RULES

PUBLICATION 100/P

Safety requirements for sea-going passenger ships and high-speed passenger craft engaged on domestic voyages

May
2023

Publications P (Additional Rule Requirements) issued by Polish Register of Shipping complete or extend the Rules and are mandatory where applicable.

GDAŃSK

Publication 100/P – Safety requirements for sea-going passenger ships and high-speed passenger craft engaged in domestic voyages – May 2023 is based on the *Directive 2009/45/EC*, as amended, and is an extension of the requirements contained in *the Rules for the Classification and Construction of Sea-Going Ships and the Rules for the Classification and Construction of High Speed Craft (HSC).*

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1 INTRODUCTION

1.1 This *Publication* provides specific technical requirements for sea-going passenger ships and high-speed passenger craft engaged on domestic voyages within the EU Community, regardless of the flag they fly.

1.2 This *Publication* has been developed on the basis of the EU requirements set out in Annex I, Section 2, to the *Directive 2009/45/EC* of the European Parliament and of the Council *on safety rules and standards for passenger ships*, as amended by *Directive (EU) 2017/2108* and further amended by Commission Delegated *Regulation (EU) 2020/411, on safety rules and standards for passenger ships, as regards the safety requirements for passenger ships engaged on domestic voyages*. EU requirements related to *Life saving appliances* and to *Radio communications* are provided in the *Rules for Statutory Survey of Sea-going ships*, Part II and IV respectively.

1.3 The editorial layout of the *Publication* corresponds to the layout and the sequence chapter/regulation/paragraph of *SOLAS Convention*, based on which Annex I, Section 2, to the *Directive 2009/45/EC*, as amended, has been developed. This allows for easy comparison between the requirements of the *Directive*, *SOLAS Convention* and the *Publication* and facilitates future implementation of amendments to the *Publication* should the *Directive* be amended again.

1.4 PRS' numbering of requirements in the *Publication* differs from that in the *Directive*; however, at the end of each subchapter/paragraph, a number is given in brackets which corresponds to the number of requirement in: Annex I, section 2, to the *Directive 2009/45/EC*, as amended and in the *SOLAS Convention*, or to the *Directive* Article and paragraph number. Numbers of paragraphs/subchapters referred to in the text of the *Publication*, are the original numbers from the *Directive* (i.e. referred numbers are the numbers given in brackets at the end of each subchapter/paragraph).

1.5 Requirements of *Directive 2009/45/EC*, as amended, which either don't exist in the *SOLAS Convention* or significantly differ from those in *SOLAS*, have been highlighted with purple font for easy identification.

1.6 Whenever in the text of the *Publication* some technical arrangements are left to the decision/satisfaction of flag State Administrations, PRS, acting as recognized organisation (RO) on behalf of a flag State Administration, will make relevant decisions following provisions of Agreement with the Administration. If the flag State Administration of a newbuilding is unknown (not decided yet) PRS will make relevant decisions on its own.

2 CHAPTER I
GENERAL PROVISIONS

2.1 Application

2.1.1 This *Publication* applies to the following passenger ships and craft, regardless of their flag, when engaged on domestic voyages:

.1 new and existing* passenger ships of 24 metres in length and above;

* See definition of new and existing ship in 2.5.5 and 2.5.6.

.2 high-speed passenger craft. (Art. 3, p. 1)

2.1.2 The *Directive 2009/45/EC*, as amended, based on which the *Publication* has been developed, does not apply to:

(a) passenger ships which are:

.1 ships of war and troopships;

.2 sailing ships;

.3 ships not propelled by mechanical means;

.4 vessels constructed in material other than steel or equivalent and not covered by the standards concerning *High Speed Craft* (Resolution MSC.36(63) or MSC.97(73)) or *Dynamically Supported Craft* (Resolution A.373(X))*;

* This *Publication* however applies to such passenger ships, which in the scope of construction materials, hull construction, fire protection, ventilation, escape routes, assembly and embarkation stations, means of escape and life-saving appliances shall comply with *Publication 118/P – Requirements for passenger ships constructed of polymer composites, engaged on domestic voyages*.

.5 wooden ships of primitive build;

.6 traditional ships;

.7 pleasure yachts;

.8 ships exclusively engaged in port areas;

.9 offshore service ships; or

.10 tenders;

(b) high-speed passenger craft which are:

.1 craft of war and troopcraft;

.2 pleasure craft;

.3 craft exclusively engaged in port areas; or

.4 offshore service craft. (Art. 3, p. 2)

2.2 Classes of passenger ships and categorisation of sea areas

2.2.1 Passenger ships are divided into the following classes according to the sea area in which they operate: (Art. 4, p. 4)

Class A	means a passenger ship engaged on domestic voyages in Areas A, B, C and D
Class B	means a passenger ship engaged on domestic voyages in Areas B, C and D
Class C	means a passenger ship engaged on domestic voyages in Areas C and D
Class D	means a passenger ship engaged on domestic voyages in Area D

2.2.2 Sea areas are divided into the following categories: (Art. 4, p. 1)

Area A	means a sea area outside of areas B, C and D.
Area B	means a sea area, whose geographical coordinates are at no point more than 20 miles from the line of coast, corresponding to the medium tide height, but which is outside of areas C and D.
Area C	means a sea area, whose geographical coordinates are at any point no more than 5 miles from the line of coast, corresponding to the medium tide height, but outside of sea area D if any. Additionally the probability of the significant wave height exceeding 2,5 metres shall be smaller than 10 % for a period of one year for all-year-round operation, or for a specific period for seasonal operation, such as summer period operation.
Area D	means a sea area, whose geographical coordinates are at any point no more than 3 miles from the line of coast, corresponding to the medium tide height. Additionally the probability of the significant wave height exceeding 1,5 metres shall be smaller than 10 % for a period of one year for all-year-round operation, or for a specific period for seasonal operation, such as summer period operation.

2.3 Categories of high-speed passenger craft

High-speed passenger craft are categorized as below:

.1 **CATEGORY A craft** is any high-speed passenger craft:

.1 operating on a route where it has been demonstrated to the satisfaction of the flag and port States that there is a high probability that in the event of an evacuation at any point of the route, all passengers and crew can be rescued safely within the least of:

- the time to prevent persons in survival craft from exposure causing hypothermia in the worst intended conditions,
- the time appropriate with respect to environmental conditions and geographical features of the route, or
- 4 hours; and

.2 carrying not more than 450 passengers.

.2 **CATEGORY B craft** is any high-speed passenger craft other than a category A craft, with machinery and safety systems arranged such that, in the event of any essential machinery and safety systems in any one compartment being disabled, the craft retains the capability to navigate safely. (Art. 4, p. 5)

2.4 Safety requirements

2.4.1 New and existing passenger ships of Class A, B, C and D:

.1 the construction and maintenance of the hull, main and auxiliary machinery, electrical and automatic plants shall comply with the applicable requirements specified in PRS' *Rules for the Classification and Construction of Sea-going Ships*; (Art. 6, p. 1(a))

.2 the provisions of Chapters IV, including the 1988 GMDSS amendments, V and VI of the *1974 SOLAS Convention*, as amended, shall apply; (Art. 6, p. 1(b))

.3 the provisions for shipborne navigational equipment of Reg. 12, Chapter V of the *1974 SOLAS Convention*, as amended, shall apply. Shipborne navigational equipment, as listed in Annex A.1 to *Directive 96/98/EC* and complying with the provisions of the latter, shall be considered to be in conformity with the type approval requirements of SOLAS Reg. V/12(r), as amended; (Art. 6, p. 1(c))

.4 **ro-ro passenger** ships of **Class A** and **Class B** shall comply with Articles 6, 8 and 9 of *Directive 2003/25/EC*. (Art. 7, p. 1)

2.4.2 New passenger ships of Class A:

.1 shall comply entirely with the requirements of the *1974 SOLAS Convention*, as amended; for those regulations for which the *1974 SOLAS Convention*, as amended, leaves the interpretation to the discretion of the Administration, PRS will apply the interpretations as contained in this *Publication*; (Art. 6, p. 2(a)(i))

.2 ships the keel of which was laid or which were at a similar stage of construction **on or after 19 September 2021** shall also comply with the specific relevant requirements specified in 3 (Chapter II-1) and 4 (Chapter II-2) of this *Publication* i.e.

- Chapter II-1, 3.14.5 (Reg. II-1/C/31 para. 100); 3.38, 3.39 and 3.40 (Reg. II-1/Z/100, Reg. II-1/Z/101 and Reg. II-1/Z/102); and
- Chapter II-2, 4.4.4.3.1 and 4.4.5 (Reg. II-2/B/4, subpara. 4.3.100 and .4.100); 4.10.4.4 and 4.10.6.3 (Reg. II-2/C/10 subpara. 4.100 and 6.4); 4.13.4.1.7 (Reg. II-2/D/13 subpara. 4.1.100); and 4.19.6.1.4 and 4.19.6.1.5 (Reg. II-2/G/20, subpara. 6.1.4 and 6.1.5); (Art. 6, p. 2(a)(i))

.3 ships the keel of which was laid or which were at a similar stage of construction **before 19 September 2021** shall comply with the specific relevant requirements specified in Annex I, Section 1 to *Directive 2009/45/EC*, as amended (not included in this *Publication*); (Art. 6, p. 2(a)(i))

.4 ships of 24 metres in length and above shall comply with the *1966 International Convention on Load Lines*; (Art. 6, p. 2(b)(i))

.5 shall have a full deck. (Art. 6, p. 2(b)(iv))

2.4.3 New passenger ships of Class B, Class C and Class D:

.1 ships the keel of which was laid or which were at a similar stage of construction **on or after 19 September 2021** shall comply with the specific relevant requirements specified in 3 (Chapter II-1) and 4 (Chapter II-2) of this *Publication*; (Art. 6, p. 2(a)(ii))

.2 ships the keel of which was laid or which were at a similar stage of construction **before 19 September 2021** shall comply with the specific relevant requirements specified in Annex I, Section 1 to *Directive 2009/45/EC*, as amended (not included in this *Publication*); (Art. 6, p. 2(a)(ii)) and especially with the applicable retroactive requirements specified in 5 of this *Publication*;

.3 ships of 24 metres in length and above shall comply with the *1966 International Convention on Load Lines*, however ships of **Class D** are exempt from the minimum bow height requirement laid down in the *1966 International Convention on Load Lines*; (Art. 6, p. 2(b)(i) and (iii))

.4 shall have a full deck; (Art. 6, p. 2(b)(iv))

.5 **ro-ro passenger** ships of **Class C**, the keels of which were laid or which were at a similar stage of construction **on or after 1 October 2004** shall comply with Articles 6, 8 and 9 of *Directive 2003/25/EC*. (Art. 7, p. 1)

2.4.4 Existing passenger ships of Class A:

.1 shall comply with the regulations for existing passenger ships defined in the *1974 SOLAS Convention*, as amended; for those regulations for which the *1974 SOLAS Convention*, as amended, leaves the interpretation to the discretion of the Administration, PRS will apply the interpretations as contained in this *Publication*; (Art. 6, p. 3(a))

.2 shall comply with the specific relevant requirements specified in Annex I, Section 1 to *Directive 2009/45/EC*, as amended (not included in this *Publication*). (Art. 6, p. 3(a))

2.4.5 Existing passenger ships of Class B, C and D:

.1 ships of **Class B** shall comply with the specific relevant requirements specified in Annex I, Section 1 to *Directive 2009/45/EC*, as amended (not included in this *Publication*); (Art. 6, p. 3(b));

.2 ships of **Class C** and **D** shall comply with the specific relevant requirements specified in Annex I, Section 1 to *Directive 2009/45/EC*, as amended (not included in this *Publication*)and in respect of matters not covered by such requirements, with the rules of the Administration of the flag State (also not included in this *Publication*); such rules shall provide an equivalent level of safety to that of Chapters II-1 and II-2 of Annex I to the *Directive*; (Art. 6, p. 3)

.3 ships of **Class B**, **Class C** and **D** shall also comply with the applicable retroactive requirements specified in 5 of this *Publication*.

2.4.6 High-speed passenger craft

2.4.6.1 High-speed passenger craft constructed or subjected to repairs, alterations or modifications of a major character **on or after 1 January 1996** shall comply with the requirements of Reg. X/3 of the *1974 SOLAS Convention*, as amended, i.e.:

.1 a high-speed craft constructed **on or after 1 January 1996 but before 1 July 2002** which complies with the requirements of the *High-Speed Craft Code, 1994* in its entirety and which has been surveyed and certified as provided in that *Code* shall be deemed to have complied with the requirements of Chapters I to IV and Regulations V/18, 19 and 20. For the purpose of this paragraph, the requirements of that *Code* shall be treated as mandatory;

.2 a high-speed craft constructed **on or after 1 July 2002** which complies with the requirements of the *High-Speed Craft Code, 2000* in its entirety and which has been surveyed and certified as provided in that *Code* shall be deemed to have complied with the requirements of Chapters I to IV and Regulations V/18, 19 and 20;

unless:

- their keel was laid or they were at a similar stage of construction not later than 4 June 1998,
- delivery and commissioning has taken place not later than 4 December 1998, and
- they fully comply with the requirements of the *Code of Safety for Dynamically Supported Craft* (*DSC Code*) in IMO Resolution A.373(X), in its up-to-date version; (Art. 6, p. 4(a))

2.4.6.2 High-speed passenger craft constructed **before 1 January 1996** and complying with the requirements of the *High- Speed Craft Code* shall continue operation certified under that *Code*.

High-speed passenger craft constructed **before 1 January 1996** and not complying with the requirements of the *High-Speed Craft Code* may not be engaged on domestic voyages unless they were already in operation on domestic voyages in a Member State on 4 June 1998, in which case they may be allowed to continue their domestic operation in that Member State; such craft shall comply with the requirements of the *DSC Code*. (Art. 6, p. 4(b))

2.4.6.3 The construction and maintenance of high-speed passenger craft and their equipment shall comply with requirements specified in PRS' *Rules for the Classification and Construction of High-Speed Craft (HSC)*. (Art. 6, p. 4(c))

2.4.7 Passenger ships and high-speed passenger craft

2.4.7.1 All passenger ships and high-speed passenger craft used for public transport shall comply with the guidelines specified in Annex to this *Publication*, relating to persons with reduced mobility. (Art. 8, p. 1)

2.4.7.2 Marine equipment listed in Commission Delegated Regulation (EU) 2022/1157, laying down rules for the application of Directive 2014/90/EU of the European Parliament and of the Council with regard to design, construction and operation requirements as well as testing standards for marine equipment, should be certified in accordance with the applicable requirements of individual Parts of PRS' *Rules for the Classification and Construction of Sea-going Ships* or PRS' *Rules for the Classification and Construction of High-Speed Craft (HSC)*.

2.4.7.3 Periodic surveys of fixed fire detection and fire extinguishing systems, and portable fire-extinguishing equipment shall be performed in accordance with the requirements specified in *Publication 29/I – Guidelines for Periodic Inspections of Fire-Extinguishing Systems and Appliances Used on Ships*.

2.4.8 Repairs, alterations and modifications of a major character and outfitting related thereto – new and existing ships

Such repairs, alterations and modifications and outfitting related thereto shall comply with the requirements for new ships set out in 2.4.2.1, 2.4.2.2 (for **Class A** ships) and 2.4.3.1, 2.4.3.2 (for **Class B**, **Class C** and **Class D** ships); alterations made to a ship which are intended solely to achieve a higher survivability standard shall not be regarded as modifications of a major character. (Art.6, p. 5)

2.5 Definitions

For the purposes of this *Publication*, in addition to the definitions given in Part I of the *Rules for the Classification and Construction of Sea-going Ships* and in individual Chapters, the following definitions based on *Directive 2009/45/EC*, as amended, apply:

.1 ***Intact Stability Code*** means the "*Code on Intact Stability for all types of ships covered by IMO Instruments*", contained in IMO Assembly Resolution A.749(18) of 4 November 1993, or the "*International Code on Intact Stability, 2008*" contained in IMO Resolution MSC.267(85) of 4 December 2008, in their up-to-date versions. (Art. 2(b))

.2 ***High-Speed Craft Code*** means the „*International Code for Safety of High-Speed Craft*", contained in Res. MSC.36(63), in its up-to-date version. (Art. 2(c))

.3 ***Passenger ship*** means a ship which carries more than 12 passengers. (Art. 2(e))

.4 ***High-speed passenger craft*** means a high-speed craft as defined in Reg. X/1 of the *1974 SOLAS Convention*, as amended, which carries more than 12 passengers, with the exception of passenger ships engaged on domestic voyages in sea areas of Class B, C or D when:

- their displacement corresponding to the design waterline is less than 500 m^3; and
- their maximum speed, as defined in paragraph 1.4.30 of the *High-Speed Craft Code*, is less than 20 knots. (Art. 2(g))

.5 ***New ship*** means a ship the keel of which was laid or which was at a similar stage of construction on or after 1 July 1998; a 'similar stage of construction' means the stage at which:

- construction identifiable with a specific ship begins; and
- assembly of that ship has commenced comprising at least 50 tonnes or 1 % of the estimated mass of all structural material, whichever is less. (Art. 2(h)

.6 ***Existing ship*** means a ship which is not a new ship. (Art. 2(i)

.7 ***Ship with a full deck*** means a ship that is provided with a complete deck, exposed to weather and sea, which has permanent means of closing all openings in the weather part thereof and below which all openings in the sides of the ship are fitted with permanent means of at least weathertight closing.
The complete deck may be a watertight deck or equivalent structure consisting of a non-watertight deck completely covered by a weathertight structure of adequate strength to maintain the weathertight integrity and fitted with weathertight closing appliances. (Art. 2(n))

.8 ***International voyage*** means a voyage by sea from a port of a Member State to a port outside that Member State, or conversely. (Art. 2(o))

.9 ***Domestic voyage*** means a voyage in sea areas from a port of a Member State (UE) to the same or another port within that Member State. (Art. 2(p))

.10 ***Sea area*** means an area as defined in paragraph 2.3. (Art. 2(q))

.11 ***Port area*** means an area other than a sea area, as defined by the Member States, extending to the outermost permanent harbour works forming an integral part of the harbour system, or to the limits defined by natural geographical features protecting an estuary or similar sheltered area. (Art. 2(r))

.12 ***Administration of the flag State*** means the competent authorities of the State whose flag the ship or craft is entitled to fly. (Art. 2(t))

.13 ***Persons with reduced mobility*** means persons who have a particular difficulty when using public transport, including elderly persons, persons with disabilities, persons with sensory impairments and wheelchair users, pregnant women and persons accompanying small children. (Art. 2(y))

.14 ***Equivalent material*** means aluminium alloy or any other non-combustible material which, by itself or due to the insulation provided, maintains structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test. (Art. 2(za))

.15 ***Standard fire test*** means a test in which specimens of the relevant bulkheads or decks are exposed in a test furnace to temperatures corresponding approximately to the standard time-temperature curve in accordance with the test method specified in the *2010 International Code for Application of Fire Test Procedures*, contained in IMO Resolution MSC.307(88) of 3 December 2010, in its up-to-date version. (Art. 2(zb))

.16 ***Tender*** means a ship-carried boat used for transferring more than 12 passengers from a stationary passenger ship to shore and back. (Art. 2(ze))
Tenders, if provided on board a ship, should be constructed in accordance with MSC.1/Circ.1417 – *Guidelines for passenger ship tenders*.

.17 ***Offshore service ship*** means a ship used to transport and accommodate industrial personnel who do not conduct work on board that is essential to the business of the ship. (Art. 2(zf))

.18 ***Offshore service craft*** means a craft used to transport and accommodate industrial personnel who do not conduct work on board that is essential to the business of the craft. (Art. 2(zg))

.19 ***Repairs, alterations and modifications of a major character*** means any of the following:

- any change that substantially alters the dimensions of a ship, such as lengthening by adding new midbody,
- any change that substantially alters the passenger-carrying capacity of a ship, such as converting the vehicle deck to passenger accommodation,
- any change that substantially increases a ship's service life, such as renewing the passenger accommodation on one entire deck,
- any conversion of any type of ship into a passenger ship. (Art. 2(zh))

2.6 Additional marks in the symbol of class

2.6.1 A passenger ship subject to the requirements of the *Rules for the Classification and Construction of Sea-going Ships*, which complies with the relevant safety requirements specified in 2.4 of this *Publication* is assigned one of the following additional marks in the symbol of class:

Class A, Class B, Class C or **Class D**

Apart from the confirmation of ship compliance the marks have the meaning as specified in 2.2.1.

2.6.2 A passenger ship subject to the requirements of the *Rules for the Classification and Construction of Small Sea-going Ships,* which complies with the relevant safety requirements specified in 2.4 of this Publication is assigned one of the following additional marks in the symbol of class:

pas A, pas B, pas C or **pas D**

Apart from the confirmation of ship compliance the marks have the meaning as specified in 2.2.1 for Class A, Class B, Class C and Class D respectively.

2.6.3 A high-speed passenger craft which complies with the relevant safety requirements specified in 2.4 of this *Publication* is assigned one of the following additional marks in the symbol of class:

PASSENGER CATEGORY A or **PASSENGER CATEGORY B**

Apart from the confirmation of craft compliance the marks have the meaning as specified in 2.3.

2.7 Ship classification documentation

The scope of technical documentation required to be submitted to be considered by PRS prior to commencement of ship construction or alteration shall comply with the requirements specified in the applicable Parts of PRS' *Rules for the Classification and Construction of Sea-going Ships* or PRS' *Rules for the Classification and Construction of High-Speed Craft (HSC)*.

3 CHAPTER II-1 CONSTRUCTION – STRUCTURE, SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS

NOTE:
This Chapter II-1 applies to new passenger ships of Class A, B, C and D the keel of which was laid or which were at a similar stage of construction on or after 19 September 2021. Such ships which shall comply with relevant requirements of this Chapter as stipulated thereinafter.

PART A GENERAL

3.1 Definitions relating to Parts A-1, C, D, E and G (Reg. II-1/A/3)

.1 ***Steering gear control system*** is the equipment by which orders are transmitted from the navigating bridge to the steering gear power units. Steering gear control systems comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables.

.2 ***Main steering gear*** is the machinery, rudder actuators, steering gear power units, if any, and ancillary equipment and the means of applying torque to the rudder stock (e.g. tiller or quadrant) necessary for effecting movement of the rudder for the purpose of steering the ship under normal service conditions.

.3 ***Steering gear power unit*** is:

.1 in the case of electric steering gear, an electric motor and its associated electrical equipment;

.2 in the case of electrohydraulic steering gear, an electric motor and its associated electrical equipment and connected pump;

.3 in the case of other hydraulic steering gear, a driving engine and connected pump.

.4 ***Auxiliary steering gear*** is the equipment other than any part of the main steering gear necessary to steer the ship in the event of failure of the main steering gear but not including the tiller, quadrant or components serving the same purpose.

