharge, systems for separating oily water and oil filtering plant, fully satisfy the relevant provisions of this chapter and are in good operational condition. The certificate issued in accordance with regulations 5 and 6 shall be provided with an endorsement of such intermediate surveys.
- (d) An annual survey within three months before or after the 1-year anniversary of the issue of the certificate, which shall include a general survey of the structure, equipment, installations, fittings, appliances and materials referred to in 1 (a) of this regulation in order to ensure that they have been maintained in accordance with 4 of this regulation and that they continue to be satisfactory for the service area for which the ship is intended. The certificate shall be endorsed in respect of such annual surveys in accordance with regulations 5 and 6.
- (e) Additional surveys shall be carried out, either generally or partially, after repairs resulting from investigations prescribed in 4 of this regulation, or whenever any important repairs or renewals are made. The survey shall be such as to ensure that the necessary repairs or renewals have been effectively made, that the materials and workmanship of such repairs and renewals are in all respects satisfactory and that the ship complies in all respects with the provisions of this chapter.

- (2) The Administration shall lay down suitable measures for ships not covered by the provisions of 1 above in order to ensure that the relevant provisions of this chapter are observed.

- (3) (a) Surveys of ships carried out to enforce the provisions of this chapter shall be carried out by officers of the Administration. The Administration may, however, entrust inspections and surveys either to surveyors nominated for the purpose or to organisations recognised by it.

- (b) An Administration nominating surveyors or recognising organisations to conduct inspections and surveys as set forth in a) and b) shall, as a minimum, authorise any nominated surveyor or recognised organisation to:

- (1) require repairs to a ship, and
- (2) carry out inspections and surveys if requested by the appropriate authorities of a port state. The Administration shall notify the Organization of the specific tasks and responsibilities delegated to the nominated surveyors or organisations. The

information shall be forwarded to the parties to the convention for the information of their officers.

- (c) When a nominated surveyor or recognised organisation determines that the condition of a ship or its equipment does not correspond substantially with the particulars of the certificate or is such that the ship is not fit to proceed to sea without presenting an unreasonable risk of harm to the marine environment, such surveyor or organisation shall immediately ensure that corrective action is taken and shall in due course notify the Administration. If such corrective action is not taken, the certificate should be withdrawn and the Administration notified immediately. If the ship is in the port of another party to the convention, the appropriate authorities of the port state shall also be notified immediately. When an officer of the Administration, a nominated surveyor or recognised organisation has notified the appropriate authorities of the port state, the government of the port state concerned shall give such officer, surveyor or organisation any necessary assistance to carry out their obligations in accordance with this paragraph.

When applicable, the government of the port state concerned shall take the measures necessary to ensure that the ship does not sail until it can proceed to sea or leave port for the purpose of proceeding to the nearest appropriate repair yard available without presenting an unreasonable risk of harm to the marine environment.

- (d) In every case, the Administration concerned shall fully guarantee the completeness and effectiveness of the inspection and survey and shall undertake to ensure the necessary arrangements to satisfy this obligation.
- (4) (a) The condition of the ship and its equipment shall be maintained so as to comply with the provisions of this chapter in order to ensure that the ship in all respects will remain fit to proceed to sea without presenting an unreasonable risk of harm to the marine environment.
- (b) When a survey of a ship has been completed in accordance with 1 above, no change may be made in the structural arrangement, equipment, installations, fittings, appliances or materials covered by the survey, apart from direct replacement of such equipment and fittings, without the permission of the Administration.
- (c) Whenever an accident occurs to a ship or a defect is discovered, either of which significantly affects the safety of the ship or the efficiency or completeness of its equipment covered by this chapter, the master or owner of the ship shall report this at the earliest opportunity to the Administration, recognised organisation or nominated surveyor responsible for issuing the relevant certificate, who shall cause investigations to be initiated to determine whether a survey, as required by 1 above, is necessary. If the ship is in a port of another party to the convention, the master or owner shall also report immediately to the appropriate authorities of the port state and the nominated surveyor or recognised organisation shall ascertain that such a report has been made.

S Regulation 5: Issue of Certificate

- (1) When a survey has been carried out in accordance with regulation 4, an International Oil Pollution Prevention Certificate shall be issued to any other ship with a gross tonnage of 400 and upwards that is engaged on voyages to ports or offshore terminals under the jurisdiction of other Parties to the convention.
- (2) Such a certificate shall be issued or endorsed by the Administration, or by any person or organisation duly authorised by it. In all cases, the Administration shall assume full responsibility for the certificate.
- (3) Notwithstanding any other provision of the amendments to this chapter adopted by the IMO's environmental committee (MEPC) by Resolution MEPC. 39(29), any International Oil Pollution Prevention Certificate valid when these amendments enter into force shall retain its validity until it expires under the conditions of this chapter prior to entry into force of the amendments.

S Regulation 6: Issue or Endorsement of Certificates by Another Government

- (1) A contracting government may, at the request of the Administration, cause a ship to be surveyed and, if satisfied that the provisions of this chapter are complied with, shall issue or

grant authority to issue an International Oil Pollution Prevention Certificate to the ship in accordance with this chapter.

- (2) A copy of the certificate and a copy of the survey report shall as quickly as possible be sent to the Administration that requested that the survey be carried out.
- (3) Any certificate so issued shall contain an endorsement to the effect that it has been issued at the request of the Administration and it shall have the same validity and receive the same recognition as a certificate issued under regulation 5.
- (4) An International Oil Pollution Prevention Certificate shall not be issued to a ship entitled to fly the flag of a non-contracting state.

S Regulation 7: Form of Certificates

The form of the International Oil Pollution Prevention Certificate shall be that of the model given by the Organization. If a language other than English or French has been used, the text shall include a translation into one of these languages.

S Regulation 8: Duration and Validity of Certificates

- (1) The Administration shall issue an International Oil Pollution Prevention Certificate for a period to be laid down by the Administration, which may not exceed five years from the date of issue.
- (2)
 - (a) Notwithstanding the provisions of 1 of this Regulation, even if the periodical survey has taken place within three months before the existing certificate's expiry date, the new certificate shall be valid from the date on which the periodical survey was held until a date that may not exceed five years from the expiry date of the existing certificate.
 - (b) If the periodical survey has taken place after the expiry date of the existing certificate, the new certificate shall be valid from the date on which the periodical survey was carried out until a date that may not exceed five years from the expiry date of the existing certificate.
 - (c) If the periodical survey has taken place more than three months before the expiry date of the existing certificate, the new certificate shall be valid from the date on which the periodical survey was held until a date that may not exceed five years from the date on which the periodical survey was carried out.
- (3) If a certificate is issued with a period of validity less than five years, the Administration may extend the certificate's period of validity to the maximum period given in 1 of this regulation, provided that the surveys referred to in regulation 4 (1 (c) and (d)) of this chapter are carried out when the certificate is issued with a period of validity of five years.
- (4) If a periodical survey has taken place and a new certificate cannot be issued or installed on board until the existing certificate expires, the person or organisation authorised by the Administration may extend the existing certificate's period of validity. Such a certificate shall be recognised as being valid for the given period, which may not exceed five years.
- (5) If a ship is in a port in which a survey cannot be carried out and the certificate has expired, the Administration may extend the certificate's period of validity, but such extension shall be granted only for the purpose of allowing the ship to complete its voyage to the port in which the survey can take place, and then only in cases where it appears proper and reasonable to do so. No certificate may be extended for a longer period than three months, and a ship to which an extension has been granted shall not, during the period of the extension, leave the port in which the survey is to take place without having obtained a new certificate. When the periodical survey has been carried out, the issued certificate's period of validity shall not exceed five years from the date on which the existing certificate expired before the extension was granted.
- (6) A certificate that has been issued to a ship which undertakes short voyages and which has not been extended pursuant to the previous provisions may be extended by the Administration for a period of up to one month from the expiry date given on it. When the periodical survey has been carried out, the new certificate shall be valid until a date that may not exceed five years from the date on which the existing certificate expired before the extension was granted.
- (7) In special cases determined by the Administration, a new certificate's period of validity need not run from the existing certificate's expiry period, as required under 2 (b) and 5 and 6 of this

regulation. In such special cases, the new certificate's period of validity shall not exceed five years from the date on which the periodical survey was carried out.

- (8) If an annual or intermediate survey is carried out before the period given in regulation 4, then
- (a) the annual survey date on the certificate shall be amended to show a date that may not be more than three months later than the date on which the survey was carried out,
 - (b) the following annual and intermediate surveys required in accordance with regulation 4 of this chapter shall be carried out at the intervals given in this regulation using the new annual survey date,
 - (c) the expiry date may remain unamended, provided that one or more annual or intermediate surveys are carried out so that the maximum period between the surveys given in Regulation 4 of this chapter is not exceeded.
- (9) A certificate issued in accordance with regulations 5 and 6 of this chapter shall be regarded as not being valid in any of the following cases:
- (a) If the prescribed surveys are not carried out within the periods specified under regulation 4 (1) of this chapter.
 - (b) If the certificate is not endorsed in accordance with regulation 4 (1 (c) and (d)) of this chapter.
 - (c) Upon transfer of a ship to the flag of another government, a new certificate may only be issued when the government issuing the new certificate is satisfied that the ship fully satisfies the requirements of regulation 4 (4 (a) and (b)). In the case of a transfer between parties to the convention, if requested within three months after the transfer has taken place, the government of the party whose flag the ship was formerly entitled to fly shall, as soon as possible, submit to the new Administration a copy of the certificate carried by the ship before the transfer and, if available, a copy of the relevant survey report.

S Regulation 8A: Port State Control of Operational Requirements¹⁾

- (1) Any ship, when in a port or terminal of another party to the convention, may be subjected to inspection by a person duly authorised by the party if there are clear reasons for believing that the ship's master or crew are not familiar with basic ship procedures connected with the prevention of oil pollution.
- (2) Given the circumstances in 1 above, the party to the convention shall take such steps as to ensure that the ship does not sail until the situation has been remedied in accordance with the provisions of this Annex.
- (3) The procedure for port state control as prescribed in article 5 of the MARPOL Convention shall be used to enforce this regulation.
- (4) No part of this regulation shall be interpreted as a limitation of the rights and obligations that a party to the convention has as regards carrying out control of operational requirements as specified and prescribed in the MARPOL Convention.

Part II: Provisions on Control of Pollution Originating from the Operation of Ships

M Regulation 9: Control of Oil Discharging

- (1) Without prejudice to the provisions of regulations 10 and 11, and paragraph 2 of this regulation, any discharging of oil or oily mixtures into the sea by ships covered by this chapter shall be prohibited, unless all the following conditions are met, insofar as concerns discharging from machinery space bilges by ships with a gross tonnage of 400 and upwards:²⁾
 - (a) the ship is not within a special sea area,
 - (b) the ship is on route to a predetermined location,

1. Reference is made to the procedure for control of operational requirements in connection with ship safety and prevention of pollution, which was introduced by the IMO in Resolution A.742(18).

2. This shall not apply to Danish territorial waters, where any form of oil discharging is prohibited, cf. section 9 of Act no. 130 of 9 April 1980 on Protection of the Marine Environment.

- (c) the oil content of the discharge, without being diluted, does not exceed 15 ppm, and
 - (d) the ship uses the equipment prescribed in regulation 13.
- (2) Insofar as concerns a ship with a gross tonnage below 400 outside a special sea area, the Administration shall ensure that, as far as practicable and reasonable, it is fitted with installations providing for on board storage of oily residue and its discharge into reception facilities or into the sea in accordance with the provisions of paragraph 1.
 - (3) Whenever visible traces of oil are observed on or under the surface of the sea in the immediate vicinity of a ship or its wake, the governments of the parties to the convention should, within reasonable limits, immediately investigate the matter with a view to determining any possible contravention of this regulation or of regulation 10. The investigation should especially cover wind, sea and tide conditions, the ship's course and speed, whether other possible causes of the visible traces are found in the area, and relevant registered oil discharges.
 - (4) The provisions of paragraph 1 shall not apply to discharging clean or segregated ballast or untreated oily mixtures that, without being diluted, have an oil content not exceeding 15 ppm.
 - (5) No discharge into the sea may contain chemicals or other substances in quantities or concentrations harmful to the marine environment or chemicals or other substances used to circumvent the conditions for discharging stipulated in this regulation.
 - (6) Oily residues that cannot be discharged into the sea in accordance with paragraphs 1, 2 and 4 shall be kept on board or be discharged into reception facilities.

M Regulation 10: Methods for the Prevention of Oil Pollution from Ships in Special Sea Areas

- (1) In this chapter, the special sea areas shall be the Mediterranean Area, the Baltic Sea Area and the North-West European Sea Areas, the Black Sea Area, the Red Sea Area, the Gulf Area, the Gulf of Aden and the Antarctic Area, which are defined as follows:
 - (a) The Mediterranean Area shall be the Mediterranean proper and its associated bays and seas, the boundary between the Mediterranean and the Black Sea being the parallel at 41° N and the boundary to the west being the Strait of Gibraltar at the meridian 5° 36' W.
 - (b) The Baltic Sea Area shall be the Baltic Sea proper with the Gulf of Bothnia, the Gulf of Finland and the entrance to the Baltic bounded by the parallel of the Skaw in the Skagerrak at 57° 44.8' N.
 - (c) The Black Sea Area shall be the Black Sea proper, the parallel at 41° N being the boundary between the Mediterranean and the Black Sea.
 - (d) The Red Sea Area shall be the Red Sea proper with the Gulf of Suez and the Gulf of Aqaba, bounded to the south by the rhomb line between Ras si Ane (12° 8.5' latitude N, 43° 19.6' longitude E) and Husn Murad (12° 0.4' latitude N, 43° 30.2' longitude E).
 - (e) The Gulf Area shall be the sea area northwest of the rhomb line between Ras al Hadd (22° 30' latitude N, 59° 48' longitude E) and Ras al Fasteh (25° 0.4' latitude N, 61° 25' longitude E).
 - (f) The Gulf of Aden shall be the sea area between the Red Sea and the Arabian Sea, bounded to the west by the rhomb line between Ras si Ane (12° 28.5' latitude N, 43° 19.6' longitude E) and Husn Murad (12° 40.4' latitude N, 43° 30.2' longitude E) and to the east by the rhomb line between Ras Asir (11° 50' latitude N, 51° 16.9' longitude E) and Ras Fartak (15° 35' latitude N, 52° 13.8' longitude E).
 - (g) The Antarctic Area shall be south of 60° latitude S.
 - (h) The North-West European Sea Areas shall cover the North Sea and its approach waters, the Irish Sea and its approach waters, the Celtic Sea, the English Channel and its approach waters and part of the North-East Atlantic Sea Area in the immediate vicinity of the west of Ireland. The area shall be bounded by the lines through the following points:
 - (i) 48° 27' N (on the French coast)
 - (ii) 48° 27' N, 6° 25' W
 - (iii) 49° 52' N, 7° 44' W

- (iv) 50° 30' N, 12° W
 - (v) 56° 30' N, 12° W
 - (vi) 62° N, 3° W
 - (vii) 62° N (on the Norwegian coast)
 - (viii) 57° 44,8' N (on the Danish and Swedish coast).
- (2) Without prejudice to the provisions of regulation 11, any discharging of oil or oily mixtures into the sea by ships with a gross tonnage of 400 and upwards shall be prohibited whilst the ship is in a special sea area. Any discharging of oil or oily mixtures into the sea by ships with a gross tonnage below 400 shall not be permitted whilst the ship is in special sea areas, unless the oil content in the discharge, without being diluted, does not exceed 15 ppm.
- (3) (a) The provisions of paragraph 2 shall not apply to discharging clean or segregated ballast.
- (b) The provisions of paragraph 2 (a) shall not apply to discharging treated bilge water from machinery spaces if all the following conditions are met:
- (i) the ship is proceeding through the water;
 - (ii) the oil content in the discharge, without being diluted, does not exceed 15 ppm;
 - (iii) the ship uses a statutory filtering system; and
 - (iv) the filtering system is fitted with a stopping device that automatically shuts off the discharge if the oil content in the discharge exceeds 15 ppm.
- (4) (a) No discharge into the sea may contain chemicals or other substances in quantities or concentrations harmful to the marine environment or substances introduced to circumvent the provisions on discharging in this regulation.
- (b) Oily residues that cannot be discharged into the sea in accordance with the provisions of paragraphs 2 and 3 shall be kept on board or discharged into reception facilities.
- (5) No aspect of this regulation shall preclude a ship on a voyage of which only a part runs through a special sea area from carrying out a discharge outside the special sea area in accordance with regulation 9.
- (6) Whenever visible traces of oil are observed on or under the surface of the sea in the immediate vicinity of a ship or its wake, the governments of the parties to the convention should, insofar as possible, immediately investigate the matter with a view to determining any possible contravention of this regulation or of regulation 9. The investigation should especially cover wind, sea and tide conditions, the ship's course and speed, whether other possible causes of the visible traces are found in the area, and relevant registered oil discharges.
- (7) Reception facilities within special sea areas:
- (a) Mediterranean Area, Black Sea Area and Baltic Sea Area:
- (i) The government of each individual party to the convention whose coastline adjoins a designated special sea area shall undertake to ensure that all oil cargo terminals and repair ports within this special sea area are provided, no later than 1 January 1977, with facilities adequate for receiving and treating all dirty ballast and tank flushings from oil tankers. Additionally, all ports within the special sea area shall be provided with facilities adequate for receiving other residues and oily mixtures from all ships. Such facilities shall have the necessary capacity to cover the requirements of the ships that use them without causing unnecessary delays.
 - (ii) The government of any party to the convention with jurisdiction over approaches to waterways with low depth contours that might make it necessary to carry out a reduction in the draught by discharging ballast shall undertake to provide for the establishment of the facilities referred to in subparagraph (a) (1), but with the proviso that ships that are obliged to discharge sewage or dirty ballast may be subjected to delays.
 - (iii) During the period between the entry into force of this convention (if this is earlier than 1 January 1977) and 1 January 1977, ships, when sailing in special sea areas, shall comply with the provisions of regulation 9. Parties to the convention whose

coastline adjoins any of the special sea areas covered by this paragraph may, however, stipulate a date earlier than 1 January 1977, but after the date of entry into force of this convention, on which the provisions of this regulation relating to the special sea areas in question shall enter into force:

- (1) provided the necessary reception facilities have been established before the date thus stipulated, and
 - (2) provided that the parties in question, at least six months beforehand, inform the Organization of the date thus stipulated for the information of other parties to the convention.
- (iv) After 1 January 1977, or any earlier date stipulated pursuant to subparagraph (a) (3), each party to the convention shall inform the Organization of all cases where the facilities are alleged to be inadequate so that it can accordingly notify the governments of the parties to the convention concerned.
- (b) Red Sea Area, Gulf Area, the Gulf of Aden and the North-West European Sea Areas.
- (i) The government of each individual party to the convention whose coastline adjoins a special sea area shall undertake to ensure that all oil cargo terminals and repair ports within this special sea area are provided, as soon as possible, with facilities adequate for receiving and treating all dirty ballast and tank flushings from oil tankers. Additionally, all ports within the special sea area shall be provided with facilities adequate for receiving other residues and oily mixtures from all ships. Such facilities shall have the necessary capacity to cover the requirements of the ships that use them without causing unnecessary delays.
 - (ii) The government of any party to the convention with jurisdiction over approaches to waterways with low depth contours that might make it necessary to carry out a reduction in the draught by discharging ballast shall undertake to provide for the establishment of the facilities referred to in subparagraph (b) (1), but with the proviso that ships obliged to discharge sewage or dirty ballast may be subjected to delays.
 - (iii) Each of the parties concerned shall notify the Organization of the measures that it has taken in accordance with the provisions given in subparagraph (b) (1) and (2). After having received a sufficient number of notifications, the Organization shall stipulate a date on which the provisions of this regulation, with regard to the sea area in question, shall enter into force. The Organization shall, at least 12 months before this date, inform all parties of the date thus stipulated.
 - (iv) During the period between the entry into force of this convention and the date thus stipulated, ships sailing in the special sea area in question shall comply with the provisions of regulation 9.
 - (v) After this date, oil tankers loading in ports in these special sea areas where such facilities are not yet available shall also fully comply with the provisions of this regulation. Oil tankers entering these special sea areas for loading purposes shall, however, take all possible measures to enter the area with clean ballast on board.
 - (vi) After the date on which the provisions concerning the special sea area in question enter into force, all parties to the convention shall notify the Organization of all cases where the facilities are alleged to be inadequate so that it can accordingly notify the parties in question.
 - (vii) The prescribed reception facilities shall be established at the latest by 1 January 1977, or one year after this convention enters into force, if this is later.
- (8) Notwithstanding the provisions of paragraph (7), the following provisions shall apply in the Antarctic Area:
- (a) The government of any party to the convention at whose ports ships are scheduled to call or which come from the Antarctic Area shall be obliged, as soon as practicable, to ensure that adequate reception facilities are available for the storage of oil sludge, dirty ballast, tank washings and other oily residues and oily mixtures from all ships, without causing unnecessary delays to the ships and in accordance with the requirements of the ships that are to use them.

- (b) The government of any party to the convention shall ensure that all ships registered in the state in question are equipped with a tank or tanks of sufficient capacity to store all oil sludge, dirty ballast, tank washings and other oily residues and oily mixtures before and during sailing in the Antarctic Area, and that they have entered an agreement on discharging such oily residues into a reception facility before leaving the Antarctic Area.

M Regulation 11: Exemptions

Regulations 9 and 10 shall not apply to:

- (a) discharge into the sea of oil or oily mixtures necessary with a view to the safety of the ship or for the purpose of saving human life at sea, or
- (b) discharge into the sea of oil or oily mixtures as a result of damage to a ship or its equipment:
 - (1) on condition that after the occurrence of the damage or the discovery of the discharge, all reasonable measures are taken to prevent the discharge or restrict it to a minimum, and
 - (2) unless the owner or master acted with the intention of causing damage, or negligently and in the knowledge that damage would probably occur, or
- (c) discharge into the sea of oily substances if this is done with the approval of the Administration and with the purpose of combating specific incidents of pollution and minimising the damage caused. Such a discharge shall be approved by each of the governments within whose jurisdictions the discharge is to be carried out.

S Regulation 12: Segregation of Oil and Water Ballast and Transportation of Oil in Forepeak Tanks

- (1) Apart from the provisions of paragraph 2, ballast water may not be carried in fuel oil tanks in new ships with a gross tonnage of 4,000 and upwards.
- (2) Where abnormal circumstances or the need to carry large quantities of fuel oil make it necessary to carry ballast water that is not clean ballast in a fuel oil tank, such ballast water shall be discharged into a reception facility or into the sea in accordance with regulation 9 using the equipment specified in regulation 13. Information concerning this shall be entered in the Oil Record Book.
- (3) All other ships shall comply with the provisions of paragraph 1 insofar as is reasonable and practicable.
- (4) In a ship with a gross tonnage of 400 and upwards which has been contracted after 1 January 1982 or, if there is no construction contract, the keel of which is laid or which is at a similar stage of construction after 1 July 1982, oil may not be transported in a forepeak tank or a tank located before the collision bulkhead.
- (5) The provision of paragraph 4 shall be observed by other ships insofar as is reasonable and practicable.

S Regulation 13: System for Recording and Controlling Oil Discharges and Oily Water Separating Equipment³⁾

- (1) All ships with a gross tonnage of 400 and upwards but below 10,000 tonnes shall be provided with oily water separating equipment pursuant to paragraph 4 of this regulation. All such ships carrying large quantities of fuel oil shall satisfy the provisions of paragraph 2 of this regulation or paragraph 1 of regulation 14.
- (2) All ships with a gross tonnage of 10,000 and upwards shall be provided with oily water separating equipment with an arrangement for alerting and automatically shutting off any discharge of oily mixtures if the oil content in the discharge exceeds 15 ppm.

3) Reference is made to the Recommendation on International Performance and Test Specifications for Oily Water Separating Equipment and Oil Content Meters approved by the Organisation in Resolution A.393(X).

- (3) (a) The Administration may exempt from the requirements of paragraphs 1 and 2 of this regulation any ship that sails exclusively within special sea areas, provided that all the following conditions are met:
- (i) the ship is equipped with a holding tank, to the satisfaction of the Administration, with sufficient capacity to store all oily bilge water on board,
 - (ii) all oily bilge water is stored on board with a view to subsequently discharging it into a shore-based reception facility,
 - (iii) the Administration has judged that sufficient reception facilities for receiving oily bilge water are available in a sufficient number of ports or terminals at which the ship calls,
 - (iv) the International Oil Pollution Prevention Certificate, where this is required, states that the ship sails exclusively within special sea areas, and
 - (v) the quantity of the oily mixture and the date and port of discharge is stated in the Oil Record Book.
- (b) The Administration shall ensure that ships with a gross tonnage below 400, insofar as is practicable, are provided with equipment for storing oil or oily mixtures on board or for discharging such in accordance with regulation 9 (paragraph 1 (b)).
- (c) In order to satisfy the provisions of subparagraph (b):
- (1) Ships with a gross tonnage below 400, but more than 15 metres in length, shall be provided with:
 - (1.1) a shore connection and pump and an oil/water separating system plus alarm making it possible to treat oily water from machinery space bilges and to discharge it in accordance with the provisions of regulations 9 and 10, or
 - (1.2) a holding tank of at least 1m³ together with pump and shore connection so that the oily water from machinery space bilges can be stored on board for subsequent discharge into shore-based reception facilities, or
 - (1.3) other systems that may be approved by the Danish Maritime Authority, together with a shore connection and pump.
 - (1.4) All ships that use centrifuges or the like to treat fuel oil and lubricating oil shall be provided with sludge tanks in accordance with regulation 14.
- (4) The oily water separating equipment referred to in paragraph 1 of this regulation shall be of a design approved by the Administration, and it shall ensure that any oily mixture discharged into the sea after having passed through the system has an oil content not exceeding 15 ppm. In assessing the design of such equipment, the Administration shall take into account the specifications recommended by the Organization.
- (5) The oily water separating equipment referred to in paragraph 2 of this regulation shall be of a design approved by the Administration, and it shall ensure that any oily mixture discharged into the sea after having passed through the system(s) has an oil content not exceeding 15 ppm. It shall be provided with alarm systems indicating when this level cannot be maintained, and with an arrangement ensuring that any discharge of oily mixtures is stopped if the oil content exceeds 15 ppm. In assessing the design of such equipment and arrangement, the Administration shall take into account the specifications recommended by the Organization.
- (6) In the case of ships delivered before 6 July 1993, the provisions of this regulation shall be satisfied by 6 July 1998, provided that these ships use oily water separating equipment (100 ppm equipment).
- (7) Guideline concerning minimum capacities for oil separators for treating bilge water from machinery spaces:

Gross tonnage	Minimum capacity (m ³ /hour)
200-400	0.25
400-1,600	0.5
1,600-4,000	1.0
4,000-15,000	2.5
15,000 and above	5.0

Higher separator capacities may be necessary in ships with large and complex machinery spaces.

The capacity of oil separators that are also used to treat ballast water shall be approved by the Administration in each individual case.

S Regulation 14: Tanks for Oily Residues (Sludge)

- (1) All ships with a gross tonnage of 400 and upwards shall, taking into account the engine type and length of the voyage, be provided with one or more tanks of sufficient capacity to hold the oily residues (sludge) that cannot be otherwise treated in accordance with the requirements of these regulations, e.g. residues emanating from the cleaning of fuel oil and lubricating oils, and from oil leaks in machinery spaces.⁴⁾
- (2) In new ships, such tanks shall be designed and constructed to clean and discharge residues to reception facilities. Existing ships shall satisfy these requirements insofar as is reasonable and practicable.
- (3) The inlet and outlet lines of sludge tanks shall not have a direct overboard connection. The lines shall only be connected to the standard connection referred to in regulation 15.
- (4) Minimum capacity of sludge tanks:
 - (a) In the case of ships that do not carry ballast water in fuel oil tanks, the sludge tank capacity shall be calculated using the following formula: $V1 = K1 \times C \times D$ (m³). K1 = 0.01 for ships using heavy fuel oil for propulsion that is centrifuged on board, or 0.005 for ships using diesel oil for propulsion or where the heavy fuel oil is not centrifuged on board. C = daily fuel oil consumption. D = maximum sailing time in days, if known, between ports with reception facilities (minimum 30).
 - (b) In the case of ships with on-board equipment approved by the Danish Maritime Authority for the disposal of oil sludge, the sludge tank capacity V1 may be taken as 1 (m³) for ships with a gross tonnage of 400 and upwards, and 2 (m³) for ships with a gross tonnage of 4,000 and upwards.
 - (c) In the case of ships carrying ballast water in fuel oil tanks, the sludge tank capacity shall be calculated as follows:
 $V2 = V1 + K2 \times B$ (m³)
 V1 = sludge tank capacity as specified in 1 or 2.

S Regulation 15: Standard connection

In order that the pipes of reception facilities can be connected to the ship's pipe for discharging sewage from machinery space bilges, both lines shall be fitted with a standard connection in accordance with the following table:

Standard dimensions of flanges for discharge connections	
Description	Dimension
External diameter	215 mm
Internal diameter	According to pipe outside diameter
Bolt circle's diameter	183 mm
Slots in flange	Six holes, 22 mm in diameter, spaced equidistantly on a bolt circle of the above diameter, slotted to the flange periphery. The breadth of the slot shall be 22 mm
Flange thickness	20 mm
Bolts and nuts	Six, each of 20 mm in diameter and of suitable length

The flange shall be designed to accept pipes up to a maximum internal diameter of 125 mm and shall be made of steel or other similar material with an even surface.

The flange and its gasket shall be able to withstand a working pressure of 6 kg/(cm²).