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

.6 ***Emergency condition*** is a condition under which any services needed for normal operational and habitable conditions are not in working order due to failure of the main source of electrical power.

.7 ***Main source of electrical power*** is a source intended to supply electrical power to the main switchboard for distribution to all services necessary for maintaining the ship in normal operational and habitable condition.

.8 ***Dead ship condition*** is the condition under which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power.

.9 ***Main generating station*** is the space in which the main source of electrical power is situated.

.10 ***Main switchboard*** is a switchboard which is directly supplied by the main source of electrical power and is intended to distribute electrical energy to the ship's services.

.11 ***Emergency switchboard*** is a switchboard which in the event of failure of the main electrical power supply system is directly supplied by the emergency source of electrical power or the transitional source of emergency power and is intended to distribute electrical energy to the emergency services.

.12 ***Emergency source of electrical power*** is a source of electrical power, intended to supply the emergency switchboard in the event of failure of the supply from the main source of electrical power.

.13 ***Power actuating system*** is the hydraulic equipment provided for supplying power to turn the rudderstock, comprising a steering gear power unit or units, together with the associated pipes and fittings, and a rudder actuator. The power actuating systems may share common mechanical components, i.e. tiller, quadrant and rudder stock, or components serving the same purpose.

.14 ***Maximum ahead service speed*** is the greatest speed which the ship is designed to maintain in service at sea at the deepest seagoing draught.

.15 ***Maximum astern speed*** is the speed which it is estimated the ship can attain at the designed maximum astern power at the deepest seagoing draught.

.16 ***Machinery spaces*** are all machinery spaces of category A and all other spaces containing propelling machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.

.17 ***Machinery spaces of category A*** are those spaces and trunks to such spaces which contain:

.1 internal combustion machinery used for main propulsion; or

.2 internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW; or

.3 any oil-fired boiler or oil fuel unit.

.18 ***Control stations*** are those spaces in which the ship's radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment is centralized.

.19 ***IGF Code*** means the *International Code of safety for ships using gases or other low-flashpoint fuels* as adopted by the Maritime Safety Committee of the Organization by resolution MSC.391(95).

PART A-1
STRUCTURE OF SHIPS

3.2 Protective coatings of dedicated seawater ballast tanks (Reg. II-1/A-1/3-2)

3.2.1 This Reg. II-1/A-1/3-2 shall apply to **Class B** ships of not less than 500 gross tonnage. (1)

3.2.2 All dedicated seawater ballast tanks made of steel shall be coated during construction in accordance with the '*Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers*' (MSC.215(82)), as amended. (2)

3.2.3 Maintenance of the protective coating system shall be included in the overall ship's maintenance scheme. The effectiveness of the protective coating system shall be verified based on the '*Guidelines for maintenance and repair of protective coatings*' (MSC.1/Circ.1330). (4)

3.3 Emergency towing procedures (Reg. II-1/A-1/3-4)

3.3.1 **Class B** ships shall be provided with a ship-specific emergency towing procedure. Such a procedure shall be carried aboard the ship for use in emergency situations and shall be based on existing arrangements and equipment available on board the ship. (2.2)

3.3.2 The procedure (refer to IMO MSC.1/Circ.1255, '*Guidelines for owners/operators on preparing emergency towing procedures*') shall include:

.1 drawings of fore and aft deck showing possible emergency towing arrangements;

.2 inventory of equipment on board that can be used for emergency towing;

.3 means and methods of communication; and

.4 sample procedures to facilitate the preparation for and conducting of emergency towing operations. (2.3)

3.4 New installation of materials containing asbestos (Reg. II-1/A-1/3-5)

3.4.1 This Reg. II-1/A-1/3-5 shall apply to materials used for the structure, machinery, electrical installations and equipment covered by the this *Publication* (Regulations of Section 2 of Annex to *EU Regulation)*. (1)

3.4.2 For all ships, new installation of materials which contain asbestos shall be prohibited. (2)

3.5 Construction drawings maintained on board and ashore (Reg. II-1/A-1/3-7)

3.5.1 A set of as-built construction drawings and other plans showing any subsequent structural alterations shall be kept on board ships. Reference is made to the IMO MSC/Circ.1135 on '*As-built construction drawings to be maintained on board the ship and ashore*'. (1)

3.5.2 An additional set of such drawings shall be kept ashore by the Company, as defined in *Regulation (EC) No 336/2006,* as amended. (2)

3.6 **Towing and mooring equipment** (Reg. II-1/A-1/3-8)

3.6.1 Ships shall be provided with arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all towing and mooring operations associated with the normal operation of the ship. (1)

3.6.2 Arrangements, equipment and fittings provided in accordance with paragraph 1 shall comply with the standards specified for classification by the rules of a recognized organization (see PRS' *Rules for the Classification and Construction of Sea-going Ships, Part III – Hull equipment,* chapters 4 and 5, and PRS' *Rules for the Classification and Construction of High-speed Craft, Part III – Hull equipment, chapters 4 and 5*), or equivalent rules used by an Administration in accordance with Article 11(2) of *Directive 2009/15/EC*. (2)

3.6.3 Reference is made to the IMO MSC/Circ.1175 on '*Guidance on shipboard towing and mooring equipment*'. (3)

3.6.4 Each fitting or item of equipment provided under this Reg. II-1/A-1/3-8 shall be clearly marked with any restrictions associated with its safe operation, taking into account the strength of its attachment to the ship's structure. (4)

3.7 **Means of embarkation on and disembarkation from ships** (Reg. II-1/A-1/3-9)

3.7.1 Ships shall be provided with means of embarkation on and disembarkation from ships for use in port and in port related operations, such as gangways and accommodation ladders, in accordance with paragraph 2, unless the Administration deems that compliance with a particular provision is unreasonable or impractical. Circumstances where compliance may be deemed unreasonable or impractical may include where the ship:

.1 has small freeboards and is provided with boarding ramps; or

.2 is engaged in voyages between designated ports where appropriate shore accommodation/embarkation ladders (platforms) are provided. (1)

3.7.2 The means of embarkation and disembarkation required in paragraph 1 shall be constructed and installed based on the '*Guidelines for construction, installation, maintenance and inspection/survey of means of embarkation and disembarkation*.' (MSC.1/Circ.1331). (2)

3.7.3 The means of embarkation and disembarkation shall be inspected and maintained (refer to MSC.1/Circ.1331) in suitable condition for their intended purpose, taking into account any restrictions related to safe loading. All wires used to support the means of embarkation and disembarkation shall be maintained as specified in SOLAS III/20.4. (3)

3.8 **Protection against noise** (Reg. II-1/A-1/3-12)

3.8.1 Ships of 1600 gross tonnage and above shall be constructed to reduce on-board noise and to protect personnel from the noise in accordance with the IMO *Code on noise levels on-board ships*, adopted by the Maritime Safety Committee by resolution MSC.337(91), as may be amended by the IMO. (3)

3.8.2 For ships not covered under previous paragraph, measures shall be taken to reduce machinery noise to acceptable levels in machinery spaces and, as defined in Ch. II-2, in ro-ro cargo and special category spaces. If this noise cannot be sufficiently reduced, the source of excessive noise shall be suitably insulated or isolated or a refuge from noise shall be provided if the space is required to be manned. Ear protectors shall be provided for personnel required to enter such spaces. (3a)

PART B
INTACT STABILITY, SUBDIVISION AND DAMAGE STABILITY

3.9 **Stability and subdivision requirements** (Reg. II-1/B/4 to II-1/B-4/25)

Ships shall apply the requirements in the appropriate provisions of *SOLAS* Chapter II-I, parts B to B-4, as amended.

PART C
MACHINERY

3.10 General (Reg. II-1/C/26)

3.10.1 The machinery, boilers and other pressure vessels, associated piping systems and fittings shall be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards. (1)

3.10.2 Means shall be provided whereby normal operation of propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative. (3)

3.10.3 Means shall be provided to ensure that the machinery can be brought into operation from the dead ship condition without external aid. (4)

3.10.4 For **Class B** and **Class C** ships, main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the ship shall, as fitted in the ship, be designed to operate when the ship is upright and when inclined at any angle of list up to and including 15° either way under static conditions and 22,5° under dynamic conditions (rolling) either way and simultaneously inclined dynamically (pitching) 7,5° by bow or stern. (6)

3.10.5 Location and arrangement of vent pipes for fuel oil service, settling and lubricating oil tanks shall be such that in the event of a broken vent pipe this shall not directly lead to the risk of ingress of seawater splashes or rainwater. Two fuel oil service tanks for each type of fuel used on board necessary for propulsion and vital systems or equivalent arrangements shall be provided on each ship, with a capacity of at least 8 hours for **Class B** ships and at least 4 hours for **Class C** and **Class D** ships, at maximum continuous rating of the propulsion plant and normal operating load at sea of the generator plant. (11)

3.11 Internal combustion engines (Reg. II-1/C/27)

3.11.1 Internal combustion engines of a cylinder diameter of 200 mm, or a crankcase volume of 0,6 m^3 and above shall be provided with crankcase explosion relief valves of a suitable type with sufficient relief area. The relief valves shall be arranged or provided with means to ensure that discharge from them is so directed as to minimize the possibility of injury to personnel. (4)

3.12 Means of going astern (Reg. II-1/C/28)

3.12.1 Sufficient power for going astern shall be provided to secure proper control of the ship in all normal circumstances. (1)

3.12.2 The ability of the machinery to reverse the direction of thrust of the propeller in sufficient time, and so to bring the ship to rest within a reasonable distance from maximum ahead service speed, shall be demonstrated and recorded. (2)

3.12.3 The stopping times, ship headings and distances recorded on trials, together with the results of trials to determine the ability of ships having multiple propellers to navigate and manoeuvre with one or more propellers inoperative, shall be available on board for use of the master or designated personnel. (3)

3.13 **Steering gear** (Reg. II-1/C/29)

3.13.1 Every ship shall be provided with an efficient main and auxiliary steering system. The main steering system and the auxiliary steering system shall be so arranged that the failure of one of them will not render the other one inoperative. (1)

3.13.2 The main steering gear and rudder stock where fitted shall be:

.1 of adequate strength, and capable to steer the ship at maximum service speed ahead, and so designed that they will not be damaged at maximum speed astern; (3.1)

.2 capable of putting the rudder over from 35° on one side to 35° on the other side with the ship at its deepest seagoing draught and running ahead at maximum ahead service speed and, under the same conditions from 35° on either side to 30° on the other side in not more than 28 seconds. Where it is impractical to demonstrate compliance with this requirement during sea trials with the ship at its deepest seagoing draught and running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch, ships, regardless of their date of construction, may demonstrate compliance with this requirement by one of the following methods:

.1 during sea trials the ship is at even keel and the rudder fully submerged whilst running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch; or

.2 where full rudder immersion during sea trials cannot be achieved, an appropriate ahead speed shall be calculated using the submerged rudder blade area in the proposed sea trial loading condition. The calculated ahead speed shall result in a force and torque applied to the main steering gear which is at least as great as if it was being tested with the ship at its deepest seagoing draught and running ahead at the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch; or

.3 the rudder force and torque at the sea trial loading condition have been reliably predicted and extrapolated to the full load condition. The speed of the ship shall correspond to the number of maximum continuous revolutions of the main engine and maximum design pitch of the propeller; (3.2)

.3 operated by power where necessary to meet the requirements of paragraph 3.2 and in any case when a rudder stock over 120 mm in diameter in way of the tiller, excluding strengthening for navigation in ice, is required in order to comply with paragraph 3.1. (3.3)

3.13.3 If fitted, the auxiliary steering gear shall be:

.1 of adequate strength and capable of steering the ship at navigable speed and of being brought speedily into action in an emergency; (4.1)

.2 capable of putting the rudder over from 15° on one side to 15° on the other side in not more than 60 seconds with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater. Where it is impractical to demonstrate compliance with this requirement during sea trials with the ship at its deepest seagoing draught and running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater, ships regardless of their date of

construction may demonstrate compliance with this requirement by one of the following methods:

.1 during sea trials the ship is at even keel and the rudder fully submerged whilst running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater; or

.2 where full rudder immersion during sea trials cannot be achieved, an appropriate ahead speed shall be calculated using the submerged rudder blade area in the proposed sea trial loading condition. The calculated ahead speed shall result in a force and torque applied to the auxiliary steering gear which is at least as great as if it was being tested with the ship at its deepest seagoing draught and running ahead at one half of the speed corresponding to the number of maximum continuous revolutions of the main engine and maximum design pitch or 7 knots, whichever is greater; or

.3 the rudder force and torque at the sea trial loading condition have been reliably predicted and extrapolated to the full load condition; (4.2)

.3 operated by power where necessary to meet the requirements of paragraph.4.2 and in any case where a rudder stock is more than 230 mm in diameter in way of the tiller, excluding strengthening for navigation in ice. (4.3)

3.13.4 Steering power units shall be:

.1 arranged to restart automatically when power is restored after a power failure; and

.2 capable of being brought into operation from a position on the navigating bridge. In the event of a power failure to any of the steering power units, an audible and visual alarm shall be given on the navigating bridge. (5)

3.13.5 Where the main steering gear comprises two or more identical power units, an auxiliary steering gear need not be fitted, provided that:

.1 the main steering gear is capable of operating the rudder as required by paragraph 3.2 while any one of the power unit is out of operation; (6.1.1)

.2 the main steering gear is so arranged that after a single failure in its piping system or in one of the power units the defect can be isolated so that the steering capability can be maintained or speedily regained. (6.1.3)

3.13.6 Steering gear control shall be provided:

.1 for the main steering gear, both on the navigating bridge and in the steering compartment; (7.1)

.2 when the main steering gear is arranged in accordance with paragraph.6, by two independent control systems, both operable from the navigating bridge. This does not require duplication of the steering wheel or steering lever. Where the control system consists of a hydraulic telemotor, a second independent system need not be fitted; (7.2)

.3 for the auxiliary steering gear, in the steering gear compartment and, if power operated, it shall also be operable from the navigating bridge and shall be independent of the control system for the main steering gear. (7.3)

3.13.7 Any main and auxiliary steering gear control system operable from the navigating bridge shall comply with the following:

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

.2 means shall be provided in the steering gear compartment for disconnecting any control system operable from the navigating bridge from the steering gear it serves;

.3 the system shall be capable of being brought into operation from a position on the navigating bridge;

.4 in the event of a failure in the electrical power supply to the control system, an audible and visual alarm shall be given in the navigating bridge; and

.5 short circuit protection only shall be provided for steering gear control supply circuits. (8)

3.13.8 The electrical power circuits and the steering gear control systems with their associated components, cables and pipes required by this Reg. II-1/C/29 and by Reg. II-1/C/30 shall be separated as far as is practicable throughout their length. (9)

3.13.9 A means of communication shall be provided between the navigating bridge and the steering gear compartment or alternative steering position. (10)

3.13.10 The angular position of the rudder(s) shall:

.1 if the main steering gear is power operated, be indicated on the navigating bridge. The rudder angle indication shall be independent of the steering gear control system;

.2 be recognizable in the steering gear compartment. (11)

3.13.11 Hydraulic power-operated steering gear shall be provided with the following:

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

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

.3 a fixed storage tank having sufficient capacity to recharge at least one power actuating system including the reservoir, where the main steering gear is required to be power-operated. The storage tank shall be permanently connected by piping in such manner that the hydraulic systems can be readily recharged from a position within the steering gear compartment and shall be provided with a contents gauge. (12)

3.13.12 The steering gear compartments shall be:

.1 readily accessible and, as far as practicable, separated from machinery spaces; and

.2 provided with suitable arrangements to ensure working access to steering gear machinery and controls. These arrangements shall include handrails and gratings or other nonslip surfaces to ensure suitable working conditions in the event of hydraulic fluid leakage. (13)

3.14 Additional requirements for electric and electro-hydraulic steering gear (Reg. II-1/C/30)

3.14.1 Means for indicating that the motors of electric and electro-hydraulic steering gears are running shall be installed on the navigating bridge and at a suitable main machinery control position. (1)

3.14.2 Each electric or electro-hydraulic steering system comprising one or more power units shall be served by at least two exclusive circuits fed directly from the main switchboard; however, one of the circuits may be supplied through the emergency switchboard. An auxiliary electric or electro-hydraulic steering system associated with a main electric or electro-hydraulic steering system may be connected to one of the circuits supplying this main steering system. The circuits supplying an electric or electro-hydraulic steering system shall have adequate rating for supplying all motors which can be simultaneously connected to them and may be required to operate simultaneously. (2)

3.14.3 Short circuit protection and an overload alarm shall be provided for steering gear electric and electro-hydraulic circuits and motors. Protection against excess current, including starting current, if provided, shall be for not less than twice the full load current of the motor or circuit so protected, and shall be arranged to permit the passage of the appropriate starting currents.
The alarms required in this paragraph shall be both audible and visual and shall be situated in a conspicuous position in the main machinery space or control room from which the main machinery is normally controlled and as may be required by Reg. II-1/E/51. (3)

3.14.4 When an auxiliary steering gear required by Reg. II-1/C/29, subparagraph.4.3 to be operated by power is not electrically powered or is powered by an electric motor primarily intended for other services, the main steering system may be fed by one circuit from the main switchboard. Where such an electric motor primarily intended for other services is arranged to power such an auxiliary steering system, the requirements of paragraph 3 may be waived by the Administration of the flag State, if satisfied with the protection arrangement together with the requirements of Reg. II-1/C/29, paragraph 5 and subparagraph 7.3 applicable to auxiliary steering systems. (4)

3.15 Machinery controls (Reg. II-1/C/31)

3.15.1 Main and auxiliary machinery essential for the propulsion, control and safety shall be provided with effective means for its operation and control. All control systems essential for the propulsion, control and safety of the ship shall be independent or designed such that failure of one system does not degrade the performance of another system. (1)

3.15.2 Where remote control of propulsion machinery from the navigating bridge is provided, the following shall apply:

.1 the speed, direction of thrust and, if applicable, the pitch of the propeller shall be fully controllable from the navigating bridge under all sailing conditions, including manoeuvring;

.2 the control shall be performed by a single control device for each independent propeller with automatic performance of all associated services including, where necessary, means of preventing overload of the propulsion machinery. Where multiple propellers are designed to operate simultaneously, they may be controlled by one control device;

.3 the main propulsion machinery shall be provided with an emergency stopping device on the navigating bridge which shall be independent of the navigating bridge control system;

.4 propulsion machinery orders from the navigation bridge shall be indicated in the main machinery control room and at the manoeuvring platform;

.5 remote control of the propulsion machinery shall be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there shall be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigating bridge and machinery spaces shall be possible only in the main machinery space or the main machinery control room. This system shall include means to prevent the propelling thrust from altering significantly when transferring control from one location to another;

.6 it shall be possible to control the propulsion machinery locally, even in the case of failure in any part of the remote control system. It shall also be possible to control the auxiliary machinery, essential for the propulsion and safety of the ship, at or near the machinery concerned;

.7 the design of the remote control system shall be such that in case of its failure an alarm will be given. The pre-set speed and direction of thrust of the propellers shall be maintained until local control is in operation;

.8 indicators shall be fitted in the navigation bridge, the main machinery control room and at the manoeuvring platform for:

.8.1 propeller speed and direction of rotation in the case of fixed pitch propellers, and

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

.9 an alarm shall be provided on the navigating bridge and in the machinery space to indicate low starting air pressure which shall be set at a level to permit further main engine starting operations. If the remote control system of the propulsion machinery is designed for automatic starting, the number of automatic consecutive attempts which fail to produce a start shall be limited in order to safeguard sufficient starting air pressure for starting locally.

.10 The automation systems shall be designed in a manner which ensures that threshold warning of impending or imminent slowdown or shutdown of the propulsion system is given to the officer in charge of the navigational watch in time to assess navigational circumstances in an emergency. In particular, the systems shall control, monitor, report, alert and take safety action to slow down or stop propulsion while providing the officer in charge of the navigational watch an opportunity to manually intervene, except for those cases where manual intervention will result in total failure of the engine and/or propulsion equipment within a short time, for example in the case of overspeed. (2)

3.15.3 Where the main propulsion and associated machinery, including sources of main electrical power supply, are provided with various degrees of automatic and remote control and are under continuous manual supervision from a control room the arrangements and controls shall be so designed, equipped and installed that the machinery operation will be as safe and effective as if it were under direct supervision; for this purpose Reg. from II-1/E/46 to II-1/E/50 shall apply as appropriate. Particular consideration shall be given to protect such spaces against fire and flooding. (3)

3.15.4 In general, automatic starting, operational and control systems shall include provisions for manually overriding the automatic controls. Failure of any part of such systems shall not prevent the use of the manual override. (4)

3.15.5 Means shall be provided for the propulsion machinery and the propeller to be stopped in cases of emergencies from relevant positions outside of the engine room/engine control room, e.g. open deck or the wheel house. (100)

3.16 **Steam pipe systems** (Reg. II-1/C/33)

3.16.1 Every steam pipe and every fitting connected thereto through which steam may pass shall be so designed, constructed and installed as to withstand the maximum working stresses to which it may be subjected. (1)

3.16.2 Means shall be provided for draining every steam pipe in which dangerous water hammer action might otherwise occur. (2)

3.16.3 If a steam pipe or fitting may receive steam from any source at a higher pressure than that for which it is designed a suitable reducing valve, relief valve and pressure gauge shall be fitted. (3)

3.17 **Air pressure systems** (Reg. II-1/C/34)

3.17.1 Means shall be provided to prevent overpressure in any part of compressed air systems and wherever water jackets or casings of air compressors and coolers might be subjected to dangerous overpressure due to leakage into them from air pressure parts. Suitable pressure relief arrangements shall be provided for all systems. (1)

3.17.2 The main starting air arrangements for main propulsion internal combustion engines shall be adequately protected against the effects of backfiring and internal explosion in the starting air pipes. (2)

3.17.3 All discharge pipes from starting air compressors shall lead directly to the starting air receivers, and all starting pipes from the air receivers to main and auxiliary engines shall be entirely separate from the compressor discharge pipe system. (3)

3.17.4 Provisions shall be made to reduce to a minimum the entry of oil into the air pressure systems and to drain these systems. (4)

3.18 **Ventilating systems in machinery spaces** (Reg. II-1/C/35)

Machinery spaces of category A shall be adequately ventilated so as to ensure that when machinery or boilers therein are operating at full power in all weather conditions including heavy weather, an adequate supply of air is maintained to the spaces for the safety and comfort of personnel and the operation of the machinery.

3.19 **Bilge pumping arrangement** (Reg. II-1/C/35-1)

3.19.1 An efficient bilge pumping system shall be provided, capable of pumping from and draining any watertight compartment other than a space permanently appropriated for the carriage of fresh water, water ballast, oil fuel or liquid cargo and for which other efficient means of pumping are provided, under all practical conditions. Efficient means shall be provided for draining water from insulated holds. (2.1)

3.19.2 Sanitary, ballast and general service pumps may be accepted as independent power bilge pumps if fitted with the necessary connections to the bilge pumping system. (2.2)

3.19.3 All bilge pipes used in or under fuel storage tanks or in boiler or machinery spaces, including spaces in which oil-settling tanks or oil fuel pumping units are situated, shall be of steel or other suitable material. (2.3)

3.19.4 The arrangement of the bilge and ballast pumping system shall be such as to prevent the possibility of water passing from the sea and from water ballast spaces into the cargo and machinery spaces, or from one compartment to another. Provision shall be made to prevent any deep tank having bilge and ballast connections being inadvertently flooded from the sea when containing cargo, or being discharged through a bilge pump when containing water ballast. (2.4)

3.19.5 All distribution boxes and manually operated valves in connection with the bilge pumping arrangements shall be in positions which are accessible under ordinary circumstances. (2.5)

3.19.6 Provision shall be made for the drainage of enclosed cargo spaces situated on the bulkhead deck.

.1 Where the freeboard to the bulkhead deck is such that the deck edge is immersed when the ship heels more than 5°, the drainage shall be by means of a sufficient number of scuppers of suitable size discharging directly overboard, fitted in accordance with the requirements of Reg. II-1/B-2/15 of Section 1 or Reg. 15 of SOLAS II-1, as appropriate. (2.6.1)

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

.1 the number, size and disposition of the scuppers are such as to prevent unreasonable accumulation of free water;

.2 the pumping arrangements required by this Reg. II-1/C/35-1 take account of the requirements for any fixed pressure water spraying fire-extinguishing system;

.3 water contaminated with petrol or other dangerous substances is not drained to machinery spaces or other spaces where sources of ignition may be present; and

.4 where the enclosed cargo space is protected by a carbon dioxide fire-extinguishing system, the deck scuppers are fitted with means to prevent the escape of the smothering gas. (2.6.2)

.3 Provisions for the drainage of closed ro-ro cargo spaces and special category spaces shall also comply with subparagraphs 6.1.4 and 6.1.5 of Reg. II-2/G/20. (2.6.3)

.4 When provided with sprinkler installations and hydrants, passenger and crew lounges shall have an adequate number of scuppers, sufficient to cope with the quantity of water originating from fire extinguishing by the room's sprinkler heads and from two fire hoses with jets. The scuppers shall be located in the most effective positions, e.g. in each corner. (2.6.3a)

3.19.7 The bilge pumping system required by paragraph 2.1 shall be capable of operation under all practicable conditions after a casualty whether the ship is upright or listed. For this purpose, wing suctions shall generally be fitted except in narrow compartments at the end of the ship where one suction may be sufficient. In compartments of unusual form, additional suctions may be required. Arrangements shall be made whereby water in the compartment may find its way to the suction pipes. (3.1)

3.19.8 At least three power pumps shall be fitted connected to the bilge main, one of which may be driven by the propulsion machinery. Where the bilge pump numeral is 30 or more, one additional independent power pump shall be provided.

The bilge pump numeral shall be calculated as follows

when P_1 is greater than P: $$\text{bilge pump numeral} = 72 \cdot \left[\frac{M+2P_1}{V+P_1-P}\right]$$

in other cases: $$\text{bilge pump numeral} = 72 \cdot \left[\frac{M+2P_1}{V}\right]$$

where:

L = the length of the ship (metres), as defined in SOLAS II-1/2;

M = the volume of the machinery space (cubic metres), as defined in SOLAS II-1/2, that is below the bulkhead deck; with the addition thereto of the volume of any permanent oil fuel bunkers which may be situated above the inner bottom and forward of, or abaft, the machinery space;

P = the whole volume of the passenger and crew spaces below the bulkhead deck (cubic metres), which are provided for the accommodation and use of passengers and crew, excluding baggage, store and provision rooms;

V = the whole volume of the ship below the bulkhead deck (cubic metres);

$P_1 = KN$,

where:

N = the number of passengers for which the ship is to be certified; and

$K = 0.056L$

However, where the value of KN is greater than the sum of P and the whole volume of the actual passenger spaces above the bulkhead deck, the figure to be taken as P_1 is that sum or two-thirds KN, whichever is the greater. (3.2)

3.19.9 Where practicable, the power bilge pumps shall be placed in separate watertight compartments and so arranged or situated that these compartments will not be flooded by the same damage. If the main propulsion machinery, auxiliary machinery and boilers are in two or more watertight compartments, the pumps available for bilge service shall be distributed as far as is possible throughout these compartments. (3.3)

3.19.10 On a ship of 91.5 m in length *L* and upwards or having a bilge pump numeral, calculated in accordance with paragraph 3.2, of 30 or more, the arrangements shall be such that at least one power bilge pump shall be available for use in all flooding conditions which the ship is required to withstand, and, for ships designed in line with SOLAS Chapter II-I, parts B to B-4, as amended, in all flooding conditions derived from consideration of minor damages as specified in SOLAS Chapter II-1 Reg. 8 as follows:

.1 one of the required bilge pumps shall be an emergency pump of a reliable submersible type having a source of power situated above the bulkhead deck; or

.2 the bilge pumps and their sources of power shall be so distributed throughout the length of the ship that at least one pump in an undamaged compartment will be available. (3.4)

3.19.11 With the exception of additional pumps which may be provided for peak compartments only, each required bilge pump shall be so arranged as to draw water from any space required to be drained by paragraph 2.1. (3.5)

3.19.12 Each power bilge pump shall be capable of pumping water through the required main bilge pipe at a speed of not less than 2 m/sec. Independent power bilge pumps situated in machinery spaces shall have direct suctions from these spaces, except that not more than two such suctions shall be required in any one space. Where two or more such suctions are provided there shall be at least one on each side of the ship. Direct suctions shall be suitably arranged and those in a machinery space shall be of a diameter not less than that required for the bilge main. (3.6)

3.19.13 In addition to the direct bilge suction or suctions required by paragraph 3.6, a direct emergency bilge suction fitted with a non-return valve shall be led from the largest available independent power driven pump to the drainage level of the machinery space; the suction shall be of the same diameter as the main inlet to the pumps used. (3.7.1)

3.19.14 The spindles of the sea inlet and direct suction valves shall extend well above the engine-room platform. (3.7.3)

3.19.15 All bilge suction piping up to the connection to the pumps shall be independent of other piping. (3.8)

3.19.16 The diameter *d* of the main and branch bilge suction pipes shall be calculated according to the following formulae. However, the actual internal diameter may be rounded off to the nearest standard size acceptable to the Administration of the flag State:

main bilge suction pipe:

$$d = 25 + 1.68\sqrt{(L(B + D))}$$

branch bilge suction pipes between collecting boxes and suctions:

$$d = 25 + 2.15\sqrt{(L_1(B + D))}$$

where:

d refers to internal diameter in millimetres,

L and *B* are the length and the breadth of the ship (metres),

L_1 is the length of the compartment, and

D is the moulded depth of the ship to bulkhead deck (metres) provided that, in a ship having an enclosed cargo space on the bulkhead deck which is internally drained in accordance with the requirements of paragraph 2.6.2 and which extends for the full length of the ship, *D* shall be measured to the next deck above the bulkhead deck. Where the enclosed cargo spaces cover a lesser length, *D* shall be taken as the moulded depth to the bulkhead deck plus $l \cdot h/L$ where l and h are the aggregate length and height respectively of the enclosed cargo spaces. (3.9)

3.19.17 Provision shall be made to prevent the compartment served by any bilge suction pipe being flooded in the event of the pipe being severed or otherwise damaged by collision or grounding in any other compartment. For this purpose, where the pipe is at any part situated nearer the side of the ship than one fifth of the breadth of the ship (measured at right angles to the centreline at the level of the deepest subdivision load line), or is in a duct keel, a non-return valve shall be fitted to the pipe in the compartment containing the open end. For ships designed in line with SOLAS Chapter II-I, parts B to B-4, as amended, the deepest subdivision load line shall be taken as the deepest subdivision draught. (3.10)

3.19.18 Distribution boxes, cocks and valves in connection with the bilge pumping system shall be so arranged that, in the event of flooding, one of the bilge pumps may be operative on any compartment; in addition, damage to a pump or its pipe connecting to the bilge main outboard of a line drawn at one fifth of the breadth of the ship shall not put the bilge system out of action. If there is only one system of pipes common to all the pumps, the necessary valves for controlling the bilge suctions must be capable of being operated from above the bulkheads deck. Where, in addition to the main bilge pumping system, an emergency bilge pumping system is provided, it shall be independent of the main system and so arranged that a pump is capable of operating on any compartment under flooding condition as specified in paragraph 3.1; in the case only the valves necessary for the operation of the emergency system need be capable of being operated from above the bulkhead deck. (3.11)

3.19.19 All cocks and valves referred to in paragraph 3.18.18 (3.11) which can be operated from above the bulkhead deck shall have their controls at their place of operation clearly marked and shall be provided with means to indicate whether they are open or closed. (3.12)

3.20 Communication between the navigating bridge and machinery space (Reg. II-1/C/37)

At least two independent means of communication shall be provided for communication orders from the navigating bridge to the position in the machinery space or in the control room from which the speed and direction of thrust of the propellers are normally controlled: one of these shall be an engine-room telegraph which provides visual indication of the orders and responses both in the machinery space and on the navigating bridge. Appropriate means of communication shall be provided from the navigation bridge and the engine-room to any other position from which the speed or direction of thrust of the propellers may be controlled.

3.21 Engineers' alarm (Reg. II-1/C/38)

An engineers' alarm shall be provided to be operated from the engine control room or at a manoeuvring platform as appropriate, and shall be clearly audible in the engineers' accommodation, and/or navigating bridge, as appropriate.

3.22 **Location of emergency installations** (Reg. II-1/C/39)

3.22.1 Emergency sources of electrical power, fire pumps, bilge pumps except those specifically serving the spaces forward of the collision bulkhead, and fixed fire-extinguishing system required by Chapter II-2 and other emergency installations which are essential for the safety of the ship, except anchor windlasses, shall not be installed forward of the collision bulkhead.

PART D
ELECTRICAL INSTALLATIONS

3.23 General (Reg. II-1/D/40)

3.23.1 Electrical installations shall be such that:

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

.2 electrical services essential for safety will be ensured under various emergency conditions; and

.3 the safety of passengers, crew and ship from electrical hazards will be ensured. (1)

3.23.2 The Administration of the flag State shall take appropriate steps to ensure uniformity of implementation and application of the provision of this Part D in respect of electrical installations*. (2)

* Reference is made to the recommendations published by the International Electrotechnical Commission and, in particular, 60092 series — *Electrical Installations in Ships*.

3.24 Main source of electrical power and lighting (Reg. II-1/D/41)

3.24.1 Ships of **Class C** and **Class D** in which the electrical power is the only power for maintaining the auxiliary services essential for the safety of the ship, and ships of **Class B** in which the electrical power is the only power for maintaining the auxiliary services essential for the safety and the propulsion of the ship, shall be provided with two or more main generating sets of such power that the aforesaid services can be operated when any one sets is out of service. (1)

3.24.2 A main electric lighting system which shall provide illumination throughout those parts of the ship normally accessible to and used by passengers or crew shall be supplied from the main source of electrical power. (2.1)

3.24.3 The arrangement of the main electric lighting system shall be such that a fire or other casualty in spaces containing the main source of electrical power, associated transforming equipment, if any, the main switchboard and the main lighting switchboard will not render the emergency lighting system required by Reg. II-1/D/42 inoperative. (2.2)

3.24.4 The arrangement of the emergency electric lighting system shall be such that a fire or other casualty in spaces containing the emergency source of electrical power, associated transforming equipment, if any, the emergency switchboard and the emergency lighting switchboard will not render the main electric lighting system required by this Reg. II-1/D/41 inoperative. (2.3)

3.24.5 The main switchboard shall be so placed relative to one main generating station that, as far as is practicable, the integrity of the normal electrical supply may be affected only by a fire or other casualty in the space where the generating set and the switchboard are installed. (3)

3.24.6 Supplementary lighting shall be provided in all cabins to clearly indicate the exit so that occupants will be able to find their way to the door. Such lighting, which may be connected to an emergency source of power or have a self-contained source of electrical power in each cabin, shall automatically illuminate when power to the normal cabin lighting is lost and remain on for a minimum of 30 min. (6)

3.25 Emergency source of electrical power (Reg. II-1/D/42)

3.25.1 Every ship shall be provided with a self-contained emergency source of electrical power with emergency switchboard located above the bulkhead deck, in a readily accessible space which shall not be contiguous to the boundaries of machinery spaces of category A or of those spaces containing the main source of electrical power or main switchboard. (1)

3.25.2 The requirement in paragraph 1 is not required provided that ships are designed with two fully redundant machinery spaces, separated by at least one watertight and fire-safe compartment and two bulkheads or an alternative construction giving the same level of safety, and that there is at least one generator with an associated switchboard, etc. in each machinery space. (1a)

3.25.3 The emergency source of power required by paragraph 1 shall:

.1 be capable of operating in general for a period of:

12 hours for **Class B** ships

6 hours for **Class C** ships

3 hours for **Class D** ships;

.2 in particular, be capable to operate simultaneously the consumers as identified within the following services as required for the class of ships for the times indicated above:

(a) one independent bilge power pump and one of the fire pumps;

(b) emergency lighting:

1. at every assembly or embarkation station and over the sides as provided in Reg. III/5, paragraph.3;
2. in all alleyways, stairways and exits giving access to the assembly or embarkation stations;
3. in the machinery spaces, and in the place where the emergency generator is situated;
4. in the control stations where radio and main navigating equipment are situated;
5. as required in Reg. II-2/D/13, subparagraph 3.2.5.1;
6. at all stowage positions for firefighter's outfits;
7. at one independent bilge power pump and one of the fire pumps, referred to in subparagraph (a) and at the starting position of their motors;

(c) the ship's navigation lights;

(d) 1 all communication equipment,

2. the general alarm system,
3. the fire detecting system, and
4. all signals which may be required in an emergency, if they are electrically operated from the ship's main generating sets;

(e) the ship's sprinkler pump, if any and if it is electrically operated; and

(f) the ship's daylight signalling lamp, if it is operated by the ship's main source of electric power;

.3 be capable to operate, for a period of half an hour, the power-operated watertight doors together with the associated control, indication and alarm circuits. (2)

3.25.4 The emergency source of electric power may be either an accumulator battery capable of complying with the requirements of paragraph 2, without being recharged or suffering an excessive voltage drop, or a generator, capable of complying with the requirements of paragraph 2, driven by internal combustion type of machinery with an independent supply of fuel having a flashpoint of not less than 43 °C, with automatic starting arrangements, and provided with a transitional source of emergency electrical power according to paragraph 4. (3)

3.25.5 Where electrical power is necessary to restore propulsion, the capacity shall be sufficient to restore propulsion to the ship in conjunction with other machinery, as appropriate, from a dead ship condition within 30 min after blackout. (3.4)

3.25.6 The transitional source of emergency electrical power required by paragraph 3 shall consist of an accumulator battery suitably located for the use in an emergency which shall operate without recharging or suffering an excessive voltage drop for half an hour:

(a) the services required by paragraph 2.2(b) and 2.2(c) of this Reg. II-1/D/42;

(b) the watertight doors, as required by subparagraphs.7.2 and.7.3 of Reg. II-1/B/13 of Section 1 or by Reg. 13.7.3.3 of SOLAS II-1, as appropriate, but not necessarily all of them simultaneously, unless an independent temporary source of stored energy is provided; and

(c) the control, indication and alarm circuits as required by subparagraph.7.2 of Reg. II-1/B-2/13 of Section 1 or by Reg. 13.7.2 of SOLAS II-1, as appropriate. (4)

3.25.7 The emergency switchboard shall be situated as near as practicable to the emergency source of power. (5.1)

3.25.8 The emergency source of electric power shall be so arranged that it will operate efficiently when the ship is listed to 22,5° and when the trim of the ship is 10° from an even keel. Emergency generator set(s) shall be capable of being started automatically in any cold condition likely to be encountered. (6)

3.26 Supplementary emergency lighting for ro-ro ships (Reg. II-1/D/42-1)

3.26.1 In addition to the emergency lighting required in Reg. II-1/D/42, subparagraph 2.2(b), on every ship with ro-ro cargo spaces or special category spaces:

.1 all passenger public spaces and alleyways shall be provided with supplementary electric lighting that can operate for at least three hours when all other sources of electrical power have failed and under any condition of heel. The illumination provided shall be such that the approach to the means of escape can be readily seen. The source of power for the supplementary lighting shall consist of accumulator batteries located within the lighting units that are continuously charged, where practicable, from the emergency switchboard. Alternatively, any other means of lighting which is at least as effective may be accepted by the Administration of the flag State. The supplementary lighting shall be such that any failure of the lamp will be immediately apparent. Any accumulator battery provided shall be replaced at intervals having regards to the specific service life in the ambient conditions that they are subject to in service; and

.2 a portable rechargeable battery operated lamp shall be provided in every crew space alleyway, recreational space and every working space which is normally occupied unless supplementary emergency lighting, as required by paragraph.1 is provided. (1)

3.27 Starting arrangements for emergency generating sets (Reg. II-1/D/44)

3.27.1 Emergency generating sets shall be capable of being readily started in their cold condition at a temperature of 0 ° C. If this is impracticable, or if lower temperatures are likely to be encountered, provision acceptable to the Administration shall be made for the maintenance of heating arrangements, to ensure ready starting of the generating sets. (1)

3.27.2 The source of stored energy shall be protected to preclude critical depletion by the automatic starting system, unless a second independent means of starting is provided. In addition, a second source of energy shall be provided for an additional three starts within 30 minutes unless manual starting can be demonstrated to be effective. (2)

3.27.3 The stored energy shall be maintained at all times, as follows:

.1 electrical and hydraulic starting systems shall be maintained from the emergency switchboard;

.2 compressed air starting systems may be maintained by the main or auxiliary compressed air receivers through a suitable non-return valve or by an emergency air compressor which, if electrically driven, is supplied from the emergency switchboard;

.3 all of these starting, charging and energy storing devices shall be located in the emergency generator space; these devices are not to be used for any purpose other than the operation of the emergency generating set. This does not preclude the supply to the air receiver of the emergency generating set from the main or auxiliary compressed air system through the non-return valve fitted in the emergency generator space. (3)

3.27.4 Where automatic starting is not required, manual starting is permissible, such as manual cranking, inertia starters, manually charged hydraulic accumulators, or powder charge cartridges, where they can be demonstrated as being effective. (4.1)

3.27.5 When manual starting is not practicable, the requirements of paragraphs 2 and 3 shall be complied with except that starting may be manually initiated. (4.2)

3.28 Precautions against shock, fire and other hazards of electrical origin (Reg. II-1/D/45)

3.28.1 Exposed metal parts of electrical machines or equipment which are not intended to be live but which are liable under fault conditions to become live shall be earthed unless the machines or equipment are:

.1 supplied at a voltage not exceeding 50 V direct current or 50 V, root mean square, between conductors; auto-transformers shall not be used for the purpose of achieving this voltage; or

.2 supplied at a voltage not exceeding 250 V by safety isolating transformers supplying only one consuming device; or

.3 constructed in accordance with the principle of double insulation. (1.1)

3.28.2 All electrical apparatus shall be so constructed and so installed as not to cause injury when handled or touched in the normal manner. (1.3)

3.28.3 The sides and the rear and, where necessary, the front of switchboards shall be suitably guarded. Exposed live parts having voltages to earth exceeding the voltage specified under 1.1 shall not be installed on the front of such switchboards. Where necessary, non-conducting mats or gratings shall be provided at the front and rear of the switchboard. (2)

3.28.4 In distribution systems with no connection to earth, a device capable of monitoring the insulation level to earth and giving an audible or visual indication of abnormally low insulation values shall be provided. (4.2)

3.28.5 All metal sheaths and armour of cables shall be electrically continuous and shall be earthed. (5.1)

3.28.6 All electrical cables and wiring external to equipment shall be at least of a flame-retarding type and shall be so installed as not to impair their original flame-retarding properties. Where necessary for particular application, the Administration of the flag State may permit the use of special type of cables such as radio frequency cables, which do not comply with the foregoing. (5.2)

3.28.7 Cables and wiring serving essential or emergency power, lighting, internal communications or signals shall so far as practicable be routed clear of galleys, laundries, machinery spaces of category A and their casings and other high fire risk areas. Cabling for emergency alarms and public address systems installed shall be approved by the Administration of the flag State having regard to the recommendations in IMO MSC/Circ.808. Cables connecting fire pumps to the emergency switchboard shall be of a fire-resistant type where they pass through high fire risk areas. Where practicable all such cables should be run in such a manner as to preclude their being rendered unserviceable by heating of the bulkheads that may be caused by a fire in an adjacent space. (5.3)

3.28.8 Cables and wiring shall be installed and supported in such a manner as to avoid chafing or other damage. (5.5)

3.28.9 Terminations and joints in all conductors shall be so made as to retain the original electrical, mechanical flame- retarding and, where necessary, fire resisting properties. (5.6)

3.28.10 Each separate circuit shall be protected against short circuit and against overload, except as permitted in Reg. II-1/C/29 and II-1/C/30. (6.1)

3.28.11 Lighting fittings shall be so arranged as to prevent temperature rises which could damage the cables and wiring, and to prevent surrounding material from becoming excessively hot. (7)

3.28.12 Accumulator batteries shall be suitably housed, and compartments used primarily for their accommodation shall be properly constructed and efficiently ventilated. (9.1)

3.28.13 Electrical or other equipment which may constitute a source of ignition of flammable vapours shall not be permitted in these compartments. (9.2)

3.28.14 No electrical equipment shall be installed in any space where flammable mixtures are liable to collect, e.g. in compartments assigned principally to accumulator batteries, in paint lockers, acetylene stores or similar spaces, unless the Administration is satisfied that such equipment is:

.1 essential for operational purposes;

.2 of a type which will not ignite the mixture concerned;

.3 appropriate to the space concerned; and

.4 appropriately certified for safe usage in the dusts, vapours or gases likely to be encountered. (10)

3.28.15 Distribution systems shall be so arranged that fire in any main vertical zone, as is defined in Reg. II-2/A/3, paragraph 32, will not interfere with services essential for safety in any other such zone. This requirement will be met if main and emergency feeders passing through any such zone are separated both vertically and horizontally as wide as is practicable. (12)

PART E
ADDITIONAL REQUIREMENTS FOR SHIPS CONSTRUCTED WITH PERIODICALLY UNATTENDED MACHINERY SPACES

3.29 General (Reg. II-1/E/46)

3.29.1 The arrangements provided shall be such as to ensure that the safety of the ship in all sailing conditions, including manoeuvring, is equivalent to that of a ship having the machinery spaces manned. (1)

3.29.2 Measures shall be taken to ensure that the equipment is functioning in a reliable manner and that satisfactory arrangements are made for regular inspections and routine tests to ensure continuous reliable operation. (2)

3.29.3 Every ship shall be provided with documentary evidence of its fitness to operate with periodically unattended machinery spaces. (3)

3.30 Fire precautions (Reg. II-1/E/47)

3.30.1 Means shall be provided to detect and give alarms at an early stage in case of fires:

.1 in boiler air supply casings and exhausts (uptakes); and

.2 in scavenging air belts of propulsion machinery, unless it is considered to be unnecessary in a particular case. (1)

3.30.2 Internal combustion engines of 2 250 kW and above or having cylinders of more than 300 mm bore shall be provided with crankcase oil mist detectors or engine bearing temperature monitors or equivalent devices. (2)

3.31 Protection against flooding (Reg. II-1/E/48)

3.31.1 Bilge wells in periodically unattended machinery spaces shall be located and monitored in such a way that the accumulation of liquids is detected at normal angles of trim and heel, and shall be large enough to accommodate easily the normal drainage during the unattended period. (1)

3.31.2 Where the bilge pumps are capable of being started automatically, means shall be provided to indicate when the influx of liquid is greater than the pump capacity or when the pump is operating more frequently than would normally be expected. In these cases, smaller bilge wells to cover a reasonable period of time may be permitted. Where automatically controlled bilge pumps are provided, special attention shall be given to oil pollution prevention requirements. (2)

3.31.3 The location of the controls of any valve serving a sea inlet, a discharge below the waterline or a bilge injection system shall be so sited as to allow adequate time for operation in case of influx of water to the space, having regard to the time likely to be required in order to reach and operate such controls. If the level to which the space could become flooded with the ship in the fully loaded condition so requires, arrangements shall be made to operate the controls from a position above such level. (3)

3.32 Control of propulsion machinery from the navigating bridge (Reg. II-1/E/49)

3.32.1 Under all sailing conditions, including manoeuvring, the speed, direction of thrust and, if applicable, the pitch of the propeller shall be fully controllable from the navigating bridge. (1)

1.1. Such remote control shall be performed by a separate control device for each independent propeller, with automatic performance of all associated services, including, where necessary, means of preventing overload of the propulsion machinery.