M Regulation 16: Oil Record Book

- (1) All ships with a gross tonnage of 400 and upwards shall be provided with an Oil Record Book I (machinery space operations). The Oil Record Book shall, irrespective of whether it

4) Reference is made to MEPC/Circ. 235, Guidelines for Systems for Handling Oily Wastes in Machinery Spaces of Ships.

- constitutes a part of the Ship's Logbook or is separate, be arranged as laid down by the Organization.
- (2) The Oil Record Book shall be up-dated, if necessary for each tank separately, whenever one of the following operations is performed:
 - (a) Machinery space operations (all ships):
 - (1) Taking in of ballast or cleaning of fuel oil tanks.
 - (2) Discharging of dirty ballast or tank washings from the tanks referred to in (1).
 - (3) Disposal of oily residues (sludge).
 - (4) Overboard discharging or other disposal of bilge water from machinery spaces.
 - (3) If discharging of oil or oily mixtures is carried out or occurs as referred to in regulation 11, or if oil is discharged as a consequence of an accident or other unforeseen occurrence that is not exempted under the cited regulation, an entry must be made in the Oil Record Book giving details of the discharge and its causes.
 - (4) Each action described in paragraph 2 shall immediately be recorded in the Oil Record Book so that all the entries in the record book concerning the action in question are complete. Each completed operation shall be endorsed by the officer(s) responsible, and each completed page signed by the master. The entries in the Oil Record Book shall be made in a language that is official in the state whose flag the ship is entitled to fly, and, in the case of ships with an International Oil Pollution Prevention Certificate, in English or French. The entries in an official, national language used in the state whose flag the ship is entitled to fly shall have priority in cases of dispute or discrepancy.
 - (5) The Oil Record Book shall be kept in such a place as to be easily accessible for inspection at all reasonable times, and, apart from unmanned ships in tow, shall be kept on board the ship. It shall be retained for a period of three years following the final entry.
 - (6) The competent authority under the government of a party to the convention shall have the right to inspect the Oil Record Book on board any ship covered by this chapter whilst the ship is in one of its ports or at one of its oil terminals, and to take a copy of any entry in the record book and ask the master to verify its accuracy. Any such copy that has been verified by the master as being an accurate copy of an entry in the ship's Oil Record Book shall be eligible for presentation in any legal case as evidence of the facts stated in the entry. The competent authority's inspection of the Oil Record Book and making out of a verified copy in accordance with this paragraph shall be effected as quickly as possible and shall not entail unnecessary delays to the ship.

Chapters 22-23 have been reserved for later use

Chapter 24: Prevention of Garbage Pollution

Regulation 1: Definitions

- (1) For the purposes of this chapter, the following definitions shall apply:

"Garbage": Any form of food waste, domestic waste and industrial waste, with the exception of fresh fish and parts thereof, which is generated during normal operation of the ship, and which is continuously or periodically disposed of. Garbage shall not include materials defined or listed in the other annexes to the convention.
- (2) "Nearest land": The term "from the nearest land" shall mean from the base line from which the outer territorial waters of the territory in question are determined in accordance with international law, it being understood that in this chapter "from the nearest land" means off Australia's north-east coast from a line extended from the point 11° latitude S, 142° 08' longitude E on the Australian coast to the point 10° 35' latitude S, 141° 55' longitude E, thereafter to the point 10° 00' latitude S, 142° 00' longitude E thereafter to the point 9° 10' latitude S, 143° 52' longitude E thereafter to the point 9° 00' latitude S, 144° 30' longitude E thereafter to the point 13° 00' latitude S, 144° 00' longitude E thereafter to the point 15° 00' latitude S, 146° 00' longitude E thereafter to the point 18° 00' latitude S, 147° 00' longitude E thereafter to the point 21° 00' latitude S, 153° 00' longitude E thereafter to the point 24° 42' latitude S, 153° 15' longitude E on the Australian coast.
- (3) "Special sea area": A sea area where, bearing in mind the area's oceanographic and ecological conditions and its special traffic, it is necessary for recognised technical reasons to introduce special obligatory methods for preventing garbage pollution of the sea. Special sea areas shall cover those listed in regulation 5.

Regulation 2: Application

The provisions of this chapter shall apply to all ships.

M Regulation 3: Disposal of Garbage outside Special Sea Areas

- (1) Apart from the provisions of regulations 4, 5 and 6:
 - (a) the disposal into the sea of all items made of plastic, among others synthetic rope, synthetic fishing net and plastic waste bags, shall be prohibited;
 - (b) the disposal of the following types of garbage shall be effected as far as possible from the nearest land and shall be prohibited in all cases if the distance from the nearest land is less than: 1) 25 nautical miles for dunnage and lining/packing materials that can float; 2) 12 nautical miles for food wastes and all other wastes, including paper products, rags, glass, metal, bottles, crockery and similar waste;
 - (c) the disposal into the sea of garbage as detailed in subparagraph (b) (2) shall be permissible, provided it has passed through a comminution or grinding system and the discharge is effected as far from land as possible, but shall be prohibited in all cases if the distance from the nearest land is less than 3 nautical miles. Such comminuted or ground waste shall be able to pass through a sieve with a maximum mesh size of 25 mm.
- (2) If the garbage is mixed with other discharge matter for which other provisions apply with regard to disposal or discharging, the more stringent provisions shall be observed.

M Regulation 4: Special Requirements for Garbage Disposal

- (1) Apart from the provisions of paragraph 2, the disposal of any material covered by this chapter shall be prohibited from fixed or floating platforms engaged in the exploration, exploitation and associated processing of the seabed's mineral resources, and from all other ships when they are moored to or are within a distance of 500 m from such a platform.

- (2) Disposal into the sea of food waste from such fixed or floating platforms and from ships moored to or lying within a distance of 500 m from such a platform may, if the platform is at least 12 nautical miles from land, be permitted, provided the waste has passed through a comminution or grinding system. Such comminuted or ground food waste shall be able to pass through a sieve with a maximum mesh size of 25 mm.

M Regulation 5: Garbage Disposal within Special Sea Areas

- (1) In this chapter, the special sea areas shall be the Mediterranean Area, the Baltic Sea Area, the Black Sea Area, the Red Sea Area, the Gulf Area, the North Sea Area, the Antarctic Area and the Wider Caribbean Area, including the Gulf of Mexico and the Caribbean Sea, which are defined as follows:

- (a) The Mediterranean Area shall be the Mediterranean proper and its associated bays and seas, the boundary between the Mediterranean and the Black Sea being the parallel at 41° N and the boundary to the west being the Strait of Gibraltar at the meridian 5° 36' W.
- (b) The Baltic Sea Area shall be the Baltic Sea proper with the Gulf of Bothnia, the Gulf of Finland and the entrance to the Baltic Sea, bounded by the parallel of the Skaw in the Skagerrak at parallel 57° 44.8' N.
- (c) The Black Sea Area shall be the Black Sea proper, the parallel at 41° N being the boundary between the Mediterranean and the Black Sea.
- (d) The Red Sea Area shall be the Red Sea proper with the Gulf of Suez and the Gulf of Aqaba, bounded to the south by the rhomb line between Ras si Ane (12° 8.5' latitude N, 43° 19.6' longitude E) and Husn Murad (12° 0.4' latitude N, 43° 30.2' longitude E).
- (e) The Gulf Area shall be the sea area northwest of the rhomb line between Ras al Hadd (22° 30' latitude N, 59° 48' longitude E) and Ras al Fasteh (25° 0.4' latitude N, 61° 25' longitude E).
- (f) The North Sea Area shall be the following sea areas:
 - (1) The North Sea south of 62° latitude N and east of 4° longitude W,
 - (2) The Skagerrak, bounded east of the Skaw to the south at 57° 44.8' latitude N, and
 - (3) The English Channel and its access ways east of 5° longitude W and north of 48° 30' latitude N.
- (g) The Antarctic Area shall be the sea area south of 60° latitude S.

Note: The Areas given in regulation 5 (1) (c), (d), (e) and (h) shall, until further notice, still be covered by the provisions of regulation 3.

- (h) The Wider Caribbean Area, as defined in article 2 (paragraph 1) of the Convention of the Wider Caribbean Region (Cartegenea de Indias, 1983), shall be the Gulf of Mexico and the Caribbean Sea proper, comprising bays and the open sea, and the part of the Atlantic Ocean within the boundary 30° latitude N from Florida and to the east to 77° 30' longitude W, thereafter a rhomb line intersecting with 7° 20' latitude N and 50° longitude W, thereafter a rhomb line which is extended to the south-west to the eastern border of French Guyana.
- (2) Apart from the provisions of regulation 6:
- (a) the disposal into the sea of the following shall be prohibited:
 - (1) all items made of plastic, among others synthetic rope, synthetic fishing net and plastic waste bags; and
 - (2) all other garbage, including paper products, rags, glass, metal, bottles, crockery, dunnage and lining/packing materials;
 - (b) with the exception of the provisions of subparagraph (c) below, the disposal of food waste shall be effected as far from land as possible, but under no circumstances less than 12 nautical miles from the nearest land;
 - (c) the disposal of food waste that has passed through a comminuting or grinding system shall be effected as far from land as possible in the Wider Caribbean Area, but under no circumstances at a distance of less than three nautical miles from the nearest land, yet

only if the disposal is not covered by regulation 4. Such comminuted or ground food waste shall be able to pass through a sieve with a maximum mesh size of 25 mm.

- (3) If waste is mixed with other discharge matter to which other provisions apply with regard to disposal or discharging, the more stringent provisions shall be observed.
- (4) Reception facilities within special sea areas:
 - (a) The government of each individual party to the convention whose coastline adjoins a special sea area shall undertake to ensure that, as soon as possible, all ports within a special sea area are provided with adequate reception facilities in accordance with regulation 7, taking into account the special requirements of ships sailing these areas.
 - (b) The government of each of the states concerned shall inform the Organization of the measures taken in accordance with subparagraph (a). After having received a sufficient number of notifications, the Organization shall stipulate a date on which the provisions of this regulation, with regard to the sea area in question, shall enter into force. The Organization shall, at least 12 months before this date, inform all parties of the date thus stipulated.
 - (c) After the date thus stipulated, ships calling at ports in these special sea areas shall also, where such facilities are not yet available, fully comply with the provisions of this regulation.
- (5) Notwithstanding the provisions of paragraph 4, the following provisions shall apply to the Antarctic Area:
 - (a) The government of each individual party to the convention at whose ports ships are scheduled to call, or which come from the Antarctic Area, shall be obliged, as soon as possible, to ensure that reception facilities are available for the storage of garbage from all ships, without causing unnecessary delays, and in accordance with the requirements of the ships that are to use them.
 - S (b) The government of each party to the convention shall ensure that all ships registered in the state in question, before they sail in the Antarctic Area, have sufficient capacity to store all the garbage produced whilst sailing in the region, and that they have entered an agreement that the garbage can be delivered to a reception facility before they leave the region.

M Regulation 6: Exemptions

Regulations 3, 4 and 5 shall not apply to:

- (a) disposal of garbage from a ship necessary with a view to the safety of the ship and those on board or with the purpose of saving human life at sea, or
- (b) discharge of garbage as a result of damage to a ship or its equipment, on condition that, before and after the occurrence of the damage, all reasonable measures have been taken to prevent the discharge or to limit it as much as possible, or
- (c) accidental loss of synthetic fishing net on condition that all reasonable measures have been taken to prevent such loss.

M Regulation 7: Reception Facilities

- (1) The government of each individual party to the convention shall undertake to ensure that ports and terminals are provided with facilities for receiving garbage in accordance with the requirements of the ships using them, without causing unnecessary delays.
- (2) Each party to the convention shall inform the Organization of all cases where the facilities provided pursuant to this regulation are alleged to be inadequate so that it can accordingly inform the states concerned.

S Regulation 8: Port State Control of Operational Requirements¹⁾

- (1) A ship in a port of another party to the convention may be subjected to inspection by a person duly authorised by this party if there are clear reasons to believe that the master or crew are not familiar with the basic ship procedures connected with the prevention of oil pollution.
- (2) Given the circumstances of paragraph 1, the party to the convention shall take steps to ensure that the ship does not sail until the situation has been remedied in accordance with the provisions of this Annex.
- (3) The procedure for port state control as prescribed in article 5 of the MARPOL Convention shall be used to enforce this regulation.
- (4) No part of this regulation shall be understood as a limitation of the rights and duties that a party to the convention has as regards carrying out control of operational requirements as specified and prescribed in the MARPOL Convention.

S Regulation 9: Notices, Plans for Treating Garbage and Garbage Record Book

- (1)
 - (a) All ships with an overall length of 12 metres and upwards shall post a notice drawing the attention of crewmembers and passengers to the requirements of regulations 3 and 5 of this chapter concerning the disposal of garbage.
 - (b) The notice shall be in the official language of the flag state. In the case of ships calling at ports or terminals under the jurisdiction of another party to the convention, the notice shall be in English or French.
 - (c) The notice shall be posted at conspicuous places where passengers and crewmembers generally congregate and in galleys where stores are unpacked, where garbage is sorted, stored and treated, and similar places.
- (2) All ships with a tonnage of 400 and upwards, and all ships approved to carry 15 persons or more shall have a plan for treating garbage, which the crew shall follow. This plan shall contain written procedures for collecting, storing, treating and disposing of garbage, including procedures for the use of garbage processing plant. It shall also indicate the person who is responsible for implementing the procedures of the plan. Such a plan shall be devised in accordance with the guidelines drawn up by the Organization and shall be written in the working language of the crew.
- (3) All ships with a tonnage of 400 and upwards and all ships approved to carry 15 persons or more and calling at ports or terminals under the jurisdiction of another party to the convention and all fixed or floating platforms engaged in exploration or exploitation of the sea-bed's resources shall be provided with a Garbage Record Book. The Garbage Record Book, irrespective of whether it forms part of the official Ship's Logbook or of another record book, shall be in the form specified in Resolution MEPC.65(37).
 - (a) Each discharge or completed garbage incineration shall be recorded in the Garbage Record Book and endorsed at the time of discharge or incineration by the responsible officer. The master shall sign each completed page in the Garbage Record Book. The entries in the Garbage Record Book shall be in both the official language of the flag state and in English or French. The entries in the language of the flag state shall be used (have priority) in cases of dispute or discrepancy.
 - (b) The entry for each garbage incineration or discharge shall include the date, time, ship's position, description of the garbage and the estimated amount incinerated or discharged.
 - (c) The Garbage Record Book shall be kept on board and in a place where it can be located for inspection reasonably quickly. The record book shall be safely retained for a period of two years after the final entry.
 - (d) In cases of accidental discharge, release or loss, as referred to in regulation 6 of this chapter, the circumstances, causes, loss involved, etc. shall be entered in the Garbage Record Book.

1) These regulations contain provisions transposing Council Directive 97/70/EC of 11 December 1997 setting up a harmonised safety regime for fishing vessels of or above a length of 24 metres (OJ 1998 L 34, p. 1).

- (4) The Administration may exempt the following from the requirement to keep a Garbage Record Book:
- (i) ships engaged on voyages lasting one hour or less and are approved to carry 15 persons or more, or
 - (ii) fixed or floating platforms engaged in the exploration or exploitation of the seabed's resources.
- (5) The competent administration of the member state shall inspect the Garbage Record Book on all ships covered by the provisions of this chapter when the ships are in its ports or at its terminals. The Administration may take a copy of each entry in the record book and require the master to verify it. Each such copy that has been verified by the master as a true copy of an entry in the Garbage Record Book shall be accepted in all legal respects as proof of the facts stated in the entry. The competent authority's inspection of the Garbage Record Book and the making and verification of copies shall be effected as quickly as possible and shall not entail unnecessary delays to the ship.
- (6) In the case of ships constructed before 1 July 1997, this provision shall apply from 1 July 1998.
- (7) All ships shall be provided with storage facilities with a capacity sufficient to hold on board solid waste and food waste, taking into account the given ship's service area and sailing time between ports capable of receiving garbage. The ships shall as a minimum be equipped with storage facilities with the capacity stipulated in Annex 1.
- (8) In the case of ships constructed after 1 January 1997, garbage incinerators shall satisfy the provisions of Resolution MEPC.59(33), "Standard specification for shipboard incinerators".

Guideline for garbage container capacities	
Gross tonnage and number of persons	Garbage container minimum capacity (m³)
< 400 with up to 10 persons	0.1
< 400 with up to 50 persons	0.5
400-1,600	0.4
1,600-4,000	1.2
4,000-10,000	2.5
10,000 and upwards	5.0
Ships carrying more than 50 persons	1.0 m ³ per 100 persons per day

Ships shall be provided with three garbage containers corresponding to the three garbage categories set out in the "Guidelines for the implementation of Annex V of MARPOL 73/78". It may generally be anticipated that garbage will consist of 50% glass, cardboard, paper, etc., 25% plastic and 25% food waste.

The garbage container capacity may be reduced for ships that only call at two ports, that have a short sailing time, or that are provided with garbage incinerators or compacting and grinding plants.

GUIDELINE FOR NOTICES CONCERNING TREATMENT OF GARBAGE ON BOARD

Ship garbage shall be separated in accordance with the following Table and shall be stored in containers on board.

All ship-generated garbage shall, as far as possible, be delivered to shore-based reception facilities.

Lawful disposal of garbage by ships into the sea shall only be effected in accordance with the following table and on the authorisation of the ship's master or officers.

Unlawful disposal of garbage into the sea shall be prosecuted.

Garbage	Outside special sea areas	Within special sea areas
All forms of plastic, including synthetic rope and fishing net and refuse sacks	Prohibited	Prohibited
Dunnage, lining/packing material which floats	25 nautical miles from nearest land	Prohibited
Paper, rags, glass, metal, bottles, crockery and similar materials	12 nautical miles from nearest land	Prohibited
Food wastes	12 nautical miles from nearest land	12 nautical miles from nearest land

Supplement 1: Guidelines for Allocating Service Areas to Traditional Ships

The service areas of ships shall be determined by the Danish Maritime Authority in each individual case following a specific assessment as follows:

- 1 On condition that it is otherwise suitable, a traditional ship that satisfies the provisions of the annex to the technical regulation on Traditional Ships (Ships worthy of Preservation, Sport Fishing Vessels, etc.) may be authorised to be engaged on restricted voyages. Restricted voyages shall be construed as voyages in the North Sea east of 3° longitude E and south of 61° latitude N, and in the Baltic and intermediate waters.
- 2 Traditional ships may not normally be authorised to call at foreign ports with more than 12 passengers. The Danish Maritime Authority may, however, have agreed with the authorities of a neighbouring state that certain categories of ship may call at each other's ports.
- 3 A traditional ship that only satisfies the provisions of this technical regulation will not normally be eligible for authorisation to sail an existing ferry crossing. Excursions shall not be considered to be covered by the term "ferry crossing".

Supplement 2: Tables

Table 1

Ground tackle, etc. for ships with a length up to 15 metres							
LOA	Total anchor weight	Anchor cable length	Anchor cable breaking strength	Chain foreganger length	Chain foreganger breaking strength	Mooring line length	Mooring line breaking strength
m	kg	m	kN	m	mm"	m	kN
3	5	15	8	1.2	8mm 5/16"	5	5
4	6	17	11	2	8 mm 5/16"	7	7
5	9	20	15	3	8 mm 5/16"	9	9
6	12	24	19	4	8 mm 5/16"	11	11
7	16	28	23	5	8 mm 5/16"	13	13
8	21	32	28	6	8 mm 5/16"	15	15
9	26	36	32	7	9.5 mm 3/8"	17	17
10	32	40	36	8	9.5 mm 3/8"	19	19
11	39	44	41	8	9.5 mm 3/8"	21	21
12	47	48	45	9	12.5 mm 1/2"	23	23
13	54	52	49	10	12.5 mm 1/2"	26	26
14	62	56	53	11	12.5 mm 1/2"	28	28
15	70	60	58	13	12.5 mm 1/2"	30	30

Table 2

Ground tackle for ships with a length above 15 metres but below 40 metres						
LOA	Total anchor weight	Largest anchor minimum	Anchor chain length	Anchor chain size	Anchor wire length (+12.5 m chain foreganger)	Anchor wire breaking strength
m	kg	kg	m	Mm"	m	kN
15	70	50	85	13 mm 1/2"	213	70
16	88	64	87	13 mm 1/2"	217	76
17	106	78	88	13 mm 1/2"	221	83
18	124	92	90	14 mm 9/16"	225	89
19	142	106	91	14 mm 9/16"	229	96
20	160	120	93	14 mm 9/16"	233	102
21	178	134	95	14 mm 9/16"	237	108
22	196	148	96	14 mm 9/16"	241	115
23	214	162	98	16 mm 5/8"	245	121
24	230	176	99	16 mm 5/8"	249	128
25	253	190	101	16 mm 5/8"	253	134
26	276	200	103	16 mm 5/8"	257	140
27	299	218	104	17.5 mm 11/16"	261	147
28	322	236	106	17.5 mm 11/16"	265	153
29	345	254	107	17.5 mm 11/16"	269	160
30	370	272	109	17.5 mm 11/16"	273	168
31	407	290	111	19 mm 3/4"	277	175
32	444	310	112	19 mm 3/4"	281	183
33	481	329	114	19 mm 3/4"	285	190
34	518	348	115	19 mm 3/4"	289	198
35	555	367	117	22 mm 7/8"	293	205
36	590	386	119	22 mm 7/8"	297	213
37	633	405	120	22 mm 7/8"	301	220
38	676	424	122	22 mm 7/8"	305	228
39	719	443	123	25 mm 1"	309	235
40	760	460	123	25 mm 1"	313	243

Table 3

Hawser and mooring lines for ships of a length of 15 metres and upwards but below 40 metres				
LOA	Hawser length	Hawser breaking strength	Length of each mooring line	Breaking strength of each mooring line
m	m	kN	m	kN
15	105	62	15	30
16	108	65	16	32
17	110	67	17	33
18	113	70	18	35
19	115	72	19	37
20	118	75	20	39
21	121	77	21	40
22	123	80	22	42
23	126	82	23	44
24	128	85	24	45
25	131	87	25	47
26	134	90	26	49
27	136	92	27	51
28	139	95	28	52
29	141	97	29	54
30	144	100	30	56
31	147	103	31	58
32	149	105	32	59
33	152	108	33	61
34	154	110	34	63
35	157	113	35	64
36	160	115	36	66
37	162	118	37	68
38	165	120	38	70
39	167	123	39	71
40	170	125	40	73

Supplement 3: Bilge Pump and Bilge Line

Bilge pump and bilge line		
L x (B + D)	Q	Diameter
m	m³/h	mm
0	15	50
100	15	50
200	15	50
300	17	54
400	19	59
500	22	63
600	25	66
700	27	69
800	30	73
900	32	75
1,000	35	78

Supplement 4: Regulations on Electrical Installations

(Extract from Order no. 173 of 21 May 1965 on Regulations on the Construction, Equipment, etc., of Ships, as amended).³

Section 137. Application

- a. The regulations contained in this section shall cover all electrical installations, but not installations for ship propulsion or series systems of distribution, for which approval shall be obtained from the Directorate in each individual case.
- b. However, radio installations and other special installations requiring specially trained operators and not accessible to other persons shall only be covered by the provisions insofar as concerns the power sources of such installations plus their cables and wiring components.

Section 138. Application of the regulations of classification societies.

- a. In the case of unclassified ships, unless expressly provided otherwise, regulations corresponding to those used by one of the classification societies recognised at any time by the Ministry shall generally apply to electrical equipment and its installation. Electrical equipment approved by the Danmarks Elektriske Materielkontrol (DEMKO), i.e. D-marked equipment, may also be used.
- b. In the case of classified ships or ships constructed to be admitted into a specific class, the regulations of the class shall, with regard to electrical equipment and its installation, be recognised as satisfactory in the areas covered by these regulations. Reference is made to section F regarding recognition of class surveys and inspections.

A. Passenger ships on international voyages

Section 139. Where electrical power is the only means of ensuring operation of the auxiliary installations essential to the ship's propulsion and safety, at least two main generating sets shall be carried. The capacity of these sets shall be such as to ensure, in the event of any one generating set being stopped, operation of equipment important for maintaining safety in various emergency situations.

Section 140. DC supply systems

A. Distribution systems:

The following standard distribution systems shall normally be used:

- 1) two-wire systems, unearthed.
- 2) three-wire systems with inner conductor earthed, but no hull return.

In special cases, the following distribution systems may be approved:

- 3) single-wire system with hull return.
- 4) two-wire system with one pole earthed.
- 5) three-wire system with inner conductor earthed and hull return.

B. System voltages:

- 1) 110 or 220 V shall generally be used as the system voltage, by which shall be understood the voltage between the poles.
- 2) The following maximum system voltages shall be permitted:

Application

500 V:

- a) power supply;
- b) heating and cooking equipment of 4 kW and upwards when fixed and permanently connected to the power installation;

3. Sections in the same Order (no. 173) to which reference is made in sections 137-173 have been inserted after section 173.

- c) large portable equipment, e.g. motor generators for welding or special pumps, provided the connecting cable's earth conductor and the equipment's metallic components are properly earthed (protection earthing), and provided the cable is connected in an especially fixed casing combined with a switch designed so that the casing can only be opened when the switch is open (e.g. an engine casing), cf. also section 163, paragraph (d).

250 V:

- a) lighting;
- b) heating and cooking equipment when fixed;
- c) general portable equipment.

50 V:

- a) hand lamps and small hand tools used in particularly dangerous areas of machinery spaces or on deck and for boiler cleaning and tank checks.

Telephone and similar communication systems should preferably be supplied at 24 V.

Section 141. AC supply systems

A. Distribution systems:

- a) The following standard distribution systems shall normally be used for the primary distribution system, by which shall be understood the part of the system with direct electrical connection to the generator:
 - 1) three-phase, three-wire system, unearthed.
 - 2) single-phase, two-wire system, unearthed. In special cases, the following distribution systems may be approved:
 - 3) three-phase, four-wire system with earthed neutral point but no hull return.
 - 4) three-phase, three-wire system with earthed neutral point.
 - 5) single-phase, two-wire system with one wire earthed.
- b) In addition to the distribution systems referred to in paragraph (a), the following systems may be approved for the secondary distribution system, by which is understood the part of the system that does not have a direct electrical connection to the generator, but is e.g. insulated from it by a double wound transformer or a motor generator:
 - 6) single-phase, two-wire system with earthed central point, but only for lighting purposes.
 - 7) single-phase, three-wire system with inner conductor unearthed.
 - 8) single-phase, three-wire system with inner conductor earthed, but no hull return.

B. System voltages:

The following maximum voltages shall generally be used as the system voltage, by which shall be understood the voltage between two of the phases in a three-phase system and between the conductors in a single-phase system.

500 V:

- a) power supply;
- b) heating and cooking equipment of 4 kW and upwards when fixed and permanently connected to the power installation;
- c) large portable equipment, e.g. transformers and motor generators for welding or special pumps, provided the connecting cable's earth conductor and the equipment's metal components are both properly earthed (protection earthing), and provided that the cable is connected in an especially fixed casing combined with a switch designed so that the casing can only be opened when the switch is open (e.g. an engine casing), cf. also section 163, paragraph (d).

250 V:

- a) lighting;
- b) heating and cooking equipment when not fixed;

- c) general portable equipment, if it is provided with double insulation or reinforced insulation, or if the connecting cable and equipment are provided with proper protection earthing;
- d) hand lamps and small hand tools used in particularly dangerous areas of machinery spaces or on deck, provided an isolating transformer only supplying one object of consumption is used (both wires in such a system shall be insulated from the ground);
- e) internal communication systems, apart from telephone and similar systems, provided precautions are taken as per paragraph (c).

50 V:

- a) hand lamps and small hand tools used in particularly dangerous areas, and where special precautions as per paragraph (d) are not taken;
- b) communication systems where precautions as per paragraph (e) are not taken.

Telephone and similar communication systems should preferably be supplied with 24 V.

Section 142. Connection to shore systems

- a. Where a ship's electrical installations are designed to draw power from sources outside the ship, a fixed terminal box shall be provided on board, located so that flexible cables from the power source outside the ship can easily be connected. The terminal box shall house a switch and fuses or the like for the connected cables. There shall also be connecting shoe of sufficient size and suitable design to provide a satisfactory connection. Fixed cables shall be led from the terminal box to fuses at the main switchboard, and it shall be possible, by means of suitable measures, to ensure that the ship's generators and the cited power source cannot simultaneously be connected to the ship's electric supply mains.
- b. The fixed cables shall, both at the main switchboard and at the connecting junctions, be provided with a voltage indicator. They shall also be provided with means of checking the polarity (in the case of DC) and phase sequence (in the case of AC) of the given power source.
- c. At connecting junctions, there shall be a clear indication of the type of current and the voltage that shall be supplied to the system, as well as instructions for connecting the power.
- d. The regulations of sections 140 and 141 shall apply to the given power source's current type and operating voltage.

Section 143. Electrical machinery

- a. Generators, motors, converters, transformers and rectifiers shall be designed either in accordance with the codes of practice laid down by a classification society recognised by the Ministry, or in accordance with codes of practice and recommendations issued by the International Electrotechnical Commission (hereafter IEC) and approved by the Directorate. All such electrical machinery shall be clearly marked in a conspicuous place, stating the manufacture, voltage, output and speed.
- b. They shall be installed or guarded so that they are not susceptible to mechanical damage or damage from water, steam or oil, and so as to facilitate inspection, minor repairs and disassembly. They may not be installed so close to easily ignitable materials that heat generation or sparks can cause ignition.
- c. Generators and converters may not be installed in spaces presenting an explosion or a fire hazard. Special regulations shall apply to the installation of other electrical machinery in such spaces (cf. sections 168 and 169).
- d. If transformers are used for lighting or other important purposes, their number and output shall be such that the power supply is ensured even if the largest transformer is out of operation.
- e. Transformers shall be double wound and shall generally be of the air-cooled (dry) type.

However, oil-cooled transformers may be permitted for use in machinery spaces, as defined in section 68, paragraph (k), provided the following provisions are satisfied:

1. They shall be fitted in drip pans to collect oil from leaks or similar. These drip pans shall be provided with easily accessible drain cocks.
2. They shall generally be of the type with conservator, which shall be designed so that oil cannot run out as the ship moves about at sea.

3. They shall be provided with an oil-level glass, and the normal oil level shall be clearly indicated.
 4. The oil's flashpoint shall be a minimum of 135° C.
- f. Electrical machines that are exposed to exceptional damp or the sea shall be of enclosed, hose-proof execution.
 - g. All live parts of electrical machines and apparatus shall be guarded against accidental contact.

Section 144. Accumulator batteries

- a. Accumulator batteries shall be constructed and fused so that the electrolyte cannot escape from the cells as the ship moves about, and so as to prevent the electrolyte spraying out.
- b. Measures shall be taken to prevent the electrolyte from coming into contact with the ship's structural components.
- c. If acid is used as the electrolyte, the batteries shall be installed in lead trays or wooden trays sheathed with lead.
- d. Accumulator batteries with different electrolytes shall not be installed in the same space.
- e. Accumulator batteries of a size capable of producing more than 100 W for 20 hours shall be housed in special spaces or in special compartments.
- f. The internal surfaces of battery rooms shall be treated with anticorrosion paint.
- g. Switches, fuses and other electrical parts capable of producing sparks shall not be installed in battery rooms.
- h. Accumulator batteries shall be installed so that all cells or cell cases are accessible from above and from one side.
- i. Cells and/or cell cases shall be mutually supported and stiffened with non-absorbing, insulating material so as to prevent any displacement of cells and/or cell cases as the ship moves about.
- j. Battery rooms shall be provided with a special ventilation system. From the top of the room, an air duct shall be carried to the open air, and measures shall be taken to ensure provision of air low down in the room.

Natural ventilation may be used if the duct or the ducts can be carried directly to the open air without any part of a duct inclining by more than 45° from the vertical plane.

Mechanical ventilation shall be used if natural ventilation is not possible. However, ventilator motors may not be installed in ventilation ducts.

The internal surfaces of ventilation ducts shall be treated with anticorrosion paint.

- k. All openings in bulkheads and decks surrounding a battery room, apart from ventilation openings, shall be effectively sealed so as to minimise the risk of gases escaping from the room.
- l. Battery cases installed below deck shall be ventilated in a similar fashion to battery rooms.
- m. If batteries are installed in deck cases, these shall be well-ventilated and designed so as to prevent penetration of water.
- n. Starter batteries for engines shall be located as near as possible to the engines that they operate. If such batteries cannot be installed in a battery room, they shall be installed in places where proper ventilation is ensured.
- o. Batteries, apart from those used exclusively for starting, shall be protected against short circuit by fuses at each insulated pole or using multipolar overload switches. Fuses or overload switches shall be installed as near to the battery room as possible.
- p. Accumulator batteries may not be installed in the same room as the emergency switchboard.

Section 145. Arrangement and design of main switchboards

- a. If there is only one main generator space, the main switchboard shall be installed in the same main fire zone. If there is more than one main generator room, only one main switchboard shall be permitted.

- b. Generators, transformers and accumulators that supply power to the electric supply mains shall be connected either directly to a main switchboard or to special switchboards (cf. section 146) that are themselves connected to a main switchboard.
- c. The switchboards shall be arranged or guarded so that they are not susceptible to mechanical damage or damage from water, steam or oil, and they shall not be located in spaces that present an explosion or fire hazard or so close to easily ignitable materials that heat from the switchboards or any sparks can cause ignition.
- d. Live parts that can be touched shall not be installed on the front of main switchboards if the voltage to the hull exceeds 250 V DC or 150 V AC.
- e. Main switchboards shall be so arranged as to give easy access to their front and back without danger to personnel. Their sides and rear shall be suitably guarded.
- f. If live parts on a main switchboard may be accidentally touched, guardrails or mats of damp-proof, oil-resistant and non-conducting material shall be provided.
- g. Main switchboards shall be executed in flameproof and damp-proof material. There shall be a partition made of equivalent materials between the individual panel sections. All live parts shall be fitted on well-insulated, flameproof and damp-proof material.
- h. All connections on main switchboards shall be secured against working loose.
- i. In the case of main switchboards rated for voltages not exceeding 50 V (the safety voltage), the provisions of section 159 shall apply.

Section 146. Terminals on main switchboards

The terminals necessary for safe operation of the electrical installation shall be provided on main switchboards.

All power sources connected to a main switchboard, and all circuits fed from such a switchboard, shall be protected against overload and short circuit using either overload trip switches or switches with fuse.

Fuses rated for more than 320 A shall not be used to protect against overload, although they may be used to protect against short circuit.

Power sources that, during normal operation, supply the circuits necessary for ship and passenger safety shall be provided at the main switchboard with a device that, on overloading, automatically disconnects the circuits less essential for the ship's operation.

Regarding switches and fuses for accumulator batteries, see also section 144, paragraph (o).

Main switchboards shall also be provided with the protective and measuring devices, etc, given below.

a. Protection of Generators:

1. Both DC and AC generators shall be provided at the main switchboard with the following protective devices:
 - (a) For generators that cannot be used in parallel operation:
A multipolar switch with adjustable overload trip at each pole.
For generators less than 50 kW, a multipolar switch with fuses at each insulated pole may be used.
 - (b) For generators used in parallel operation:
A multipolar switch with adjustable overload trip at each pole.
2. The following shall also apply to DC systems with parallel operation of generators:
 - (a) Each generator shall be provided with reverse current protection independent of the voltage. In the case of compound-wound generators, this shall be applied at the pole that is not connected in series with the generator's compound-winding.
 - (b) In the case of compound-wound generators, there shall be a switch in the equalising connection for each generator that is locked so that it closes before and opens after the generator switch.

- (c) In the case of three-wire distribution systems, there shall be a three-pole switch for each generator so that the outer conductors and the inner conductor are switched off simultaneously. Additionally, if the system is centre grounded, a single-pole switch shall be inserted in the associated earth conductor so that the system can be isolated from earth. An alarm relay and an isolator may be inserted into this earthing instead of the switch.
3. In the case of AC systems, a directional current relay shall be installed for each generator operating in parallel with one or more generators.

b. Protection of circuits fed from main switchboards:

- 1. All outgoing circuits shall be provided with a multipolar automatic switch or a multipolar switch with fuse at each insulated pole.
- 2. Overload protection and protection against short circuit shall be implemented as follows:
For cables
 - (a) with full load current 320 A and more, automatic switches shall be used,
 - (b) with full load current less than 320 A, either automatic switches or closed-type fuses shall be used.

Overload protection for outgoing circuits shall be matched to the generator protection so that the release is selective under all normal conditions.
- 3. Switches and fuses for each outgoing circuit shall be provided with a clear indication of the circuit to which they belong, and the maximum current consumption of the circuit.

For motors, the rating of the protective fuse shall also be given.

c. Measuring instruments:

- 1. DC generators
 - (a) In the case of generators not used in parallel operation, there shall be at least one voltmeter and one amperemeter for each generator.
 - (b) In the case of parallel operation, there shall be one voltmeter and one amperemeter for each generator. Instead of a voltmeter for each generator, one voltmeter connected via the busbars and one provided with a voltmeter converter may be used so that the voltage can be measured for each individual generator.
 - (c) In the case of compound-wound generators provided with an equalising connection, the amperemeter shall be connected to the generator pole that is not connected to the series winding.
 - (d) In the case of three-wire systems, there shall be an amperemeter for each generator pole and a voltmeter between the inner conductor and each of the outer conductors.
- 2. AC generators
 - (a) In the case of general operation, each generator shall be provided with at least one voltmeter, one frequency meter and either an amperemeter with amperemeter converter so that the current in each phase can be isolated, or an amperemeter in each phase. In the case of generators of 50 kVA and more, there shall also be a wattmeter.
 - (b) In the case of parallel operation, each generator shall have a wattmeter and amperemeter as per paragraph (a). Additionally, there shall be two voltmeters, two frequency meters and a synchronisation device consisting of a synchronoscope with lamps or other similar device. One voltmeter and one frequency meter shall be provided with a converter for connecting to one of the phases on the respective generators. The other voltmeter shall be permanently connected via one of the phases at the busbars, and all other voltmeter connections shall be connected to the corresponding phase at the generators.
- 3. In the case of insulated distribution systems, there shall be means to indicate important insulation defects in the system.
- 4. Measuring instruments, e.g. voltmeters, voltage poles, insulation measuring devices, indicating lamps, etc., shall, with regard to their supply lines, be protected by means of special

fuses in accordance with the Diazed system (the diameter system). Fuses in accordance with the length system may not be used. The fuses shall be fitted as near to the branches of the system as possible, and the connecting cables to the appliances shall be insulated with temperature-resistant, non-flame-promoting material.

Section 147. Special precautions for parallel operation of generators

If several generators are used in parallel operation, the following regulations shall be observed:

- a. In the case of DC current, the generators shall be provided either with a compound winding or an automatic voltage regulator to ensure that the total load remains distributed proportionately with the rated load for the generators.
- b. Compound-wound DC generators shall have equalising connections that are rated so that they can carry at least half the full load of the generators to which they belong. Equalising bars shall be able to carry at least half the full load of the largest generator in the group.
- c. In the case of AC current, each generator shall be provided with an automatic voltage regulator. Additionally, there shall be means at the main switchboard or in its immediate vicinity to regulate the power supply to the prime movers so as to ensure a uniform load.

Section 148. Division of the installation

- a. All power-consuming appliances shall, either individually or in groups, be connected to a main switchboard or a secondary switchboard that is connected to a main switchboard either directly or via another secondary switchboard.
- b. It shall be possible to disconnect the voltage, by means of a switch, from all circuits fed from a switchboard or transformer, and these circuits shall have fuses for all insulated poles. In the case of polyconductor circuits, the neutral conductor shall not, however, be fused.
- c. Automatic trip switches may be used instead of switches with fuse.
- d. Small power consumers may be grouped in final subcircuits, although the maximum load in such a circuit shall not exceed 16 A.
- e. Unless expressly provided otherwise, all final subcircuits shall be protected with fuses or automatic trip switches at each insulated pole.
- f. Final subcircuits shall not supply light, power and heat simultaneously, although this requirement shall not apply to room fans designed for connection to the lighting installation.
- g. A final subcircuit shall not normally contain more than 24 points, although every two sockets in such may be counted as one point. In the case of ceiling lights and similar, where many points are used in close proximity to one another, a group of six lamps may be counted as one point, provided the points are not connected to flexible cables. The maximum load for such a final subcircuit shall not exceed 10 A.
- h. Any motor intended for important purposes shall have its own final subcircuit, and any motor of 0.5 kW/hp shall have its own protection both against overload and short circuit.
- i. Several secondary switchboards may be connected to a supply line that need not be separately guarded at each secondary switchboard, provided it has the same cross-section along its entire length, cf. section 158, paragraph (a). Such secondary switchboards shall have a suitable multipolar switch that can disconnect the voltage from the secondary switchboard.

Section 149. Reserve and emergency sources of electrical power

- a. Above the bulkhead deck and outside engine casings, there shall be an independent emergency source of electrical power. Its location in relation to the main generator(s) shall be such as to ensure to the satisfaction of the Directorate that a fire or other casualty in the machinery space will not interfere with the supply or distribution of emergency electrical power. The emergency power source shall not be located forward of the collision bulkhead.
- b. The electrical power available shall be sufficient to supply all the services that the Directorate deems essential for the safety of passengers and crew in an emergency, due regard being paid to such services as may have to be operated simultaneously. The electrical power shall be sufficient to operate these services for at least 36 hours, although the Directorate may, for ships engaged regularly on voyages of short duration, accept a lesser period if satisfied that the same standard of safety would be attained.

- c. The emergency power source may be either
 - 1) a generator driven by a suitable prime mover with an independent supply of fuel and with an approved starting system (the fuel shall have a flashpoint of not less than 43°C), or
 - 2) an accumulator battery capable of carrying the emergency electrical load without recharging or excessive voltage drop.
- d. If the emergency source of electrical power is a generator, the transitional source of emergency electrical power shall consist of an accumulator battery with sufficient capacity to
 - 1) continuously supply power for emergency lighting for half an hour,
 - 2) close the watertight doors (if these are electrically operated); it shall not, however, be necessary for all watertight doors to be closed simultaneously,
 - 3) operate the indicators (if these are electric) showing whether the mechanically operated watertight doors are open or closed, and
 - 4) operate the sound signals (if these are electric) warning that mechanically operated watertight doors have begun to close.

Measures shall be taken so that the transitional emergency source of electrical power automatically begins to operate if the main power supply fails.

- e. Where the emergency source of electrical power is an accumulator battery, measures shall be taken to ensure that the emergency lighting automatically switches on if the power supply from the main source of electrical power for the lighting fails.
- f. Where the emergency source of electrical power is a generator that automatically begins to operate by means of an approved starting system as soon as the main source of power fails, the accumulator battery required by paragraph (d) may be omitted.
- g. In the machinery space, an indicator shall be fitted on the main switchboard wherever possible to indicate when an accumulator battery installed in accordance with the provisions of this paragraph is being discharged.
- h. The following shall apply to the emergency switchboard:
 - 1) It shall be installed as near as is practicable to the emergency source of electrical power.
 - 2) Where the emergency source of electrical power is a generator, the emergency switchboard shall be located in the same space unless the operation of the emergency switchboard would thereby be impaired.
 - 3) No accumulator battery fitted in accordance with the provisions of this paragraph shall be installed in the same space as the emergency switchboard.
 - 4) The Directorate may permit the emergency switchboard to be supplied from the main switchboard under normal operating conditions.
- i. The complete emergency system shall be capable of functioning at any angle of list up to 22.5° and/or when the ship has a trim of 10°.
- j. Provision shall be made for periodic testing of both the emergency source of power and, if applicable, the transitional source of power. The testing shall also cover the automatic systems.

Section 150. Equipment essential to ship and passenger safety

The following electrical equipment, etc. shall be regarded as essential to ship and passenger safety in an emergency and it shall be possible to supply it from the emergency source of electrical power covered in section 149:

- 1. The emergency lighting for all lifeboats (on deck and over the sides).
- 2. The emergency lighting in corridors, stairways, exits from all large spaces where passengers or crew are accommodated, machinery spaces and control rooms.

3. The electric alarm equipment calling passengers to assembly points (cf. section 224) and the automatic fire alarm installation (cf. sections 90 and 91⁴), if they do not have an independent source of electrical power.
4. Equipment for closing watertight doors (cf. section 21⁴).
5. Emergency bilge pumps (cf. section 28, paragraph (d) (1)).
6. The navigation lights and day signal lamp if this draws power from the main source of electrical power.
7. One of the fire pumps (cf. section 114, paragraph (a)⁴).
8. Sprinkler pumps (cf. section 108⁴).
9. Passenger lifts.
10. Electric engine room telegraphs.

Section 151. Reserve and Emergency Circuits

- a. If a ship is divided into several main fire zones, the following shall be observed:
 1. Each zone shall have two separate supply lines for the lighting. One of these may be the supply line for the emergency lighting.
 2. The distribution system shall be designed so that fire in any main fire zone cannot disrupt important power supplies in other main fire zones. The supply lines for main and emergency installations that run through any fire zone shall to this end be installed as far apart as possible, both vertically and horizontally.
- b. The distribution system shall also, as far as possible, be designed so that water entering a deck lying beneath the bulkhead deck does not cause a short circuit in equipment on a higher deck. The supply lines for both main and emergency installations belonging to various decks shall to this end be kept separate wherever possible.
- c. The emergency electric lighting required by section 225⁴ shall not have fuses other than those fitted at the emergency power source's switchboard, and switches may only be located at the emergency power source and in the wheelhouse.
- d. The emergency lighting shall be operative at all times at the exits from all large spaces where passengers or crew are accommodated. The power to this lighting may, under normal conditions, be drawn from the main power source.
- e. In the following spaces, the lamps shall be connected to at least two different groups:
 - 1) spaces accessible to passengers:
 - corridors
 - stairways leading to the boat deck
 - lounges
 - 2) spaces accessible only to the crew:
 - machinery spaces
 - boiler rooms
 - large galleys
- f. Each generator should have at least one lamp connected to it so that the lamp does not go out if the power from the generator is shut off at its switch or fuses.

Section 152. Electric and electro-hydraulic steering gear

- a. Means for continuously indicating that the motors of electric and electro-hydraulic steering gear are running shall be installed at a suitable point acceptable to the Directorate.
- b. Electric and electro-hydraulic steering gear shall be served by two circuits fed from the main switchboard. One of the circuits may be supplied through the emergency switchboard. Each circuit shall have adequate rating for supplying all motors normally connected to it and

4. The sections have been reprinted at the end of supplement 4.

operating simultaneously. If the steering gear space has change-over devices via which each circuit can be made to supply any given motor or combination of motors, both circuits shall be rated to be able to carry the maximum load. The circuits shall, throughout their length, be situated as far apart as practicable.

The above circuits and motors shall only be provided with short circuit protection.

Section 153. Special emergency precautions

- a. Reference is made to the provisions of section 85, paragraph (b)⁵ with regard to means for shutting down artificial ventilation equipment.

These provisions shall not apply to room fans, etc. connected to the lighting installation.

- b. Reference is made to the provisions of section 70, paragraphs (a) and (b)⁵ with regard to means for shutting down the ventilation in machinery spaces and shutting down oil fuel pumps, etc.
- c. Reference is made to the provisions of section 108, paragraph (e)⁵ with regard to power supply to pumps, air compressors and automatic fire alarm installations associated with automatic sprinkler systems.
- d. If motors for pumps with outlet above the waterline are provided with switches located outside the machinery space, these shall be guarded against use at inappropriate times. This provision shall be combined with the provision of section 222, paragraph (a) (3)⁵.
- e. Reference is made to section 114, paragraph (a) with regard to the arrangement of motors for fire pumps.
- f. It shall be possible to start the motor for the emergency bilge pump covered by section 28, paragraph (d) (1) from a point located above the bulkhead deck. If there is also a starting system located at the motor itself, it shall be possible to shut off all connections to this starting system from the above-mentioned point. The cables, which shall not contain splices, shall be introduced to the air bell from below.

Section 154. Installation of navigation lights and engine room telegraphs

- a. If the required navigation lights are electric, they shall each be connected to a special secondary switchboard that is directly connected to the main or emergency power source and does not include other circuits. It shall be possible, by means of a converter on the bridge, to connect the main switchboard via a connection other than the normal one in the event of failure.
- b. If the reserve lanterns required by section 198 are electric, they shall be connected via special cables to a special secondary switchboard.
- c. All navigation lights shall be provided with fuse and switch at each insulated pole. These shall also be fitted so that they are readily accessible for operation.
- d. For each navigation light there shall also be a device, near to the switch, which automatically activates an acoustic or visual signal if the navigation light is switched off.
- e. Electric engine room telegraphs shall each be connected to a secondary switchboard that is directly connected to the main or emergency switchboard. The secondary switchboard shall be installed near to the secondary switchboard for the navigation lights covered in paragraph (a).
- f. Two fuses with associated converters for each engine room telegraph shall be installed at the secondary switchboard at each insulated pole, unless overload switches are used.

Section 155. Electric means of communication

- a. Equipment in which electricity is used to transmit communications, e.g. signalling equipment, telephone and public address systems, fire alarm and other alarm installations, remote indicators, shall satisfy the provisions of this section if:
 - 1) they serve the safety of the ship or those on board,
 - 2) they have a direct electrical connection to a system in which the electricity is used for lighting, power or heat,

5. The sections have been reprinted in supplement 4.

- 3) the voltage exceeds 50 V, or
 - 4) the power source is of such capacity that it is able to supply more than 100 W for at least 20 hours.
- b. In all apparatus forming part of the equipment cited in paragraph (a), the live parts shall be of weatherproof metal and shall be fitted on flameproof and weatherproof insulating materials. All protective casings shall be of flameproof material.
 - c. Equipment not covered by the categories of paragraph (a) above shall in every respect be properly executed, taking into account the voltage used. All circuits, except those drawing current from dry elements, shall be guarded with fuses for each insulated pole.
 - d. Converters and transformers used to reduce the voltage for equipment covered under paragraph (c), together with the associated cables and components, shall satisfy the provisions of this section.
 - e. Circuits shall be arranged and junction boxes designed and marked so that error measurements and necessary repairs can be carried out with minimum disruption to other circuits.

Section 156. Design of conductors

a. Material

All conductors in insulated cables shall be of copper with conductivity that is at least 98% of the conductivity for copper in accordance with IEC standards.

b. Construction of copper conductors

1. Conductors with a cross-section of 1 square millimetre and less shall not be used for permanent assembly.
2. Conductors with a cross-section of 2 square millimetres and more shall be multi-stranded. This shall not, however, apply to mineral-insulated cables with copper sheath.
3. In rubber-insulated cables, all conductor wires shall be coated with pure-quality tin.

c. Insulation

The following types of insulation may be used:

1. Rubber (natural or synthetic)
2. Polyvinyl chloride (PVC)
3. Heat-resistant isobutylene-isoprene rubber
4. Textiles
5. Silicon rubber
6. Mineral

Cf. also IEC recommendations.

d. Protection of cables

The following types of protection may be used:

1. Impregnated textile braiding
2. Lead sheath without braiding
3. Lead sheath with braiding or other approved protective layer
4. Armoured lead sheath with or without braiding or other protective layer over the armour
5. Rubber sheath with or without braiding
6. Rubber sheath and armour with or without braiding or other protective layer over the armour
7. PVC sheath
8. Copper sheath (only for mineral-insulated cables)

- e. Cables for fixed installations for lighting, power and heat:
 - 1. General insulated cable
 - 2. Non-armoured cable
 - 3. Armoured cable
- f. Cables for portable appliances for lighting, power and heat may be:
 - 1. Flexible cable with general protective layer
 - 2. Flexible cable with abrasion-proof protective layer.
- g. Cables for installation of electric means of communication, apart from those cited in section 155, paragraph (a), may be:
 - 1. Low-current cables for fixed installation
 - 2. Flexible low-current cables.
- h. For the construction of the cables and cable types referred to in paragraphs (e) and (f), and for the tests to which they will be subjected before laying, the regulations recognised or laid down at any time by the Directorate shall apply. In general, the IEC's recommendations in this respect shall be followed.
- i. All conductors and cables shall be of a type that, in respect of fire-retarding properties, is to the satisfaction of the Directorate.

The Directorate may, with a view to preventing fire or explosion, require additional safety measures for electric cables in special spaces on ships.

With regard to running cables to pumps and compressors for automatic sprinkler systems, see also section 108, paragraph (g).

Section 157. Loading and dimensioning cables

- a. In calculating the permissible load for various cable cross-sections, account shall be taken of:
 - 1) whether the load is permanent or intermittent,
 - 2) the ambient air temperature.
- b. Taking into account the conditions of paragraph (a), the permissible load for various types and cross-sections of cable shall be calculated using the tables contained in the regulations laid down or approved by the Directorate as covered in section 156.
- c. The dimensioning of group cables shall take account of the total maximum current with which the group (current consumer) may be loaded. In the case of motors, the normal current shall be taken into account, and in the case of points the maximum load, but not less than 60 W for each point.
- d. Dimensioning of cables supplying one or more secondary switchboards shall take account of a load less than the sum of the maximum loads in the individual groups connected to the secondary switchboards. The ratio of desired load to total maximum load (simultaneity factor) shall be laid down in each individual case in consideration of the probability of simultaneous loading of the various groups. This shall not, however, apply to groups that only have connecting points for light and heat.
- e. Taking into account the calculated permissible load, the cables shall be dimensioned so that the voltage drop between the busbars at the main switchboard and any point of the installation shall not exceed 6% of the normal operating voltage when the cables are fully loaded under normal operating conditions. In calculating the voltage drop in a cable supplying several groups, it shall be permitted to reckon with the simultaneity factor, cf. paragraph (d).
- f. In the case of AC installations, the cables shall be dimensioned so that the starting current for motors does not cause such a large voltage drop that the protective devices for other operative motors are triggered.

Section 158. Fuses or automatic trip switches

- a. Main switchboards and secondary switchboards shall be provided with fuses or automatic trip switches for each outgoing, non-earthed cable. Fuses (automatic trip switches) shall also be installed wherever one cable section is connected to another with a lower permissible load.

- b. Fuses and automatic trip switches shall not be prescribed for more than the maximum permitted load of the cables in question and shall have a breaking capacity corresponding to the short circuit current at the connection terminals, although the protective devices for motor circuits may be dimensioned for the overload that occurs during the motor's normal acceleration period.
With regard to fuses for cables to steering gear, see section 152.
- c. Fusing devices shall be of an approved design. Both fuse holders and fuse elements (plugs and cartridges, etc.) shall be clearly marked in a conspicuous place with the prescribed current and maximum voltage. Automatic trip switches shall be similarly marked.
- d. All live parts of fusing devices shall be fitted on flameproof, damp-proof and well-insulated material and shall be guarded against being accidentally touched.
- e. Fusing devices that can be operated by non-expert personnel shall have plug or cartridge fusing elements or similar and shall be designed so as to exclude the careless fitting of fusing elements for lower currents than that for which the fusing device is prescribed.
- f. Automatic trip switches shall be of an approved design and shall disconnect all non-earthed poles simultaneously. For a prescribed current of more than 15 A, they shall be provided with hand levers with trip-free release and means of adjusting the cut-out current.
- g. Instead of automatic trip switches, switches with inbuilt fuses may be used.
- h. Fuses and automatic trip switches shall, wherever possible, be installed together at switchboards and at an easily accessible point. Regarding the arrangement of fuses for the navigation lights and engine room telegraphs, see section 154.
- i. Fuses and automatic trip switches shall be arranged and guarded so that they cannot constitute a fire hazard. If they are installed in cargo spaces, they shall only guard cables belonging to the lighting in the cargo spaces in question, and they shall be enclosed in solid protective cases of metal. If they are exposed to exceptional damp or the sea, they shall be installed in watertight enclosed protective cases of steel or metal.

Section 159. Design and arrangement of secondary switchboards

- a. Secondary switchboards shall be of flameproof and damp-proof material and all live parts shall be fitted on well-insulated, flameproof and damp-proof material.
- b. Secondary switchboards shall be arranged so that there is a free space of at least 3 cm depth behind the switchboard. However, if non-insulated parts are arranged on the back of the switchboard, the distance from these to the bulkhead shall be at least 10 cm, unless the bulkhead is clad in flameproof material.
- c. Secondary switchboards may not be installed in spaces presenting a fire or explosion hazard and shall, unless they are installed in special purpose-built spaces accessible only to expert personnel, be installed in solid protective cases. In accommodation spaces and similar dry spaces, these may be of wood, but shall otherwise be executed in steel or metal; where they are exposed to exceptional damp or the sea, they shall be watertight.
- d. Wooden protective cases shall be well-ventilated and shall be protected against fire by means of a flameproof protective cladding, e.g. steel sheet.
- e. Live parts that may be touched shall not be installed on the front of secondary switchboards if the voltage to the hull exceeds 250 V for DC and 150 V for AC.
- f. Secondary switchboards shall be designed so that live parts are guarded against being touched.

Section 160. Cable installation

- a. Wherever possible, cables shall be laid so that they have a straight course, are easily accessible and are not exposed to exceptional damp, oil, mechanical damage or high temperature.
- b. Cables that are installed on open weather decks, in bathrooms, cargo spaces, refrigerated holds, machinery spaces or other places where water or harmful vapours (e.g. oil vapours) can collect, shall be surrounded by a non-penetrable protective layer.

In exceptionally damp places, cables with hygroscopic insulation shall be surrounded by a metallic, non-penetrable protective layer. Cables with steel braiding shall not be used on open

decks or in places where they are exposed to exceptional damp, unless they are surrounded by a non-penetrable protective layer, e.g. PVC sheath.

- c. In spaces where cables are exposed to chemical effects, the cables shall be provided with a protective layer resistant to these effects.
- d. Cables whose protective layer can damage the protective layer of other cables shall not be laid together with such cables.
- e. Cables that are exposed to mechanical effects shall, if the cables' protective layer, e.g. armour, is not able to withhold the possible effects, be protected with a screen of steel or metal or be lead through steel tubing.

Cables in cargo spaces and other spaces where there is a particular risk of mechanical damage shall, unless the ship's structural components themselves afford satisfactory protection, be properly protected, even if the cables are armoured.

- f. Steel used to protect cables shall be treated against corrosion.

Cables shall be effectively supported and retained using clamps at suitable spacing and of a form that does not damage the cables. The cables shall also be laid so that they are not damaged when being bended, and so that they are exposed as little as possible to stretching or crumpling under their own weight as a result of heat gains, movements of the ship or otherwise. Cableways and clamps shall be of non-corroding material or shall be properly treated against corrosion before installation.