1.2. The main propulsion machinery shall be provided with an emergency stopping device on the navigating bridge which shall be independent of the navigating bridge control system. (1)

3.32.2 Propulsion machinery orders from the navigating bridge shall be indicated in the main machinery control room or at the propulsion machinery control position as appropriate. (2)

3.32.3 Remote control of the propulsion machinery shall be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there shall be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigating bridge and machinery spaces shall be possible only in the main machinery space or in the main machinery control room. The system shall include means to prevent the propelling thrust from altering significantly when transferring control from one location to another. (3)

3.32.4 It shall be possible for all machinery essential for the safe operation of the ship to be controlled from a local position, even in the case of failure in any part of the automatic or remote control systems. (4)

3.32.5 The design of the remote automatic control system shall be such that in case of its failure an alarm will be given. Unless it is considered impracticable, the preset speed and direction of thrust of the propeller shall be maintained until local control is in operation. (5)

3.32.6 Indicators shall be fitted on the navigating bridge for:

.1 propeller speed and direction of rotation in the case of fixed pitch propellers; or

.2 propeller speed and pitch position in the case of controllable pitch propellers. (6)

3.32.7 The number of consecutive automatic attempts which fail to produce a start shall be limited to safeguard sufficient starting air pressure. An alarm shall be provided to indicate low starting air pressure set at a level which still permits starting operations of the propulsion machinery. (7)

3.33 Communication (Reg. II-1/E/50)

A reliable means of vocal communication shall be provided between the main machinery control room or the propulsion machinery control position as appropriate, the navigating bridge and the engineer officers' accommodation.

3.34 **Alarm system** (Reg. II-1/E/51)

3.34.1 An alarm system shall be provided indicating any fault requiring attention and shall:

.1 be capable of sounding an audible alarm in the main machinery control room or at the propulsion machinery control position, and indicate visually each separate alarm function at a suitable position;

.2 have a connection to the engineers' public rooms and to each of the engineers' cabins through a selector switch, to ensure connection to at least one of those cabins. Alternative arrangements may be permitted if they are considered to be equivalents;

.3 activate an audible and visual alarm on the navigating bridge for any situation which requires action by or attention of the officer on watch;

.4 as far as is practicable be designed on the fail-to-safety principle; and

.5 activate the engineers' alarm required by Reg. II-1/C/38, if an alarm function has not received attention locally within a limited time. (1)

3.34.2 The alarm system shall be continuously powered and shall have an automatic changeover to a stand-by power supply in case of loss of normal power supply. (2.1)

3.34.3 Failure of the normal power supply of the alarm system shall be indicated by an alarm. (2.2)

3.34.4 The alarm system shall be able to indicate at the same time more than one fault and the acceptance of any alarm shall not inhibit another alarm. (3.1)

3.34.5 Acceptance at the position referred to in paragraph 1 of any alarm condition shall be indicated at the positions where it was shown. Alarms shall be maintained until they are accepted and the visual indications of individual alarms shall remain until the fault has been corrected, when the alarm system shall automatically reset to the normal operating condition. (3.2)

3.35 **Safety systems** (Reg. II-1/E/52)

A safety system shall be provided to ensure that serious malfunction in machinery or boiler operations, which presents an immediate danger, shall initiate the automatic shutdown of that part of the plant and that an alarm shall be given. Shutdown of the propulsion system shall not be automatically activated except in cases which could lead to serious damage, complete breakdown, or explosion. Where arrangements for overriding the shutdown of the main propelling machinery are fitted, these shall be such as to preclude inadvertent operation. Visual means shall be provided to indicate when the override has been activated. Automatic machinery safety shut down and slow down controls should be separated from the alarm installation.

3.36 Special requirements for machinery, boiler and electrical installations (Reg. II-1/E/53)

3.36.1 The main source of electrical power shall comply with the following:

.1 where the electrical power can normally be supplied by one generator, suitable load-shedding arrangements shall be provided to ensure the integrity of supplies to services required for propulsion and steering as well as the safety of the ship. In the case of loss of the generator in operation, adequate provision shall be made for automatic starting and connecting to the main switchboard of a stand-by generator of sufficient capacity to permit propulsion and steering and to ensure the safety of the ship with automatic restarting of the essential auxiliaries including, where necessary, sequential operations;

.2 if the electrical power is normally supplied by more than one generator simultaneously in parallel operation, provision shall be made, for instance by load shedding, to ensure that, in case of loss of one of these generating sets, the remaining ones are kept in operation without overload to permit propulsion and steering, and to ensure the safety of the ship. (2)

3.36.2 Where stand-by machines are required for other auxiliary machinery essential to propulsion, automatic changeover devices shall be provided. (3)

3.36.3 Automatic control and alarm system (4)

3.36.3.1 The control system shall be such that the services needed for the operation of the main propulsion machinery and its auxiliaries are ensured through the necessary automatic arrangements. (4.1)

3.36.3.2 An alarm shall be given on the automatic changeover. (4.2)

3.36.3.3 An alarm system complying with Reg. II-1/E/51 shall be provided for all important pressures, temperatures and fluid levels and other essential parameters. (4.3)

3.36.3.4 A centralised control position shall be arranged with the necessary alarm panels and instrumentation indicating any alarm. (4.4)

3.36.4 Means shall be provided to keep the starting air pressure at the required level where internal combustion engines essential for main propulsion are started by compressed air. (5)

3.37 Special consideration (Reg. II-1/E/54)

Ships shall be specially considered by the Administration of the flag State as to whether or not their machinery spaces may be periodically unattended and, if so, whether additional requirements to those stipulated in the relevant Regulations are necessary to achieve equivalent safety to that of normally attended machinery spaces.

PART G
SHIPS USING LOW-FLASHPOINT FUELS

3.38 Requirements for ships using low-flashpoint fuels (Reg. II-1/G/57)

Ships using gaseous or liquid fuel having a flashpoint lower than otherwise permitted under Reg. II-2/4.2.1.1 shall comply with the requirements of the *IGF Code*, as defined in SOLAS II-1/2.28.

PART Z
SPECIFIC REQUIREMENTS OF DIRECTIVE 2009/45/EC

3.39 **Hoistable car platforms and ramps** (Reg. II-1/Z/100)

On ships fitted with suspended decks for transport of passenger vehicles, the construction, installation and operation shall be carried out in accordance with measures imposed by the Administration of the flag State. With regard to the construction, the relevant rules of a recognized organization (see PRS' *Rules for the Classification and Construction of Sea-going Ships, Part III – Hull equipment*, chapter 19) shall be used.

3.40 **Railings** (Reg. II-1/Z/101)

3.40.1 On external decks to which passengers are permitted access, and where there is no bulwark of adequate height provided, railings shall be provided of a height of minimum 1 100 mm above the deck and of such design and construction as to prevent any passenger from climbing on these railings and from accidentally falling from that deck. (1)

3.40.2 Stairs and landings on such external decks shall be provided with railings of equivalent construction. (2)

3.41 **Lifts** (Reg. II-1/Z/102)

3.41.1 Passenger and goods lifts shall, in respect of dimensioning, layout, number of passengers and/or quantity of goods, comply with the provisions laid down by the Administration of the flag State in each individual case or for each type of plant. (1)

3.41.2 Installation drawings and maintenance instructions, including provisions governing periodical inspections, shall be approved by the Administration of the flag State, which shall inspect and approve the plant before it is taken into use. (2)

3.41.3 Following approval, the Administration of the flag State will issue a certificate which is to be kept on board. (3)

3.41.4 The Administration of the flag State may permit the periodical inspections to be carried out by an expert authorized by the Administration, or by a recognized organization. (4)

4 CHAPTER II-2
FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION

NOTE:
This Chapter II-2 applies to new passenger ships of Class A, B, C and D the keel of which was laid or which were at a similar stage of construction on or after 19 September 2021. Such ships which shall comply with relevant requirements of this Chapter as stipulated thereinafter.

PART A
GENERAL

4.1 Application (Reg. II-2/A/1)

4.1.1 Repairs, alterations, modifications and outfitting (3)

4.1.1.1 All ships which undergo repairs, alterations, modifications and outfitting related thereto not falling under the definition of a major character included in the article 2(zh) of *Directive 2009/45/EC* shall continue to comply with at least the requirements previously applicable to these ships. (3.1)

4.2 Fire safety objectives and functional requirements (Reg. II-2/A/2)

4.2.1 Fire safety objectives (1)

4.2.1.1 The fire safety objectives of this chapter are to:

.1 prevent the occurrence of fire and explosion;

.2 reduce the risk to life caused by fire;

.3 reduce the risk of damage caused by fire to the ship, its cargo and the environment;

.4 contain, control and suppress fire and explosion in the compartment of origin; and

.5 provide adequate and readily accessible means of escape for passengers and crew. (1.1)

4.2.2 Functional requirements (2)

4.2.2.1 In order to achieve the fire objectives set out in paragraph 1, the following basic principles underlie the Regulations in this chapter and are embodied in the Regulations as appropriate, having regard to the type of ships and the potential fire hazard involved:

.1 division of ship into main vertical zones by thermal and structural boundaries;

.2 separation of accommodation spaces from the remainder of the ship by thermal and structural boundaries;

.3 restricted use of combustible materials;

.4 detection of any fire in the zone of origin;

.5 containment and extinction of any fire in the space of origin;

.6 protection of means of escape and access for fire-fighting;

.7 ready availability of fire-extinguishing appliances;

.8 minimisation of possible ignition of flammable cargo vapour. (2.1)

4.2.3 Achievement of the fire safety objectives (3)

The fire safety objectives set out in paragraph 1 shall be achieved by ensuring compliance with the prescriptive requirements specified in this chapter or by alternative design and arrangements which comply with Part F of the revised Chapter II-2 of SOLAS 1974, as amended. A ship shall be considered to meet the functional requirements set out in paragraph 2 and to achieve the fire safety objectives set out in paragraph 1 when either:

.1 the ship's designs and arrangements, as a whole, complies with the relevant prescriptive requirements in this chapter;

.2 the ship's designs and arrangements, as a whole, have been reviewed and approved in accordance with Part F of the revised Chapter II-2 of SOLAS 1974, as amended;

.3 part(s) of the ship's designs and arrangements have been reviewed and approved in accordance with the above mentioned Part F of the revised SOLAS Chapter II-2 and the remaining parts of the ship comply with the relevant prescriptive requirements of this chapter.

4.3 Definitions (Reg. II-2/A/3)

.1 ***Accommodation spaces*** are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces. (1)

.2 ***'A' class divisions*** are those divisions formed by bulkheads and decks which comply with the following:

.1 they shall be constructed of steel or other equivalent material;

.2 they shall be suitably stiffened;

.3 they shall be insulated with approved non-combustible materials such that the average temperature of the unexposed side will not rise more than 140 °C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180 °C above the original temperature, within the time listed below:

class 'A-60'	60 minutes
class 'A-30'	30 minutes
class 'A-15'	15 minutes
class 'A-0'	0 minutes

.4 they shall be so constructed as to be capable of preventing the passage of smoke and flame to the end of the one-hour standard fire test;

.5 The Administration of the flag State shall require a test of a prototype bulkhead or deck to ensure that it meets the above requirements for integrity and temperature rise in accordance with the '*Fire Test Procedures Code*'. (2)

.3 ***Atriums*** are public spaces within a single main vertical zone spanning three or more open decks. (3)

.4 ***'B' class divisions*** are those divisions formed by bulkheads, decks, ceilings or linings which comply with the following:

.1 they shall be so constructed as to be capable of preventing the passage of flame to the end of the first half hour of the standard fire test;

.2 they shall have an insulation value such that the average temperature of the unexposed side will not rise more than 140 °C above the original temperature, nor will the temperature at any one point, including any joint, rise more than 225 °C above the original temperature within the time listed below:

class 'B-15' 15 min

class 'B-0' 0 min

.3 they shall be constructed of approved non-combustible materials and all materials entering into the construction and erection of 'B' class divisions shall be non-combustible, with the exception that combustible veneers may be permitted provided they meet other requirements of this chapter;

.4 the Administration of the flag State shall require a test of a prototype division to ensure that it meets the above requirements for integrity and temperature rise in accordance with the '*Fire Test Procedures Code*'. (4)

.5 ***Bulkhead deck*** is the uppermost deck up to which the transverse watertight bulkheads are carried. (5)

.6 ***Cargo spaces*** are all spaces used for cargo (including cargo oil tanks) and trunks to such spaces. (8)

.7 ***Central control station*** is a control station in which the following control and indicator functions are centralised:

.1 fixed fire detection and alarm systems;

.2 automatic sprinklers, fire detection and alarm systems;

.3 fire door indicator panels;

.4 fire doors closures;

.5 watertight door indicator panels;

.6 watertight door closures;

.7 ventilation fans;

.8 general/fire alarms;

.9 communication systems including telephones; and

.10 microphones to public address systems. (9)

.8 ***'C' class divisions*** are divisions constructed of approved non-combustible materials. They need meet neither requirements relative to the passage of smoke and flame nor limitations relative to the temperature rise. Combustible veneers are permitted provided they meet other requirements of this chapter. (10)

.9 ***Closed ro-ro cargo spaces*** are ro-ro cargo spaces which are neither open ro-ro cargo spaces nor weather decks. (12)

.10 ***Continuous 'B' class ceilings or linings*** are those 'B' class ceilings or linings which terminate only at an 'A' or 'B' class division. (16)

.11 ***Continuously manned central control station*** is a central control station which is continuously manned by a responsible member of the crew. (17)

.12 ***Control stations*** are those spaces in which the ship's radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment is centralized. (18)

.13 ***Dangerous goods*** are those goods referred to in the *IMDG Code*, as defined in SOLAS VII/1.1. (20)

.14 ***Fire Safety Systems Code*** means the *International Code for Fire Safety Systems* adopted by Resolution MSC.98 (73), as amended. (22)

.15 ***Fire Test Procedures Code*** means the *International Code for Application of Fire Test Procedures, 2010*, adopted by Resolution MSC.307(88), as amended. (23)

.16 ***Flashpoint*** is the temperature in degrees Celsius (closed cup test) at which a product will give off enough flammable vapour to be ignited, as determined by an approved flashpoint apparatus. (24)

.17 ***Helideck*** is a purpose-built helicopter landing area located on a ship including all structure, fire-fighting appliances and other equipment necessary for the safe operation of helicopters. (26)

.18 ***Low flame spread*** means that the surface thus described will adequately restrict the spread of flame, this being determined in accordance with the *Fire Test Procedures Code*. (29)

.19 ***Machinery spaces*** are all machinery spaces of category A and all other spaces containing propelling machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilising, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces. (30)

.20 ***Machinery spaces of category A*** are those spaces and trunks to such spaces which contain:

- **.1** internal combustion machinery used for main propulsion; or
- **.2** internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW; or
- **.3** any oil-fired boiler or oil fuel unit, or any oil-fired equipment other than boilers, such as inert gas generators, incinerators, etc. (31)

.21 ***Main vertical zones*** are those sections into which the hull, superstructure, and deckhouses are divided by 'A' class divisions, the mean length and width of which on any deck does not in general exceed 40 metres. (32)

.22 ***Non-combustible material*** is a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750 °C, this being determined in accordance with the *Fire Test Procedures Code*. Any other material is a combustible material. (33)

.23 ***Oil fuel unit*** is the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure of more than 0,18 N/mm^2. (34)

.24 ***Open ro-ro cargo spaces*** are ro-ro cargo spaces either open at both ends, or open at one end and provided with adequate natural ventilation effective over the entire length through permanent openings in the side plating or deckhead, or from above, having a total area of at least 10 % of the total area of the space sides. (35)

.25 ***Prescriptive requirements*** mean the constructive characteristics, limiting dimensions or fire safety systems specified in this chapter. (38)

.26 ***Public spaces*** are those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces. (39)

.27 ***Rooms containing furniture and furnishings of restricted fire risk*** are, for the purpose of Reg. II-2/C/9, those rooms containing furniture and furnishings of restricted fire risk (whether cabins, public spaces, offices or other types of accommodation) in which:

.1 all case furniture such as desks, wardrobes, dressing tables, bureaux, dressers, is constructed entirely of approved non-combustible materials, except that a combustible veneer not exceeding 2 mm may be used on the working surface of such articles;

.2 all free-standing furniture such as chairs, sofas, tables, is constructed with frames of non-combustible materials;

.3 all draperies, curtains and other suspended textile materials have qualities of resistance to the propagation of flame not inferior to those of wool of mass 0,8 kg/m^2, in accordance with the *Fire Test Procedures Code*;

.4 all floor coverings have low flame spread characteristics;

.5 all exposed surfaces of bulkheads, linings and ceilings have low flame-spread characteristics; and

.6 all upholstered furniture has qualities of resistance to the ignition and propagation of flame in accordance with the *Fire Test Procedures Code*.

.7 all bedding components have qualities of resistance to the ignition and propagation of flame, this being determined in accordance with the *Fire Test Procedures Code*. (40)

.28 ***Ro-ro cargo spaces*** are spaces not normally subdivided in any way and extending to either a substantial length or the entire length of the ship in which motor vehicles with fuel in their tanks for their own propulsion and/or goods (packaged or in bulk, in or on rail or road cars, vehicles (including road and rail tankers), trailers, containers, pallets, dismountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction. (41)

.29 ***Ro-ro passenger ship*** means a passenger ship with ro-ro cargo spaces or special category spaces as defined in this Reg. II-2/A/3. (42)

.30 ***Service spaces*** are those spaces used for galleys, pantries containing cooking appliances, lockers, mail and specie rooms, storerooms, workshops other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces. (45)

.31 ***Special category spaces*** are those enclosed vehicle spaces above or below the bulkhead deck, into and from which such vehicles can be driven and to which passengers have access. Special category spaces may be accommodated on more than one deck provided that the total overall clear height for vehicles does not exceed 10 metres. (46)

.32 ***A standard fire test*** is the one defined in paragraph 2.2.14. (47)

.33 ***Vehicle spaces*** are cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion. (49)

.34 ***Weather deck*** is a deck which is completely exposed to the weather from above and from at least two sides. (50)

.35 ***Cabin balcony*** is an open deck space which is provided for the exclusive use of the occupants of a single cabin and has direct access from such a cabin. (53)

.36 ***Fire damper*** means, for the purpose of implementing Reg. II-2/C/9, paragraph 7, a device installed in a ventilation duct which under normal conditions remains open allowing flow in the duct and is closed during a fire, preventing the flow in the duct to restrict the passage of fire. In using the above definition, the following terms may be associated:

- **.1** ***automatic fire damper*** means a fire damper that closes independently in response to exposure to fire products;
- **.2** ***manual fire damper*** means a fire damper that is intended to be opened or closed by the crew by hand at the damper itself; and
- **.3** ***remotely operated fire damper*** means a fire damper that is closed by the crew through a control located at a distance away from the controlled damper. (54)

.37 ***Smoke damper*** means, for the purpose of implementing Reg. II-2/C/9, paragraph 7, a device installed in a ventilation duct which under normal conditions remains open allowing flow in the duct and is closed during a fire, preventing the flow in the duct to restrict the passage of smoke and hot gases. A smoke damper is not expected to contribute to the integrity of a fire rated division penetrated by a ventilation duct. In using the above definition the following terms may be associated:

- **.1** ***automatic smoke damper*** means a smoke damper that closes independently in response to exposure to smoke or hot gases;
- **.2** ***manual smoke damper*** means a smoke damper intended to be opened or closed by the crew by hand at the damper itself; and
- **.3** ***remotely operated smoke damper*** means a smoke damper that is closed by the crew through a control located at a distance away from the controlled damper. (55)

PART B
PREVENTION OF FIRE AND EXPLOSION

4.4 Probability of ignition (Reg. II-2/B/4)

4.4.1 Purpose (1)

The purpose of this Reg. II-2/B/4 is to prevent the ignition of combustible materials or flammable liquids.
For this purpose, the following functional requirements shall be met:

.1 means shall be provided to control leaks of flammable liquids;

.2 means shall be provided to limit the accumulation of flammable vapours;

.3 the ignitability of combustible materials shall be restricted;

.4 ignition sources shall be restricted; and

.5 ignition sources shall be separated from combustible materials and flammable liquids.

4.4.2 Arrangements for oil fuel, lubricating oil and other flammable oils (2)

4.4.2.1 Limitations in the use of oil as fuel (2.1)

The following limitations shall apply to the use of oil as fuel:

.1 Except as otherwise permitted by this paragraph, no oil fuel with a flashpoint of less than 60 °C shall be used.

.2 In emergency generators, oil fuel with a flashpoint of not less than 43 °C may be used.