- g. The use of PVC-insulated cables shall be restricted to small cables whose dimension shall not generally exceed 35 square millimetres. PVC-insulated cables may not be used where it is necessary to run the cables through watertight bulkheads and should not be used in refrigerated holds either.
- h. Flexible cabling without protective cladding may be used for portable appliances in dry accommodation spaces where the cables are not exposed to mechanical damage. Outside dry accommodation spaces where the cables are not particularly exposed to mechanical damage, flexible cables with general protective cladding may be used. In machinery spaces, at stokeholds, in bunkers and cargo spaces and on deck, and in other places where there is exceptional damp or where mechanical damage is to be feared, flexible cabling may be used with abrasion-proof protective cladding.
- i. The permanently laid, low-current cables covered in section 156, paragraph (g) shall be kept separate from other cables on installation.
- j. In the case of AC equipment, polyconductor cables shall be used wherever possible so that all phases are carried in the same cable. If single-conductor cables are used, care shall be taken when laying the cables that all phases are as near to each other as possible and, where applicable, are carried in the same pipe. If necessary, single-conductor cables shall be twisted together or crossed to reduce the circuit's inducing effects, and placed at such a distance from the ship's hull that loss by induction is reduced as much as possible.

Section 161. Cable penetrations and connections

- a. Where unprotected cables, including non-armoured lead cables, are led through bulkheads, iron beams or similar, the cables shall be protected using sheathing of lead, wood or similar, which fully envelops the cables. If the cables are led through watertight bulkheads, watertight stuffing boxes shall be installed around the cables, and if they are led through fireproof bulkheads of class A, fireproof stuffing boxes shall be used (cf. section 76, paragraph (a)⁶).
- b. Where the cables are led through decks, they shall be installed in tubes of steel or metal, which shall be solidly fastened to the deck and lead sufficiently high up that water cannot rise up over them. The tubes shall be plugged with fire-resistant insulating compound and made watertight. In the case of single-core AC cables, the tubes shall be of metal and preferably be secured in metal plates.
- c. Conductors, apart from those in low-voltage communication circuits, shall only be grouped in junction/branching boxes. All such branching boxes or components shall be constructed so that any fire in the component shall be prevented from spreading. Where splicing is used, only an approved method shall be used, which ensures that the cable's original mechanical and

6. The sections have been reprinted in supplement 4.

electrical properties are maintained. Junction/branching boxes fitted in circuits important for safety purposes, cf. section 150, shall be clearly marked.

- d. At places where the installation is exposed to damp, junction/branching boxes shall be closed watertight or cast watertight with insulating compound.
- e. In cables between main switchboards and secondary switchboards and between switchboards and machines and consuming devices, grouping shall be avoided as far as possible.

Section 162. Precautions against shock, fire and other hazards of electrical origin

- a. Exposed parts of electrical machines or equipment that are not intended to be live but that are liable under fault conditions to become live shall be earthed to the ship's hull. All electrical apparatus shall be so constructed and so installed as not to cause injury when handled or touched in the normal manner.
- b. Regarding precautions for portable lamps, tools and similar apparatus, see sections 140 and 141.
- c. Where a hull return system of distribution is used, special precautions approved by the Directorate shall be taken.
- d. The cable's metal sheaths and armour shall be electrically continuous to the ship's hull.
If cables are provided with neither a metal covering nor armour, special measures shall be taken so that fire cannot start due to an electrical fault.
- e. Lighting fittings shall be so arranged as to prevent temperature rises that could damage the cables and wiring, and to prevent surrounding material becoming excessively hot.
- f. Connections to earth shall be of copper or phosphor-bronze and shall be designed so as to be protected against damage and corrosion. They shall be easily accessible and the connection to the ship's hull shall be ensured by means of a brass screw of suitable diameter that shall not be used for other purposes.
- g. The provisions contained in the regulations approved or laid down by the Directorate as covered in section 156 shall apply with regard to dimensioning.

Section 163. Switches, converters and sockets

- a. Switches, converters and sockets shall be of approved design. All live parts shall be fitted on flameproof, damp-proof and well-insulated material, and shall, if not covered by insulating material, be guarded against being touched by means of solid covers of flameproof material.
- b. Switches and converters shall be of the quick-break type. Group switches, switches and converters for motors and other appliances, as well as switches on deck and in damp spaces, shall disconnect all poles.
- c. It shall be possible to shut off fixed appliances, including winches and transformers, etc., in their immediate vicinity.
- d. All sockets rated for a current of more than 15 A (and in damp spaces, more than 6 A) shall, on open deck, be provided with a switch that is linked to the plug so that the plug can only be inserted and removed when the switch is open. Equipment with a working voltage less than 50 V is exempt from this provision.
- e. Switches, converters and sockets shall be fitted or guarded so that they cannot present a fire hazard. Where they are exposed to damp, they shall be watertight, and in exceptionally exposed places they shall also be protected against mechanical damage.
- f. Circuits for lighting and sockets, etc. in coal bunkers or cargo holds shall be provided with lockable two-pole switches fitted outside these spaces.
- g. In bathrooms and similar damp spaces, sockets shall not be installed unless each socket is provided with its own isolating transformer.

Section 164. Starters and resistors

- a. In the case of starters and resistors, all live parts shall be fitted on flameproof and well-insulated material and shall be guarded against being touched by means of a protective cladding of flameproof material.

- b. They shall also be arranged so that in normal use they cannot reach an external temperature that could be hazardous for the surrounding materials. No unprotected timberwork shall be located within 10 cm of the external parts of the apparatus.
- c. Starters and resistors shall be easily accessible and shall not be installed in the accommodation. On decks, in cargo holds and at stokeholds, as well as in places where they are exposed to exceptional damp, they shall be suitably protected against damp and overload.

Section 165. Filament lamps

- a. The lampholders' live parts shall be fitted on flameproof, damp-proof and well-insulated material and shall be guarded against being touched by means of such material.
- b. Fittings with shields of combustible material shall be of such design that the shields cannot come dangerously close to the lighting element.
- c. Lamps in the vicinity of easily ignitable materials shall be guarded or installed so that the lighting elements cannot come into direct contact with the materials.
- d. Lamps exposed to mechanical damage, e.g. lamps in cargo holds and similar spaces, shall be installed in fittings of solid construction and with strong guard shields.
- e. Lamps installed on deck and at stokeholds as well as in other places where they are exposed to exceptional damp shall be installed in watertight fittings with tight-fitting bells of glass or similar material.

Section 166. Discharge lamps

- a. Induction coils, capacitors and switching appliances forming part of discharge lamp installations shall be enclosed in protective casing of metal that is connected to the ship's hull. The temperature rise in these parts may not exceed 60°C, and capacitors of more than 0.5 microfarads shall be provided with protective earthing.
- b. Special regulations approved or laid down by the Directorate shall apply to the use of discharge lamps designed for voltages above 250 V.

Section 167. Portable lamps and appliances

- a. In the case of hand lamps and large, portable lamps or lighting appliances for illuminating decks, cargo spaces or similar, the lampholders shall either be fully covered with tough insulating material or guarded against being accidentally touched by means of shields or guard shields insulated from the lampholders by means of tough insulating material. The lamps shall not be provided with built-in switches.
- b. Portable appliances shall be of approved design and shall, in a conspicuous place, clearly state the manufacture, voltage and output. They shall, both electrically and mechanically, be adequately dimensioned and designed so that they cannot cause a fire hazard or endanger personnel as a result of sparking or similar.
- c. The electrical appliances mentioned in paragraph (b) shall be designed so that all live parts are guarded against being accidentally touched. They shall also preferably be designed so that non-live metal parts that may be touched are separated, by means of specially fitted, tough insulation, from all live parts so that they cannot come into contact with them. If this is not practicable, non-live metal parts that may be touched shall be connected to the ship's hull via a suitable conductor in the power supply cable.

Section 168. Special regulations for hazardous spaces

For electrical installations in spaces where an explosion hazard may be feared, the provisions relating to tankers in part D shall apply.

Section 169. Special regulations for spaces presenting a fire hazard

- a. Generators, converters and rectifiers, as well as main switchboards, shall not be installed in spaces intended for the storage of easily ignitable substances (fire hazard spaces). Motors and transformers shall be fully closed or installed in close-fitting, protective casing made of or sheathed in flameproof material.
- b. Fuses, switches, sockets and other components that may give rise to sparks shall be surrounded by close-fitting, protective cases in flameproof material. Sockets shall be provided

with a switch linked to the plug so that the plug can only be inserted and removed when the switch is open.

- c. Lighting elements shall be installed in close-fitting fittings.
- d. Electrical appliances that may give rise to sparks shall either be of closed design or installed in close-fitting, protective cases of flameproof material.

Section 170. Precautions against radio interference

- a. In order to reduce the interference caused by electrical equipment to the radio receivers installed on board for safety reasons, the following precautions shall be taken:
 - 1. Electrical machines and apparatus shall be designed and installed so that interference is prevented, as far as possible, at the source.
 - 2. Noise filters of approved design that prevent the spread of interference shall, if necessary, be installed at noise sources, preferably built into the machines or apparatus in question. Such machines and apparatus installed in the vicinity of the receiver antennae or the radio room shall be afforded special care.
 - 3. Cables installed in the vicinity of the receiver antennae and the radio room shall be shielded by means of metal tubes, unless they are themselves provided with metal sheathing. They shall, wherever possible, be laid as twin-conductor or polyconductor cables, and if single conductor cables are used, the outward and return conduits shall be laid as close together as possible.
 - 4. Cables belonging to the radio room installation shall, if necessary, be provided with noise filters at their entrance to the radio room.
 - 5. Cables and pipes that do not terminate in the radio room shall, as far as possible, be carried around it.
 - 6. Converters installed in the radio room itself shall be surrounded by a shielded case, unless they are themselves of shielded design.
- b. The shields and tubes covered in paragraph (a) (3) and (6) shall be connected to the ship's hull by means of a copper bar that, at several points, is effectively connected to this and to the radio room's metal structure or shielding.

Section 171. Lightning conductors

The following provisions shall apply to the lightning conductors required by sections 30, 47 and 58⁷:

- 1. The lightning conductor shall consist of a pointed copper rod that is at least 12 mm in diameter and extends at least 150 mm up over the top of the mast. It shall be solidly connected to a copper strip or a copper cable with a cross-section of at least 75 square millimetres that is run down to the shroud stores.
- 2.
 - a) In wooden ships, the lightning conductor shall, from the stores, follow the shrouds as a copper cable with at least 75 mm² cross-section and shall be solidly connected to a copper plate with an area of at least 0.2 square metres, which is fitted to the side of the ship below the light waterline so that it is submerged in the water under all conditions.
 - b) In steel ships with wooden masts or wooden members, the lightning conductor shall be executed as above, but instead of being connected to an earthing plate it may be connected to the nearest part of the ship's hull.
- 3. Lightning conductors shall be run as straight as possible and sharp bends shall be avoided. All connections shall be screw connections of brass or copper and shall be effectively secured against working loose.

Section 172. Installation around compasses and chronometers

- a. Electrical machines and apparatus, as well as main switchboards and secondary switchboards, shall be installed so that they cannot disrupt compasses and chronometers.
- b. Cables shall be laid so that they cannot disrupt compasses and chronometers. Within 5 m of compasses, complementary cables of opposite polarity shall be laid close together or shall be twisted together.

7. The sections have been reprinted in supplement 4.

- c. Lamps for illuminating compasses shall be arranged and installed so that they do not disrupt them.

B. Passenger ships engaged on domestic voyages

Section 173. Principle

The provisions of sections 137-172 above shall also apply in principle to passenger ships engaged on domestic voyages, although the Directorate may, if it considers that implementation of these provisions would, given the voyage's specific nature, be unreasonable or impractical, grant the necessary relaxations and departures.

The following sections from Order no. 173 of 21 May 1965 on Regulations on the Construction, Equipment, etc. of ships, as amended, have been included because reference hereto has been made in the above sections of this supplement

Section 21. Openings in watertight bulkheads

- a. The number of openings in watertight bulkheads shall be as restricted as is compatible with the general purpose and proper operation of the ship; such openings shall be provided with satisfactory means of closing.
- b.
 1. Where pipes, scuppers, electrical cables, etc. are led through watertight dividing bulkheads, such penetrations shall be arranged so that the bulkheads remain watertight.
 2. Valves and cocks not associated with a pipe system may not be found in watertight dividing bulkheads.
 3. Led or other not heat-resistant materials may not be used in systems penetrating watertight dividing bulkheads if deterioration of such systems in case of fire would impair the watertightness of the bulkheads.
- c.
 1. There may not be any doors, manholes or access openings in the forepeak bulkhead below the margin line or in watertight cross-sectional bulkheads dividing a cargo space from an adjoining cargo space or from a permanent bunker or reserve bunker, however with the exceptions mentioned in paragraph (m) of this section.
 2. Except for the exception mentioned in paragraph (3) below, maximum one pipe may be led through the forepeak bulkhead below the margin line for discharge from the forepeak tank and only on the condition that the pipe is provided with a screw-down valve operable from a point above the bulkhead deck, the valve box being located on the forepeak bulkhead inside the forepeak.
 3. If the forepeak has been subdivided for storage of two different kinds of liquids, the Directorate may permit that two pipes are being led through the forepeak bulkhead below the margin line, both of which are fitted as required in paragraph (2), provided that the Directorate finds that there is no practical alternative for the location of the pipe and the safety of the ship is maintained in consideration of the further subdivision of the forepeak.
- d.
 1. Watertight doors fitted in the bulkheads between the permanent bunkers and the reserve bunkers shall always be accessible, except for the doors to bunkers on the 'tween-deck referred to in paragraph (1).
 2. Shielding or other satisfactory arrangements shall be provided to ensure that coal does not make it difficult to close the watertight doors to the bunkers.
- e.
 1. In spaces in which the main and auxiliary propulsion machinery as well as boilers necessary for the propulsion and all permanent bunkers are located, there may be only one intercommunication door in each main cross-section bulkhead in addition to doors for bunkers and shaft tunnels. In case of two or more propeller shafts, the shaft tunnels shall be connected by means of a connecting tunnel. In case of two propeller shafts, there may be only one door between the engine space and the shaft tunnel, and in case of more than two propeller shafts, there may be only two doors in this position. All such doors shall be sliding doors, and they shall be arranged in such a way that their thresholds are as high as practicable.
 2. The manual device for the operation of such doors from a point above the bulkhead deck shall be located outside the spaces in which the machinery is located if this is compatible with a satisfactory location of the necessary device.
- f.
 1. Watertight doors shall be sliding doors or hinged doors or doors of similar type. Plate doors that are only secured by means of bolts and doors that close by falling down or by means of a falling weight shall be prohibited.
 2. Sliding doors may be doors that are either operated only manually or both mechanically and manually.
 3. Subsequently, approved, watertight doors may be divided into three classes:
Class 1 – hinged doors.

Class 2 – manually operated sliding doors.

Class 3 – both mechanically and manually operated sliding doors.

4. The means for operating any watertight door, be it mechanically or manually, shall be capable of closing the door at an angle of heel of 15°.
 5. For all classes of watertight doors, there shall be indicators at all control stations from where the doors are not visible showing whether the doors are open or closed.
 6. If any watertight door is not arranged so that it can be closed from a central control station, it shall be equipped with a suitable, direct means of communication enabling the officer on duty to immediately get in contact with the person responsible for the closing of the relevant door.
- g. Hinged doors (class 1) shall be provided with quick-closing devices, such as fasteners operable from both sides of the bulkhead.
- h.
 1. Manually operated sliding doors (class 2) may have a horizontal or a vertical movement. The device shall be operable from a point at the door and on both sides of it and, furthermore, from an accessible point above the bulkhead deck by means of a continuous spiral movement or another movement offering a similar guarantee of safety and of an approved type. Exemptions may be granted from the requirement for operability from both sides if this requirement cannot be met because of the arrangement of the spaces.
 2. In case of manual operation, the time necessary to completely close the door with the ship on an even keel may not exceed 90 seconds.
- i.
 1. Mechanically operated sliding doors (class 3) may have a horizontal or a vertical movement. If it shall be possible to operate a door mechanically from a central control station, the mechanism shall be arranged so that the door may also be operated mechanically from a point at the door and on both sides of it. This arrangement shall be so that the door is automatically closed if it is, after having been closed from the central control station, opened by means of a device fitted at the door, and so that it is possible to keep the doors closed by means of the devices fitted at the doors preventing the door from being opened from the control station located at a higher level.
 2. On both sides of the bulkhead and in connection with the mechanical device, local operating levers shall be provided that are so arranged that persons passing through the opening of the door are able to keep both levers in the open position simultaneously without being able to put the closing mechanism into operation accidentally. Sliding doors that may be operated mechanically shall be fitted with a manual lever that can be used from both sides of the door as such and from an accessible point above the bulkhead deck by means of a continuous spiral movement or another movement offering the same guarantee of safety and is of an approved type.
 3. Arrangements shall have been made so that a sound signal warns that the door has started to close and will continue to move until it is completely closed.
 4. For safety reasons, proper time shall pass before the door is completely closed.
 5. There shall be at least two independent sources of power capable of opening and closing all the remote-controlled doors and each capable of operating all doors simultaneously. The two sources of power shall be operated from the central control station on the bridge, which shall be fitted with all necessary indicators with a view to ascertaining that each of the two sources of power are capable of carrying out the necessary functions satisfactorily.
 6. In case of hydraulic operation, each source of power shall consist of a pump that closes all doors in a period of not more than 60 seconds. Furthermore, there shall be hydraulic accumulators for the entire arrangement with sufficient capacity to operate all doors at least three times, i.e. open-close-open. The liquid used may not freeze at any of the probable temperatures that the ship may be exposed to during its voyages.
- j.
 1. Watertight, hinged doors (class 1) in passenger, crew and working spaces shall be permitted only above a deck the lower edge of which in the side is at least 2.13 m above the deepest subdivision load line.

2. Watertight doors the thresholds of which are above the deepest load line and below the deck mentioned in the above paragraph shall be sliding doors and may be manually operated (class 2), excepted in ships engaged on short, international voyages with a required subdivision factor of 0.50 or less, in which it shall be possible to operate all such doors mechanically. When trunks in connection with refrigerated cargoes and ducts for ventilation or artificial exhaust are led through more than one watertight dividing main bulkhead, the doors at such openings shall be mechanically operable.
- k. Watertight doors that are occasionally opened during voyages and the thresholds of which are below the deepest subdivision load line shall be sliding doors. The following regulations shall apply:
- 1) When the number of such doors (except for doors at the entrance to shaft tunnels) exceed five, all these doors and doors at the entrance to shaft tunnels or ducts for ventilation or artificial exhaust shall be mechanically operable (class 3), and it shall be possible to close them simultaneously from a central control station located on the bridge.
 - 2) When the number of such doors (except for doors at the entrance to shaft tunnels) exceeds one, but does not exceed five,
 - a) all the above-mentioned doors may be manually operated (class 2) if the ship does not have passenger spaces below the bulkhead deck,
 - b) all the above-mentioned doors shall be mechanically operated (class 3), and it shall be possible to close them simultaneously from a central control station located on the bridge if the ship has passenger spaces below the bulkhead deck.
 - 3) In case of only two such doors in a ship, and if they give access to or are located in spaces containing machinery, the Directorate may permit that these two doors are operated only manually (class 2).
- l. If there are watertight sliding doors between the bunkers below the bulkhead deck, which are occasionally opened during voyages because of the shifting of coal, it shall be possible to operate such doors mechanically.
- m. 1. Watertight doors of satisfactory design may be located in watertight bulkheads separating cargo 'tween-deck spaces if the Directorate finds that such doors are indispensable. Such doors may be hinged doors, rolling doors or sliding doors, but they need not be remote-controlled.
2. They shall be located as high as practicable and as far from the shell plating as practicable, but the vertical edges facing the ship's side may under no circumstances be located below a fifth of the ship's breadth from the shell plating, this distance being measured perpendicularly on the ship's middleline plan at the same height as the deepest subdivision load line.
 3. If any of the doors are accessible during the voyage, they shall be fitted with a device preventing them from being opened by unauthorised persons. When it is the plan to fit such doors, their number and location shall be carefully examined by the Directorate.
- n. It is only permitted to use removable plates in bulkheads in engine spaces. The necessary precautions shall be taken to ensure complete watertightness at joints when they are fitted anew.
- o. 1. If trunks or tunnels allowing access from the crew accommodation to the stokehold, to pipelines or for any other purpose are led through watertight main cross-sectional bulkheads, such trunks or tunnels shall be watertight and have the same strength as watertight bulkheads at the same height. The access to at least one of each of these trunks or tunnels shall, if they are used for passage when on voyages, be through a trunk stretching to such a height that the entrance is located above the margin line. The access to the other end of the trunk or the tunnel may be through a watertight door of the type that may be required in consideration of the place in the ship where it is located. Such trunks or tunnels may not be led through the first watertight bulkhead astern of the forepeak bulkhead.

2. Where there are plans to lead tunnels or trunks for artificial exhaust through watertight main cross-sectional bulkheads, the strength and the watertightness of the bulkhead may not be impaired thereby.

Section 28. Bilge pumping arrangements

- d. In ships the length of which are 91.5 m or more or with a criteria of service numeral of 30 or more, the bilge pumping arrangement shall be such that at least one engine-driven pump is ready for use under all normal conditions under which a ship at sea may be flooded. This condition shall be regarded as met, if:
 - 1) one of the required pumps is an emergency bilge pump of a reliable underwater type, whose source of power is above the bulkhead deck.

Section 30. Rigging with fittings

- a. The rigging with fittings shall be proper.
- b. Cranes, masts, derricks, mountings and any other permanent fittings for loading, unloading and other hoisting gear shall have such a strength that the safety coefficient at the greatest permitted lifting load under a calm and equal load shall normally be at least 4.5.
- c. In wooden ships and in steel ships where the masts or the topmasts are made of wood, a lightning conductor shall be fitted on each mast if the ship is engaged on voyages in foreign quarters of the world, cf. section 171.

Section 47. Rigging with fittings

- a. The rigging with fittings shall be proper.
- b. Cranes, masts, derricks, mountings and any other permanent fittings for loading, unloading and other hoisting gear shall have such a strength that the safety coefficient at the greatest permitted lifting load under a calm and equal load shall normally be at least 4.5.
- c. In wooden ships and in steel ships where the masts or the topmasts are made of wood, a lightning conductor shall be fitted on each mast if the ship is engaged on voyages in foreign quarters of the world, cf. section 171.

Section 58. Rigging with fittings

- a. The rigging with fittings shall be proper.
- b.
 1. Bowsprits and jib booms, with the exception of loose jibs, shall in general be fitted with solid foot-ropes, including the necessary hand and yard-arm foot-ropes.
 2. If the foot-ropes are made of steel, they shall be plated.
- c. Cranes, masts, derricks, mountings and any other permanent fittings for loading, unloading and other hoisting gear shall have such a strength that the safety coefficient at the greatest permitted lifting load under a calm and equal load shall normally be at least 4.5.
- d. In wooden ships and in steel ships where the masts or the topmasts are made of wood, a lightning conductor shall be fitted on each mast if the ship is engaged on voyages in foreign quarters of the world, cf. section 171.

Section 68. Special definitions

If nothing else follows from the content, the expressions mentioned below shall in the following be understood as follows:

- a. Non-combustible materials shall mean materials that can neither burn nor liberate ignitable vapours in such a quantity that they are ignited by a pilot flame when heated to about 750° C. All other materials shall be "combustible materials".
- b. A standard fire test is a test during which test objects that correspond as exactly as possible to the intended design of the bulkheads and decks in question and have an area of about 4.65 square metres and a height of 2.44 m as well as, according to the circumstances, contain at least one coupling, are exposed to the following approximate temperatures during a number of time intervals in an assay furnace:
after a period of 5 minutes 538° C
after a period of 10 minutes 704° C

after a period of 30 minutes 843° C

after a period of 60 minutes 927° C.

- c. Class A bulkheads and decks (fire-retardant bulkheads and decks) shall mean bulkheads and decks complying with the following conditions:
1. They shall be made of steel or another similar material.
 2. They shall be adequately stiffened.
 3. They shall be designed so that they are capable of preventing smoke and flames penetrating until the end of a standard fire test of an hour's duration.
 4. They shall, in consideration of the character of the adjoining spaces, have an insulating power that is satisfactory to the Directorate. Where such bulkheads and decks are required as a fire-retardant division between spaces containing adjoining woodwork, wooden plating or other combustible material, they shall generally be insulated so that the average temperature on the unexposed side at no point in time during the test increases by more than 139° C above the initial temperature if one of the bulkhead sides is exposed to the standard fire test for an hour's duration; the temperature may not increase by more than 180° C above the initial temperature at any point of the surface, including all couplings, either. Where the Directorate finds that the fire hazard is rather small, insulation may be used to a lesser degree or it may be completely waived. The Directorate may require a test of a total prototype of a bulkhead or a deck to ensure that the above-mentioned requirements for mechanical resistance and temperature rise have been complied with.
- d. Class B bulkheads (fire-retardant bulkheads) shall mean bulkheads designed so that they are capable of resisting the penetration of flames until the end of the first half hour of the standard fire test. Furthermore, they shall, in consideration of the character of the adjoining spaces, have an insulating power that is satisfactory to the Directorate. Where such bulkheads are required as a fire-retardant division between spaces, they shall generally be made of such a material that, if one of the sides is exposed to the first half hour of the standard fire test, the average temperature on the unexposed side may at no point in time during the test increase by more than 139° C above the initial temperature, just as the temperature may not increase by more than 225° C above the initial temperature at any point on the unexposed side, including all couplings. For bulkhead elements that are made of non-combustible material, it shall only be necessary to meet the above-mentioned limitation in the temperature rise during the first 15 minutes of the standard fire test, but the test shall be continued until the end of the first half hour in order to examine the mechanical resistance in the usual way. All materials forming part of the construction and design of non-combustible class B bulkheads shall be made of non-combustible material. Where the Directorate finds that the fire hazard is rather small, insulation may be used to a lesser degree or it may be completely waived. The Directorate may require a test of a total prototype of a bulkhead or a deck to ensure that the above-mentioned requirements for mechanical resistance and temperature rise have been complied with.
- e. Vertical main zones shall be the compartments into which bulkheads, superstructures and deckhouses are divided by class A bulkheads and decks. The average length of a vertical main zone may in general not exceed 40 m in any individual deck.
- f. The control station shall mean the spaces where the radio station, the most important means of navigation, the main installation for the detection of fires or the emergency generator are located.
- g. Accommodation shall mean generally accessible spaces, corridors, toilet rooms, cabins, offices, crew accommodation, barbershop spaces, isolated pantries and linen rooms and other similar spaces.
- h. Generally accessible spaces shall mean the part of the accommodation that is used for halls, dining rooms, smoking lounges and similar, permanently enclosed spaces.
- i. Service spaces shall mean spaces used as galleys, the most important pantries, stores rooms (except for isolated pantries and stores rooms), mail and locker rooms and similar spaces as well as trunks for such spaces.

- j. Cargo spaces shall mean all spaces used for cargo (including cargo oil tanks) and trunks for such spaces.
- k. Engine spaces shall include all spaces used for propulsion, auxiliary or refrigerating machinery, boilers, pumps, workshops, generators, ventilation and air-conditioning machinery, oil-filling and similar spaces as well as trunks to such spaces.
- l. Steel or other similar material. Where this expression is used, "similar material" shall mean any material that has, by itself or through the use of insulation, the same mechanical resistance as steel after having been exposed to the fire test in question (e.g. aluminium with adequate insulation).
- m. Low flame-spreading property shall mean that the thus described surface will, in a satisfactory way, limit the spreading of flames in consideration of the fire hazard in the spaces in question since this is determined to the satisfaction of the Directorate at a suitably designed and suitable test method.

Section 70. Means of stopping machinery and of closing fuel oil suction mains

- a. Means shall be provided for stopping ventilators serving engine and cargo spaces as well as for closing all door openings, airpipes, the space between the outer and the inner funnel and other openings to such spaces. It shall be possible to operate such means in case of fire from a point outside the spaces mentioned.
- b. The power for pressure and suction ventilators, fuel oil transfer pumps, oil-firing aggregates and other similar fuel oil pumps shall be remote-controlled so that, in case of fire in the space where it is situated, it may be stopped from a point outside the space in question.

Section 73. General structural provisions

The hull, superstructures and deckhouses shall be divided into vertical main zones by means of class A bulkheads and decks, as specified in section 68, paragraph (c), and further divided by similar bulkheads for the protection of stairwells and the like and for the division of the accommodation from the engine space, cargo space, service space and other spaces. In order to prevent incipient fires from spreading outside the spaces where they originate, one of the following protective measures or a combination of these measures to the satisfaction of the Directorate shall, furthermore, be used in accommodation and service spaces.

Method I. Construction of an internal system of division in the form of class B bulkheads, in general without any installation of systems for fire-detection or of sprinkler systems in accommodation and service spaces; or

Method II. Installation of an automatic sprinkler and fire-alarm system for the detection and fighting of fires in all spaces where a fire may be expected to occur, in general without any special requirements as to the nature of the internal dividing bulkheads in spaces where such measures have been taken; or

Method III. A system of division within each vertical main zone by means of class A and B bulkheads placed in consideration of the importance, size and nature of the different spaces in connection with an automatically operating system for fire-detection in all spaces in which a fire may be expected to occur, and with a limited use of combustible and easily ignitable materials and fittings, but in general without the installation of a sprinkler system.

Section 74. Special structural provisions

Method I.

The hull, superstructures, structural bulkheads, decks and deckhouses shall be made of steel or another similar material.

Method II.

- a. The hull, superstructures, structural bulkheads, decks and deckhouses shall be made of steel or another similar material.
- b. Where measures have been taken to prevent fire in accordance with method II, superstructures may be made of, for example, aluminium alloy provided that:
 - 1) the temperature rise in the metallic parts of class A bulkheads and decks are assessed in consideration of the mechanical properties of the material when the construction is subjected to the standard fire test;

- 2) an automatic sprinkler system complying with the provisions of section 108 has been installed;
- 3) adequate measures have been taken to ensure that the means for storing, launching and embarking lifeboats and liferafts in case of fire remain as effective as if the superstructure had been made of steel;
- 4) top and casing sides for boiler and engine spaces have been made as steel constructions, which are adequately insulated, and that any openings herein have been fitted and protected in an adequate way so that a fire is prevented from spreading.

Method III.

- a. The hull, superstructures, structural bulkheads, decks and deckhouses shall be made of steel or another similar material.
- b. Where measures have been taken to prevent fire in accordance with method III, superstructures may be made of, for example, aluminium alloy provided that:
 - 1) the temperature rise in the metallic parts of class A bulkheads and decks are assessed in consideration of the mechanical properties of the material when the construction is subjected to the standard fire test;
 - 2) it is proved to the Directorate in a satisfactory way that the quantity of combustible materials in the relevant part of the ship has been limited to an adequate extent. Ceilings (i.e. plating below deck) shall be made of non-combustible material;
 - 3) adequate measures have been taken to ensure that the means for storing, launching and embarking lifeboats and liferafts in case of fire remain as effective as if the superstructure had been made of steel;
 - 4) top and casing sides for boiler and engine spaces have been made as steel constructions, which are adequately insulated, and that any openings herein have been fitted and protected in an adequate way so that a fire is prevented from spreading.

Section 75. Vertical main zones

Methods I, II, and III

- a. The hull, superstructures and deckhouses shall be divided into vertical main zone. Steps and recesses shall be limited as much as possible, but where they are necessary, they shall be constructed as class A bulkheads and decks.
- b. The bulkheads that delimit the vertical main zones above the bulkhead deck shall, insofar as practicable, be a continuation of the watertight dividing bulkheads located immediately below the bulkhead deck.
- c.
 1. Such bulkheads shall extend from deck to deck and to the shell plating or any other external delimitation.
 2. Where the arrangement of such bulkheads would constitute a hindrance to the carrying out of the purpose for which the ship is intended, such as on car and railway ferries, the Directorate may instead approve any other arrangement that is, in each individual case, deemed equally suitable for controlling a fire that has occurred and for preventing it from spreading.

Section 76. Openings in class A bulkheads and decks

Methods I, II, and III.

- a. Where electrical cables, pipes, trunks, ducts, etc. for girders, beams or any other structural elements have been led through class A bulkheads, measures shall be taken to ensure that the fire resistance is not impaired.
- b. In ventilation trunks and ducts penetrating bulkheads in vertical main zones, dampers shall be provided that are operable from both sides of the bulkhead. The points of operation shall be easily accessible and marked with red. Means shall be provided to indicate whether the dampers are open or closed.
- c. Except for tonnage openings and hatches between cargo, stores and luggage spaces and between such spaces and the weatherdeck, all openings shall be provided with fixed means of closing that are at least as resistant to fire as the bulkheads in which they are located. Where

tonnage openings are fitted in class A bulkheads, the means of closing shall be made of steel plates.

- d. Doors and openings in class A bulkheads and the means of securing the doors in the closed position shall, insofar as possible, be just as resistant to fire and the penetration of smoke and flames as the bulkheads in which such doors are fitted. It shall not be required that watertight doors are insulated.
- e. It shall be possible for only one person to open each individual door from both sides of the bulkhead. Fire doors in bulkheads in vertical main zones, except for watertight doors, shall be of the self-closing type, and it shall be easy and simple to release them from the upright position. Such doors shall be of an approved type and design, and the self-closing mechanism shall be able to close the door against an angle of heel of 3.5°.
- f. Doors in class A bulkheads may be provided with suitable openings for the penetration of fire hoses. Such openings shall be arranged so that they may be closed by means of covers.

Section 77. Bulkheads within vertical main zones

Method I.

- a.
 - 1. In the accommodation, all boundary bulkheads not required to be class A bulkheads, shall be made as class B bulkheads of non-combustible material, which may, however, in accordance with the provisions of section 86 be permitted to be clad with combustible material. All door openings and similar openings shall be fitted with means of closing similar to the type of the bulkhead in which they are fitted.
 - 2. All bulkheads in corridors shall extend from deck to deck. Ventilation openings may be permitted in doors in class B bulkheads, primarily in the lower part of this. All other boundary bulkheads shall extend vertically from deck to deck and thwartships to the shell plating or any other boundaries, unless a non-combustible ceiling or lining has been fitted so that the fire resistance is maintained, in which case the bulkheads may end at the ceiling or the lining.

Method III.

- b.
 - 1. In the accommodation, all boundary bulkheads not required to be class A bulkheads, shall be made as class B bulkheads of non-combustible material, which may, however, in accordance with the provisions of section 86 be permitted to be clad with combustible material. These bulkheads shall form a continuous system of fire-retardant bulkheads, within which the area of any compartment may in general not exceed 120 square metres and with a maximum permitted area of 150 square metres. The bulkheads shall extend from deck to deck. All door openings and similar openings shall be fitted with means of closing similar to the type of the bulkhead in which they are fitted.
 - 2. Any generally accessible space the area of which does not exceed 150 square metres shall be surrounded by class B bulkheads of non-combustible material.
 - 3. Insulation of class A and B bulkheads, with the exception of those separating vertical main zones, control stations, stairwells and corridors, may be left out when the outside of the ship constitute the boundary, or when the adjoining space does not constitute a fire hazard.
 - 4. All bulkheads in corridors shall be class B bulkheads and shall extend from deck to deck. Any ceiling shall be of non-combustible material. Ventilation openings may be permitted in doors, primarily in the lower part of them. All other boundary bulkheads shall also extend vertically from deck to deck and thwartships to the shell plating or any other boundaries, unless a non-combustible ceiling or lining has been fitted, in which case the bulkheads may end at the ceiling or the lining.
 - 5. Class B bulkheads with the exception of those not required to be of a non-combustible type shall have a non-combustible core or be a constructed type with inner layers of asbestos plates or similar non-combustible material. The Directorate may approve other materials without a non-combustible core provided that equally suitable fire-retardant properties have been ensured.
- c. Doors in class B bulkheads may be fitted with adequate openings for the penetration of fire hoses. Such openings shall be arranged so that they are closed by hinges.

Section 78. Accommodation separation from engine, cargo and service spaces

Methods I, II, and III

The boundary bulkheads and decks that separate the accommodation from the engine, cargo and service spaces shall be made as class A bulkheads and decks with an insulation value to the satisfaction of the Directorate in consideration of the nature of the adjoining spaces.

Section 79. Deck covering

Methods I, II, and III

The primary layer of deck covering in the accommodation, control stations, stairwells and corridors shall be of an approved material that it is not easy to ignite.

Section 80. Protection of stairways in accommodation and service spaces

Methods I and III.

- a. All stairways shall have a steel skeleton, unless the Directorate permits the use of another similar material, and they shall be enclosed in class A bulkheads and decks with safe means of closing at all openings from the lowest galley deck and at least to a height with direct access to the open deck, with the exception that
 - 1) a stairway that connects only two decks need not be enclosed in bulkheads, provided that the fire resistance of the penetrated deck is maintained by means of adequate bulkheads or doors at one of the decks;
 - 2) open stairways may be located in a generally accessible space, provided that they are in their entirety inside such a space.
- b. Stairways shall have direct access to the corridors and shall, in relation to the number of persons that may be anticipated to use them in an emergency, have a sufficient area to prevent crowding, and they shall contain as few as possible enclosed spaces for accommodation and other purposes in which a fire may occur.
- c. The bulkheads and decks that enclose stairwells shall have an insulating power that is satisfactory to the Directorate in consideration of the nature of the adjoining spaces. The means of closing openings in bulkheads enclosing stairwells shall be at least as resistant to fire as the bulkheads in which they are located. Except for watertight doors, doors shall be of the self-closing type as prescribed for bulkheads in vertical main zones.

Method II.

- d. The main stairways shall have a steel skeleton unless the Directorate permits the use of other suitable materials that would, in the opinion of the Directorate, be as suitable as the construction mentioned in connection with further fire protection and/or fire-fighting measures. The main stairways shall be enclosed by class A bulkheads and decks with secure means of closing at all openings from the lowest galley deck and at least up to a height where there is direct access to the open deck, however, with the in paragraph (a) (1) and (2) above mentioned exceptions.
- e. The provisions of paragraphs (b)-(c) shall apply by analogy.
- f. Reserve stairways, i.e. stairways not forming part of the exits prescribed in section 69 and only connecting two decks, shall have a steel skeleton, unless the Directorate permits the use of another suitable material in specific cases, but they need not be enclosed by bulkheads if the fire resistance of the deck is maintained through the installation of sprinkler systems at these stairways.

Section 81. Protection of passenger and service lifts and vertical lighting and ventilation trunks, etc. in the accommodation and service spaces

Methods I, II, and III.

- a. Shafts for passenger and service lifts and vertical lighting and ventilation shafts for passenger accommodation, etc. shall be class A constructions. Doors shall be made of steel or another similar material and shall, when they are closed, be at least as fire-resistant as the shafts in which they are located.
- b. Lift shafts shall be arranged so that they prevent smoke and flames from spreading from a 'tween-deck to another, and they shall be fitted with means of closing so that draught and

smoke may be kept under control. Lift shafts located in stairwells are not required to be insulated.

- c. Where a lighting and ventilation shaft is connected to more than one 'tween-deck space, and the Directorate finds it probable that smoke and flames may move from one 'tween-deck to another, smoke dampers shall be fitted at suitable points so that it is possible to delimit each space in case of fire.

Section 82. Protection of control stations

Methods I, II and III.

Control stations shall be separated from the remaining part of the ship by means of class A bulkheads and decks.

Section 83. Protection of stores rooms, etc.

Methods I, II, and III.

The bulkheads and decks that enclose luggage rooms, mail and stores rooms, paint and lamp lockers, galleys and similar spaces shall be class A bulkheads and decks. Spaces containing stores of highly flammable character shall be located so that they present the lowest possible hazard to passengers and crew in case of fire.

Section 84. Windows and portholes

Methods I, II and III.

- a. All windows and portholes in bulkheads separating accommodation from the open deck shall be provided with frames of steel or another suitable material. The glass shall be secured by a metal frame.
- b. All windows and portholes in bulkheads in the accommodation shall have the same fire resistance as the type of the bulkhead in which they are located.
- c. In spaces containing
main propulsion machinery, or
oil-fired boilers, or
auxiliary engines of the diesel type with a total effect of 1,000 B.H.K. or more, the following measures shall have been taken:
 1. It shall be possible to close skylights from a point outside the space.
 2. Skylights with glass frames shall be fitted with external, fixed hatches of steel or another similar material.
 3. Any window in casings for such spaces that has been permitted by the Directorate shall be of the fixed type and be fitted with external, fixed hatches of steel or another similar material.
- d. Wire mesh reinforced glass shall be used for windows in casings and for skylights to the spaces mentioned in paragraph (c).

Section 85. Ventilation systems

Methods I, II, and III.

- a. It shall be possible to close the most important inlet and outlet openings in all ventilation systems from a point outside this space in case of fire. In general, the ventilators shall be located so that the air ducts leading to the different spaces are kept within the relevant vertical main zone.
- b. All artificial ventilation, except for ventilation to cargo and engine spaces, as well as any alternative system that may be prescribed pursuant to paragraph (d) shall be centrally controlled so that it is possible to stop all ventilators from two points located as far away from each other as possible. There shall be two central control stations for the artificial ventilation to the engine space, one of which shall be operable from a point outside the engine space.
- c. Air ducts from galleys, galley ranges, etc. shall be effectively insulated where they have been led through the accommodation or close to combustible material.

- d. Insofar as practicable, measures shall be taken to ensure that the ventilation and the visibility is maintained and that smoke is avoided in control stations below deck and outside engine spaces so that the machinery and fittings that are located in the space may be observed and keep functioning effectively in case of fire. In addition to the normal ventilation, totally separate means for the air supply of such control stations shall be provided. The inlet openings for air to the two ventilation systems shall be located so that there is the lowest possible risk of both inlet openings sucking smoke at the same time. The Directorate may permit that the requirements mentioned do not apply to spaces located on and with direct access to an open deck or where local shut-off devices would be equally effective.
- e. In ships especially designed for the carriage of cars in enclosed spaces, they shall be provided with means for adequate ventilation.

Section 86. Structural details

Method I.

All bulkhead coverings, frame materials, ceilings and insulation materials shall be made of non-combustible materials; however, this shall not apply to cargo spaces, mail rooms, luggage rooms or cold stores spaces. The total volume of combustible surface materials, lists, ornaments and plywood in the accommodation or in generally accessible spaces may not exceed a volume corresponding to 2.54 mm plywood on the total bulkhead and ceiling area. All exposed surfaces in corridors and stairwells as well as in covered or inaccessible spaces shall have low flame-spreading properties.

Method III.

The use of all kinds of combustible materials such as untreated wood, plywood, ceilings, curtains, carpets, etc. shall be limited to the extent reasonable and practicable. In large, generally accessible spaces, coverings and frames for bulkheads and ceilings shall be made of steel or another similar material. All exposed surfaces in corridors or stairwells as well as in covered or inaccessible spaces shall have low flame-spreading properties.

Section 87. Different provisions

Methods I, II, and III.

Regulations that apply throughout the ship.

- a. Paint, enamel and similar substances whose main constituent is nitrocellulose or any other very flammable substance may not be used.
- b. Pipes led through class A bulkheads and decks or class B bulkheads shall, in consideration of the temperature that the divisions in question shall be capable of resisting, be made of a material approved by the Directorate. Pipes for oil or other combustible liquids shall, in consideration of the fire hazard, be made of a material approved by the Directorate. Materials that are easily degradable when exposed to heat may not be used for scuppers, sanitary drains and other drains located close to the waterline and, furthermore, not anywhere where the failure of the material in case of fire would present a risk of water entering.

Regulations that apply to accommodation and service spaces.

- c.
 1. Enclosed spaces behind ceilings, panels or lining shall be suitably separated by close-fitting partitions the mutual distance of which may not exceed 13.73 m.
 2. In the vertical direction, such spaces, including spaces behind the lining of stairways and trunks, shall be closed at each deck.
- d. Ceilings and bulkheads shall be constructed in a way that makes it possible for the fire guard, without impairing the efficiency of the fire protection, to detect smoke originating from covered and inaccessible spaces, with the exception, however, of such spaces where there is no risk of a fire occurring according to an assessment made by the Directorate.
- e. The inaccessible surfaces of all bulkheads, all lining, panels, stairways, wooden frames, etc. in the accommodation shall have low flame-spreading properties.
- f. If electrical radiators are used, they shall be fixed and constructed so that the risk of fire is as low as possible. Radiators may not be installed whose filament is placed so that they may cause scorching or ignition of garments, curtains or other similar materials.

Regulations that apply to car decks.

- g. In ships that can carry petrol-driven vehicles, notices shall be affixed in conspicuous places clearly stating that the smoking of tobacco as well as the filling of the vehicles' tanks with petrol are prohibited on the car deck.

Section 88. Movies

Methods I, II, and III.

Movies made on a basis of cellulose may not be used for film projectors on board.

Section 89. Automatic fire-alarm and fire-detection systems

Method III.

A fire-alarm and fire-detection system of an approved type shall be provided, and it shall be arranged so that it shows the occurrence of fire in all enclosed spaces designed for the use or service of passengers or crew (except for spaces that do not present any considerable fire hazard) and so that it automatically shows the occurrence of or signs of fire as well as the place of the fire at one or more control stations where it may be readily observed by officers and crew.

Section 91. Provisions for ships carrying 36 or fewer passengers

- a. Sections 73-90 shall apply to ships carrying more than 36 passengers.
On other passenger ships, only the provisions of sections 74-76, 78-79, 81, paragraph (a), sections 82-84, 87, paragraphs (a)-(c) and section 88 as well as paragraphs (b)-(e) below shall apply.
- b. Where insulated class A bulkheads and decks are prescribed pursuant to the provisions mentioned in paragraph (a), the Directorate may permit that insulation is used to a lesser extent than anticipated in section 68, paragraph (c) (4).
- c. All stairways and emergency stairways in the accommodation and service spaces shall be made of steel or another suitable material.
- d. It shall be possible to shut-off the ventilation for engine spaces from an easily accessible point outside the engine spaces.
- e. Unless all boundary bulkheads in the accommodation comply with the regulations for method I in section 77, paragraph (a), and section 86, such ships shall be equipped with an automatic fire-alarm and fire-detection system as prescribed in section 90, and in the accommodation bulkheads in corridors shall be made of steel or be executed as class B bulkheads.

Section 100. Fire pumps

- a. The fire pumps shall be independently driven. Sanitary, ballast, discharge and general service pumps may be accepted as fire pumps provided that they are not normally used for pumping oil and that, if they are occasionally used to pump fuel oil, suitable shifting devices are available.
- b. All the prescribed fire pumps (except for any emergency pumps that may be mentioned in section 122) shall have a capacity of at least 80% of the total prescribed capacity divided by the number of prescribed fire pumps, and they shall under all circumstances be able to give at least the water jets mentioned in section 101.
If more pumps than prescribed have been installed, their capacity shall be to the satisfaction of the Directorate.
- c. If the pumps can develop a pressure that exceeds the pressure for which pipelines, fire hydrants and fire hoses have been constructed, safety valves shall have been fitted so as to prevent harmful overpressure in the individual parts of the main fire system.

Section 101. Number and location of fire hydrants

The number and location of fire hydrants shall be so as to permit at least two water jets to reach any point in the ship that is not normally accessible to passengers or the crew when on voyages; such two water jets may not come from the same fire hydrant, and one of them shall come from a single hose length.

Section 102. Fire hoses and fire hydrants

Materials that are easily degradable when exposed to heat may not be used for fire lines unless protected in a suitable way. The fire lines and the fire hydrants shall be arranged so that it is easy to connect the fire hoses. In ships designed for the carriage of deck cargoes, the fire hydrants shall be arranged in such a way that they are always easily accessible, and the fire lines shall, insofar as practicable, be arranged so that there is no risk of them being damaged by such cargo. If there is no fire hose with spray nozzles for each fire hydrant on board, all hose couplings and spray nozzles shall be mutually interchangeable.

Cocks and valves shall be fitted on the fire hoses in such a way that any fire hose may be changed while the fire pumps are in operation.

In ships especially designed for the carriage of cars, the fire hoses on the car deck shall be connected to the hydrant when cars are carried.

Section 103. Fire hoses and jet nozzles

Fire hoses shall be of an approved material and shall have a sufficient length to aim a water jet at any place in the ship as described in section 101. Their maximum length shall be to the satisfaction of the Directorate. All fire hoses shall be fitted with jet nozzles and the necessary couplings. Fire hoses with fittings and tools shall be located ready for use in conspicuous places close to fire hydrants or connection points.

Section 104. Nozzles

- a. The normal diameters of nozzles shall be 12 mm, 16 mm and 20 mm or any diameter as close to these figures as possible. Nozzles with a greater diameter may be permitted in consideration of the provisions of section 100, paragraph (b).
- b. In the accommodation and services spaces, the nozzles are not required to have a larger diameter than 12 mm.
- c. In engine spaces and on deck, nozzles shall have a diameter that ensures that, at the pressure from the smallest pump mentioned in sections 114 and 122, the greatest possible quantity of water is provided from two jet nozzles.

Section 108. Automatic sprinkler systems in accommodation

- a. All automatic sprinkler systems prescribed in section 90 shall be ready to operate at any time without it being required that the crew take measures to this effect. Where such a system is installed, it shall be kept at the necessary pressure, and a constant supply of water shall be ensured.
- b. The system shall be divided into a number of sections determined by the Directorate, and automatic apparatuses shall be provided that sound an alarm that is both acoustic and visible at one or more control stations when a sprinkler head has started operating; such automatic apparatuses shall also show in what section the sprinkler head is located.
- c. The pump or pumps that are to supply the sprinkler heads with water shall automatically start operating at a falling pressure in the system. There shall also be a connection from the ship's main fire line fitted with a lockable screw-down valve and non-return valve.
- d. All pumps shall be able to maintain the necessary supply of water at the necessary pressure to the sprinkler heads when the number of sprinkler heads determined by the Directorate are in operation.
- e. There shall be at least two sources of energy for saltwater pumps, air compressors and automatic alarms. When electrical sources of energy are used, they shall consist of a main generator and an emergency source of power. One of the supplies of power shall emanate from the main switchboard through cables that are used only for this purpose. Such cables shall be led to a change-over switch located close to the sprinkler pump, and normally the change-over switch shall be connected to the cable from the emergency switchboard. The change-over switch shall be clearly marked and the cables may not have any other switches.
- f. The sprinkler heads shall be capable of starting operating at the temperatures determined by the Directorate. Suitable means shall be provided for the periodical testing of all automatic devices.

- g. Where fire protection in accordance with method II is used in a passenger ship the superstructure of which has been made of aluminium alloy, the entire system, including the sprinkler pump, the tank and the air compressor, shall be located to the satisfaction of the Directorate in a place that is at a suitable distance from boiler spaces and engine spaces. If the cables from the emergency generator to the sprinkler system has been led through spaces that present a fire hazard, the cables shall be of a type that is resistant to fire.

Section 114. Fire pumps, fire hoses, etc.

Fire hoses and their fittings shall comply with the provisions of sections 100-103 as well as the following regulations:

- a. Fire pumps
1. Number
Ships of 4,000 tonnes and upwards shall be provided with three fire pumps with independent motive power, while ships below this size shall be provided only with two such fire pumps.
 2. Location
 - (a) In ships of 1,000 tonnes and upwards, sea connections, pumps and their sources of power shall be located so that a fire cannot render all other fire pumps inoperative, regardless of its place of origin.
 - (b) In ships below 1,000 tonnes, the installations shall be located to the satisfaction of the Directorate.
 3. Capacity and pressure
 - (a) The prescribed fire pumps shall, in connection with fire-fighting, be capable of providing a quantity of water that equals, at the pressure prescribed in (b) below, at least two-thirds of the quantity that the bilge pumps shall be capable of providing when they are used for discharge.
 - (b) When the two pumps mentioned in paragraph (b) below provide the maximum prescribed quantity of water at the same time through the jet nozzles mentioned in section 104 through any fire hydrants located next to each other, the following minimum pressure shall be kept at all fire hydrants:

Ship tonnage	Minimum pressure
4,000 tonnes and upwards	3.2 kg/cm ²
1,000 tonnes and upwards, but below 4,000 tonnes	2.8 kg/cm ²
Below 1,000 tonnes	To the satisfaction of the Directorate

Section 222. Embarkation in lifeboats and liferafts

- a. Appropriate measures shall be taken for the embarkation in the lifeboats, including:
- 1) A ladder at every set of davits for transfer into the lifeboats when these are lying in the water;
 - 2) means for illuminating the lifeboats and the embarkation equipment during the preparations for and during the embarkation as well as for illuminating the part of the sea into which the lifeboats are lowered until the embarkation has been carried out; and
 - 3) means to prevent any discharge of water into the lifeboats.
- b. The Directorate may permit that the ladders mentioned in paragraph (a-1) are replaced by other equipment, provided that at least one ladder is available on each side of the ship.
- c. Appropriate measures shall be taken for the embarkation in the liferafts, including:
- 1) Sufficient ladders to facilitate the embarkation into the liferafts when these are lying in the water;
 - 2) as to liferafts for which approved embarkation devices are provided: means for illuminating such liferafts and the embarkation devices during the preparations for and during the embarkation as well as for illuminating the part of the sea into which the

liferafts are lowered until the embarkation has been carried out. As to other liferafts: means for illuminating the places where the liferafts are placed; and

- 3) means to prevent any discharge of water into liferafts fitted at permanent embarkations points as well as into rafts under approved embarkation devices.
- d. The Directorate may permit that the ladders mentioned in paragraph (c-1) are replaced by other equipment.

Section 224. Alarm signals

- a. Electrically-driven alarm signals shall be provided for the alerting of passengers and crew when embarkation has to take place, capable of sounding all over the ship and of being operated from the bridge.
- b. The meaning of all signals aimed at the passengers as well as detailed instructions for the passengers about how to behave in an emergency shall be clearly indicated in the most appropriate languages in consideration of the conditions on notices in passenger cabins and at conspicuous points in other passenger accommodation.
- c. On ships engaged on short, international voyages, the provision of paragraph (a) shall be regarded as having been complied with by means of the ship's usual equipment for the sounding of sound signals.

Section 225. Lighting for decks, lifeboats, liferafts, etc.

- a. On decks where lifeboats and liferafts are located, electrical or similar lighting shall be provided that is sufficient to satisfy the requirements of the safety service. The emergency lighting shall, furthermore, comprise lighting in corridors, in stairways as well as in engine spaces and at control stations. The independent, electrical emergency source of energy required in section 149, paragraph (a), shall, if necessary, be able to supply power to such lighting as well as to the lighting required in section 222, paragraph (a-2) and paragraph (c-2).
- b. Exits from any main section where passengers or crew move about shall be constantly lit by an emergency light. It shall be possible to take the power for such lights from the emergency source of energy mentioned in paragraph (a) in case of failure in the main lighting system.

Supplement 5: Furnaces

Danish Shipping Inspectorate Notices no. 257 of 30 December 1971 on the Installation and Guarding of Furnaces in Crew Quarters

Section 7 of Order no. 9 of 24 January 1953 on Crew Accommodation, etc., section 10 of Order no. 11 of 15 January 1960 on Crew Accommodation, etc. in Faroese Fishing Vessels and section 9 (paragraph 3) of Order no. 247 of 3 June 1971 on Crew Accommodation, etc. in Fishing Vessels (not applicable to the Faroe islands) provide that furnaces shall be of sufficient size and shall be properly installed and protected, and that woodwork and other combustible material in the vicinity of the furnace and the ventilation pipe shall be suitably insulated.

Hereunder, the Directorate shall consider the provisions on the protection of furnaces, etc. to be satisfied,

- 1) if the furnace is securely fixed to the floor,
- 2) if, where the floor is made of wood or other combustible material, a metal plate or fence of suitable dimensions and extent is fitted under and in front of the furnace,
- 3) if the insulation of the woodwork around the oven and the penetration of the ventilation pipe through the deck or bulkhead has been made as shown in the accompanying drawing or in a similar safe manner, and
- 4) if the distance from the surface of the oven and the ventilation pipe to unclad woodwork is not less than 300 mm.

If it is desired to make the topmost external section of the ventilation pipe removable, this section shall be fitted in a connection piece executed in at least 6 mm thick sheet and with ca. 300 mm height.

Attention is drawn to the fact that cellulose lacquer shall not be used to treat wooden bulkheads in spaces where fires are installed.

If the only exit from a space is via another space where a furnace is installed, the first space shall be provided with an emergency exit (skylight or similar).

Spaces in which furnaces are installed shall be ventilated in a suitable fashion with both supply and discharge of air. In accommodation spaces below deck, e.g. on small fishing vessels, the ventilation may be via a pipe carried from the open air down to about 150 mm above the floor and a ventilation opening in the space's uppermost part in the form of a gooseneck in the deck or ventilation holes in the descending sheath.

Ventilation openings shall never be closed or plugged.

Acting on information received, the Directorate wishes to draw attention to the fact:

- that the provisions of the mentioned sections of Order no. 9 of 24 January 1953 and Order no. 11 of 15 January 1960 as well as the above guidelines shall be observed irrespective of the given ship's tonnage,
- that the provisions of the mentioned sections of Order no. 247 of 3 June 1971 as well as the above guidelines shall be observed in all fishing vessels with a tonnage below 75 tonnes. In new fishing vessels above this limit, heating by means of open fires shall not be permitted in accommodation spaces.

Supplement 6: Liquefied Petroleum Gas Installations in Ships

Order on Liquefied Petroleum Gas Installations in Ships

The following special provisions on liquefied petroleum gas installations in ships and vessels are hereby laid down pursuant to sections 6 and 12 of the Act on Ship Surveys (cf. Consolidated Act no. 336 of 31 August 1965).

DEFINITIONS

Section 1. For the purposes of this order, the following definitions shall apply:

LIQUEFIED PETROLEUM GAS: Flammable gaseous hydrocarbons which, under pressure, are able to liquefy at normal temperatures, e.g. propane, butane, propylene, butylene and mixtures thereof.

GAS INSTALLATIONS: Containers of liquefied petroleum gas with a means of regulation and the associated appurtenances such as pipes, gas hoses, consuming devices, etc. used for cooking and heating, etc., apart from portable gas installations with utility containers designed for not more than 1.2 kg gas.

DIRECTORATE: The Directorate of the Danish Shipping Inspectorate.

APPLICATION

Section 2. The provisions shall apply to all ships and vessels with gas installations for cooking and heating, including heating the ignition bodies of motor cylinders.

Subsection 2. Gas shall only be used for lighting, central-heating boilers in machinery spaces, refrigerators and water heaters, etc. on receipt of a specific authorisation from the Directorate and under the conditions laid down by the Directorate in each individual case.

EXISTING INSTALLATIONS

Section 3. In the case of gas installations which, at the time when this Order enters into force, have been surveyed and approved by the Danish Shipping Inspectorate, more stringent requirements may not generally be imposed than is warranted by previously applicable provisions, although the owner of a ship or vessel shall, when such systems as do not satisfy the provisions of this Order are subjected to changes or major repairs, call in the Danish Shipping Inspectorate with a view to implementing such improvements to increase safety as might be reasonable in each individual case.

LIQUEFIED PETROLEUM GAS CONTAINERS

Section 4. Containers may be used only if they are designed, arranged and marked as well as tested for the type of gas in question.

Subsection 2. Spare containers, utility containers and empty containers shall be installed on open deck as far from openings to the inside of the ship as practicable. The containers shall be installed in an upright position, and both the containers and the container valves shall be well protected against mechanical damage. Any protective casing shall be ventilated above and below.