.3 Subject to such additional precautions as it may consider necessary and on condition that the ambient temperature of the space in which such oil fuel is stored or used shall not be allowed to rise to within 10 °C below the flashpoint of the oil fuel, the Administration of the flag State may permit the use of oil fuel having a flashpoint of less than 60 °C but not less than 43 °C (e.g., for feeding the emergency fire pump's engines and the auxiliary machines which are not located in the machinery spaces of category A), subject to the following:

.3.1 fuel oil tanks except those arranged in double bottom compartments shall be located outside of machinery spaces of category A;

.3.2 provisions for the measurement of oil temperature are provided on the suction pipe of the oil fuel pump;

.3.3 stop valves and/or cocks are provided on the inlet side and outlet side of the oil fuel strainers and;

.3.4 pipe joints of welded construction or of circular cone type or spherical type union joint are applied as much as possible.

The flashpoint of oils shall be determined by an approved closed cup method. (3)

.4 In ships, to which part G of Chapter II-1 is applicable, the use of oil fuel having a lower flashpoint than otherwise specified in subparagraph 2.1.1 is permitted. (5)

4.4.2.2 **Arrangements for oil fuel** (2.2)

In a ship in which oil fuel is used, the arrangements for the storage, distribution and utilisation of the oil fuel shall be such as to ensure the safety of the ship and persons on board and shall at least comply with the following provisions

4.4.2.2.1 **Location of oil fuel systems** (2.2.1)

As far as practicable, parts of the oil fuel system containing heated oil under pressure exceeding 0,18 N/mm^2 shall not be placed in a concealed position such that defects and leakage cannot readily be observed. The machinery spaces in way of such parts of the oil fuel system shall be adequately illuminated. By heated oil is meant oil the temperature of which after heating is higher than 60 °C or higher than the current flashpoint of the oil, if this is lower than 60 °C.

4.4.2.2.2 **Ventilation of machinery spaces** (2.2.2)

The ventilation of machinery spaces shall be sufficient under all normal conditions to prevent accumulation of oil vapour.

4.4.2.2.3 **Oil fuel tanks** (2.2.3)

4.4.2.2.3.1 Fuel oil, lubrication oil and other flammable oils shall not be carried in forepeak tanks. (2.2.3.1)

4.4.2.2.3.2 As far as practicable, oil fuel tanks shall be part of the ship's structure and shall be located outside machinery spaces. Where oil fuel tanks, other than double bottom tanks, are necessarily located adjacent to or within machinery spaces, at least one of their vertical sides shall be contiguous to the machinery space boundaries, and shall preferably have a common boundary with the double bottom tanks, and the area of the tank boundary common with the machinery spaces shall be kept to a minimum. Where such tanks are situated within the boundaries of machinery spaces they shall not contain oil fuel having a flashpoint of less than 60 °C. The use of freestanding oil fuel tanks shall be avoided and shall be prohibited in machinery spaces. (2.2.3.2)

4.4.2.2.3.3 No oil fuel tank shall be situated where spillage or leakage therefrom can constitute a hazard by falling on heated surfaces. (2.2.3.3)

4.4.2.2.3.4 Every oil fuel pipe, which, if damaged, would allow oil to escape from a storage, settling or daily service tank, having a capacity of 500 litres or above, situated above the double bottom, shall be fitted with a cock or valve directly on the tank capable of being closed from a safe position outside the space concerned in the event of a fire occurring in the space in which such tanks are situated. In the special case of deep tanks situated in any shaft or pipe tunnel or similar space, valves on the tank shall be fitted but control in the event of fire may be effected by means of an additional valve on the pipe or pipes outside the tunnel or similar space. If such additional valve is fitted in the machinery space it shall be operated from a position outside this space. The controls for remote operation of the valve for the emergency generator fuel tank shall be in a separate location from the controls for remote operation of other valves located in machinery spaces. (2.2.3.4)

4.4.2.2.3.5 In ships having a gross tonnage of less than 500, fuel tanks above the double bottom shall be fitted with a cock or valve. (2.2.3.4a)

4.4.2.2.3.6 Safe and efficient means of ascertaining the amount of oil fuel contained in any oil fuel tank shall be provided. (2.2.3.5)

4.4.2.2.3.6.1 Sounding pipes shall not terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they shall not terminate in passenger or crew spaces. As a general rule, sounding pipes shall not terminate in machinery spaces. However, where the Administration of the flag State considers that these latter requirements are impracticable, it may permit termination of sounding pipes in machinery spaces on condition that all the following requirements are met:

.1 in addition, an oil-level gauge is provided meeting the requirements of subparagraph 2.2.3.5.2;

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

.3 the termination of sounding pipes are fitted with self-closing blanking devices and with a small-diameter self-closing control cock located below the blanking device for the purpose of ascertaining before the blanking device is opened that oil fuel is not present. Provision shall be made as to ensure that any spillage of oil fuel through the control cock involves no ignition hazard. (2.2.3.5.1)

4.4.2.2.3.6.2 Other means of ascertaining the amount of oil fuel contained in any oil fuel tank may be permitted if such means do not require penetration below the top of the tank, and providing their failure or overfilling of the tanks will not permit release of fuel. (2.2.3.5.2)

4.4.2.2.3.6.3 Means prescribed in subparagraph 2.2.3.5.2 shall be maintained in the proper condition to ensure their continued accurate functioning in service. (2.2.3.5.3)

4.4.2.2.4 **Prevention of overpressure** (2.2.4)

Provisions shall be made to prevent overpressure in any oil tank or in any part of the oil fuel system, including the filling pipes served by pumps on board. Any relief valves and air or overflow pipes shall discharge to a position where there is no risk of fire or explosion from the emergence of oils and vapour and shall not lead into crew spaces, passenger spaces nor into special category spaces, closed ro-ro cargo spaces, machinery spaces or similar spaces.

4.4.2.2.5 **Oil fuel piping** (2.2.5)

4.4.2.2.5.1 Oil fuel pipes and their valves and fittings shall be of steel or other approved material, except that restricted use of flexible pipes may be permitted. Such flexible pipes and end attachments shall be of approved fire-resisting materials of adequate strength.
For valves, fitted to oil fuel tanks and which are under static pressure, steel or spheroidal-graphite cast iron may be accepted. However, ordinary cast iron valves may be used in piping systems, where the design pressure is lower than 7 bar and the design temperature is below 60 °C. (2.2.5.1)

4.4.2.2.5.2 All external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors shall be protected with a jacketed piping system capable of containing fuel from a high pressure line failure. A jacketed pipe incorporates an outer pipe into which the high-pressure fuel pipe is placed forming a permanent assembly. The jacketed piping system shall

include a means for collection of leakages and arrangements shall be provided for an alarm to be given in case of a fuel line failure. (2.2.5.2)

4.4.2.2.5.3 Oil fuel lines shall not be located immediately above or near units of high temperature including boilers, steam pipelines, exhaust manifolds, silencers or other equipment required to be insulated. As far as practicable, oil fuel lines shall be arranged far apart from hot surfaces, electrical installations or other sources of ignition and shall be screened or otherwise suitably protected to avoid oil spray or oil leakage onto the sources of ignition. The number of joints in such piping systems shall be kept to a minimum. (2.2.5.3)

4.4.2.2.5.4 Components of a diesel engine fuel system shall be designed considering the maximum peak pressure which will be experienced in service, including any high pressure pulses which are generated and transmitted back into fuel supply and spill lines by the action of fuel injection pumps. Connections within the fuel supply and spill lines shall be constructed having regard to their ability to prevent pressurised oil fuel leaks while in service and after maintenance. (2.2.5.4)

4.4.2.2.5.5 In multi-engine installations which are supplied from the same fuel source, means of isolating the fuel supply and spill piping to individual engines, shall be provided. The means of isolation shall not affect the operation of the other engines and shall be operable from a position not rendered inaccessible by a fire on any of the engines. (2.2.5.5)

4.4.2.2.5.6 Where the Administration of the flag State may permit the conveying of oil, combustible or other flammable liquids through accommodation, service spaces or control stations; the conveying pipes shall be of a material approved by the Administration having regard to the fire risk. (2.2.5.6)

4.4.2.2.6 Protection of high-temperature surfaces (2.2.6)

4.4.2.2.6.1 All surfaces with temperatures above 220 °C which may be impinged as a result of a fuel system failure shall be properly insulated. (2.2.6.1)

4.4.2.2.6.2 Precautions shall be taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces. (2.2.6.2)

4.4.2.3 Lubricating oil arrangements (2.3)

4.4.2.3.1 The arrangements for the storage, distribution and utilisation of oil used in pressure lubrication systems shall be such as to ensure the safety of the ship and persons on board, and such arrangements in machinery spaces shall at least comply with the provisions of subparagraphs 2.2.1, 2.2.3.3, 2.2.3.4, 2.2.3.5, 2.2.4, 2.2.5.1, 2.2.5.3 and 2.2.6, except that:

.1 this does not preclude the use of sight-flow glasses in lubricating systems provided that they are shown by test to have a suitable degree of fire resistance. If sight-flow glasses are used, the pipe shall be provided with valves in both ends. The valve at the lower end of the pipe shall be of a self-closing type;

.2 sounding pipes may be authorised in machinery spaces; the requirements of subparagraphs 2.2.3.5.1.1 and 2.2.3.5.1.3 need not be applied on condition that the sounding pipes are fitted with appropriate means of closure. (2.3.1)

4.4.2.3.2 The provisions of subparagraph 2.2.3.4 shall also apply to lubricating oil tanks except those having a capacity less than 500 litres, storage tanks on which valves are closed during the normal operation of the ship or where it is determined that the unintended operation of a quick closing valve on the lubricating oil tank would endanger the safe operation of the main propulsion and essential auxiliary machinery. (2.3.2)

4.4.2.4 Arrangements for other flammable oils (2.4)

The arrangements for the storage, distribution and utilisation of other flammable oils employed under pressure in power transmission systems, control and activating systems and heating systems shall be such as to ensure the safety of the ship and persons on board. In locations where means of ignition are present, such arrangements shall at least comply with the provisions of subparagraphs 2.2.3.3, 2.2.3.5, 2.2.5.3 and 2.2.6 and with the provisions of subparagraphs 2.2.4 and 2.2.5.1 in respect of strength and construction.

4.4.2.5 Periodically unattended machinery spaces (2.5)

In addition to the requirements of provisions of subparagraphs 2.1 to 2.4, the oil fuel and lubricating oil systems shall comply with the following:

.1 where daily service oil fuel tanks are filled automatically, or by remote control, means shall be provided to prevent overflow spillages. Other equipment which treats flammable liquids automatically, e.g. oil fuel purifiers, which, whenever practicable, shall be installed in a special space reserved for purifiers and their heaters, shall have arrangements to prevent overflow spillages;

.2 where daily service oil fuel tanks or settling tanks are fitted with heating arrangements, a high temperature alarm shall be provided if the flashpoint of the oil fuel can be exceeded.

4.4.3 Arrangements for gaseous fuel for domestic purpose (3)

Gaseous fuel systems used for domestic purposes shall be approved by the Administration of the flag State. Storage of gas bottles shall be located on the open deck or in a well ventilated space which opens only to the open deck.

4.4.4 Miscellaneous items of ignition sources and ignitability (4)

4.4.4.1 Electric radiators (4.1)

Electric radiators, if used, shall be fixed in position and so constructed as to reduce fire risks to a minimum. No such radiators shall be fitted with an element so exposed that clothing, curtains, or other similar materials can be scorched or set on fire by heat from the element.

4.4.4.2 Waste receptacles (4.2)

All waste receptacles shall be constructed of non-combustible materials with no openings in the sides or bottom.

4.4.4.3 Insulation surfaces protected against oil penetration (4.3)

In spaces where penetration of oil products is possible, the surface of insulation shall be impervious to oil or oil vapours.

4.4.4.3.1 In spaces where there is a risk of oils splashing or oil vapour, e.g. in machinery spaces of category A, the surface of the insulating material shall be impermeable by oil and oil vapour. Where in referred ships there is covering by non-perforated steel plate or other non-combustible materials (not aluminium) which is the ultimate physical surface, this covering may be joined by seaming, riveting, etc. (4.3.100)

4.4.4.4 Primary deck coverings (4.4)

Primary deck coverings, if applied within accommodation, cabin balconies, service spaces and control stations, shall be of an approved material which will not readily ignite, this being determined in accordance with the IMO *Fire Test Procedure Code*.

4.4.5 Pressurised gas containers (4.100)

All portable containers for gases which are compressed, liquefied or broken down under pressure, which may feed a possible fire, shall immediately after use be put in a suitable place above the bulkhead deck, from which there is direct access to open deck.

4.5 Fire growth potential (Reg. II-2/B/5)

4.5.1 Purpose (1)

The purpose of this Reg. II-2/B/5 is to limit the fire growth potential in every space of the ship. For this purpose, the following functional requirements shall be met:

.1 means of control for the air supply to the space shall be provided;

.2 means of control for flammable liquids in the space shall be provided; and

.3 the use of combustible materials shall be restricted.

4.5.2 Control of air supply and flammable liquid to the space (2)

4.5.2.1 Closing appliances and stopping devices of ventilation (2.1)

4.5.2.1.1 The main inlets and outlets of ventilation systems shall be capable of being closed from outside the spaces being ventilated. The means of closing shall be easily accessible as well as prominently and permanently marked and shall indicate the operating position of the closing device. (2.1.1)

4.5.2.2 Means of control in machinery spaces (2.2)

4.5.2.2.1 Means of control shall be provided for opening and closure of skylights, closure of openings in funnels which normally allow exhaust ventilation, and closure of ventilator dampers. (2.2.1)

4.5.2.2.2 Means of control shall be provided for stopping ventilating fans. (2.2.2)

4.5.2.2.3 Means of control shall be provided for stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps, lubricating oil service pumps, thermal oil circulating pumps and oil separators. However, paragraphs 2.2.4 and 2.2.5 of this Reg. II-2/B/5 need not apply to oily water separators. (2.2.3)

4.5.2.2.4 The controls required in paragraphs 2.2.1 to 2.2.3 and Reg. II-2/B/4, subparagraph 2.2.3.4 shall be located outside the space concerned, where they will not be cut off in the event of fire in the space they serve. (2.2.4)

4.5.2.2.5 Such controls and the controls for any required fire-extinguishing system shall be situated at one control position or grouped in as few positions as possible. Such positions shall have a safe access from the open deck. (2.2.5)

4.5.3 Fire protection materials (3)

4.5.3.1 Use of non-combustible materials (3.1)

4.5.3.1.1 Insulating materials (3.1.1)

Insulating materials shall be non-combustible, except in cargo spaces, mail rooms, baggage rooms and refrigerated compartments of service spaces.
Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings for cold service systems need not be non-combustible, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame spread characteristics.

4.5.3.1.2 Ceilings and linings (3.1.2)

Except in cargo spaces, mail rooms, baggage rooms, or refrigerated compartments of service spaces, all linings, grounds, draught stops, ceilings, and insulations shall be of non-combustible materials.

4.5.3.1.3 Partial bulkheads and decks (3.1.3)

4.5.3.1.3.1 Partial bulkheads or decks used to subdivide a space for utility or artistic treatment shall be of non-combustible materials. (3.1.3.1)

4.5.3.1.3.2 Linings, ceilings and partial bulkheads or decks used to screen or to separate adjacent cabin balconies shall be of non-combustible materials. (3.1.3.2)

4.5.3.2 Use of combustible materials (3.2)

4.5.3.2.1 General (3.2.1)

4.5.3.2.1.1 'A', 'B' or 'C' class divisions in accommodation and services spaces and cabin balconies which are faced with combustible materials, facings, mouldings, decorations and veneers shall comply with the provisions of paragraphs 3.2.2 to 3.2.4 and Reg. II-2/B/6. However, traditional wooden benches and wooden linings on bulkheads and ceilings are permitted in saunas and such materials need not be subject to the calculations prescribed in paragraphs 3.2.2 and 3.2.3. However, the provisions of paragraph 3.2.3 need not be applied to cabin balconies. (3.2.1.1)

4.5.3.2.2 Maximum calorific value of combustible materials (3.2.2)

Veneers used on surfaces and linings covered by the requirements of paragraph 3.2.4 shall have a calorific value not exceeding 45 MJ/m^2 of the area for the thickness used.

4.5.3.2.3 Total volume of combustible materials (3.2.3)

.1 The total volume of combustible facings, mouldings, decorations and veneers in any accommodation and service space shall not exceed a volume equivalent to 2,5 mm veneer on the combined area of the walls and ceilings. Furniture fixed to linings, bulkheads or decks need not be included in the calculation of the total volume of combustible materials.

.2 In the case of ships fitted with an automatic sprinkler system complying with the provisions of Reg. II-2/C/10, subparagraph 6.1.100, the above volume may include some combustible material used for erection of 'C' class divisions.

4.5.3.2.4 Low flame-spread characteristics of exposed surfaces (3.2.4)

The following surfaces shall have low flame-spread characteristics:

.1 exposed surfaces in corridors and stairway enclosures, and of bulkheads, wall and ceiling linings in all accommodation and service spaces (except saunas) and control stations;

.2 concealed or inaccessible spaces in accommodation, service spaces and control stations.

.3 exposed surfaces of cabin balconies, except for natural hard wood decking systems.

4.5.4 Furniture in stairway enclosures (3.3)

Furniture in stairway enclosures shall be limited to seating. It shall be fixed, limited to six seats on each deck in each stairway enclosure, be of restricted fire risk, and shall not restrict the passenger escape route. The Administration of the flag State may permit additional seating in the main reception area within a stairway enclosure if it is fixed, non-combustible and does not restrict the passenger escape route. Furniture shall not be permitted in passenger and crew corridors forming escape routes in cabin areas. In addition to the above, lockers of non-combustible material, providing storage for safety equipment required by the relevant Regulations, may be permitted. Drinking water dispensers and ice cube machines may be permitted in corridors provided they are fixed and do not restrict the width of the escape routes. This applies as well to decorative flower or plant arrangements, statues or other objects of art such as paintings and tapestries in corridors and stairways.

4.5.5 Furniture and furnishings on cabin balconies (3.4)

Furniture and furnishings on cabin balconies shall comply with subparagraphs 40.1, 40.2, 40.3, 40.6 and 40.7 of Reg. II-2/A/3 unless such balconies are protected by a fixed pressure water-spraying and fixed fire detection and fire alarm systems complying with Reg. II-2/C/7, paragraph10 and Reg. II-2/C/10, subparagraph 6.1.3.

4.6 Smoke generation potential and toxicity (Reg. II-2/B/6)

4.6.1 Purpose (1)

The purpose of this Reg. II-2/B/6 is to reduce the hazard to life from smoke and toxic products generated during a fire in spaces where persons normally work or live. For this purpose, the quantity of smoke and toxic products released from combustible materials, including surface finishes, during fire shall be limited.

4.6.2 Paints, varnishes, other finishes and primary deck coverings (2)

4.6.2.1 Paints, varnishes and other finishes used on exposed interior surfaces shall not be capable of producing excessive quantities of smoke and toxic products, this being determined in accordance with the *Fire Test Procedures Code*. (2.1)

4.6.2.2 Paints, varnishes and other finishes used on exposed surfaces of cabin balconies, excluding natural hard wood decking systems, shall not be capable of producing excessive quantities of smoke and toxic products, this being determined in accordance with the *Fire Test Procedures Code*. (2.2)

4.6.2.3 Primary deck coverings, if applied within accommodation and service spaces and control stations, shall be of an approved material which will not give rise to toxic or explosive hazards at elevated temperatures, this being determined in accordance with the *Fire Test Procedure Code*. (3.1)

4.6.2.4 Primary deck coverings on cabin balconies shall not give rise to smoke, toxic or explosive hazards at elevated temperatures, this being determined in accordance with the *Fire Test Procedures Code*. (3.2)

PART C
SUPPRESSION OF FIRE

4.7 Detection and alarm (Reg. II-2/C/7)

4.7.1 Purpose (1)

The purpose of this Reg. II-2/C/7 is to detect a fire in the space of origin and to provide alarm for safe escape and fire-fighting activity. For this purpose, the following functional requirements shall be met:

.1 fixed fire detection and fire alarm system installations shall be suitable for the nature of the space, fire growth potential and potential generation of smoke and gases;

.2 manually operated call points shall be placed effectively to ensure a readily accessible means of notification; and

.3 fire patrols shall provide an effective means of detecting and locating fires and alerting the navigation bridge and fire teams, where appropriate.

4.7.2 General requirements (2)

4.7.2.1 The fixed fire detection and fire alarm systems shall be of an approved type, complying with the provisions of the *Fire Safety Systems Code*. (2.2)

4.7.3 Protection of machinery spaces (4)

4.7.3.1 Installation (4.1)

A fixed fire detection and fire alarm system of an approved type, in accordance with the provisions of subparagraph 2.2, shall be installed in:

.1 periodically unattended machinery spaces;

.2 machinery spaces where:

.2.1 the installation of automatic and remote control systems and equipment has been approved in lieu of continuous manning of the space; and

.2.2 the main propulsion and associated machinery including sources of main source of electrical power are provided with various degrees of automatic or remote control and are under continuous manned supervision from a control room; and

.3 enclosed spaces containing incinerators.

4.7.4 Design (4.2)

With regard to the fixed fire detection and fire alarm system required by subparagraphs 4.1.1, 4.1.2 and 4.1.3, the following shall apply:

The fire detection system shall be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is especially appropriate, detection systems using only thermal detectors shall not be permitted. The detection system shall

initiate audible and visual alarms distinct in both respects from the alarms of any other system not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the navigating bridge and by a responsible engineer officer. When the navigating bridge is unmanned, the alarm shall sound in a place where a responsible member of the crew is on duty.

After installation, the system shall be tested under varying conditions of engine operation and ventilation.

4.7.5 Protection of accommodation and service spaces and control stations (5)

4.7.5.1 Requirements for ships carrying more than 36 passengers (5.2)

A fixed fire detection and fire alarm system of an approved type, complying with the requirements of subparagraph 2.2 shall be installed, so installed and arranged as to provide smoke detection in service spaces, control stations and accommodation spaces, including corridors and stairways. Smoke detectors need not be fitted in private bathrooms and galleys. Spaces having little or no fire risk such as voids, public toilets, carbon dioxide rooms and similar spaces need not be fitted with a fixed fire detection and alarm system.

4.7.5.2 Requirements for ships carrying not more than 36 passengers (5.3)

There shall be installed throughout each separate zone, whether vertical or horizontal, in all accommodation and service spaces and in control stations, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc., either:

.1 a fixed fire detection and fire alarm system of an approved type and complying with the requirements of paragraph 2.2 and so installed and arranged as to detect the presence of fire in such spaces and providing smoke detection in corridors, stairways and escape routes within accommodation spaces, or,

.2 an automatic sprinkler, fire detection and fire alarm system of an approved type complying with the requirements of Reg. II-2/C/10, subparagraph 6.1.100 or with the IMO *Guidelines for an approved equivalent sprinkler system* as given in IMO Resolution A.800(19) and so installed and arranged as to protect such spaces and, in addition, a fixed fire detection and fire alarm system of an approved type and complying with the requirements of subparagraph 2.2 and so installed and arranged as to provide smoke detection in corridors, stairways and escape routes within accommodation spaces.

4.7.6 Protection of cargo spaces (6)

A fixed fire detection and fire alarm system or a sample extraction smoke detection system shall be provided in any cargo space which is not accessible.

4.7.7 Manually operated call points (7)

Manually operated call points complying with the *Fire Safety Systems Code* shall be installed throughout the accommodation spaces, service spaces and control stations. One manually operated call point shall be located at each exit. Manually operated call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 metres from a manually operated call point.

4.7.7.1 **Fire patrols** (8.1)

For ships carrying more than 36 passengers, an efficient patrol system shall be maintained so that an outbreak of fire may be promptly detected. Each member of the fire patrol shall be trained to be familiar with the arrangements of the ship as well as the location and operation of any equipment he or she may be called upon to use.

4.7.7.2 **Two-way portable radiotelephone apparatus** (8.3)

Each member of the fire patrol shall be provided with a two-way portable radio telephone apparatus.

4.7.8 **Fire alarm signalling systems** (9)

4.7.8.1 All ships shall at all times when at sea, or in port (except when out of service), be so manned or equipped as to ensure that any initial fire alarm is immediately received by a responsible member of the crew. (9.1)

4.7.8.2 The control panel shall be designed on the fail-safe principle, e.g. an open detector circuit shall cause an alarm condition. (9.2)

4.7.8.3 Ships carrying more than 36 passengers shall have the detection alarms for the systems required by subparagraph 5.2 centralised in a continuously manned central control station. In addition, controls for remote closing of the fire doors and shutting down the ventilation fans, shall be centralised in the same location. The ventilation fans shall be capable of reactivation by the crew at the continuously manned control station. The control panel in the central control station shall be capable of indicating open or closed positions of fire doors, closed or off status of the detectors, alarms and fans. The control panel shall be continuously powered and should have an automatic changeover to standby power supply in case of loss of normal power supply. The control panel shall be powered from the main source of electrical power and the emergency source of electrical power defined by Reg. II-1/D/42 unless other arrangements are permitted by the Regulations, as applicable. (9.3)

4.7.8.4 A special alarm, operated from the navigating bridge or fire control station, shall be fitted to summon the crew. This alarm may be part of the ship's general alarm system but it shall be capable of being sounded independently of the alarm to the passenger spaces. (9.4)

4.7.9 **Protection of cabin balconies on passenger ships** (10)

A fixed fire detection and fire alarm system complying with the provisions of the *Fire Safety Systems Code* shall be installed on cabin balconies of ships to which Reg. II-2/B/5, subparagraph 3.4 applies, when furniture and furnishings on such balconies are not as defined in subparagraphs 40.1, 40.2, 40.3, 40.6 and 40.7 of Reg. II-2/A/3.

4.8 **Control of smoke spread** (Reg. II-2/C/8)

4.8.1 **Purpose** (1)

The purpose of this Reg. II-2/C/8 is to control the spread of smoke in order to minimize the hazards from smoke. For this purpose, means for controlling smoke in atriums, control stations, machinery spaces and concealed spaces shall be provided.

4.8.2 Protection of control stations outside machinery spaces (2)

Practicable measures shall be taken for control stations outside machinery spaces in order to ensure that ventilation, visibility and freedom from smoke are maintained so that, in the event of fire, the machinery and equipment contained therein may be supervised and continue to function effectively. Alternative and separate means of air supply shall be provided and air inlets of the two sources of supply shall be so disposed that the risk of both inlets drawing in smoke simultaneously is minimized. At the discretion of the Administration, such requirements need not apply to control stations situated on, and opening on to, an open deck or where local closing arrangements would be equally effective.

4.8.3 Release of smoke from machinery spaces (3)

4.8.3.1 Suitable arrangements shall be made to permit the release of smoke in the event of fire, from the space to be protected.(3.2)

4.8.3.2 Means of control shall be provided for permitting the release of smoke and such controls shall be located outside the space concerned, where they will not be cut off in the event of fire in the space they serve (3.3)

4.8.3.3 The controls required by paragraph 3.3 shall be situated at one control position or grouped in as few positions as possible. Such positions shall have a safe access from the open deck. (3.4)

4.8.4 Draught stops (4)

In accommodation and service spaces, control stations, corridors and stairways:

.1 air spaces enclosed behind ceilings, panelling or linings shall be suitably divided by close-fitting draught stops placed not more than 14 metres apart;

.2 in the vertical direction, such enclosed air spaces, including those behind linings of stairways, trunks, etc. shall be closed at each deck.

4.8.5 Smoke extraction systems in atriums (5)

Atriums shall be equipped with a smoke extraction system. The smoke extraction system shall be activated by the required smoke detection system and be capable of manual control. The fans shall be sized such that the entire volume within the space can be exhausted in 10 min or less.

4.9 Containment of fire (Reg. II-2/C/9)

4.9.1 Purpose (1)

The purpose of this Reg. II-2/C/9 is to contain a fire in the space of origin. For this purpose, the following functional requirements shall be met:

.1 the ship shall be subdivided by thermal and structural boundaries;

.2 thermal insulation of boundaries shall have due regard to the fire risk of the space and adjacent spaces; and

.3 the fire integrity of the divisions shall be maintained at openings and penetrations.

4.9.2 Thermal and structural boundaries (2)

4.9.2.1 Main vertical zones and horizontal zones (2.2.1)

4.9.2.1.1.1 In ships carrying more than 36 passengers, the hull, superstructure and deckhouses shall be subdivided into main vertical zones by A-60 class divisions. Steps and recesses shall be kept to a minimum but, where they are necessary, they shall also be A-60 class divisions. Where a category (5), (9) or (10) space defined in paragraph 2.2.3.2.2, is on one side or where fuel oil tanks are on both sides of the division, the standard may be reduced to A-0. (2.2.1.1.1)

4.9.2.1.1.2 For ships carrying not more than 36 passengers, the hull, superstructure and deckhouses in way of accommodation and service spaces shall be subdivided into main vertical zones by 'A' class divisions. These divisions shall have insulation values in accordance with the tables in paragraph 2.2.4. (2.2.1.1.2)

4.9.2.1.2 As far as practicable, the bulkheads forming the boundaries of the main vertical zones above the bulkhead deck shall be in line with watertight subdivision bulkheads situated immediately below the bulkhead deck. The length and width of main vertical zones may be extended to a maximum of 48 metres in order to bring the ends of main vertical zones to coincide with subdivision watertight bulkheads or in order to accommodate a large public space extending for the whole length of the main vertical zone provided that the total area of the main vertical zone is not greater than 1 600 m^2 on any deck. The length or width of a main vertical zone is the maximum distance between the furthermost points of the bulkheads bounding it. (2.2.1.2)

4.9.2.1.3 Such bulkheads shall extend from deck to deck and to the shell or other boundaries (2.2.1.3)

4.9.2.1.4 Where a main vertical zone is subdivided by horizontal 'A' class divisions into horizontal zones for the purpose of providing an appropriate barrier between a zone with sprinklers and a zone without sprinklers, the divisions shall extend between adjacent main vertical zone bulkheads and to the shell or exterior boundaries of the ship and shall be insulated in accordance with the fire insulation and integrity values given in table 9.4. (2.2.1.4)

4.9.2.1.4.1 On ships designed for special purposes, such as automobile or railroad car ferries where the provision of main vertical zone bulkheads would defeat the purpose for which the ship is intended, equivalent protection shall be obtained by dividing space in horizontal zones. (2.2.1.5.1)

4.9.2.1.4.2 However, in a ship with special category spaces, any such space shall comply with the applicable provisions of Reg. II-2/G/20 and in so far as such compliance would be inconsistent with compliance with other requirements of this part, the requirements of Reg. II-2/G/20 shall prevail. (2.2.1.5.2)

4.9.2.2 Bulkheads within a main vertical zone (2.2.2)

4.9.2.2.1 For ships carrying more than 36 passengers all bulkheads which are not required to be 'A' class divisions shall be at least 'B' class or 'C' class divisions as prescribed in the tables in paragraph 2.2.3. All such divisions may be faced with combustible materials in accordance with the provisions of Reg. II-2/B/5, paragraph 3. (2.2.2.1)

4.9.2.2.2 For ships carrying not more than 36 passengers all bulkheads within accommodation and service spaces which are not required to be 'A' class divisions shall be at least 'B' class or 'C' class divisions as prescribed in the tables in paragraph 2.2.4. All such divisions may be faced with combustible materials in accordance with the provisions of Reg. II-2/B/5, paragraph 3.

In addition, in ships carrying not more than 36 passengers all corridor bulkheads, where not required to be 'A' class, shall be 'B' class divisions which shall extend from deck to deck except:

.1 when continuous 'B' class ceilings or linings are fitted on both sides of the bulkhead, the portion of the bulkhead behind the continuous ceiling or lining shall be of material which, in thickness and composition, is acceptable in the construction of 'B' class divisions, but which shall be required to meet 'B' class integrity standards only in so far as is reasonable and practicable;

.2 in the case of a ship protected by an automatic sprinkler system complying with the provisions of Reg. II-2/C/10, subparagraph 6.1.100, the corridor bulkheads of 'B' class materials may terminate at a ceiling in the corridor provided such ceiling is of material which, in thickness and composition, is acceptable in the construction of 'B' class divisions.

Notwithstanding the requirements of paragraph 2.2.4, such bulkheads and ceilings shall be required to meet 'B' class integrity standards only in so far as is reasonable and practicable. All doors and frames in such bulkheads shall be of non-combustible materials and shall be so constructed and erected as to provide substantial fire resistance. (2.2.2.2)

4.9.2.2.3 All bulkheads required to be 'B' class division, except corridor bulkheads prescribed in paragraph 2.2.2.2, shall extend from deck to deck and to the shell or other boundaries unless the continuous 'B' class ceilings or linings fitted on both sides of the bulkheads are at least of the same fire resistance as the bulkhead, in which case the bulkhead may terminate at the continuous ceiling or lining. (2.2.2.3)

4.9.2.3 Fire integrity of bulkheads and decks in ships carrying more than 36 passengers (2.2.3)

4.9.2.3.1 In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this part, the minimum fire integrity of all bulkheads and decks shall be as prescribed in tables 9.1 and 9.2. (2.2.3.1)

4.9.2.3.2 The following requirements shall govern the application of the tables:

.1 Table 9.1 shall apply to bulkheads not bounding either main vertical zones or horizontal zones. Table 9.2 shall apply to decks not forming steps in main vertical zones nor bounding horizontal zones.

.2 For determining the appropriate fire integrity standards to be applied to boundaries between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (14). Where the contents and use of a space are such that there is a doubt as to its classification for the purpose of this Reg. II-2/C/9, it shall be treated as a space within the relevant category having the most stringent boundary requirements. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables.

(1) Control stations:

— spaces containing emergency sources of power and lighting,

— wheelhouse and chartroom,

— spaces containing the ship's radio equipment,

— fire-extinguishing rooms, fire control rooms and fire-recording stations,

— control room for propulsion machinery when located outside the propulsion machinery space,

— spaces containing centralised fire alarm equipment,

— spaces containing centralised emergency public address system stations and equipment.

(2) Stairways:

— interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) for passengers and crew and enclosures thereto;

— in this connection a stairway which is enclosed at only one level shall be regarded as part of the space from which it is not separated by a fire door.

(3) Corridors:

— passenger and crew corridors.

(4) Evacuation stations and external escape routes:

— survival craft stowage area,

— open deck spaces and enclosed promenades forming lifeboat and life-raft embarkation and lowering stations,

— assembly stations, internal and external,

— external stairs and open decks used for escape routes,

— the ship's side to the waterline in the lightest seagoing condition, superstructure and deckhouse sides situated below and adjacent to the life-rafts and evacuation slide's embarkation areas.

(5) Open deck spaces:

— open deck spaces and enclosed promenades clear of lifeboat and life-raft embarkation and lowering stations,

— air spaces (the space outside superstructures and deckhouses).

(6) Accommodation spaces of minor fire risk:

— cabins containing furniture and furnishing of restricted fire risk,

— offices and dispensaries containing furniture and furnishings of restricted fire risk,

— public spaces containing furniture and furnishings of restricted fire risk and having a deck area of less than 50 m^2.

(7) Accommodation spaces of moderate fire risk:

- spaces as in category (6) above but containing furniture and furnishing of other than restricted fire risk,
- public spaces containing furniture and furnishing of restricted fire risk and having a deck area of 50 m^2 or more,
- isolated lockers and small storerooms in accommodation spaces having areas less than 4 m^2 (in which flammable liquids are not stowed),
- sale shops,
- motion picture projection and film stowage rooms,
- diet kitchens (containing no open flame),
- cleaning gear lockers (in which flammable liquids are not stowed),
- laboratories (in which flammable liquids are not stowed),
- pharmacies,
- small drying rooms (having a deck area of 4 m^2 or less),
- specie rooms,
- operating rooms.

(8) Accommodation spaces of greater fire risk:

- public spaces containing furniture and furnishing of other than restricted fire risk and having a deck area of 50 m^2 or more,
- barber shops and beauty parlours,
- saunas,
- sale shops.

(9) Sanitary and similar spaces:

- communal sanitary facilities, shower, baths, water closets, etc.,
- small laundry rooms,
- indoor swimming pool area,
- isolated pantries containing no cooking appliances in accommodation spaces,
- private sanitary facilities shall be considered a portion of the space in which they are located.

(10) Tanks, voids and auxiliary machinery spaces having little or no fire risk:

- water tanks forming part of the ship's structure;
- voids and cofferdams;
- auxiliary machinery spaces which do not contain machinery having a pressure lubrication system and where storage of combustibles is prohibited, such as: ventilation and air-conditioning rooms; windlass room; steering gear room; stabiliser equipment room; electrical propulsion motor room; rooms containing section

switchboards and purely electrical equipment other than oil-filled electrical transformers (above 10 kVA); shaft alleys and pipe tunnels; spaces for pumps and refrigeration machinery (not handling or using flammable liquids),

- closed trunks serving the spaces listed above,
- other closed trunks such as pipe and cable trunks.

(11) Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk:

- cargo oil tanks,
- cargo holds, trunkways and hatchways,
- refrigerated chambers,
- oil fuel tanks (where installed in a separate space with no machinery),
- shaft alleys and pipe tunnels allowing storage of combustibles,
- auxiliary machinery spaces as in category (10) which contain machinery having a pressure lubrication system or where storage of combustibles is permitted,
- oil fuel filling stations,
- spaces containing oil-filled electrical transformers (above 10 kVA),
- spaces containing small internal combustion engines of power output up to 110 kW driving generators, sprinkler, drencher or fire pumps, bilge pumps, etc.,
- closed trunks serving the spaces listed above.

(12) Machinery spaces and main galleys:

- main propulsion machinery rooms (other than electric propulsion motor rooms) and boiler rooms,
- auxiliary machinery spaces other than those in categories (10) and (11) which contain internal combustion machinery or other oil burning, heating or pumping units,
- main galleys and annexes,
- trunks and casings to the spaces listed above.

(13) Store-rooms, workshops, pantries, etc.:

- main pantries not annexed to galleys,
- main laundry,
- large drying rooms (having a deck area of more than 4 m^2),
- miscellaneous stores,
- mail and baggage rooms,
- garbage rooms,
- workshops (not part of machinery spaces, galleys, etc.),

— lockers and storerooms having areas greater than 4 m^2, other than those spaces that have provisions for the storage of flammable liquids.

(14) Other spaces in which flammable liquids are stowed:

— paint lockers,

— store-rooms containing flammable liquids (including dyes, medicines, etc.),

— laboratories (in which flammable liquids are stowed).

.3 Where a single value is shown for the fire integrity of a boundary between two spaces, that value shall apply in all cases.

.4 There are no special requirements for material or integrity of boundaries where only a dash appears in the tables.

.5 The Administration of the flag State shall determine in respect of category (5) spaces whether the insulation values in table 9.1 shall apply to ends of deckhouses and superstructures, and whether the insulation values in table 9.2 shall apply to weather decks. In no case shall the requirements of category (5) of tables 9.1 or 9.2 necessitate enclosure of spaces which in the opinion of the Administration of the flag State need not be enclosed. (2.2.3.2)

4.9.2.3.3 Continuous 'B' class ceiling or linings, in association with the relevant decks or bulkheads, may be accepted as contributing wholly or in part, to the required insulation and integrity of a division. (2.2.3.3)

4.9.2.3.4 Construction and arrangement of saunas (2.2.3.4)

4.9.2.3.4.1 The perimeter of the sauna shall be of "A" class boundaries and may include changing rooms, showers and toilets. The sauna shall be insulated to A-60 standard against other spaces except those inside of the perimeter and spaces of categories (5), (9) and (10). (2.2.3.4.1)

4.9.2.3.4.2 Bathrooms with direct access to saunas may be considered as part of them. In such cases, the door between sauna and the bathroom need not comply with fire safety requirements. (2.2.3.4.2)

4.9.2.3.4.3 The traditional wooden lining on the bulkheads and ceiling are permitted in the sauna. The ceiling above the oven shall be lined with a non-combustible plate with an air gap of at least 30 mm. The distance from the hot surfaces to combustible materials shall be at least 500 mm or the combustible materials shall be protected (e.g. non-combustible plate with an air gap of at least 30 mm). (2.2.3.4.3)

4.9.2.3.4.4 The traditional wooden benches are permitted to be used in the sauna. (2.2.3.4.4)

4.9.2.3.4.5 The sauna door shall open outwards by pushing. (2.2.3.4.5)

4.9.2.3.4.6 Electrically heated ovens shall be provided with a timer. (2.2.3.4.6)

Table 9.1
Bulkheads not bounding either main vertical zones or horizontal zones

Spaces		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control stations	(1)	B-0 a)	A-0	A-0	A-0	A-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60
Stairways	(2)		A-0 a)	A-0	A-0	A-0	A-0	A-15	A-15	A-0 c)	A-0	A-15	A-30	A-15	A-30
Corridors	(3)			B-15	A-60	A-0	B-15	B-15	B-15	B-15	A-0	A-15	A-30	A-0	A-30
Evacuation stations and external escape routes	(4)					A-0	A-60 b)d)	A-60 b)d)	A-60 b)d)	A-0 d)	A-0	A-60 b)	A-60 b)	A-60 b)	A-60 b)
Open deck spaces	(5)					–	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Accommodation spaces of minor fire risk	(6)						B-0	B-0	B-0	C	A-0	A-0	A-30	A-0	A-30
Accommodation spaces of moderate fire risk	(7)							B-0	B-0	C	A-0	A-15	A-60	A-15	A-60
Accommodation spaces of greater fire risk	(8)								B-0	C	A-0	A-30	A-60	A-15	A-60
Sanitary and similar spaces	(9)									C	A-0	A-0	A-0	A-0	A-0
Tanks, voids and auxiliary machinery spaces having little or no fire risk	(10)										A-0 a)	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk	(11)											A-0 a)	A-0	A-0	A-15
Machinery spaces and main galleys	(12)												A-0 a)	A-0	A-60
Store-rooms, workshops, pantries etc.	(13)													A-0 a)	A-0
Other spaces in which flammable liquids are stowed	(14)														A-30

Table 9.2
Decks neither forming steps in main vertical zones nor bounding horizontal zones

Space below ↓ Space above →		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control stations	(1)	A-30	A-30	A-15	A-0	A-0	A-0	A-15	A-30	A-0	A-0	A-0	A-60	A-0	A-60
Stairways	(2)	A-0	A-0	–	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-30	A-0	A-30
Corridors	(3)	A-15	A-0	A-0 a)	A-60	A-0	A-0	A-15	A-15	A-0	A-0	A-0	A-30	A-0	A-30
Evacuation stations and external escape routes	(4)	A-0	A-0	A-0	A-0	–	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Open deck spaces	(5)	A-0	A-0	A-0	A-0	–	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Accommodation spaces of minor fire risk	(6)	A-60	A-15	A-0	A-60	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Accommodation spaces of moderate fire risk	(7)	A-60	A-15	A-15	A-60	A-0	A-0	A-15	A-15	A-0	A-0	A-0	A-0	A-0	A-0
Accommodation spaces of greater fire risk	(8)	A-60	A-15	A-15	A-60	A-0	A-15	A-15	A-30	A-0	A-0	A-0	A-0	A-0	A-0
Sanitary and similar spaces	(9)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Tanks, voids and auxiliary machinery spaces having little or no fire risk	(10)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0 a)	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk	(11)	A-60	A-60	A-60	A-60	A-0	A-0	A-15	A-30	A-0	A-0	A-0 a)	A-0	A-0	A-30
Machinery spaces and main galleys	(12)	A-60	A-60	A-60	A-60	A-0	A-60	A-60	A-60	A-0	A-0	A-30	A-30 a)	A-0	A-60
Store-rooms, workshops, pantries, etc.	(13)	A-60	A-30	A-15	A-60	A-0	A-15	A-30	A-30	A-0	A-0	A-0	A-0	A-0	A-0
Other spaces in which flammable liquids are stowed	(14)	A-60	A-60	A-60	A-60	A-0	A-30	A-60	A-60	A-0	A-0	A-0	A-0	A-0	A-0

Notes to be applied to Tables 9.1 and 9.2

(a) Where adjacent spaces are in the same numerical category and superscript 'a' appears, a bulkhead or deck between such spaces need not to be fitted if deemed unnecessary by the Administration of the flag State. For example, in category (12) a bulkhead need not be required between a galley and its annexed pantries provided the pantry bulkhead and decks maintain the integrity of the galley boundaries. A bulkhead is, however, required between a galley and a machinery space even though both spaces are in category (12).

(b) The ship's side, to the waterline in the lightest seagoing condition, superstructure and deckhouse sides situated below and adjacent to the life-rafts and evacuation slides may be reduced to 'A-30'.

(c) Where public toilets are installed completely within the stairway enclosure, the public toilet bulkhead within the stairway enclosure can be of 'B' class integrity.

(d) Where spaces of categories (6), (7), (8) and (9) are located completely within the outer perimeter of the assembly station, the bulkheads of these spaces are allowed to be of 'B-0' class integrity. Control positions for audio, video and light installations may be considered as part of the assembly station.