Subsection 3. In small ships where, due to the ship's nature and type, it is not practicable to install the containers on open decks, they may be installed in a place easily accessible in the given conditions, below deck level, but above the waterline, under the following conditions:

- a. The containers shall be installed in cockpits or similar open spaces and shall be surrounded by a solid, fixed protective case that is executed in welded steel plates or other gastight material. The protective casing shall be provided with a solid cover that is gastight when fastened.
- b. A ventilation pipe with an inside diameter of at least 25 mm shall be run from the bottom of the protective casing through the ship's side. The pipe shall have descending gradient towards the ship's side and shall exit above the waterline.
- c. The gas pipeline shall be run gastight through the side of the protective casing level with the container valve.

Subsection 4. Both containers and any protective casing shall be properly secured, although it shall be easy to release the containers. The protective casing shall be marked externally with the warning: PRESSURE CONTAINERS, REMOVE IN THE EVENT OF FIRE.

PRESSURE REDUCING VALVES AND RELIEF VALVES

Section 5. Installations that are not designed for the full gas pressure shall be provided at the container with a pressure reducing valve that can be connected to the fixed gas pipeline by means of a short hose connection.

Subsection 2. If a low-pressure relief valve has not been incorporated into the pressure reducing valve, a relief valve shall be fitted onto its outgoing side, which opens at a pressure less than twice the service pressure.

GAS PIPELINES

Section 6. Gas pipelines shall be made of seamless copper pipe or other material approved by the Directorate and shall, wherever possible, be without joints apart from the necessary joints with the container, valves and gas cocks.

Subsection 2. If it is not possible to avoid pipe joints, these shall be visible and easily accessible and shall be executed either with capillary brazed fittings or with screw connections in metal of the same type as used in the gas pipelines. The joint rings shall be of copper or copper alloys.

Subsection 3. Gas pipelines shall be laid fixed, well protected and ensured the necessary room for expansion. Care shall also be taken that they are not laid in places where they may be exposed to particular vibrations, bending influences, wear or other damage.

Subsection 4. If there are any branches from the fixed gas pipeline, the branches shall be fitted with isolation valves or cocks, and the connection therefrom to the gas-consuming apparatus shall be executed in piping of copper or another material approved by the Directorate and shall be ensured the necessary room for expansion.

SPECIAL SAFETY MEASURES

Section 7. All gas-consuming apparatuses shall be provided with a pilot flame relief valve, designed for the working pressure, which automatically and quickly shuts off the gas if the pilot flame is extinguished.

Subsection 2. Furnaces for space-heating shall, for the purpose of removing combustion products, be connected to exhaust pipes exiting directly to the open air.

Subsection 3. Bulkheads delimiting gas tables shall be of non-combustible material or shall be clad to at least 40 cm above the table with non-combustible material. The surface of gas tables shall also be of non-combustible material.

Subsection 4. Spaces where gas is used shall be ventilated.

Subsection 5. The provisions laid down by the Directorate at any given time for the installation and guarding of furnaces in crew quarters shall apply by analogy to the installation and guarding of gas fires for space-heating.

Subsection 6. In all spaces where gas is used, a Danish Shipping Inspectorate notice shall be posted in a conspicuous place detailing the precautions that must be taken.

APPROVAL OF MATERIAL, ETC.

Section 8. All gas-consuming apparatuses and fittings shall be approved by Danmarks Gasmateriel Prøvning (DGP) and marked DG in accordance with the relevant regulations in force. Similarly, fittings for use with containers shall be approved to the extent to which Danmarks Gasmateriel Prøvning has issued relevant testing regulations.

Subsection 2. In addition to being approved by Danmarks Gasmateriel Prøvning, furnaces for space-heating shall be type-approved by the Directorate. Applications for approval shall be submitted to the Directorate, accompanied by an approval certificate from Danmarks Gasmateriel Prøvning, plus drawings and description, in duplicate.

INSTALLATION AND APPROVAL

Section 9. The installation and conversion of existing gas installations (cf. section 1) shall, in all ships and vessels irrespective of their size and type, be executed in accordance with the provisions of this order.

Subsection 2. In all passenger ships, all cargo ships and fishing vessels with a tonnage of 5 tonnes GRT and upwards, and all recreational craft with a tonnage of 20 GRT and upwards, the installation of

gas installations and the conversion of existing gas installations (cf. section1) shall be inspected and approved by the Danish Shipping Inspectorate before the installation is put in service.

EXEMPTIONS

Section 10. The Directorate may, taking the necessary account of safety, permit departures from the provisions of this order.

ENTRY INTO FORCE

Section 11. This order shall enter into force on 1 October 1970. Order no. 253 of 23 June 1952 on Gas Installations in Ships shall be repealed.

Supplement 7: Machinery Installations

Order on Regulations for Machinery Installations, etc, in Ships no. 387 of 7 July 1969

The following is hereby laid down pursuant to section 6 of the Act on Ship Surveys (cf. Consolidated Act no. 336 of 31 August 1965):

A. General Provisions

Section 1. Definitions

For the purposes of this order, the following terms, unless expressly provided otherwise, shall have the meanings defined or determined below or in the section to which reference is made.

Fuel oil units: The equipment used for the preparation of fuel oil for delivery to an oil-fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and including any oil pressure pumps, filters and heaters with oil at a pressure of more than 1.8 ato.

Central heating boiler: see section 43.

Directorate: The Directorate of the Danish Shipping Inspectorate.

Fishing vessel: Any ship provided with a fishing certificate in accordance with the Act on Registration of Ships.

Evaporator heating surface: see section 19.

Heated oil: see section 11, paragraph (b).

Approved: Approved by the Directorate.

Horse power (hp): The output for ship's machinery laid down by the Directorate and expressed in horse power.

Non-flammable materials: Materials that can be approved as non-flammable in accordance with a test method specified by the Directorate. All other materials are "flammable materials".

Domestic voyage: Any voyage that is not an international voyage.

International voyage: A voyage from a Danish port to a foreign port or vice versa or between two foreign ports and a voyage to and from the Faroes or to and from Greenland.

High-pressure boilers: Boilers with a permitted working pressure of 12.65 ato and upwards.

Classified (used for ships, machinery installations, etc.): A ship or installation, etc. that has a valid certificate from a classification society recognised by the Ministry.

Refrigerating installation: see section 66.

Cargo ship: Any ship that is not a passenger ship.

Low flame spread (used for a surface coating or material for treating surfaces): A coating or a material which, in consideration of fire risk, has a restricted ability to spread flame, this being determined by a test procedure specified by the Directorate.

Machinery space: Machinery spaces of category A and all other spaces containing propulsion machinery, boilers, fuel oil units, steam engines and internal combustion engines, as well as trunks to these spaces. In passenger ships carrying more than 36 passengers, the term shall also include spaces containing generators and major electrical machinery, oil-filling stations, refrigerating, stabilising, ventilation and air-conditioning machinery, and similar spaces, and trunks to such spaces.

Machinery spaces of category A: All spaces that contain internal combustion engines for

- 1) propulsion or
 - 2) other purposes, where such engines have a total braking power of 500 hp or upwards,
- or that contain oil-fired boilers or fuel oil units, and trunks to such spaces.

Metal: Copper alloys.

The Ministry: The Ministry of Trade and Industry.

Passenger vessel: A passenger vessel with a tonnage below 20 tonnes.

Passenger ship: A ship fitted out to carry or carrying more than 12 passengers.

Bulkhead deck: The uppermost deck up to which the transverse watertight bulkheads are carried.

Tonnes: gross registered tonnes.

Section 2. Application

- a. Unless expressly provided otherwise, the provisions of this order shall apply to any
 - 1) passenger ship/vessel the keel of which is laid or which is at a similar stage of construction on or after 1 September 1969, or which after this time changes its area of operation from domestic voyages to international voyages;
 - 2) cargo ship of 5 tonnes and upwards the keel of which is laid or which is at a similar stage of construction on or after 1 September 1969, or which after this time is approved as a passenger ship;
 - 3) ship purchased from abroad.
- b. Ships and vessels for which it is determined that the order in its entirety or certain parts thereof shall not apply shall observe any guidelines that may be given by the Danish Shipping Inspectorate in individual cases.
- c. Pleasure craft with a tonnage below 20 tonnes shall not be covered by the order.
- d. In the case of ships not covered by paragraph (a) (1) and (2), requirements may not generally be imposed with regard to the construction and equipping of machinery installations, etc. that are more stringent than those warranted by the regulations previously in force, although the Directorate will, if such ships do not already satisfy these regulations are subjected to major changes in the ship's machinery installations, etc. or major repairs that are the result of predetermined plans, but not of casualties, examine the circumstances of each individual case with a view to such improvements in the increase of safety as may be practicable and reasonable.

Section 3. Construction and Approval

- a. Machinery installations, boiler installations, fuel oil installations, refrigerating installations, and similar as well as all accessories to such installations shall have the required strength and shall be properly arranged and installed.
- b. In the case of non-classified machinery and boiler installations, etc., in respect of construction, strength and material dimensions and unless otherwise provided, corresponding regulations shall generally apply, as used by a classification society approved by the Ministry at any given time, as a condition for the installations in question being accepted into a specific class.
- c. In the case of installations classified or constructed for acceptance into a specific class, the class regulations shall be recognised as satisfactory in the areas that these regulations cover.
- d. Paragraph (c) notwithstanding, the Directorate may, where special circumstances apply, impose requirements for installations that are more stringent than prescribed in the class regulations.
- e. With regard to approval at the planning stage and other advance approval of machinery, reference is made to sections 5 and 6 of Order no. 173 of 21 May 1965 on Regulations for the Construction, Equipment, etc. of Ships.

Section 4. Equivalentents

- a. Where this order requires that a specified installation, fitting, material, appliance or apparatus, or type thereof, shall be installed or carried on board, or that a special measure shall be taken, the Directorate may permit that any other installation, fitting, material, appliance or apparatus, or type thereof, be installed or carried on board, or that any other measure be taken, provided the Directorate, by means of tests or otherwise, establishes that such installation, fitting, material, appliance or apparatus, or type thereof, or such measure, is at least as effective as that required by this order.
- b. Notice shall be given of any such authorisation in the journal of notices published by the Directorate.

Section 5. On-board Provision of the Order

A copy of this order shall be carried on ships with machinery with hp more than 400.

B. Machinery Installations in and outside Machinery Spaces and Arrangement of Machinery Spaces

Section 6. General Safety Provisions

- a. In the case of installations in machinery spaces, reasonable account shall be taken of the safety of life of those on board and the safety of the ship. Machinery spaces shall also be arranged so that persons operating the various installations are only placed in danger by a lack of due care and attention.
- b. Machinery spaces, machinery installations and equipment in machinery spaces shall be designed and arranged so as to take best possible account, in a reasonable fashion, of health and safety on board, the well-being of those on board and their protection against noise and other disabling or health-damaging effects.
- c. All machinery and boiler installations, etc. shall be accessible for maintenance and inspection. Moving parts shall be satisfactorily shielded, and, to the necessary extent, solid and properly secured railings, hand rails, footplates, or similar shall be installed. Floors and gratings shall be non-slip and shall be executed in steel or other non-combustible material.
- d. Crane girders, crane runners, cranes and overhead lifting tackle shall be marked with the working load. Crane hooks shall be designed with protection against unhooking.
- e. Pressure gauges exposed to steam or air pressure above 2 ato shall be designed or installed so that if the internal parts of the gauge break, they do not present a risk of harm.
- f. Steam pipes shall be insulated, clad and shielded to the extent necessary with regard to the avoidance of harm.
- g. Care shall be taken that all joints in exhaust pipes and sound absorbers are tight, shielded and/or insulated with non-combustible material to a satisfactory extent.
- h. All exhaust pipes from internal combustion engines shall be led separately to the open air, or other measures shall be taken to prevent exhaust gas poisoning.
- i. Fixed containers holding pressurised gases for purposes other than starting and manoeuvring shall, in respect of their design, strength and material dimensions, satisfy the regulations laid down or recognised by the Directorate (cf. section 3). Such containers shall generally be fitted out as required by section 47. Containers with a working pressure below 2 ato may be executed in general container sheet.
- j. Portable containers, e.g. oxygen containers and gas containers, fire-fighting apparatuses, etc. shall, in respect of their design, fitting out and marking, satisfy the provisions for such containers applicable at any given time. All CO₂-containers for fire-fighting purposes shall, whether they form part of a fixed fire-fighting installation or are carried as portable fire extinguishers, be fitted with an approved frangible disc that will burst at a pressure suitably lower than the container's test pressure.
- k. Portable compressed air containers for air tools, etc. shall, in respect of their design, strength, material dimensions and equipment, generally satisfy the provisions of section 47.
- l. All portable containers for compressed gases, liquefied gases or gases dissolved under pressure, which may fuel a fire shall, immediately after use, be taken to a suitable place above the bulkhead deck from which there is direct access to the open deck.
- m. Driving wheels, transmissions and other moving parts on winches, cranes and other machinery outside machinery spaces shall be shielded in a suitable fashion. All winches shall be provided with braking mechanisms. Winch couplings and, if necessary, control levers shall have a suitable locking device.

Section 7. Lighting

- a. Machinery spaces shall be well lit with electric lighting. In passenger ships and cargo ships with a tonnage of 500 tonnes and upwards, the installation shall be divided into at least two groups.

- b. In passenger ships and cargo ships with a tonnage of 5,000 tonnes and upwards, emergency lighting shall also be installed, which is connected to the ship's emergency power source.
- c. In other ships, there shall be a sufficient number of fixed electric battery lamps of suitable design as a reserve.

Section 8. Escape routes

- a. Reliable means of escape shall be ensured from all machinery spaces.
- b. Ladders in machinery spaces shall be of steel and shall be shielded on the lower side. However, wooden ladders may be used in fishing vessels constructed of wood.
- c. Ladders and gratings shall be placed so that persons can quickly ascend.
- d. There shall be two means of escape from each machinery space of category A. In particular, the following provisions shall be complied with:
 - 1. If the space is below the bulkhead deck, the two means of escape upwards or outwards shall consist of either
 - a) two sets of ladders, fixed as far apart as possible, leading to doors in the upper part of the space similarly separated and from which access is provided to the embarkation deck. One of the ladders shall be enclosed so as to provide a fire-sheltered escape route from the lower part of the space to a safe point outside the space; or
 - b) a ladder leading to a door in the upper part of the space from which access is provided to the embarkation deck and, in the lower part of the space, a steel door capable of being operated from both sides and providing access to a safe escape route to the embarkation deck.
 - 2. If the space is located above the bulkhead deck, the two escape routes shall be as far apart as possible and lead to doors providing access to the embarkation deck. If ladders are used in the escape routes from such spaces, they shall be of steel.
- e. In the case of ships with a tonnage below 1,000 tonnes, the Directorate may waive the requirement for two means of escape from machinery spaces below the bulkhead deck, due regard being paid to the extent of the machinery space and the dimension and arrangement of the upper part of the space.
- f. The Directorate may also waive the requirement for two means of escape from machinery spaces above the bulkhead deck, due regard being paid to the nature and location of the space and to whether persons are normally employed in the space, always provided that, either by means of a door or ladder, a safe escape route is created to the embarkation deck.

Section 9. Sea Connections and Water Pipelines, etc.

- a. All sea connections and discharge openings in the ship's side with a connection to the machinery shall be provided with easily accessible cocks or valves fitted directly to the outside plating or on steel cases constructed on the plating. It may be permitted to install spacers of strong steel design, which shall be as short as possible, between the shut-off device and the outside plating. It shall be possible to locally operate all such cocks and valves, and they shall be provided with indicators showing whether the cock or valve is open or closed.
- b. All cocks and valves fitted below the deepest waterline shall be of steel, bronze or other approved, tough material. Generally, cast iron or similar materials may not be used.
- c. The hand wheels or hand levers of sea connections shall be easily accessible for operation. All valves used as sea connections shall close with a rightward movement of their hand wheel.
- d. Discharge cocks or valves on the ship's side for blow-off water from boilers shall be fitted at an easily accessible point and not below floor-plates. Cocks or valves shall be arranged so that it can easily be seen whether they are open or closed. Cocks shall be provided with a safety shield arranged so that the key cannot be lifted off when the cock is open.
- e. Discharge lines exiting below the deepest waterline or in its immediate vicinity shall be located so that water cannot enter the engine via this route, and they shall have a shut-off device fitted directly on the outside plating that can be operated from the deck.

- f. Pumps, valves, cocks and pipelines shall be installed and connected so that water from the sea or water tanks cannot enter any space in the ship or run from one space to another. Each bilge pipe from pumps that can also suck from the sea shall be provided with either a closable non-return valve or a cock designed so that no connection can be created from the sea or water tanks to the bilge system.
- g. Pipelines through cargo spaces shall be guarded against damage.
- h. If pipelines in machinery spaces are colour-coded, the regulations approved by the Directorate shall be complied with.
- i. All valves and cocks in pipe systems, e.g. bilge and ballast systems, fuel oil and lubricating oil systems, fire-fighting and hosing systems, coolant and sanitary systems, etc. shall be clearly marked with their respective functions.
- j. In ships with a tonnage of 50 tonnes and upwards, there shall be simple drawings of all the pipe systems cited in paragraph (i) indicating all valves and describing their functions.

C. Installations for Flammable Oils

1. Fuel Oil

Section 10. Flashpoint

- a. In passenger ships and in cargo ships with a tonnage of 500 tonnes and upwards, the fuel oil used shall have a flashpoint not less than 61°C; however, oil with a lower flashpoint, but in any case not less 43°C, may be used as fuel oil for emergency generators. The Directorate may permit the use of fuel oil with a flashpoint between 43°C and 61°C, provided that safety measures are taken as may be deemed necessary, i.e. to ensure that the temperature in the spaces where oil is stored and used can be maintained under all normal conditions at least 10°C below the oil's flashpoint.
- b. The use of fuel oil with a flashpoint below 43°C requires the authorisation of the Directorate.
- c. The flashpoint shall be determined using approved equipment in accordance with the "closed container" system.

Section 11. General Installation Regulations

- a. All parts of a fuel oil system, including pipe systems, which contain heated oil at a pressure above 1.8 ato shall, where practicable, be installed above the machinery space floor and, in all circumstances, so that any leaks can easily be seen. The parts of the machinery space where such installations are located shall be particularly well illuminated.
- b. Heated oil shall mean oil whose temperature after heating is higher than 61°C or higher than the given oil's flashpoint, if this is lower.
- c. The oil in storage tanks may not be heated to more than 40°C.
- d. In passenger ships, the fuel oil tanks that form part of the ship's structure, apart from double-bottom tanks, may not, without the authorisation of the Directorate, adjoin machinery spaces of category A. Such authorisation shall generally be on the condition that the tanks are constructed directly on double-bottom tanks, and that the area of tank sides facing the machinery space is as small as possible.
- e. In steel ships, the use of freely erected fuel oil tanks shall be avoided as far as possible, and such tanks in passenger ships shall not be installed in machinery spaces of category A. Freely erected settling or service tanks shall be accessible for observation and shall, if located in spaces dedicated to the purpose, be erected in oil-tight cofferdams or drip pans.
- f. Sufficient means shall be provided for separating water and other impurities from the fuel oil.
- g. It shall be possible to pump fuel oil to settling and/or service tanks using at least two mutually independent means.

Section 12. Fuel Oil Tank Design and Fittings

- a. All tanks shall be provided with the necessary cleaning covers, effective sounding arrangements, air pipes and filling pipes designed and located so that oil can only be spilt in the event of a leak. Air pipes, sounding pipes and filling pipes shall be clearly marked at their outlets.

- b. All cocks, valves, cleaning covers, etc. fitted to the tank shall be executed in steel, and sealing materials shall be oil-resistant and applied so that, in the event of fire, they cannot be damaged to such an extent that major leaks occur.
- c. If the tanks have a bottom drain cock or valve for drawing off water and sludge, this shall be of the self-closing type.
- d. Manholes and cleaning covers shall preferably be fitted into the tanks' top plates or, where circumstances do not so permit, as near to the tank top as practicable.
- e.
 1. Sounding pipes shall run from the highest point in the tank and shall be fitted at a suitable distance from filling pipes. With the exceptions cited in paragraph 3 below, they shall be extended to an easily accessible position above the bulkhead deck and shall not exit into accommodation or machinery spaces or accumulator battery rooms; if they exit into other enclosed spaces, they shall be provided with self-closing cocks or lockable oil-tight covers.
 2. Other devices for monitoring the oil level may be permitted if they do not connect to the tank below the tank top, and provided that any failure of these devices or overfilling of the tank cannot result in leaks near or through such fittings. If the sounding arrangement is connected to the tank below its top, such an arrangement shall be specially approved.
 3. Short sounding pipes for double-bottom tanks may be used in machinery spaces and tunnels, provided that they are installed in easily accessible places and in such a way that oil overflowing or spraying from the sounding pipe does not present a direct risk of fire. Such short sounding pipes shall be provided with self-closing cocks.
- f.
 1. All fuel oil tanks shall be provided with air pipes that shall be led to the open air, although the air pipes from several tanks may be connected to a common discharge pipe with the necessary inside diameter. The exit of air pipes shall be designed so that water cannot penetrate.
 2. In ships where the Directorate authorises the use of fuel oil with a flashpoint below 43°C (cf. section 10, paragraph (b)), air pipe exits shall be provided with safety netting that can easily be cleaned and replaced, and the exits shall have an area that is double that of the air pipes.
- g.
 1. Any settling tanks and/or service tanks shall, in addition to air pipes, be provided with overflow pipes routed to a sufficiently large bottom or overflow tank.
 2. Any overflow pipe from tanks, apart from double bottom tanks, shall be provided with an inspection glass, and alarm equipment shall be provided, which sounds the alarm either at the point of or immediately before overflow. Alarm equipment may be omitted if there is an automatic stop for pumps.
- h.
 1. Filling pipes to tanks, apart from double bottom tanks, shall be led to the top of the tank or its immediate vicinity; if this is not practicable, they shall be provided with valves or cocks as required by section 18, paragraph (g).
 2. Filling pipes exiting on deck shall end tight to the deck, and all filling pipes shall be designed so that any oil spill during filling cannot run inside the ship.
- i. Sounding pipes, filling pipes and air pipes shall be guarded against mechanical damage and shall exit at a point that the Danish Shipping Inspectorate deems safe.

Section 13. Freely Erected Fuel Oil Tanks

- a. All fuel oil tanks that do not form part of the ship's structure shall satisfy the regulations of section 12 insofar as they apply to their given type.
- b. Such tanks shall be fixed and tanks holding more than 50 litres shall be executed as welded steel structures.
- c. The sheet thickness for tanks with a capacity between 50 and 200 litres shall be at least 3 mm and for larger tanks not less than 5 mm.
- d. The tanks shall be constructed with the necessary baffles and internal stiffening so that the plate joints cannot be exposed to harmful bending effects.

- e. For tanks with a capacity of 50 litres and less, connections using double seams and brazing shall be permitted if the material used is suitable, in respect of its type and thickness, for such a method of joining and the tanks otherwise have the necessary strength.
- f. The use of fuel oil tanks that are not made of steel or copper requires the authorisation of the Directorate.

2. Lubricating Oil

Section 14. Installation Regulations

- a. It shall be possible to quickly and easily determine the oil level in each lubricating oil tank. For tanks filled from the deck, sounding pipes, air pipes and, if applicable, overflow pipes shall be led to a point that the Danish Shipping Inspectorate deems safe.
- b. Installations for storing, distributing and using lubricating oil for forced lubrication systems shall satisfy the following provisions in machinery spaces of category A and, where practicable, in other machinery spaces as well:
 - 1. All parts of a lubricating oil system, including pipe systems, which contain heated oil under pressure shall, insofar as is practicable, be fitted so that any leaks can easily be seen. The parts of the machinery space where such installations are located shall be especially well illuminated.
 - 2. All such systems shall be provided with means to prevent unwanted excess pressure in tanks, pipelines and filling pipes, etc.
 - 3. In order to sound oil in the tanks of such systems, devices may be used other than sounding pipes, provided that they are not connected to the tanks below the top of the tank, and that any faults in such devices cannot lead to the oil being discharged.
- c. Lubricating oil pressure filters in the lubricating systems of propulsion machinery and major auxiliary machinery shall be fitted so that cleaning may be effected during operation.

3. Other Flammable Oils

Section 15. Installation Regulations

Installations for storing, distributing and using flammable oils other than fuel oils and lubricating oils, e.g. pressurised oil in pressure transmission systems, control and actuation systems, heat systems, etc., shall satisfy the following provisions:

- 1. All oil tanks shall be provided with means by which the oil level can quickly and easily be determined, and tanks and fittings, apart from small service tanks only fitted up for manual oil filling directly at the tank, shall be designed and located in such a way that oil spillage can only occur as a result of leakage.
- 2. If the sounding arrangement is connected to the tank below the tank top, the arrangement shall be specially approved.
- 3. All pipelines shall be of steel or other approved material and shall be designed for the working pressure, but in any case 14 ato.
- 4. At points where the Danish Shipping Inspectorate deems it necessary, the use of hose connections of approved material and design may be permitted.

D. Measures to Prevent the Occurrence, Development and Spread of Fire

1. Fire Prevention Measures

Section 16. Miscellaneous Provisions

- a. Machinery spaces shall be well ventilated throughout. The ventilation system shall be such that under normal operating conditions oil vapours or other hazardous gases cannot accumulate at any point in the space and that sufficient air renewal and a suitable temperature are ensured in the space.
- b. In steel ships, the use of timberwork in machinery spaces, boiler spaces and shaft tunnels shall be avoided. In wooden ships, all woodwork in the immediate vicinity of the machinery's hot parts, including lines for pressurised exhaust charging, shall be clad with sheet metal plates with a non-combustible insulating underlay.

- c. Flywheels shall be shielded to the extent that any oil or water accumulation beneath the machinery space floor cannot be thrown out into the space by the flywheel.
- d. Exhaust pipes shall, wherever practicable, be kept at distance of at least 0.75 m from tanks containing flammable oils.
- e. If coal-fired or coke-fired heating boilers are installed in machinery spaces, suitable measures shall be taken, e.g. baffle plates and similar, to prevent ash or embers spreading from the boiler.
- f. A steel container with hinged lid shall be provided for storing greasy cotton waste.
- g. In machinery spaces containing internal combustion engines and/or oil-fired boiler installations, a notice from the Danish Shipping Inspectorate shall be posted in a conspicuous place concerning fire prevention measures.

Section 17. Special Provisions concerning Flammable Oils

- a. Fuel oil tanks and lubricating oil tanks, as well as tanks for other flammable oils, shall be placed so that oil from any leaks in the tank fittings, etc. cannot drip onto hot pipes or hot surfaces. It shall also be sought, by means of suitable shielding or otherwise, to prevent oil from leaks in pumps, high-pressure pipes, filters or heaters coming into contact with hot pipes and surfaces or electrical installations that can give rise to ignition.
- b. Measures shall be taken to prevent unwanted excess pressure in oil tanks or parts of the oil system, including filling pipes.
- c. The discharge pipes, air pipes and overflow pipes of relief valves shall exit at points that the Danish Shipping Inspectorate deems safe.
- d. Freely erected tanks, centrifuges, oil-fired units, pumps and heaters, etc. shall be provided with cofferdams or suitable drip trays from which leaked or spilt oil can be led, via drainpipes provided with non-return valves, to a suitably dimensioned tank from which they can be emptied and which is provided with air pipes running to the open deck.
- e. All pipelines, filters and heaters, etc. shall be of steel or other approved material.
- f. Seamless steel pipes shall be used for heated oil under pressure.
- g. Sealing materials shall be as thin as possible and shall be applied so that, in the event of fire, they will not give rise to major leaks.
- h. Oil lines shall be protected to the greatest possible extent against overload and provided with sufficient room to expand.
- i. At points where the Danish Shipping Inspectorate deems it necessary, short hose connections of approved material and design may be used.

2. Measures to Prevent the Development and Spread of Fire

Section 18. Miscellaneous Provisions

- a. The provisions of this section shall apply to all machinery spaces of category A and, where the Directorate deems it necessary, to other machinery spaces as well. In the case of wooden ships, the provisions shall only apply to the extent that they are practicable.
- b. The number of skylights, doors, ventilation openings, including openings in the flues of ventilation discharges and other openings to machinery spaces, shall be kept to a minimum, but taking account of the necessary ventilation and safe operation of the ship.
- c. Hatches in any skylights shall be of steel. Measures shall be taken so that smoke can be vented from the space.
- d. Doors, apart from watertight doors that are operated mechanically shall be fitted so that safe closure can be achieved in the event of fire in the space and shall satisfy the following conditions:
 - 1. Such doors between machinery spaces and other parts of the ship shall be of steel in all passenger ships and in cargo ships with a tonnage of 500 tonnes and upwards, and shall either be mechanically operated or of the self-closing type.

2. In passenger ships, such doors shall be of an approved type and construction, and the self-closing mechanisms shall be capable of closing the doors against an inclination of 3.5°.
 3. It shall only be possible to secure doors of the self-closing type in the open position if the securing mechanism is remote-controlled and of a fail-proof design that cannot be blocked and which is released upon failure of the remote-control system.
- e. Windows may not be installed in machinery casings.
 - f. It shall be possible to shut off the mechanical ventilation of machinery spaces from two points, one of which shall be located outside the space.
 - g. All oil lines which, in the event of leakage, will cause oil to be discharged from deep tanks, settling tanks or service tanks located above the double bottom shall be fitted directly on the tank with a cock or valve which, in the event of fire in the space in which such tanks are installed, shall be closable from a point outside the space, and at the cock or valve and at its point of operation outside the space there shall be rating plates indicating what they belong to. In the case of deep tanks located in shaft or pipe tunnels or similar spaces, the shutting off of tanks in the event of fire may be by means of an extra valve on the pipeline or pipelines outside the spaces in question.
 - h. Means shall be provided to:
 1. open and close hatches in the upper part of the space designed to remove smoke and to close ventilation discharge openings in chimneys and dampers in air pipes,
 2. close mechanically operated doors and release doors that are not mechanically operated, watertight doors,
 3. shut off mechanical ventilation,
 4. shut off the pressure and/or suction ventilators of boilers, and
 5. shut off fuel oil transfer pumps, firing pumps and similar fuel oil pumps.
 - i. The means of operation for cocks and valves as covered in paragraph (g) and the operating installations covered in paragraph (h), as well as any means of operation for fixed fire-fighting systems for machinery spaces, shall be grouped at a centrally located point or, to the satisfaction of the Danish Shipping Inspectorate, at as few centrally located points as possible to which there shall be safe access from open decks. Care shall be taken when locating means of operation that they are accessible in the event of fire in machinery spaces.

E. Boilers and Appurtenances

1. Main Boilers

Section 19. Evaporator Heating Surface

The steam boiler's evaporator heating surface shall mean the surface of the boiler's walls, ducts and pipes through which the fire or combustion products emit heat to evaporate the boiler water.

Section 20. Water Level

- a. The lowest water level at which a boiler, even with strong firing, is protected against being exposed to harmful heating up shall be indicated by means of a clear mark, wherever possible directly on the boiler, which shall be visible even if the boiler is clad. The normal water level shall be shown by means of an indicator pointing towards the gauge glass.
- b. In ships that are exposed in general use to greatly varying trim, special measures shall be taken to monitor the water level.

Section 21. General Provisions on Boiler Fittings

- a. It shall be possible to shut off at the boiler all pipelines leading from a steam boiler by means of a shut-off device fitted, wherever possible, directly on the boiler. Where superheaters, feedwater heaters or similar may be regarded as a part of the boiler, the above shut-off device may be fitted at the pipe connection to such boiler fittings.
- b. All valve and cock chambers and T-pieces, etc. carrying steam or water at temperatures higher than 220°C shall be executed in steel. Where the temperature does not exceed 220°C, bronze

may be used. Cast iron shall only be used where the temperature does not exceed 220°C and the boiler pressure does not exceed 10.5 ato.

- c. All valves and cocks fitted on the boiler shall be designed so that it can easily be seen whether they are open or closed.
- d. Valves with an opening of 38 mm and less may be provided with screw caps that are properly protected against screwing loose. All other valves shall have the valve spindle's thread outside the valve cap and this shall be fastened to the chamber with bolts or pegs. Cocks shall be designed so that the plug cannot be pushed out by the pressure from the boiler, even if the stuffing box's screw peg or similar should burst.
- e. All valves shall close with an rightward movement of their hand wheel and shall, insofar as possible, close against the boiler pressure.

Section 22. Water Gauge Glasses and Test Cocks, etc.

- a. All steam boilers shall be provided with at least two mutually independent means of monitoring the water level, one of which shall be a water gauge glass. The second or others may be other approved means, e.g. test cocks or valves. If the water or steam vessel lies athwartships and its length exceeds 4 metres, a water gauge glass shall be fitted at or in the immediate vicinity of each vessel.
- b. All fire tube boilers with a working pressure above 8.5 ato or with an internal diameter of 1.8 metres or more, and all water tube boilers shall have two mutually independent water gauge glasses.
- c. The water gauge glasses of fire tube boilers shall be fitted so that there is at least 5 cm water over the evaporator heating surface's upper part when the water is just visible in the water gauge glasses.
- d. On water tube boilers, the water gauge glasses shall be fitted so that the water level is sufficient for safe operation of the boiler when the water with a cold boiler is just visible in the glasses.
- e. On boilers where only one water gauge glass is required, this shall be fitted within the middle third of the boiler's waterline; if the water gauge glass cannot be fitted in this way, a water gauge glass shall be fitted in each side.
- f. Scotch boilers shall be provided with a water gauge glass in the centre line and in one of the sides. If it is not possible to fit a glass in the centre line, there shall be one in each side.
- g. Water gauge glasses shall be provided with the necessary shut-off and blow-through fittings, and boilers with a permitted working pressure of 12.65 ato or more shall also have solid protective shields, unless a water gauge glass of special solid construction is used.
- h. If the shut-off fitting of a water gauge glass is not of the self-closing type, it shall be provided with tension for rapid closing, unless it can easily and safely be closed directly from the stokehold or platform.
- i. A set of test cocks or test valves shall consist of at least two cocks or valves that shall, as far as possible, be fitted directly on the boiler. The lowest of the cocks or valves shall be fitted at a height of at least 5 cm above the evaporator heating surface's upper part.
- j.
 1. If the water gauge glass is not fitted directly on the boiler, but on a standpipe that is either secured to the boiler itself or connected through piping to the boiler's water or steam space, the standpipe shall be particularly solid. In accordance with the boiler's size, the minimum internal diameter of the standpipe and its feed pipes shall be as follows:

Boiler diameter	Standpipe internal diameter	Feed pipe internal diameter
Below 2.3 m	45 mm	25 mm
2.3 m and more, but below 3.0 m	50 mm	32 mm
3.0 m and more	63 mm	38 mm

2. Feed pipes to standpipes shall exit at a calm place in the boiler and shall have shut-off devices directly on the boiler. Feed pipes shall be fitted so that the standpipe is as near to the boiler's end plate as possible.
3. Feed pipes from the steam space shall also be fitted so that condensation water cannot accumulate in them, and they shall not be run through uptakes, unless laid in tubes with

good access for air circulation. Feed pipes from the water space shall be provided at the bottom with a drain cock or valve.

- k. In all valves used with water level fittings, the valve body and valve spindle shall be particularly solidly connected, possibly executed in a single piece, and particularly exposed valve seats shall be carefully secured against working free. The valves shall be arranged so that it can easily be seen whether they are open or closed.
- l. Means for monitoring the water level shall be easily accessible and arranged and illuminated so that the water level can easily be observed.

Section 23. Relief Valves

- a. All steam boilers and steam converters shall be provided with relief valves. If the boiler's evaporating area exceeds 9.3 m², there shall be two relief valves.
- b. Relief valves belonging to the same boiler may be fitted in a common valve box that shall not be connected to other valves and shall be fitted directly on the boiler; the throat between the box and flange shall be as short as possible. The valve box shall be fitted as high in the steam space as possible, and to remove condensation water it shall have a drainpipe without shut-off device with an internal diameter of at least 12.5 mm.
- c. Relief valves with springs shall be shielded and otherwise fitted so that the steam cannot under any circumstances discharge the valves, even if the means of loading them should cease to work. The valves shall, if they are restrained, be able to turn in their seats, and the valve seats shall be effectively secured.
- d. For each boiler, the relief valves' total throughput area shall at least have the area in mm² that may be derived from the formula below; however, if double relief valves are used, the diameter of their opening shall be at least 38 mm and for single relief valves at least 50 mm.

$$\text{Saturated vapour: } A_1 = \frac{K.F.H.}{p + 1}$$

Overheated steam: $A_2 = A_1 (1 + 0.0018 T)$ where

A_1 and A_2 = relief valves' total throughput area in mm², with full-lift valves, however, the net area after deduction for guides and other obstacles to the steam, when the valves are open,

H = boiler's evaporator heating surface in m²,

F = the calculated steam production in kg per hour per m² evaporator heating surface, although F may not be set below 29 for coal-fired or oil-fired boilers and not below 14.5 for boilers or parts of boilers solely heated by exhaust gas,

p = boiler's working pressure in ato,

T = temperature difference between the overheated and the saturated vapour at working pressure

K = 21 for valves of general design, 14 for high-lift valves, 10.5 for "improved" high-lift valves, and 5.25 for full-lift valves; in cases where the capacity of such valves is determined by testing, lower K -values may be permitted for use.

- e. The relief valves shall be set and fitted so that, to prevent damage to the superheater, it is fed with sufficient steam when the valves open.
- f. All relief valves belonging to a boiler shall be provided with a relief device of sufficient strength that all relief valves belonging to a single boiler can be lifted at the same time from the stokehold or control station of the machinery space. The relief device shall not exert any pressure on the valves.
- g. Care shall be taken, by fitting stoppers or otherwise, that a relief valve cannot be loaded by an unauthorised person beyond the pressure to which the valve is set.
- h. Discharge pipes from relief valves to the open air shall not at any point have a lower inside diameter than the relief valves' total throughput area, derived from the formula, with an

addition of 10%. If full-lift valves are used, the discharge pipe shall have a throughput area of at least twice the valves' total area and at least three times this area if K is set below 5.25.

- i. The relief valves' total throughput area shall for all boilers be sufficiently large that the pressure in the boiler does not rise to more than 10% above the boiler pressure within 15 minute's firing for fire tube boilers and 7 minute's firing for water tube boilers, when the stop valves are closed, the tensioning means available are used and no more feedwater is supplied than is sufficient to maintain the water level.
- j. Relief valves shall be set with the boiler under steam, and they shall open at a pressure that does not exceed the boiler pressure by more than 3%.

Section 24. Feedwater System

- a. All boilers shall be connected to at least two mutually independent feedwater systems.
- b. There shall be two feed pumps, at least one of which shall be separately driven, and each pump shall have sufficient capacity to raise the water level in the boilers under full steam production and full boiler pressure. If more than two feed pumps are installed, it shall be possible under full steam production and full boiler pressure to increase the water level in the boilers with any one of the boilers out of operation.
- c. There shall be two condensate pumps, at least one of which shall be separately driven. If it is possible using a separately driven feed pump to suck the condensation water directly from the condensator and force it to the feed tank, such a feed pump may replace one of the cited condensate pumps.
- d. Unless there are sufficiently large feedwater tanks and an evaporator of sufficient capacity, one of the separately driven feed pumps shall be able to suck directly from the sea. For water tube boilers, there shall always be feedwater tanks and evaporators.
- e. If the boilers are used whilst the ship is in port to operate auxiliary machinery, etc., there shall be two separately powered means of feeding, one of which shall be a feed pump. If the other means is a reserve feed pump, this may be used for other purposes, provided that it cannot be connected to oil tanks or tanks, cofferdams and bilge systems where oily water may occur.
- f. All feed pumps shall be provided with shut-off devices fitted so that each individual pump can be opened for inspection whilst the other pumps are in operation.
- g. Each feed pump shall comprise an isolation valve and an adjustable non-return valve. If it is necessary to use common feed pipes to a feedwater heater for both feedwater systems, such a feed pipe shall be as short as possible, and the feed valves shall be arranged so that each of the supply lines can be fully shut off without thereby obstructing the feedwater supply. It shall be possible to operate feed valves from the stokehold or other easily accessible point, possibly using an appropriate gear arrangement.
- h. If the feed pumps are able to generate a higher pressure in the feedwater systems than that for which they have been designed, the pumps' valve boxes shall be provided with suitable relief valves.
- i. At least one of the feedwater systems to water tube boilers shall be provided with an automatic feedwater regulator.

Section 25. Stop Valves

- a. All steam boilers shall be provided with a main stop valve to shut off the steam supply to the propulsion machinery. This valve shall be fitted directly on the boiler or as close to it as practicable.
- b. Stop valves for shutting off the steam supply to auxiliary machinery shall be fitted so that this steam supply is independent of the main stop valve referred to in paragraph (a).
- c. Where two or more boilers are connected, all stop valves shall be closable non-return valves.
- d. If steam is used to operate steering gear and/or electrical generators, ships with several boilers shall be capable of being supplied with steam for this purpose from at least two boilers. The same shall apply if steam is used for the ship's whistle or sirens.

Section 26. Bottom Blow-Off Valves and Scum Valves

- a. All boilers shall be provided with a valve for blowing off bottom water and shall, if there is the possibility of oil contamination of the boiler water, also be provided with a scum valve.
- b. Bottom blow-off valves shall be fitted directly on the boiler. If this is not practicable, the valve may be fitted directly outside the boiler's shell plating using a sufficiently strong intermediate pipe of steel. Both pipe and valve shall be properly supported, and all pipes exposed directly to heat from the boiler's fire shall be suitably protected.
- c. Bottom blow-off valves and scum valves and their connecting pipes to discharge cocks or valves in the ship's side shall have an inside diameter of at least 25 mm. If such valves from several boilers have a common discharge pipe in the ship's side, the valves on each boiler shall be closable non-return valves.

Section 27. Valves for Performing Boiler Water Tests

All boilers shall have at least one valve designed to remove boiler water. Such valves shall be fitted directly on each boiler and shall not be fitted on water level fittings or pipes thereto.

Section 28. Pressure Gauges

- a. All boilers and superheaters shall be provided with at least one pressure gauge that shall be fitted in a well-lit place and such that the pressure can easily be read.
- b. It shall be possible to shut off all pressure gauges from the boiler using a cock or valve fitted on it, and there shall be means to blow out the connecting pipe between boiler and pressure gauge.
- c. The boiler pressure shall be indicated on the pressure gauge by a red line, and the pressure gauge's scale shall continue to at least 25% of the boiler pressure beyond this mark.
- d. If the pressure in the boilers cannot easily be read from the machine room, there shall also be a pressure gauge at the control station. This pressure gauge may be connected to the steam pipe.

Section 29. Fittings for Connecting Test Pressure Gauges

For connecting test pressure gauges, all boilers shall have a cock with a flange of 5 mm thickness and 38 mm cross-section. The flange may be fitted on the pressure gauge.

Section 30. Manholes

Boilers, steam vessels, etc. shall, where practicable, be accessible for internal inspection. If their design or size does not permit the fitting of manholes, they shall be provided with a sufficient number of cleanout holes for inspection and effective cleaning to be carried out. Manholes shall generally have a size of 300 x 400 mm. Covers to manholes and cleanout holes shall be of steel.

Section 31. Steam Pipes

- a. Steam pipes shall be made of steel, copper or other approved material.
- b. For pressures higher than 12.65 ato, copper pipes with an inside diameter above 12.5 cm shall not be used. In machinery spaces and boiler rooms, copper pipes shall not be used for overheated steam. Copper steam pipes shall be seamless.
- c. Steam pipes shall be clamped in a sufficient number of strong rings and shall be ensured the necessary room to expand so that harmful tensions cannot arise in the pipes or connected machinery. The pipes, which shall be provided with appropriately fitted drain cocks or valves, shall be arranged so that large water accumulations cannot occur under normal conditions.
- d. Steam pipes may not be carried in the vicinity of stairways unless the pipes are surrounded by protective tubing or shields so that steam cannot block the passage in the event of leakage.

Section 32. Connections between Boilers of Different Pressure

If the boiler pressure is different in the ship's boilers and the pipe system is designed so that steam of higher pressure can be lead, through carelessness, into a boiler whose pressure is lower, the necessary safeguarding measures shall be taken using non-return valves.

Section 33. Reduced Steam Pressure

If steam of lower pressure than the boiler pressure is led by means of pressure reducers to steam systems or apparatus not designed for the full boiler pressure, a sufficiently large relief valve shall be fitted immediately after the pressure reducer set for the reduced pressure.

Section 34. Marks for Identifying Boilers

All boilers shall bear the boiler pressure, test pressure, manufacturer's mark, boiler's year of construction and serial number or other marks enabling the boiler to be identified. These marks shall be clearly indicated either by means of engraving on the boiler itself or on a metal plate fixed to it.

2. Oil-fired Boiler Systems

Section 35. General Provisions

In addition to the regulations of sections 10-34, the provisions of sections 36-39 shall apply.

Section 36. Fuel Oil Units, etc.

- a. In ships with oil-fired main boiler systems, there shall be at least two mutually independent oil-firing pumps that shall each have sufficient output to maintain the steam consumption under normal full power.
- b. Oil-firing pumps shall be connected to at least two heaters and suction and pressure filters, isolation valves and necessary thermometers and pressure gauges. Relief valves shall be fitted to the pump discharge side of pressure atomising systems, whose discharges between bypasses shall run back to the pumps' suction side.
- c. Oil-firing plants shall be arranged so that the boiler or boilers may be fired using the ship's own power sources.
- d. The oilpipes of oil-firing units shall only be connected with fuel oil systems.
- e. On oilpipes connected to oil-firing systems, valves with an inside diameter of 19 mm and less may be provided with screw caps with protection against working loose. All other valves shall have the valve spindle's thread outside the valve cap, and this shall be secured to the box with bolts or pegs. Cocks shall be arranged so that the plug cannot be pushed out by the pressure in the system, even if the stop bush's screw peg or similar should burst.
- f. All valves shall close with a rightward movement of their hand wheel and shall wherever possible close against the pressure in the system.

Section 37. Fuel Oil Atomisers, etc.

- a. The securing mechanisms of oil burners shall be designed so that a burner cannot be removed unless the oil supply is shut off. The shut-off device shall be properly secured in the closed position and it shall not be possible to reopen it until the burner has been inserted and secured.
- b. Drip trays shall be placed under oil burners.

Section 38. Insulation of boilers, etc.

- a. Steam boilers shall, in the vicinity of oil tanks, be heat-insulated to prevent improper heating of the oil. Where boilers are located above double bottom tanks used as oil tanks, the distance between the tank top and the combustion space's bottom shall be at least 750 mm.
- b. Smoke chambers with doors and uptakes shall be executed as close as practicable.
- c. If dampers are used in the furnace or uptake, these shall not be tight-closing, and shall be designed so that they can safely be kept fully open.

Section 39. Plan of Oil-firing System

For the guidance of machinery personnel, there shall be a complete plan of the oil-firing system on board with an accompanying description and operating rules.

3. Auxiliary Boilers

Section 40. Oil-fired Auxiliary Boilers

Oil-fired auxiliary boilers shall, in respect of their construction, fitting and equipment, satisfy the provisions laid down for main boilers, although boilers that are not necessary for the ship's safe

operation do not need to be connected to two feedwater systems, nor to be provided with two oil-firing units.

Section 41. Exhaust Gas boilers and Heaters, etc.

Exhaust gas boilers, steam converters, heaters, evaporators, etc. in which water is heated under a pressure higher than 2 at shall satisfy the regulations for steam boilers with regard to strength and the provision of valves and fittings, insofar as these provisions, given their nature, are applicable.

4. Boilers Designed for Automatic Operation

Section 42. Safety Equipment

- a. Oil-fired steam boilers designed for automatic operation shall, in addition to satisfying the provisions of sections 35-40, be fitted with safety equipment that stops the oil-fire and closes the oil supply at a minimum water level in the boiler, if the flame fails and if the boiler blower stops functioning.
- b. On main boilers, there shall also be an alarm for "high" and "low" water level and an alarm for failure in the oil-firing equipment.
- c. In the case of plants with automatic ignition, the safety equipment shall be designed so that blocking of the fire occurs after a reignition test of maximum 20 seconds' duration. Reignition shall only be able to occur after manual resetting and thorough ventilation of the boiler room.

5. Central-Heating Boilers

Section 43. Central-heating boilers shall mean boilers whose chamber for the liquid that is to be circulated in the central-heating system is in non-closable communication with the atmosphere, and such boilers shall, in respect of their construction and fitting out, satisfy the provisions laid down at any given time by the Directorate.

F. Propulsion and Auxiliary Machinery

Section 44. General Provisions

- a. In addition to the regulations of Sections 6-18, the provisions of the present section shall apply.
- b. The machinery's power for going astern shall be sufficient to secure proper control of the ship in all normal circumstances.
- c. In passenger ships, the machinery's ability to reverse the direction of thrust of the propeller in a short period of time in normal conditions of manoeuvrability and so bring the ship to rest from maximum ahead service speed shall be demonstrated during the initial main survey.
- d. It shall be possible to shut off the propulsion machinery and/or the propeller from the open deck without switching off power to the auxiliary machinery.
- e.
 1. In all ships where the propulsion machinery is installed below deck, if the Danish Shipping Inspectorate deems it necessary, there shall be means of communicating orders from the bridge to the machinery space.
 2. If the machinery cannot be controlled directly from the bridge in a satisfactory manner, there shall be an engine-room telegraph.
 3. In ships with a tonnage of 500 and upwards, there shall be at least two mutually independent means of communication between the bridge and the machinery space, one of which may be an engine-room telegraph.
- f. For each unit of the propulsion machinery and the auxiliary machinery, measures shall be taken to prevent the sudden removal of load to the machinery subjecting it or the ship's installations to harmful effects.
- g. Care shall be taken to ensure that the ship's whistle or siren cannot freeze over.

1. Engine System

Section 45. Engine Types

- a. In passenger ships and vessels, only compression ignition engines may be used (diesel engines).

- b. In other ships, engines may be installed of types other than those referred to in paragraph (a), although engines whose operation requires fuel oil with flashpoint below 43°C shall only be used on authorisation from the Directorate.

Section 46. Starting and Reversing Engines

- a. All engines shall be designed so that they can be started quickly and reliably; if a crank is used for starting, this shall be self-releasing or otherwise reliably designed.
- b. In ships where the direction of thrust of the propeller or propellers can only be changed by reversing the propulsion engine(s), there shall be sufficient stored power for at least 12 successive starts of each propulsion engine without further supply of power.
- c. If the engines are not reversible, the stored power only needs to be sufficient for at least six starts of each engine. If several engines operate on the same propeller, the Directorate may permit the amount of power to be reduced.
- d. Where stored power is required to start engines that drive emergency units, the amount of this stored power shall be sufficient for at least six successive starts of each engine without further supply of power.
- e.
 - 1. Where compressed air (compressed exhaust air) is used for starting and reversing, there shall be two mutually independent means of pumping.
 - 2. If the machinery's output exceeds 500 hp, at least one of these means shall be an independent mechanically driven compressor.
 - 3. If the auxiliary machinery necessary for the propulsion machinery or the ship's operation is powered by engines requiring compressed air for starting, for the purpose of starting these engines there shall be a special compressed air vessel with associated mechanically driven emergency compressor that can be started and driven without the use of compressed air.
 - 4. All compressors shall be provided with a relief valve as per section 47, paragraph (d).
 - 5. The intake of compressors shall be designed so as to restrict the intake of oily air.
- f.
 - 1. Where propulsion engines are started solely by means of electrical power, there shall be at least two mutually independent accumulator batteries that can quickly and easily be connected to both the starting and charging arrangement and each of which is especially able, without additional charging, to supply power to the number of starters stated in paragraphs (b) and (c). It shall be possible to fully charge all starting batteries within six hours.
 - 2. In ships with a tonnage upwards of 50 tonnes, it shall be possible to charge starting batteries via two mutually independent charging mechanisms, one of which shall be automatic and shall be capable of being supplied from a charging dynamo driven by the main engine or engines, whilst the other shall be supplied from a generating set that it shall be possible to start and drive without using electrical power. The provisions shall apply by analogy to ships with a tonnage of 50 or less if the machinery space has an auxiliary engine as well as the propulsion machinery.
 - 3. If the auxiliary machinery necessary for the propulsion machinery or the ship's operation as well as any emergency generators are driven by engines that can only be started using electrical power, for starting each of these engines there shall be a separate accumulator battery with automatic charging mechanism. The battery's capacity shall be sufficient for at least three starts (but for emergency units at least six starts) without further charging.
 - 4. If a starting battery is used for other purposes, the battery capacity shall be increased accordingly and the starting system's network shall be kept fully separate from other circuits.
 - 5. Electrical starting systems shall, in addition to being executed as an insulated double-conductor system, satisfy the provisions of section VI of Order no. 173 of 21 May 1965 on Regulations for the Construction and Equipment of Ships, etc.

Section 47. Compressed-Air Tanks

- a. Compressed air, including compressed exhaust air, for starting and reversing engines shall be stored in one or more compressed-air tanks designed for the purpose, which shall be made of seamless steel pipes or steam boiler plate (certified plate) and joined by means of riveting or welding. Such tanks shall, in respect of their construction, strength and material dimensions, satisfy the regulations laid down or recognised by the Directorate, cf. section 3, although the material thickness shall not be less than 5 mm.
- b. All tanks shall be marked with the working pressure, the test pressure, the manufacturer's or supplier's name, the tank's year of construction and serial number or other marks enabling identification of the tank. The marking shall be of a solid and conspicuous manner, either by engraving the tank itself or a metal plate affixed to it.
- c. The tanks shall be fixed and accessible for external inspection along their entire length. As a rule, they shall be provided with isolation valves, bottom drain cocks or valves, pressure gauges and necessary cleanout openings, and shall also be provided with a relief valve or plug fuse.
- d.
 1. Relief valves shall be of sufficient size to prevent an exceeding of the working pressure stipulated for the tank and shall under no circumstances have a diameter below 10 mm. The relief valve may be fitted on the tank's feed pipe or on the compressor and may be common for several tanks with the same pressure. All tanks whose connection with the relief valve may be broken by means of intermediate shut-off devices shall be provided with plug fuses that melt at a temperature of not more than 100°C.
 2. If the Danish Shipping Inspectorate finds that the quantity of air stored in the compressed-air tanks in relation to the size of the space would present a particular risk in cases of fire, both plug fuses and relief valves fitted on the tanks shall be surrounded by an adequately dimensioned blow-out pipe run to the open deck.
 3. Relief valves may be omitted if the tanks are only charged with compressed exhaust air from engine cylinders in which the compression pressure does not exceed 15 ato. Such compressed exhaust tanks shall, however, be provided with plug fuses as referred to in paragraph (d) (1).
- e. It shall be possible to drain condensation water and oil from the tank's lowest point.
- f. The working pressure shall be indicated on the pressure gauge by a red line, and the scale shall continue to at least 25% of the working pressure beyond this.
- g. Tanks with an inside diameter above 150 mm shall be provided with cleanout openings of such a size that cleaning and internal inspection can be carried out reliably. Such cleanout openings may under no circumstances have a diameter below 75 mm. If the tank's length is 2.5 m or more, it shall, unless provided with manholes, have a cleanout opening at each end.
- h. Regarding pressure tests, the provisions of section 371 of order no. 173 of 21 May 1965 on Regulations for the Construction and Equipment of Ships, etc. shall apply by analogy.

Section 48. Compressed-Air Pipelines

- a. Compressed-air pipelines shall be made of steel or copper pipes. If charging is with compressed exhaust air, the length of the charging pipeline between engine cylinder and tank shall be at least 1.5 m.
- b. Shut-off devices on compressed-air pipelines from tanks to the starting valves of reversible propulsion engines shall be easily accessible.
- c. At points where it is deemed necessary, the Danish Shipping Inspectorate may permit short hose connections of approved material to be used.

Section 49. Cooling Water Pumps

- a. In ships with a tonnage of 20 and upwards, there shall be both a main and reserve pump for cooling water, and both pumps shall be able to suck from at least two mutually independent sea valves installed to the satisfaction of the Danish Shipping Inspectorate.
- b. If the machinery's output is 500 hp or less, a compulsory seamless bilge pump may be approved as a reserve cooling water pump, provided that measures are taken to prevent contamination of the cooling water.

- c. If the machinery's output is over 500 hp, at least one of the cooling water pumps shall be separately driven.
- d. In the case of freshwater cooling systems, a reserve freshwater pump may be omitted, provided there is a suitable reserve connection from the saltwater cooling system.
- e. Both cooling water pumps and the other cooling water system shall be protected against harmful overpressure.

Section 50. Cooling Water Pipelines, etc.

- a. Cooling water pipelines shall be of steel, copper or other approved material. At points where it is deemed necessary, the Danish Shipping Inspectorate may permit short hose connections of approved material to be used.
- b. The cooling water system shall be provided with the necessary means of drainage, and suitable ventilation should be ensured from the system's highest point. There shall be thermometers at the cooling water discharge from each individual engine.
- c. Where seawater is used to directly cool propulsion and/or major auxiliary engines, there shall be filters on the suction line that can be cleaned without shutting off the cooling water supply.
- d. Expansion tanks belonging to freshwater cooling systems shall be made of steel sheet with a material thickness not less than 3 mm. The tanks, which shall be fixed and provided with a ventilation pipe of not less than 25 mm inside diameter, shall have cleanout openings or manholes of such a size that cleaning and internal inspection may be carried out reliably.

Section 51. Oil Pumps

- a. All oil pumps that can generate a pressure higher than that for which the oil system is designed shall be provided on the pressure side with a spring-loaded bypass valve.
- b. In the case of ships with a propulsion machinery output exceeding 500 hp, the following shall apply:
 - 1. There shall be a mechanically driven reserve lubricating oil pump ready for immediate use. If the propulsion machinery consists of two or more engines, and if each engine has an obligatory seamless lubricating oil pump, a complete lubricating oil pump ready for rapid assembly may replace the reserve lubricating oil pump.
 - 2. There shall be at least two mechanically driven pumps for particularly important oil systems, e.g. for piston cooling, reversing and/or reducing gear, hydraulic pressure systems necessary for safe operation of the propulsion machinery, reversing the direction of thrust of the propeller, etc.

Section 52. Measures to Reduce the Effects of Explosion

- a. Crankcases on all engines with a cylinder diameter of 200 mm and more shall be fitted with spring-loaded, light and quick-closing covers that, in the event of explosion in the crankcase, relieve the pressure in the case. The total area of the opening of such covers shall be at least 120 cm² per m³ of the crankcase's volume, and outlets shall be located so that persons are not exposed to spurt flames in case of explosion.
- b. The starting air pipeline shall, at suitable points, be provided with protective explosive covers to prevent pipe bursts caused by abnormal overpressure in the pipeline.

Section 53. Special Provisions for Passenger Vessels

- a. In addition to the regulations below, the provisions of sections 45-52 shall be satisfied by passenger vessels to the extent to which these provisions, in respect of their nature, may apply, taking into account the vessel's size and equipment, etc.
- b. In enclosed passenger vessels and in open passenger vessels where the engine is installed in an enclosed space, the partition between the machinery space and the other parts of the ship shall be fire-insulated to the satisfaction of the Danish Shipping Inspectorate, and the bulkheads shall, wherever practicable, be constructed and installed so that any leakage or fracture in the fuel oil system shall not entail the oil spreading to the other parts of the vessel.
- c. Air pipes and any other openings to the machinery space shall be provided with easily accessible and proper means of closing.