Additional general notes to Table 9.1 when applied to vertical divisions made of aluminium

1. As a general rule both sides should be insulated to the standard indicated in Table 9.1.
2. In boundaries where one of the sides is facing spaces category (5), (6), (9) or (10) and the other side is facing spaces of any other category different from those, only the side facing the latter space should be insulated according to the standard indicated in Table 9.1.
3. In boundaries where both spaces are included in categories (5), (6), (9) or (10), the following criteria should be followed:
    i. Open deck (5)/Accommodation Space of minor fire risk (6) – The insulation shall be installed facing only the accommodation space.
    ii. Open deck (5)/Sanitary Space (9) – The insulation shall be installed facing only the sanitary space.
    iii. Open deck (5)/Tanks, voids and auxiliary machinery spaces having little or no fire risk (10) – The insulation shall be installed facing only space (10). However, when space (10) is a tank or a void space, no insulation needs to be installed on either side.
    iv. Accommodation space of minor fire risk (6)/Sanitary Space (9) – the table 9.1 indicates a C standard between those two spaces. Accordingly, there is no insulation needed on either side.
    v. Accommodation space of minor fire risk (6)/Tanks, voids and auxiliary machinery spaces having little or no fire risk (10) – the insulation shall be installed facing only the accommodation space.
    vi. Sanitary Space (9)/Tanks, voids and auxiliary machinery spaces having little or no fire risk (10) – the insulation shall be installed facing only the sanitary space unless the category (10) space is an auxiliary machinery space having little or no fire risk, in which case the insultation shall be installed facing only the category (10) space.

vii. The side shell within spaces of category different than (5), (6), (9) or (10) will be insulated up to the bulkhead deck according to the standard indicated in table 9.1, assuming that the adjacent space is category (5).

Additional general notes to Table 9.2 when applied to horizontal divisions made of aluminium

1. As a general rule both sides should be insulated to the standard indicated in Table 9.2.
2. In boundaries where one of the sides is facing spaces category (5), (6), (9) and (10) and the other side is facing spaces of any other category different from those, only the side facing the latter space should be insulated according to the standard indicated in Table 9.2.
3. In boundaries where both spaces are included in categories (5), (6), (9) or (10), the insulation shall be only installed underside.
4. Where the space above in the boundary is provided with fixed fire-fighting installation, the insulation needs only to be provided on the underside of the division, with the exception of special category and ro-ro cargo spaces.

4.9.2.4 Fire integrity of bulkheads and decks in ships carrying not more than 36 passengers (2.2.4)

4.9.2.4.1 In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this part, the minimum fire integrity of bulkheads and decks shall be as prescribed in tables 9.3 and 9.4, as appropriate. (2.2.4.1)

4.9.2.4.2 The following requirements shall govern application of the tables:

.1 Tables 9.3 and 9.4 shall apply respectively to the bulkheads and decks separating adjacent spaces.

.2 For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (11) below. Where the contents and use of a space are such that there is a doubt as to its classification for the purpose of this Reg. II-2/C/9, it shall be treated as a space within the relevant category having the most stringent boundary requirements. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables.

(1) Control stations:

— spaces containing emergency sources of power and lighting,

— wheelhouse and chartroom,

— spaces containing the ship's radio equipment,

— fire-extinguishing rooms, fire control rooms and fire-recording stations,

— control room for propulsion machinery when located outside the propulsion machinery space,

— spaces containing centralised fire alarm equipment.

(2) Corridors:

— passenger and crew corridors and lobbies.

(3) Accommodation spaces:

— spaces as defined in Reg. II-2/A/3, paragraph 1 excluding corridors.

(4) Stairways:

— interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto,

— in this connection, a stairway which is enclosed only at one level shall be regarded as part of the space from which it is not separated by a fire door.

(5) Service spaces (low risk):

— lockers and storerooms not having provisions for the storage of flammable liquids and having areas less than 4 m^2 and drying rooms and laundries.

(6) Machinery spaces of category A:

— spaces as defined in Reg. II-2/A/3, paragraph 31.

(7) Other machinery spaces:

— spaces as defined in Reg. II-2/A/3, paragraph 30, excluding machinery spaces of category A.

(8) Cargo spaces:

— all spaces used for cargo (including cargo oil tanks) and trunkways and hatchways to such spaces, other than special category spaces.

(9) Service spaces (high risk):

— galleys, pantries containing cooking appliances, paint and lamp rooms, lockers and storerooms having areas of 4 m^2 or more, spaces for the storage of flammable liquids, saunas and workshops other than those forming part of the machinery spaces.

(10) Open decks:

— open deck spaces and enclosed promenades having no fire risk. Air spaces (the space outside superstructures and deckhouses).

(11) Special category and ro-ro cargo spaces:

— spaces as defined in Reg. II-2/A/3, paragraphs 41 and 46.

.3 In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is not protected by an automatic sprinkler system complying with the provisions of Reg. II-2/C/10, subparagraph 6.1.100 or between such zones neither of which is so protected, the higher of the two values given in the tables shall apply.

.4 In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is protected by an automatic sprinkler system complying with the provisions of Reg. II-2/C/10, subparagraph 6.1.100 or between such zones both of which are so protected, the lesser of the two values given in the tables shall apply. Where a sprinklered zone and a non-sprinklered zone meet within

accommodation and service spaces, the higher of the two values given in the tables shall apply to the division between the zones. (2.2.4.2)

4.9.2.4.3 Continuous 'B' class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division. (2.2.4.3)

4.9.2.4.4 External boundaries which are required in Reg. II-2/C/11, paragraph 2 to be of steel or other equivalent material may be pierced for the fitting of windows and sidescuttles provided that there is no requirement for such boundaries to have 'A' class integrity elsewhere in this part. Similarly, in such boundaries which are not required to have 'A' class integrity, doors may be of materials to the satisfaction of the Administration of the flag State. (2.2.4.4)

4.9.2.4.5 Saunas shall comply with paragraph 2.2.3.4. (2.2.4.5)

Table 9.3
Fire integrity of bulkheads separating adjacent spaces

Spaces		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations	(1)	A-0[c)]	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*	A-60
Corridors	(2)	–	C[e)]	B-0[e)]	A-0[a)] B-0[e)]	B-0[e)]	A-60	A-0	A-0	A-15 A-0[d)]	*	A-30
Accommodation spaces	(3)	–	–	C[e)]	A-0[a)] B-0[e)]	B-0[e)]	A-60	A-0	A-0	A-15 A-0[d)]	*	A-30 A-0[d)]
Stairways	(4)	–	–	–	A-0[a)] B-0[e)]	A-0[a)] B-0[e)]	A-60	A-0	A-0	A-15 A-0[d)]	*	A-30
Service spaces (low fire risk)	(5)	–	–	–	–	C[e)]	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A	(6)	–	–	–	–	–	*	A-0	A-0	A-60	*	A-60
Other machinery spaces	(7)	–	–	–	–	–	–	A-0[b)]	A-0	A-0	*	A-0
Cargo spaces	(8)	–	–	–	–	–	–	–	*	A-0	*	A-0
Service spaces (high fire risk)	(9)	–	–	–	–	–	–	–	–	A-0[b)]	*	A-30
Open decks	(10)	–	–	–	–	–	–	–	–	–	–	A-0
Special category spaces and ro-ro spaces	(11)	–	–	–	–	–	–	–	–	–	–	A-30

Table 9.4
Fire integrity of decks separating adjacent spaces

Space below ..↓	Space above ..→	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-60
Corridors	(2)	A-0	*	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
Accommodation spaces	(3)	A-60	A-0	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30 A-0[d)]
Stairways	(4)	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0	A-0	*	A-30
Service spaces (low fire risk)	(5)	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A	(6)	A-60	A-60	A-60	A-60	A-60	*	A-60[f)]	A-30	A-60	*	A-60
Other machinery spaces	(7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
Cargo spaces	(8)	A-60	A-0	A-0	A-0	A-0	A-0[d)]	A-0	*	A-0	*	A-0
Service spaces (high fire risk)	(9)	A-60	A-30 A-0[d)]	A-30 A-0[d)]	A-30 A-0[d)]	A-0	A-60	A-0	A-0	A-0	*	A-30
Open decks	(10)	*	*	*	*	*	*	*	*	*	–	A-0
Special category spaces and ro-ro spaces	(11)	A-60	A-30	A-30 A-0[d)]	A-30	A-0	A-60	A-0	A-0	A-30	A-0	A-30

Notes to be applied to both Tables 9.3 and 9.4, as appropriate.

(a) For clarification as to which applies, see paragraphs 2.2.2 and 2.2.5.

(b) Where spaces are of the same numerical category and superscript 'b' appears, a bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose, e.g. in category (9). A galley next to a galley does not require a bulkhead but a galley next to a paint room requires an 'A-0' bulkhead.

(c) Bulkheads separating the wheelhouse and chartroom from each other may be 'B-0' rating.

(d) See paragraphs 2.2.4.2.3 and 2.2.4.2.4 of this Reg. II-2/C/9.

(e) For the application of paragraph 2.2.1.1.2, 'B-0' and 'C', where appearing in table 9.3, shall be read as 'A-0'.

(f) Fire insulation need not be fitted if the machinery space in category (7) has little or no fire risk.

(*) Where an asterisk appears in the tables, the division is required to be of steel or other equivalent material but is not required to be of 'A' class standard. However, where a deck, except in a category (10) space, is penetrated for the passage of electric cables, pipes and ventilation ducts, such penetration shall be made tight to prevent the passage of flame and smoke. Divisions between control stations (emergency generators) and open decks may have air intake openings without means for closure, unless a fixed gas fire-fighting system is fitted.

For the application of paragraph 2.2.1.1.2. an asterisk, where appearing in Table 9.4, except for categories (8) and (10), shall be read as 'A-0'.

Additional general notes to Table 9.3 when applied to vertical divisions made of aluminium

1. As a general rule both sides should be insulated to the standard indicated in Table 9.3.
2. In boundaries where one of the sides is facing spaces category (5) or (10) and the other side is facing spaces of any other category different from those, only the side facing the latter space should be insulated according to the standard indicated in table 9.3.

Additional general notes to Table 9.4 when applied to horizontal divisions made of aluminium

1. As a general rule both sides should be insulated to the standard indicated in Table 9.4.
2. In boundaries where one of the sides is facing spaces category (5) and (10) and the other side is facing spaces of any other category different from those, only the side facing the latter space should be insulated according to the standard indicated in Table 9.4.
3. Where the space above in the boundary is provided with fixed fire-fighting installation, the insulation needs only to be provided on the underside of the division, with the exception of special category and ro-ro cargo spaces.

4.9.2.5 Protection of stairways and lifts in accommodation and service spaces (2.2.5)

4.9.2.5.1 All stairways shall be within enclosures formed of 'A' class divisions, with positive means of closure of all openings except that:

.1 a stairway connecting only two decks need not be enclosed, provided the integrity of the deck is maintained by proper bulkheads or doors in one between-deck space. When a

stairway is closed in one between-deck space, the stairway enclosure shall be protected in accordance with the tables for decks in paragraphs 2.2.3 and 2.2.4;

.2 stairways may be fitted in the open in a public space, provided they lie wholly within such public space. (2.2.5.1)

4.9.2.5.2 Lift trunks shall be so fitted as to prevent the passage of smoke and flame from one between-deck to another and shall be provided with means of closing so as to permit the control of draught and smoke. (2.2.5.2)

4.9.2.6 Arrangement of cabin balconies (2.2.6)

Non-load bearing partial bulkheads which separate adjacent cabin balconies shall be capable of being opened by the crew from each side for the purpose of fighting fires.

4.9.2.7 Protection of atriums (2.2.7)

4.9.2.7.1 Atriums shall be within enclosures formed of 'A' class divisions having a fire rating determined in accordance with tables 9.2 and 9.4, as applicable. (2.2.7.1)

4.9.2.7.2 Decks separating spaces within atriums shall have a fire rating determined in accordance with tables 9.2 and 9.4, as applicable. (2.2.7.2)

4.9.3 Penetrations in fire-resisting divisions and prevention of heat transmission (3)

4.9.3.1 Where class 'A' divisions are penetrated for the passage of electric cables, pipes, trunks, ducts etc., or for girders, beams or other structural members, such penetrations shall be tested in accordance with the *Fire Test Procedures Code* to ensure that the fire resistance of the divisions is not impaired. In the case of ventilation ducts, paragraphs 7.1.2 and 7.3.1 apply. However, where a pipe penetration is made of steel or equivalent material having a thickness of 3 mm or greater and a length of not less than 900 mm (preferably 450 mm on each side of the division) and no openings, testing is not required. Such penetrations shall be suitably insulated by extension of the insulation at the same level of the division. (3.1)

4.9.3.2 Where class 'B' divisions are penetrated for the passage of electric cables, pipes, trunks, ducts etc., or for the fitting of ventilation terminals, lighting fixtures and similar devises, arrangements shall be made to ensure that the fire resistance of the divisions is not impaired, subject to the provisions of paragraph 7.3.2. Pipes other than steel or copper that penetrate 'B' class divisions shall be protected by either:

.1 a fire tested penetration device, suitable for the fire resistance of the division pierced and the type of the pipe used; or

.2 a steel sleeve, having a thickness of not less than 1,8 mm and a length of not less than 900 mm for pipe diameters of 150 mm or more and not less than 600 mm for pipe diameters of less than 150 mm (preferably equally divided to each side of the division). The pipe shall be connected to the ends of the sleeve by flanges or couplings or the clearance between the sleeve and the pipe shall not exceed 2,5 mm or any clearance between pipe and sleeve shall be made tight by means of non-combustible or other suitable material. (3.2)

4.9.3.3 No-insulated metallic pipes penetrating 'A' or 'B' class divisions shall be of materials having a melting temperature which exceeds 950 °C for 'A-0' and 850 °C for 'B-0' class divisions. (3.3)

4.9.3.4 In approving structural fire protection details the Administration of the flag State shall have regard to the risk of heat transmission at intersections and terminal points of required thermal barriers.

In the implementation of fire proofing measures, steps shall be undertaken by the Administration of the flag State to prevent heat transfer through heat bridges, e.g. between decks and bulkheads. The insulation of a deck or bulkhead shall be carried past the penetration, intersection or terminal point for a distance of at least 450 mm in the case of steel and aluminium structures. If a space is divided with a deck or a bulkhead of 'A' class standard having insulation of different values, the insulation with the higher value shall continue on the deck or bulkhead with the insulation of the lesser value for a distance of at least 450 mm. (3.4)

4.9.4 Protection of openings in fire-resisting divisions (4)

4.9.4.1 Penetrations and openings in 'A' class divisions (4.1.1)

4.9.4.1.1 All openings in 'A' class divisions shall be provided with permanently attached means of closing which shall be as effective for resisting fires as the divisions in which they are fitted. (4.1.1.1)

4.9.4.1.2 The construction of all doors and door frames in 'A' class divisions, with the means of securing them when closed, shall provide resistance to fire as well as to the passage of smoke and flame, as far as practicable, equivalent to that of the bulkheads in which the doors are situated. Such doors and doorframes shall be constructed of steel or other equivalent material. (4.1.1.2)

4.9.4.1.3 Watertight doors need not be insulated. (4.1.1.3)

4.9.4.1.4 It shall be possible for each door to be opened and closed from each side of the bulkhead by one person only. (4.1.1.4)

4.9.4.1.5 Fire doors in main vertical zone bulkheads, galley boundaries and stairway enclosures other than power- operated watertight doors and those which are normally locked, shall satisfy the following requirements:

.1 the doors shall be self-closing and be capable of closing against an angle of inclination of up to 3,5° opposing closure;

.2 the approximate time of closure for hinged fire doors shall be no more than 40 seconds and no less than 10 seconds from the beginning of their movement with the ship in upright position. The approximate uniform rate of closure for sliding fire doors shall be of no more than 0,2 m/s and no less than 0,1 m/s with the ship in the upright position;

.3 the doors shall be capable of remote release from the continuously manned central control station, either simultaneously or in groups and shall be capable of release also individually from a position at both sides of the door. Release switches shall have an on-off function to prevent automatic resetting of the system;

.4 hold-back hooks not subject to central control station release are prohibited;

.5 a door closed remotely from the central control station shall be capable of being reopened at both sides of the door by local control. After such local opening, the door shall automatically close again;

.6 indication shall be provided at the fire door indicator panel in the continuously manned central control station whether each of the remote-released doors are closed;

.7 the release mechanism shall be so designed that the door will automatically close in the event of disruption of the control system or main source of electric power;

.8 local power accumulators for power-operated doors shall be provided in the immediate vicinity of the doors to enable the doors to be operated after disruption of the control system or main source of electric power at least 10 times (fully opened or closed) using the local controls;

.9 disruption of the control system or main source of electric power at one door shall not impair the safe functioning of the other doors;

.10 remote-released sliding or power-operated doors shall be equipped with an alarm that sounds for at least 5 seconds but no more than 10 seconds after the door is released from the central control station and before the door begins to move and continue sounding until the door is completely closed;

.11 a door designed to re-open upon contacting an object in its path shall re-open not more than 1 metre from the point of contact;

.12 double-leaf doors equipped with latch necessary to their fire integrity shall have a latch that is automatically activated by the operation of the doors when released by the control system;

.13 doors giving direct access to special category spaces which are power-operated and automatically closed need not be equipped with the alarms and remote-release mechanisms required in paragraph.3 and.10;

.14 the components of the local control system shall be accessible for maintenance and adjusting; and

.15 power-operated doors shall be provided with a control system of an approved type which shall be able to operate in case of fire, this being determined in accordance with the *Fire Test Procedure Code*. This system shall satisfy the following requirements:

.1 the control system shall be able to operate the door at a temperature of at least 200 °C for at least 60 minutes, served by the power supply;

.2 the power supply for all other doors not subject to fire shall not be impaired, and;

.3 at temperatures exceeding 200 °C the control system shall be automatically isolated from the power supply and shall be capable of keeping the door closed up to at least 945 °C. (4.1.1.5)

4.9.4.1.6 The requirements for 'A' class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles, provided that there is no requirement for such boundaries to have a 'A' class integrity in paragraphs 4.1.3.5 and 4.1.3.6. The requirements for 'A' class integrity of the outer boundaries of the ship shall not apply to exterior doors, except for those in superstructures and deckhouses facing life-saving appliances, embarkation and external

assembly station areas, external stairs and open decks used for escape routes. Stairway enclosure doors need not meet this requirement. (4.1.1.7)

4.9.4.1.7 Except for watertight doors, weathertight doors (semi-watertight doors), doors leading to the open deck and doors which need to be reasonably gastight, all 'A' class doors located in stairways, public spaces and main vertical zone bulkheads in escape routes shall be equipped with a self-closing hose port of material, construction and fire resistance which is equivalent to the door into which it is fitted, and shall be a 150 mm square clear opening with the door closed and shall be inset into the lower edge of the door, opposite to the door hinges or, in the case of sliding doors, nearest the opening. (4.1.1.8)

4.9.4.2 Penetrations and openings in 'B' class divisions (4.1.2)

4.9.4.2.1 Doors and door frames in 'B' class divisions and means of securing them shall provide a method of closure which shall have resistance to fire equivalent to that of the divisions except that ventilation openings may be permitted in the lower portion of such doors. Where such opening is in or under a door, the total net area of any such opening or openings shall not exceed 0,05 m^2. Alternatively, a non-combustible air balance duct routed between the cabin and the corridor and located below the sanitary unit is permitted where the cross- sectional area of the duct does not exceed 0,05 m^2. All ventilation openings shall be fitted with a grill made of non-combustible material. Doors shall be non-combustible. (4.1.2.1)

4.9.4.2.2 For reasons of noise reduction, the Administration may approve, as an equivalent, doors with built-in ventilation sound-locks with openings at the bottom on one side of the door and at the top on the other side, on condition that the following provisions have been complied with:

.1 The upper opening shall always face towards the corridor and shall be provided with a grating of non- combustible material and an automatically operating fire damper, which is activated at a temperature of about 70 °C.

.2 The lower opening shall be provided with a grating made of a non-combustible material.

.3 The doors shall be tested in accordance with the *Fire Test Procedures Code*. (4.1.2.1a)

4.9.4.2.3 Cabin doors in 'B' class divisions shall be of a self-closing type. Hold-backs are not permitted. (4.1.2.2)

4.9.4.2.4 The requirements for 'B' class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles. Similarly, the requirements for 'B' class integrity shall not apply to exterior doors in superstructures and deckhouses. For ships carrying not more than 36 passengers, the Administration of the flag State may permit the use of combustible materials in doors separating cabins from the individual interior sanitary spaces such as showers. (4.1.2.3)

4.9.4.3 Windows and sidescuttles (4.1.3)

4.9.4.3.1 All windows and sidescuttles in bulkheads within accommodation and service spaces and control stations other than those to which the provisions of paragraphs 4.1.1.7 and 4.1.2.3 apply, shall be so constructed as to preserve the integrity requirements of the type of bulkheads in which they are fitted, this being determined in accordance with the *Fire Test Procedures Code*. (4.1.3.1)

4.9.4.3.2 Notwithstanding the requirements of the tables 9.1 to 9.4, all windows and sidescuttles in bulkheads separating accommodation and service spaces and control stations from weather shall be constructed with frames of steel or other suitable material. The glass shall be retained by a metal glazing bead or angle. (4.1.3.2)

4.9.4.3.3 For ships carrying more than 36 passengers, windows facing survival craft, embarkation and assembly stations, external stairs and open decks used for escape routes, and windows situated below liferaft and escape slide embarkation areas shall have fire integrity as required in table 9.1. Where automatic dedicated sprinkler heads are provided for windows, "A-0" windows may be accepted as equivalent. To be considered under this paragraph, the sprinkler heads must either be:

.1 dedicated heads located above the windows, and installed in addition to the conventional ceiling sprinklers; or

.2 conventional ceiling sprinkler heads arranged such that the window is protected by an average application rate of at least 5 l/min per square metre and the additional window area is included in the calculation of the area of coverage; or

.3 water-mist nozzles that have been tested and approved in accordance with the '*Revised guidelines for approval of sprinkler systems* equivalent to that referred to in SOLAS Reg. II-2/12 (resolution A.800(19), as amended).'; and

Windows located in the ship's side below the lifeboat embarkation area shall have fire integrity at least equal to 'A-0' class. (4.1.3.5)

4.9.4.3.4 For ships carrying not more than 36 passengers, windows facing survival craft and escape slide, embarkation areas and windows situated below such areas shall have fire integrity at least equal to 'A-0' class. (4.1.3.6)

4.9.5 Protection of openings in machinery spaces boundaries (5)

4.9.5.1 The number of skylights, doors, ventilators, openings in funnels to permit exhaust ventilation and other openings to machinery spaces shall be reduced to a minimum consistent with the needs of ventilation and the proper and safe working of the ship. (5.2.1)

4.9.5.2 Skylights shall be of steel or equivalent material and shall not contain glass panels. (5.2.2)

4.9.5.3 Means of control shall be provided for closing power-operated doors or actuating release mechanism on doors other than power-operated watertight doors. The controls shall be located outside the space concerned, where they will not be cut off in the event of fire in the space they serve. (5.2.3)

4.9.5.4 The means of control required in paragraph 5.2.3 shall be situated at one control position or grouped in as few positions as possible. Such positions shall have a safe access from the open deck. (5.2.4)

4.9.5.5 Doors other than power-operated watertight doors, shall be so arranged that positive closure is assured in case of fire in the space, by power-operated closing arrangements or by the provision of self-closing doors capable of closing against an inclination of 3,5° opposing closure and having a fail-safe hold-back facility, provided with a remotely operated release device. (5.2.5)

4.9.5.6 Windows shall not be fitted in machinery space boundaries. This does not preclude the use of glass in control rooms within the machinery spaces. (5.2.6)

4.9.6 Protection of cargo space boundaries (6)

4.9.6.1 Indicators shall be provided on the navigating bridge which shall indicate when any fire door leading to or from the special category spaces is closed.