- d. In open passenger vessels where the propulsion engine is freely installed, the engine and the installations belonging to it, including fuel oil tanks, shall be partitioned with solid bulkheads or shields which, where practicable, shall be constructed so that any leakage or fracture in the fuel oil system shall not entail oil spreading to other parts of the vessel.

2. Steam Turbine Installations

Section 54. Propulsion Turbines

- a. In single-propeller ships, measures shall be taken to ensure continued operation with incomplete machinery if one of the turbines breaks down; however, such a form of operation shall ensure that no turbine or condenser can be subjected to harmful overpressure and/or temperatures.
- b. If there is bleeding from the turbine, measures shall be taken to prevent steam or water flowing in the opposite direction.
- c. Propulsion turbines shall be fitted with a mechanically driven turning gear.
- d. All propulsion turbine installations shall be designed so that they can be started using the ship's own power sources.

Section 55. Cooling Water System

- a. For circulation of seawater through the main condenser and the lubricating oil coolers, etc., there shall be two mutually independent units, at least one of which shall be a separately driven cooling water pump with a capacity sufficient for safe operation of the ship.
- b. The cooling water pumps shall be able to suck from two mutually independent sea valves fitted to the satisfaction of the Danish Shipping Inspectorate.
- c. Cooling water pipelines shall be of steel, copper or other approved material. At points where it is deemed necessary, the Danish Shipping Inspectorate may permit short hose connections of approved material to be used.
- d. The cooling water system shall be provided with the necessary means of drainage, and suitable ventilation should be ensured from the system's highest point.

Section 56. Lubricating Oil System

- a. All propulsion turbines shall be provided with means that either automatically shut off the steam supply to the turbines or sounds an alarm if the lubricating oil pressure falls to a specified level, at the same time automatically connecting the turbines to an emergency lubrication system able to ensure satisfactory lubrication until the turbines are braked.
- b. In addition to the propulsion turbines' main lubricating oil pumps, there shall be a separately driven reserve lubricating oil pump ready for immediate use.
- c. All lubricating oil pumps capable of generating a pressure higher than that for which the lubricating oil system is designed shall be provided on the pressure side with spring-loaded bypass valves.

Section 57. Regulators, etc.

- a. The measures required by section 44, paragraph (f), shall, in the case of turbine installations, consist of an emergency regulator that, in conjunction with a quick-closing valve, shall ensure that the steam supply to the turbines is shut off on exceeding of the highest speed for which the turbines have been tested.
- b. It shall be possible to operate the quick-closing valve for propulsion turbines from the control station.

Section 58. Relief Valves

- a. The parts of turbines not designed for the full boiler pressure shall be provided with relief valves that open at a pressure below the test pressure for which the given part of the turbine has been tested.
- b. The relief valves shall be provided with shields to protect against steam flowing out.

Section 59. Steam Screen

Main steam pipes running to both propulsion and astern turbines shall be provided with a steam screen as close to the turbines as practicable.

G. Steering Gear

1. Passenger Ships on International Voyages

Section 60. General Provisions

- a. There shall be a main steering system and an auxiliary steering system, both to the satisfaction of the Directorate.
- b. The main steering system shall be of adequate strength and capable of steering the ship at maximum ahead service speed. The main steering system and rudder stock shall be designed and arranged so that they will not be damaged at maximum astern speed.
- c. The auxiliary steering system shall be of adequate strength and capable of steering the ship at navigable speed and of being brought speedily into action in an emergency.
- d. If the rudder is moved mechanically, its exact position shall be shown by means of a rudder indicator at the main control station.
- e. The main steering gear shall be capable of putting the rudder over from 35° on one side to 35° on the other side with the ship running ahead at maximum service speed. The rudder shall be capable of being put over from 35° on one side to 30° on the other side in not more than 28 seconds at maximum service speed.
- f. The reserve steering system shall be driven mechanically in cases where the Directorate requires a rudder stock with a diameter of 23 cm and more, measured at the tiller.
- g. Where the main steering system, to the satisfaction of the Directorate, comprises two identical mechanical power units and associated connections, and each of these power units enables the steering apparatus to satisfy the provisions of paragraph (e), the requirement for an auxiliary steering system shall be waived.
- h. Where the Directorate requires a rudder stock with a diameter of 23 cm and more, measured at the tiller, there shall be a reserve control station at an approved point. The steering gear power systems from the main control station and the reserve control station shall be designed so that failure of one of the systems shall not mean that it is impossible to steer the ship using the other system.
- i. There shall be sufficient means, to the satisfaction of the Danish Shipping Inspectorate, to communicate orders from the bridge to the reserve control station.

Section 61. Special Provisions for Electrical and Electrohydraulic Steering Systems

- a. Means for indicating that the motors of electric and electrohydraulic steering systems are running shall be installed in a place acceptable to the Danish Shipping Inspectorate.
- b.
 1. Electric and electrohydraulic steering systems shall be served by two circuits fed directly from the main switchboard. One of the circuits may be supplied through the emergency switchboard. Each circuit shall have adequate rating for supplying all motors normally connected to them and operating simultaneously. If there are circuit changers in the steering gear compartment via which each circuit may be brought to supply any motor or combination of motors, both the circuits shall be rated for the maximum load. The cables for each circuit shall be separated as far as is practicable throughout their length.
 2. The above circuits and motors shall only be provided with short circuit protection.

2. Passenger Ships on Domestic Voyages

Section 62. The provisions of sections 60 and 61 shall also apply in principle to passenger ships on domestic voyages, although the Directorate may, if it deems that implementation of these provisions would be unreasonable or impractical in individual cases given the voyage's specific nature, grant the necessary relaxations and departures.

3. Cargo Ships of 500 Tonnes and upwards

Section 63. General Provisions

- a. The provisions of section 60, paragraphs (a) to (d), shall apply by analogy.
- b. The main steering system shall be capable of putting the rudder over from 30° on one side to 30° on the other in not more than 30 seconds with the ship running ahead at maximum ahead service speed.
- c. The auxiliary steering system shall be mechanically driven in all cases where the Directorate requires a rudder stock with a diameter of 36 cm and more, measured at the tiller.
- d. Where the main steering system, to the satisfaction of the Directorate, comprises two identical mechanically driven power units with associated connections, and each unit satisfies the provisions of section 60, paragraph (c), no auxiliary steering system is required, provided that the two units and components satisfy the provisions of section 60, paragraph (b), during simultaneous operation.

Section 64. Special Provisions for Electric and Electrohydraulic Steering Systems

- a. In the case of cargo ships with a tonnage of 5,000 and upwards, the following shall apply:
 1. Means for indicating that the motors of electric and electrohydraulic steering systems are running shall be installed at a point acceptable to the Danish Shipping Inspectorate.
 2.
 - a) Electric and electrohydraulic steering systems shall be served by two circuits fed from the main switchboard. One of the circuits may be supplied through the emergency switchboard. Each circuit shall have adequate rating for supplying all motors normally connected to it and operating simultaneously. If there are circuit changers in the steering system compartment via which each circuit may be brought to supply any motor or combination of motors, both the circuits shall be rated for the maximum load. The cables for each circuit shall be separated as far as is practicable throughout their length.
 - b) The above circuits and motors shall only be provided with short circuit protection.
- b. In the case of cargo ships with a tonnage of 500 and upwards but below 5,000 tonnes, the following shall apply:
 1. In ships in which electricity is the only power source for both the main and auxiliary steering system, the provisions of paragraph (a) (2) shall be observed; if the auxiliary steering system is driven by a motor primarily used to operate other equipment, the provisions of paragraph (a) (2) (b) may, however, be waived, provided that protective measures are approved by the Directorate.
 2. Motors and circuits for electric and electrohydraulic main steering systems shall only be provided with short circuit protection.
 4. Cargo ships with a tonnage below 500 tonnes, including fishing ships and vessels.

Section 65. Where the steering is transferred mechanically from the control station to the rudder stock, there shall be means that can be easily and quickly connected so that the auxiliary steering can be performed in cases of fault or failure of the main steering arrangement.

H. Refrigerating Installations

Section 66. General Provisions

- a. Refrigerating installations shall mean any refrigerating installation, apart from household refrigerators and freezers, in which liquids or liquefied gases whose vapour pressure at + 30°C exceeds 0 ato are used as the coolant.
- b. The provisions of sections 6-18 shall apply to the extent to which they may be applicable to the use of refrigerating installations.

Section 67. Coolants

- a. Fluorohydrocarbons (freon, arcton, frigen) and ammonia shall be used as coolants in ships.
- b. Other coolants shall only be used on the authorisation of the Directorate.

Section 68. Materials

- a. All materials used in connection with refrigerating installations shall be generally corrosion-resistant and resistant to both the coolants used and the lubricating oil or mixtures thereof used.
- b. In the case of installations where the normal working pressure exceeds 2 ato, all vessels (absorbers, receivers, condensators, oil separators, etc.) shall be made of certified plate.

Section 69. Relief Valves, etc.

- a. All compressors shall be provided on the pressure side between the compressor and its outlet valve with a relief valve and/or frangible disc from which the outlet pipe shall be run to the compressor's suction side.
- b. All other components belonging to a refrigerating installation that may be exposed to harmful overpressure shall be provided with a relief valve or frangible disc.
- c. All vessels used in a refrigerating system shall, provided there is an option for liquid filling and provided that it can be shut off from the system, be provided with a relief valve and/or frangible disc from which the outlet pipe is run to a point which the Danish Shipping Inspectorate deems safe.

Section 70. Pressure Gauges

Refrigerating installations shall be provided with the pressure gauges necessary for safe monitoring.

Section 71. Liquid-Level Gauges

On vessels for coolants, any liquid-level gauges, apart from solid-surface inspection glass built into the vessel wall itself, shall be provided with shut-off fittings that close if the pipe breaks.

Section 72. Spaces for Compressors, Receivers, etc.

- a. Spaces where compressors, receivers, etc. are installed shall be well ventilated, cf. section 16 paragraph (a), and exits from such spaces shall be easily accessible.
- b. Machinery for ammonia refrigerating installations shall be installed in special spaces separate from other parts of the ship with bulkheads and self-closing doors executed as tight as practicable. It shall be possible to easily and quickly release the doors, which shall open outwards, from the open position.
- c. Spaces as per paragraph (b) shall have either a fine liquefying system for water under pressure or an emergency ventilation system. Such systems shall satisfy the following provisions:
 1. A fine-liquefying system shall cover the entire space and shall be operable from two points, one near the door to the space and the other at a safe distance from it. The system shall be kept immediately before the operating valve or valves below the necessary pressure, and the pump that feeds the system with water shall automatically begin functioning if there is a pressure drop in the system's pipe system.
 2. An emergency ventilation system shall be separate from the ship's other ventilation system and shall for refrigerating installations with a filling of 500 kg or less have a capacity of at least 6 m³ air/min/50 kg coolant. For large installations, the ventilation system's capacity shall be increased by an additional 2.5 m³ air/min for each 50 kg ammonia by which the filling exceeds 500 kg.

It shall be possible to start the system from two places outside the space, one of which shall be near to the door of the space and the other at a safe distance from it.

Section 73. Safety Measures

- a. Doors to all refrigerated holds, freeze compartments and ventilation rooms in which persons may be occupied shall open outwards and the doors' closing and locking mechanisms shall, irrespective of the temperatures and temperature fluctuations that occur, be able to operate easily and safely by operation from within, including when locked.
- b. All refrigerated holds and freeze compartments in which persons may be occupied shall be provided with fixed electric lighting.
- c. In the case of refrigerated storerooms, the following shall also apply:

1. The switch for the light shall be installed within the space and when the light is switched on, a red pilot lamp installed immediately outside the refrigerated hold partition or at another point approved by the Danish Shipping Inspectorate shall switch on at the same time.
 2. In addition to the above pilot lamp, an electric alarm system with an acoustic signalling device shall be installed at an appropriate place, e.g. in the galley, and the operating switches for the system shall be located immediately inside the doors of the individual refrigerated holds. It shall only be possible to switch off the signalling device from the switch from which it has been started, and the device shall be connected to a group other than the lighting installation in the space or spaces.
- d.
1. In the case of refrigerating installations that use fluorohydrocarbons as coolant, and in which the filling exceeds 75 kg, there shall be protective equipment comprising respiratory protection apparatus of the fresh-air type and a lifeline of sufficient length and strength, and, in the case of all ammonia refrigerating installations, additional eye-protection devices and leather/rubber gloves. If an installation's filling exceeds 400 kg, irrespective of the type of coolant, there shall be additional protective gear as referred to above.
 2. Respiratory protection apparatus shall be stored protected against dust, damp and heat, and it shall be kept, together with the other protective equipment, ready for use in a suitable place outside the space in which it is to be used.
 3. The fireman's outfits belonging to a ship may not form part of the above equipment.
- e. In the case of installations using fluorohydrocarbons as coolant, a warning notice shall be posted in a conspicuous place stating "Smoking entails risk of poisoning".

Section 74. Description and Marking, etc.

- a. For the guidance of machine operators, a full plan of the refrigerating installation accompanied by a description and operating guidelines shall be carried on board.
- b. The refrigerating installation's various pressure components shall be identifiable, and, with regard to marking of pressure vessels, the provisions of section 47 shall apply by analogy.

I. Surveys and Inspections

Section 75. General

With regard to the surveys, tests and inspections of the installations, etc. referred to in this order, reference is made to part F of order no. 173 of 21 May 1965 on Regulations for the Construction and Equipment of Ships, etc.

Section 76. Inspection and Pressure-Testing of Refrigerating Installations

With regard to the inspection and pressure-testing of refrigerating installations, the following shall apply:

- a. All new refrigerating installations shall, before they are put in service, be subjected to a liquid pressure test and an air pressure test in accordance with the following regulations.
 1. Ammonia and Freon 22 installations (NH_3 and CHF_2Cl).
 - a) All compressors' cylinders/cylinder liners, heads and stop valves, etc. shall be tested at a fluid pressure of 42 ato and then with air at 21 ato submerged in water. Crankcases that are exposed to the coolant's gas pressure shall be tested at a fluid pressure of 21 ato and then with air at 10.5 ato submerged in water.
 - b) Boiler tubes shall be tested at a fluid pressure of 105 ato and then with air at 35 ato submerged in water.
 - c) Condensators, welded vessels and other parts of the installation exposed to the coolant's gas pressure shall be tested at a fluid pressure of 35 ato and then with air at 17.5 ato submerged in water.
 2. Installations for Fluorohydrocarbons other than Freon 22

All parts that are exposed to the coolant's gas pressure shall be tested at a fluid pressure of twice the vapour pressure of the coolant at +50°C and then with air at a gas pressure corresponding to the coolant's pressure at +50°C submerged in water.

- b. If it is difficult to test large machine parts submerged in water, such parts may be pumped with air and vapours emanating from the installation's coolant and tested using lacmus or sulphur sticks, or test lamps, depending on whether the test is performed with ammonia or fluorohydrocarbons. The tests may, depending on the circumstances, be performed with soapy water.
- c. The test pressure for coolants other than those mentioned above shall be determined in each individual case by the Directorate.
- d. Before a refrigerating installation is put in service as new or after conversion or major repair, it shall have passed a tightness test with air and/or coolant vapour below a pressure which, insofar as possible, corresponds to the vapour pressure of the given coolant at +50°C.
- e. The Danish Shipping Inspectorate's inspections and tests may be waived if there is certification from a firm and/or recognised classification society approved by the Directorate that the inspections and tests in question have been carried out with a satisfactory result.

Section 77.

- a. The order shall enter into force on 1 September 1969.
- b. [Repeal]

Supplement 8: Fire Pumps, Fire Mains, Hydrants and Hoses

Notice B from the Danish Maritime Authority (chapter II-2, regulation 4):

Regulation 4. Fire Pumps, Fire Mains, Hydrants and Hoses

Paragraph 3.3.2.5 of this regulation shall apply to ships the keels of which are laid on or after 1 February 1992.

- 1 Every ship shall be provided with fire pumps, fire mains, hydrants and hoses complying as applicable with the requirements of this regulation.
- 2 **Capacity of Fire Pumps**
 - 2.1 The required fire pumps shall be capable of delivering for fire-fighting purposes a quantity of water, at the pressure specified in paragraph 4, as follows:
 - .1 pumps in passenger ships, not less than two thirds of the quantity required to be dealt with by the bilge pumps when employed for bilge pumping; and
 - .2 pumps in cargo ships, other than any emergency pump, not less than four thirds of the quantity required under regulation 21 of chapter II-1 to be dealt with by each of the independent bilge pumps in a passenger ship of the same dimensions when employed in bilge pumping, provided that in no cargo ship need the total required capacity of the fire pumps exceed 180 m³/h.
 - 2.2 Each of the required fire pumps (other than any emergency pump required in paragraph 3.3.2 for cargo ships) shall have a capacity of not less than 80% of the total required capacity divided by the minimum number of required fire pumps but in any case not less than 25 m³/h and each such pump shall in any event be capable of delivering at least the two required jets of water. These fire pumps shall be capable of supplying the fire main system under the required conditions. Where more pumps than the minimum of required pumps are installed, the capacity of such additional pumps shall be to the satisfaction of the Administration.
- 3 **Arrangements of Fire Pumps and of Fire Mains**
 - 3.1 Ships shall be provided with independently driven fire pumps as follows:
 - .1 Passenger ships of 4,000 tonnes gross tonnage and upwards, at least three.
 - .2 Passenger ships of less than 4,000 gross tonnage and cargo ships of 1,000 tonnes gross tonnage and upwards, at least two.
 - .3 Cargo ships of less than 1,000 tonnes gross tonnage, to the satisfaction of the Administration.
 - 3.2 Sanitary, ballast, bilge or general service pumps may be accepted as fire pumps, provided that they are not normally used for pumping oil and that if they are subject to occasional duty for the transfer or pumping of oil fuel, suitable change-over arrangements are fitted.
 - 3.3 The arrangement of sea connections, fire pumps and their sources of power shall be such as to ensure that:
 - .1 In passenger ships of 1,000 gross tonnage and upwards, in the event of a fire in any one compartment all the fire pumps will not be put out of action.
 - .2 In cargo ships of 2,000 gross tonnage and upwards, if a fire in any one compartment could put all the pumps out of action, there shall be an alternative means consisting of a fixed, independently driven emergency pump which shall be capable of supplying two jets of water to the satisfaction of the Administration. The pump and its location shall comply with the following requirements:
 - .2.1 The capacity of the pump shall not be less than 40% of the total capacity of the fire pumps required by this regulation and in any case not less than 25 m³/h.
 - .2.2 When the pump is delivering the quantity of water required by paragraph 3.3.2.1, the pressure at any hydrant shall be not less than the minimum pressures given in paragraph 4.2.
 - .2.3 Any diesel driven power source for the pump shall be capable of being readily started in its cold condition down to a temperature of 0°C by hand (manual)

cranking. If this is impracticable, or if lower temperatures are likely to be encountered, consideration is to be given to the provision and maintenance of heating arrangements acceptable to the Administration so that ready starting will be ensured. If hand (manual) starting is impracticable, the Administration may permit other means of starting. These means shall be such as to enable the diesel driven power source to be started at least six times within a period of 30 minutes, and at least twice within the first 10 minutes.

- .2.4 Any service fuel tank shall contain sufficient fuel to enable the pump to run on full load for at least 3 hours and sufficient reserves of fuel shall be available outside the main machinery space to enable the pump to be run on full load for an additional 15 hours.
 - .2.5 The total suction head and the net positive suction head of the pump shall be such that the requirements of paragraphs 3.3.2, 3.3.2.1, 3.3.2.2 and 4.2 of this regulation shall be obtained under all conditions of list, trim, roll and pitch likely to be encountered in service.
 - .2.6 The boundaries of the space containing the fire pump shall be insulated to a standard of structural fire protection equivalent to that required for a control station in regulation 44.
 - .2.7 No direct access shall be permitted between the machinery space and the space containing the emergency fire pump and its source of power. When this is impracticable, an Administration may accept an arrangement where the access is by means of an airlock, each of the two doors being self-closing, or through a watertight door capable of being operated from a space remote from the machinery space and the space containing the emergency fire pump and unlikely to be cut off in the event of fire in those spaces. In such cases a second means of access to the space containing the emergency fire pump and its source of power shall be provided.
 - .2.8 Ventilation arrangements to the space containing the independent source of power for the emergency fire pump shall be such as to preclude, as far as practicable, the possibility of smoke from a machinery space fire entering or being drawn into that space.
 - .2.9 Ships constructed on or after 1 October 1994, in lieu of the provisions of paragraph 3.3.2.6, shall comply with the following requirements:

The space containing the fire pump shall not be contiguous to the boundaries of machinery spaces of category A or those spaces containing main fire pumps. Where this is not practicable, the bulkhead between the two spaces shall be insulated to a standard of structural fire protection equivalent to that required for a control station in regulation 44.
 - .3 In passenger ships of less than 1,000 gross tonnage and cargo ships of less than 2,000 gross tonnage, if a fire in any one compartment could put all the pumps out of action, the alternative means of providing water for fire-fighting purposes shall be to the satisfaction of the Administration.
 - .3.1 For ships constructed on or after 1 October 1994, the alternative means to be provided in accordance with the provisions of paragraph 3.3.3 shall be an independently driven, power-operated emergency fire pump with its source of power and sea connection located outside the machinery space.
 - .4 In addition, in cargo ships where other pumps, such as general service, bilge and ballast, etc. are fitted in a machinery space, arrangements shall be made to ensure that at least one of these pumps, having the capacity and pressure required by paragraphs 2.2 and 4.2, is capable of providing water to the fire main.
- 3.4 The arrangements for the ready availability of water supply shall be:
- .1 in passenger ships of 1,000 gross tonnage and upwards such that at least one effective jet of water is immediately available from any hydrant in an interior location and so as to ensure the continuation of the output of water by the automatic starting of a required fire pump;

- .2 in passenger ships of less than 1,000 gross tonnage and in cargo ships to the satisfaction of the Administration;
 - .3 in cargo ships with a periodically unattended machinery space or when only one person is required on watch, there shall be immediate water delivery from the fire main system at a suitable pressure, either by remote starting of one of the main fire pumps with remote starting from the navigating bridge and fire control station, if any, or permanent pressurisation of the fire main system by one of the main fire pumps, except that the Administration may waive this requirement for cargo ships of less than 1,600 gross tonnage if the arrangement of the machinery space access makes it unnecessary;
 - .4 in passenger ships, if fitted with periodically unattended machinery spaces in accordance with regulation 54 of chapter II-1, the Administration shall determine provisions for fixed water fire-extinguishing arrangements for such spaces equivalent to those required for normally attended machinery space.
- 3.5 Relief valves shall be provided in conjunction with all fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of the water service pipes, hydrants and hoses. These valves shall be so placed and adjusted as to prevent excessive pressure in any part of the fire main system. *The pressure side of any fire pump shall be provided with a non-return valve.*
- 3.6 In tankers isolation valves shall be fitted in the fire main at poop front in a protected position and on the tank deck at intervals of not more than 40 m to preserve the integrity of the fire main system in case of fire or explosion.

4 Diameter of and Pressure in the Fire Mains

- 4.1 The diameter of the fire main and water service pipes shall be sufficient for the effective distribution of the maximum required discharge from two fire pumps operating simultaneously, except that in the case of cargo ships the diameter need only be sufficient for the discharge of 140 m³/h.
- 4.2 With the two pumps simultaneously delivering through nozzles specified in paragraph 8 the quantity of water specified in paragraph 4.1, through any adjacent hydrants, the following minimum pressures shall be maintained at all hydrants:

Passenger ships:	
4,000 gross tonnage and upwards	0.31 N/mm ²
1,000 gross tonnage and upwards, but under 4,000 gross tonnage	0.27 N/mm ²
Under 1,000 gross tonnage	To the satisfaction of the Administration
Cargo ships:	
6,000 gross tonnage and upwards	0.27 N/mm ²
1,000 gross tonnage and upwards, but under 6,000 gross tonnage	0.25 N/mm ²
Under 1,000 gross tonnage	To the satisfaction of the Administration

- 4.2.1 Passenger ships constructed on or after 1 October 1994, in lieu of the provisions of paragraph 4.2, shall comply with the following requirements:

With the two pumps simultaneously delivering through the nozzles specified in paragraph 8 and with sufficient hydrants to provide for the quantity of water specified in paragraph 4.1, a minimum pressure of 0.4 N/mm² for ships of 4,000 gross tonnage and above and 0.3 N/mm² for ships of less than 4,000 gross tonnage shall be maintained at all hydrants.

- 4.3 The maximum pressure at any hydrant shall not exceed that at which the effective control of a fire hose can be demonstrated.

5 Number and Position of Hydrants

- 5.1 The number and position of hydrants shall be such that at least two jets of water not emanating from the same hydrant, one of which shall be from a single length of hose, may reach any part of the ship normally accessible to the passengers or crew whilst the ship is being navigated and any part of any cargo space when empty, any ro-ro cargo space or any special category space, in which latter case the two jets shall reach any part of such space, each from a single length of hose. Furthermore, such hydrants shall be positioned near the accesses to the protected spaces.
- 5.2 In the accommodation, service and machinery spaces of passenger ships, the number and position of hydrants shall be such that the requirements of paragraph 5.1 may be complied with when all watertight doors and all doors in main vertical zone bulkheads are closed.

- 5.3 Where, in a passenger ship, access is provided to a machinery space of category A at a low level from an adjacent shaft tunnel, two hydrants shall be provided external to, but near the entrance to that machinery space. Where such access is provided from other spaces, in one of those spaces two hydrants shall be provided near the entrance to the machinery space of category A. Such provision need not be made where the tunnel or adjacent spaces are not part of the escape route.

6 Pipes and Hydrants

- 6.1 Materials readily rendered ineffective by heat shall not be used for fire mains and hydrants unless adequately protected. The pipes and hydrants shall be so placed that the fire hoses may be easily coupled to them. The arrangement of pipes and hydrants shall be such as to avoid the possibility of freezing. In ships where deck cargo may be carried, the positions of the hydrants shall be such that they are always readily accessible and the pipes shall be arranged as far as practicable to avoid risk of damage by such cargo. Unless one hose and nozzle is provided for each hydrant in the ship, there shall be complete interchangeability of hose couplings and nozzles.
- 6.2 A valve shall be fitted to serve each fire hose so that any fire hose may be removed while the fire pumps are at work.
- 6.3 Isolating valves to separate the section of the fire main within the machinery space containing the main fire pump or pumps from the rest of the fire main shall be fitted in an easily accessible and tenable position outside the machinery spaces. The fire main shall be so arranged that when the isolating valves are shut all the hydrants on the ship, except those in the machinery space referred to above, can be supplied with water by a fire pump not located in this machinery space through pipes which do not enter this space. Exceptionally, the Administration may permit short lengths of the emergency fire pump suction and discharge piping to penetrate the machinery space if it is impracticable to route it externally provided that the integrity of the fire main is maintained by the enclosure of the piping in a substantial steel casing.

7 Fire Hoses

- 7.1 Fire hoses shall be of non-perishable material approved by the Administration and shall be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used. Fire hoses of non-perishable material shall be provided in ships constructed on or after 1 February 1992, and on ships the keels of which are laid before 1 February 1992 when the existing fire hoses are replaced. Their maximum length shall be to the satisfaction of the Administration. Each hose shall be provided with a nozzle and the necessary couplings. Hoses specified in this chapter as "fire hoses" shall, together with any necessary fittings and tools, be kept ready for use in conspicuous positions near the water service hydrants. Additionally, in interior locations in passenger ships carrying more than 36 passengers fire hoses shall be connected to hydrants at all times.
- 7.2 Ships shall be provided with fire hoses the number and diameter of which shall be to the satisfaction of the Administration.
- 7.3 In passenger ships there shall be at least one fire hose for each of the hydrants required by paragraph 5 and these hoses shall be used only for the purposes of extinguishing fires or testing the fire-extinguishing apparatus at fire drills and surveys.
- 7.4.1 In cargo ships of 1,000 gross tonnage and upwards the number of fire hoses to be provided shall be one for each 30 m length of the ship and one spare but in no case less than five in all. This number does not include any hoses required in any engine or boiler room. The Administration may increase the number of hoses required so as to ensure that hoses in sufficient number are available and accessible at all times, having regard to the type of ship and the nature of trade in which the ship is employed.
- 7.4.2 In cargo ships of less than 1,000 gross tonnage the number of fire hoses to be provided shall be to the satisfaction of the Administration.

8 Nozzles

- 8.1 For the purposes of this chapter, standard nozzle sizes shall be 12 mm, 16 mm and 19 mm or as near thereto as possible. Larger diameter nozzles may be permitted at the discretion of the Administration.

- 8.2 For accommodation and service spaces, a nozzle size greater than 12 mm need not be used.
- 8.3 For machinery spaces and exterior locations, the nozzle size shall be such as to obtain the maximum discharge possible from two jets at the pressure mentioned in paragraph 4 from the smallest pump, provided that a nozzle size greater than 19 mm need not be used.
- 8.4 All nozzles shall be of an approved dual-purpose type (i.e. spray/jet type) incorporating a shutoff.

9 Location and Arrangement of Water Pumps, etc. for other Fire-extinguishing Systems

Pumps required for the provision of water for other fire-extinguishing systems required by this chapter, their sources of power and their controls shall be installed outside the space or spaces protected by such systems and shall be so arranged that a fire in the space or spaces protected will not put any such system out of action.