Doors to special category spaces shall be of such a construction that they cannot be kept open permanently and shall be kept closed during the voyage. (6.2)

4.9.7 Ventilation systems (7)

4.9.7.1 General (7.1)

4.9.7.1.1 Ventilation ducts, including single and double wall ducts, shall be of steel or an equivalent material, except for flexible bellows of short length not exceeding 600 mm used for connecting fans to the ducting in air-conditioning rooms. Unless expressly provided otherwise in paragraph 7.1.6, any other material used in the construction of ducts, including insulation, shall also be non-combustible. However, short ducts, not exceeding 2 m in length and with a free cross-sectional area (The term free cross-sectional area means, even in the case of a pre-insulated duct, the area calculated on the basis of the inner dimensions of the duct itself and not the insulation) not exceeding 0.02 m^2, need not be of steel or equivalent material, subject to the following conditions:

.1 the ducts shall be made of non-combustible material which may be faced internally and externally with membranes having low flame-spread characteristics and, in each case, a calorific value not exceeding 45 MJ/m^2 of their surface area for the thickness used. The calorific value shall be calculated in accordance with the recommendations published by the International Organization for Standardization, in particular publication *ISO 1716:2002, 'Reaction to the fire tests for building products – Determination of the heat of combustion*';

.2 the ducts are only used at the end of the ventilation device; and

.3 the ducts are not situated less than 600 mm, measured along the duct, from an opening in an 'A' or 'B' class division, including continuous 'B' class ceiling. (7.1.1)

4.9.7.1.2 The following arrangements shall be tested in accordance with the *Fire Test Procedures Code*:

.1 fire dampers, including their relevant means of operation, although the testing is not required for dampers located at the lower end of the duct in exhaust ducts for galley ranges, which must be of steel and capable of stopping the draught in the duct; and

.2 duct penetrations through 'A' class divisions, although the testing is not required where steel sleeves are directly joined to ventilation ducts by means of riveted or screwed connections or by welding. (7.1.2)

4.9.7.1.3 Fire dampers shall be easily accessible. Where they are placed behind ceilings or linings, those ceilings or linings shall be provided with an inspection hatch on which the identification number of the fire damper is marked. The fire damper identification number shall also be marked on any remote controls provided. (7.1.3)

4.9.7.1.4 Ventilation ducts shall be provided with hatches for inspection and cleaning. The hatches shall be located near the fire dampers. (7.1.4)

4.9.7.1.5 The main inlets and outlets of ventilation systems shall be capable of being closed from outside the spaces being ventilated. The means of closing shall be easily accessible as well as prominently and permanently marked and shall indicate the operating position of the closing device. (7.1.5)

4.9.7.1.6 Combustible gaskets in flanged ventilation duct connections are not permitted within 600 mm of openings in 'A' or 'B' class divisions and in ducts required to be of 'A' class construction. (7.1.6)

4.9.7.1.7 Ventilation openings or air balance ducts between two enclosed spaces shall not be provided except as permitted by paragraph 4.1.2.1. (7.1.7)

4.9.7.2 Arrangement of ducts (7.2)

4.9.7.2.1 The ventilation systems for machinery spaces of category A, ro-ro cargo spaces, galleys, special category spaces and cargo spaces shall be separated from each other and from the ventilation systems serving other spaces. However, the galley ventilation systems in ships carrying not more than 36 passengers need not be completely separated from other ventilation systems, but may be served by separate ducts from a ventilation unit serving other spaces. In such a case, an automatic fire damper shall be fitted in the galley ventilation duct near the ventilation unit. (7.2.1)

4.9.7.2.2 Ducts provided for the ventilation of machinery spaces of category A, galleys, ro-ro cargo spaces or special category spaces shall not pass through accommodation spaces, service spaces, or control stations unless they comply with paragraph 7.2.4. (7.2.2)

4.9.7.2.3 Ducts provided for the ventilation of accommodation spaces, service spaces or control stations shall not pass through machinery spaces of category A, galleys, ro-ro cargo spaces or special category spaces unless they comply with paragraph 7.2.4. (7.2.3)

4.9.7.2.4 As permitted by paragraphs 7.2.2 and 7.2.3 ducts shall be either:

.1.1 constructed of steel having a thickness of at least 3 mm for ducts with a free cross-sectional area of less than 0.075 m^2, at least 4 mm for ducts with a free cross-sectional area of between 0.075 m^2 and 0.45 m^2, and at least 5 mm for ducts with a free cross-sectional area of over 0.45 m^2;

.1.2 suitably supported and stiffened;

.1.3 fitted with automatic fire dampers close to the boundaries penetrated; and

.1.4 insulated to 'A-60' class standard from the boundaries of the spaces they serve to a point at least 5 m beyond each fire damper;

or

.2.1 constructed of steel in accordance with paragraphs 7.2.4.1.1 and 7.2.4.1.2; and

.2.2 insulated to 'A-60' class standard throughout the spaces they pass through, except for ducts that pass through spaces of category (9) or (10) as defined in paragraph 2.2.3.2.2. (7.2.4)

4.9.7.2.5 For the purposes of paragraphs 7.2.4.1.4 and 7.2.4.2.2, ducts shall be insulated over their entire cross-sectional external surface. Ducts that are outside but adjacent to the specified space, and share one or more surfaces with it, shall be considered to pass through the specified space and shall be insulated over the surface they share with the space for a distance of 450 mm past the duct (Sketches of such arrangements are contained in the Unified Interpretations of SOLAS Chapter II-2 (MSC.1/Circ.1276)). (7.2.5)

4.9.7.2.6 Where it is necessary that a ventilation duct passes through a main vertical zone division, an automatic fire damper shall be fitted adjacent to the division. The damper shall also be capable of being manually closed from each side of the division. The control location shall be readily accessible and be clearly and prominently marked. The duct between the division and the damper shall be constructed of steel in accordance with paragraphs 7.2.4.1.1 and 7.2.4.1.2 and insulated to at least the same fire integrity as the division penetrated. The damper shall be fitted on at least one side of the division with a visible indicator showing the operating position of the damper. (7.2.6)

4.9.7.3 Details of fire dampers and duct penetrations (7.3)

4.9.7.3.1 Ducts passing through 'A' class divisions shall meet the following requirements:

.1 where a thin plated duct with a free cross sectional area equal to, or less than, 0.02 m^2 passes through 'A' class divisions, the opening shall be fitted with a steel or equivalent material sheet sleeve having a thickness of at least 3 mm and a length of at least 200 mm, divided preferably into 100 mm on each side of a bulkhead or, in the case of a deck, wholly laid on the lower side of the decks penetrated. These sleeves lining such ducts, if not made of steel, shall be provided with fire insulation. The insulation shall have at least the same fire integrity as the division through which the duct passes;

.2 where ventilation ducts with a free cross-sectional area exceeding 0.02 m^2, but not more than 0.075 m^2, pass through 'A' class divisions, the openings shall be lined with steel or equivalent material sheet sleeves. The ducts and sleeves shall have a thickness of at least 3 mm and a length of at least 900 mm. When passing through bulkheads, this length shall be divided preferably into 450 mm on each side of the bulkhead. These ducts, or sleeves lining such ducts, shall be provided with fire insulation. The insulation shall have at least the same fire integrity as the division through which the duct passes; and

.3 automatic fire dampers shall be fitted in all ducts with a free cross-sectional area exceeding 0.075 m^2 that pass through 'A' class divisions. Each damper shall be fitted close to the division penetrated and the duct between the damper and the division penetrated shall be constructed of steel in accordance with paragraphs 7.2.4.2.1 and 7.2.4.2.2. The fire damper shall operate automatically, but shall also be capable of being closed manually from both sides of the division. The damper shall be fitted with a visible indicator which shows the operating position of the damper. Fire dampers are not required, however, where ducts pass through spaces surrounded by 'A' class divisions, without serving those spaces, provided those ducts have the same fire integrity as the divisions which they penetrate. A duct of cross-sectional area exceeding 0.075 m^2 shall not be divided into smaller ducts at the penetration of an 'A' class division and then recombined into the original duct once through the division to avoid installing the damper required by this provision. (7.3.1)

4.9.7.3.2 Ventilation ducts with a free cross-sectional area exceeding 0.02 m^2 passing through 'B' class bulkheads shall be lined with steel or equivalent material sheet sleeves of 900 mm in length, divided preferably into 450 mm on each side of the bulkheads unless the duct is of steel for this length. These sleeves lining such ducts, if not made of steel, shall be provided with fire insulation. The insulation shall have at least the same fire integrity as the division through which the duct passes. (7.3.2)

4.9.7.3.3 All fire dampers shall be capable of manual operation. The dampers shall have a direct mechanical means of release or, alternatively, be closed by electrical, hydraulic, or pneumatic operation. All dampers shall be manually operable from both sides of the division. Automatic fire dampers, including those capable of remote operation, shall have a failsafe mechanism that will close the damper in a fire even upon loss of electrical power or hydraulic or pneumatic pressure loss. Remotely operated fire dampers shall be capable of being reopened manually at the damper. (7.3.3)

4.9.7.4 Ventilation systems for ships carrying more than 36 passengers (7.4)

4.9.7.4.1 In addition to the requirements in sections 7.1, 7.2 and 7.3, the ventilation system of a passenger ship carrying more than 36 passengers shall also meet the following requirements. (7.4.1)

4.9.7.4.2 In general, the ventilation fans shall be so arranged that the ducts reaching the various spaces remain within a main vertical zone. (7.4.2)

4.9.7.4.3 Stairway enclosures shall be served by an independent ventilation fan and duct system (exhaust and supply) which shall not serve any other spaces in the ventilation systems. (7.4.3)

4.9.7.4.4 A duct, irrespective of its cross-section, serving more than one 'tween-deck accommodation space, service space or control station, shall be fitted, near the penetration of each deck of such spaces, with an automatic smoke damper that shall also be capable of being closed manually from the protected deck above the damper. Where a fan serves more than one 'tween-deck' space through separate ducts within a main vertical zone, whereby each one is dedicated to a single 'tween-deck space, each duct shall be provided with a manually operated smoke damper fitted close to the fan. (7.4.4)

4.9.7.4.5 Vertical ducts shall, where necessary, be insulated as required by tables 9.1 and 9.2. Ducts shall be insulated as required for decks between the space they serve and the space being considered, as applicable. (7.4.5)

4.9.7.5 Exhaust ducts from galley ranges (7.5)

4.9.7.5.1 Requirements for ships carrying more than 36 passengers (7.5.1)

4.9.7.5.1.1 In addition to the requirements in sections 7.1, 7.2 and 7.3, exhaust ducts from galley ranges shall be constructed in accordance with paragraphs 7.2.4.2.1 and 7.2.4.2.2 and insulated to 'A-60' class standard throughout accommodation spaces, service spaces, or control stations they pass through. They shall also be fitted with:

.1 a grease trap readily removable for cleaning unless an alternative approved grease removal system is fitted;

.2 a fire damper located in the lower end of the duct at the junction between the duct and the galley range hood which is automatically and remotely operated and, in addition, a remotely operated fire damper located in the upper end of the duct close to the outlet of the duct;

.3 a fixed means for extinguishing a fire within the duct. The fire extinguishing systems shall comply with the recommendations published by the International Organization for Standardization, in particular publication *ISO 15371:2009 'Ships and marine technology – Fire-extinguishing systems for protection of galley cooking equipment'*;

.4 remote-control arrangements for shutting off the exhaust fans and supply fans, for operating the fire dampers mentioned in paragraph 7.5.1.1.2 and for operating the fire-extinguishing system, which shall be placed in a position outside the galley close to the entrance to the galley. Where a multi-branch system is installed, a remote means located with the above controls shall be provided to close all branches exhausting through the same main duct before an extinguishing medium is released into the system; and

.5 suitably located hatches for inspection and cleaning, including one provided close to the exhaust fan and one fitted in the lower end where grease accumulates. (7.5.1.1)

4.9.7.5.1.2 Exhaust ducts from ranges for cooking equipment installed on open decks shall conform to paragraph7.5.1.1, as applicable, when passing through accommodation spaces or spaces containing combustible materials. (7.5.1.2)

4.9.7.5.2 Requirements for ships carrying not more than 36 passengers (7.5.2)

When passing through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges shall be constructed in accordance with paragraphs 7.2.4.1.1 and 7.2.4.1.2. Each exhaust duct shall be fitted with:

.1 a grease trap readily removable for cleaning;

.2 an automatically and remotely operated fire damper located in the lower end of the duct at the junction between the duct and the galley range hood and, in addition, a remotely operated fire damper in the upper end of the duct close to the outlet of the duct;

.3 arrangements, operable from within the galley, for shutting off the exhaust and supply fans; and

.4 fixed means for extinguishing a fire within the duct. The fire extinguishing systems shall comply with the recommendations published by the International Organization for Standardization, in particular publication *ISO 15371:2009 'Ships and marine technology – Fire-extinguishing systems for protection of galley cooking equipment'*.

4.9.7.6 Ventilation rooms serving machinery spaces of category A containing internal combustion machinery (7.6)

4.9.7.6.1 Where a ventilation room serves only such an adjacent machinery space and there is no fire division between the ventilation room and the machinery space, the means for closing the ventilation duct or ducts serving the machinery space shall be located outside of the ventilation room and machinery space. (7.6.1)

4.9.7.6.2 Where a ventilation room serves such a machinery space as well as other spaces and is separated from the machinery space by a 'A-0" class division, including penetrations, the means for closing the ventilation duct or ducts for the machinery space can be located in the ventilation room. (7.6.2)

4.9.8 Ventilation systems for laundries in ships carrying more than 36 passengers (7.7)

Exhaust ducts from laundries and drying rooms of category (13) spaces as defined in paragraph 2.2.3.2.2 shall be fitted with:

.1 filters readily removable for cleaning purposes;

.2 a fire damper located in the lower end of the duct which is automatically and remotely operated;

.3 remote-control arrangements for shutting off the exhaust fans and supply fans from within the space and for operating the fire damper mentioned in paragraph 7.7.2; and

.4 suitably located hatches for inspection and cleaning.

4.10 Fire fighting (Reg. II-2/C/10)

4.10.1 Purpose (1)

4.10.1.1 The purpose of this Reg. II-2/C/10 is to suppress and swiftly extinguish a fire in the space of origin. For this purpose, the following functional requirements shall be met:

.1 fixed fire-extinguishing systems shall be installed having due regard to the fire growth potential of the protected spaces; and

.2 fire-extinguishing appliances shall be readily available. (1.1)

4.10.2 Water supply systems (2)

Every ship shall be provided with fire pumps, fire mains, hydrants, hoses and nozzles complying as applicable with the requirements of this Reg. II-2/C/10.

4.10.2.1 Pipes and hydrants (2.1)

4.10.2.1.1 General (2.1.1)

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. Isolating valves shall be installed for all open deck fire main branches used for purposes other than fire-fighting. 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.

4.10.2.1.2 Ready availability of water supply (2.1.2)

1.1. In **Class B** ships certified to carry more than 250 passengers, the arrangements for the ready availability of water supply shall be 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. (1.1)

1.2. In 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. (1.3)

4.10.2.1.3 Diameter of fire mains (2.1.3)

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.

4.10.2.1.4 Isolating valves and relief valves (2.1.4)

4.10.2.1.4.1 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 another pump or an emergency fire pump. The emergency pump, its seawater inlet and suction and delivery pipes and isolating valves shall be located outside the machinery space. If this arrangement cannot be made, the sea-chest may be fitted in the machinery space if the valve is remotely controlled from a position in the same compartment as the emergency pump and the suction pipe is as short as practicable. Short lengths of suction or discharge piping may penetrate the machinery space, provided they are enclosed in a substantial steel or equivalent material casing or are insulated to A-60 standards. The pipes shall have substantial wall thickness, but in no case less than 11 mm and shall be welded except for the flanged connection to the sea inlet valve. (2.1.4.1)

4.10.2.1.4.2 A valve shall be fitted to serve each fire hydrant so that any fire hose may be removed while the fire pumps are at work. (2.1.4.2)

4.10.2.1.5 Number and position of hydrants (2.1.5)

4.10.2.1.5.1 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 while 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. (2.1.5.1)

4.10.2.1.5.2 In the accommodation, service and machinery spaces the number and position of the hydrants shall be such that the requirements of paragraph 2.1.5.1 may be complied with when all watertight doors and all doors in main vertical zone bulkheads are closed. (2.1.5.2.1)

4.10.2.1.5.3 Where access is provided to a machinery space 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 of the machinery space. Such provision need not be made where the tunnel or adjacent spaces are not part of the escape route. (2.1.5.2.2)

4.10.2.1.6 **Pressure at hydrants** (2.1.6)

.1 With two pumps simultaneously delivering water through nozzles specified in paragraph 2.3.3 and sufficient hydrants to provide for the quantity of water specified in paragraph 2.1.3, the following minimum pressures shall be maintained at all hydrants:

Ships certified to carry:

more than 500 passengers – 0,4 N/mm^2

up to 500 passengers – 0,3 N/mm^2

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

4.10.2.1.7 **International shore connection** (2.1.7)

All ships shall be provided with at least one international shore connection complying with the *Fire Safety Systems Code*.

4.10.2.2 **Fire pumps** (2.2)

4.10.2.2.1 **Pumps accepted as fire pumps** (2.2.1)

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 changeover arrangements are fitted.

4.10.2.2.2 **Number of fire pumps** (2.2.2)

Ships shall be provided with power driven fire pumps as follows:

.1 ships certified to carry more than 500 passengers: at least three, one of which may be a main engine driven pump;

.2 ships certified to carry up to 500 passengers or less: at least two, one of which may be a main engine driven pump.

4.10.2.2.3 **Arrangement of fire pumps and fire mains** (2.2.3)

4.10.2.2.3.1 **Fire pumps** (2.2.3.1)

The arrangement of sea connections, fire pumps and their sources of power shall be such as to ensure that:

.1 In ship certified to carry more than 250 passengers, in the event of a fire in any one compartment all the fire pumps will not be put out of action.

.2 In **Class B** ships certified to carry up to 250 passengers or less, 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 an independently driven, power-operated emergency fire pump and with its source of power and sea connection located outside the machinery space. Such an independently driven, power operated emergency fire pump shall comply with the provisions of the *Fire Safety Systems Code*.

4.10.2.2.4 **Capacity of fire pumps** (2.2.4)

4.10.2.2.4.1 **Total capacity of required fire pumps** (2.2.4.1)

The required fire pumps shall be capable of delivering for fire-fighting purposes a quantity of water, at the pressure specified in paragraph 2.1.6 not less than two thirds of the quantity required to be dealt with by the bilge pumps when employed for bilge pumping.

4.10.2.2.4.2 **Capacity of each fire pump** (2.2.4.2)

In every ship which is required by this Reg. II-2/C/10 to be provided with more than one power fire pump, each of the required fire pumps shall have a capacity 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 m^3/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 required pumps are installed such additional pumps shall have a capacity of at least 25 m^3/h and shall be capable of delivering at least the two jets of water required in paragraph 2.1.5 of this Reg. II-2/C/10.

4.10.2.2.4.3 The delivery valve of each fire pump shall be fitted with a non-return valve. (2.2.100)

4.10.2.3 **Fire hoses and nozzles** (2.3)

4.10.2.3.1 **General specifications** (2.3.1)

4.10.2.3.1.1 Fire hoses shall be of non-perishable material, approved by the Administration of the flag State, 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. Each hose shall be provided with a nozzle and the necessary couplings. There shall be complete interchangeability of hose couplings and nozzles. 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 or connections. Additionally, in interior locations in ships carrying more than 36 passengers, fire hoses shall be permanently connected to the hydrants. (2.3.1.1)

4.10.2.3.2 **Number and diameter of fire hoses** (2.3.2)

4.10.2.3.2.1 There shall be at least one fire hose for each of the hydrants required by paragraph 2.1.5. The length of a fire hose should be restricted to not more than 20 metres on deck and in superstructures and to 15 metres in machinery spaces and, on smaller ships, respectively to 15 metres and 10 metres. (2.3.2.2)

4.10.2.3.3 **Size and types of nozzles** (2.3.3)

4.10.2.3.3.1 For the purposes of this chapter, standard nozzle sizes shall be 12 mm, 16 mm and 19 mm or as near thereto as possible. In cases where other systems are used – such as fog systems – different diameter nozzles may be permitted. (2.3.3.1)

4.10.2.3.3.2 For accommodation and service spaces, a nozzle size greater than 12 mm need not be used. (2.3.3.2)

4.10.2.3.3.3 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 2.1.6 from the smallest pump, provided that a nozzle size greater than 19 mm need not be used. (2.3.3.3)

4.10.2.3.3.4 All nozzles shall be of an approved dual-purpose type (i.e., spray/jet type), and shall have a shutoff facility. (2.3.3.4)

4.10.3 Portable fire extinguishers (3)

4.10.3.1 Type and design (3.1)

Portable fire extinguishers shall comply with the provisions of the *Fire Safety Systems Code*.

4.10.3.2 Arrangement of fire extinguishers (3.2)

4.10.3.2.1 The minimum number of fire extinguishers shall be as follows:

.1 in accommodation and service spaces:

the fire extinguishers shall be so located that no point in the space is more than 10 metres walking distance from an extinguisher;

.2 an extinguisher suitable for use in high voltage areas shall be located in the proximity of any electric panel or subpanel having a power of 20 kW or more;

.3 in galleys, the extinguishers shall be so located that no point in the space is more than 10 metres walking distance from an extinguisher;

.4 an extinguisher shall be located in the proximity of paint lockers store rooms containing readily flammable products;

.5 at least one extinguisher shall be located on the navigating bridge and in each control station. (3.2.1)

4.10.3.2.2 One of the portable fire extinguishers intended for use in any space shall be located near the entrance of that space. (3.2.2)

4.10.3.2.3 Carbon dioxide fire extinguishers shall not be placed in accommodation spaces. In control stations and other spaces containing electrical or electronic equipment or appliances necessary for the safety of the ship, fire extinguishers should be provided whose extinguishing media are neither electrically conductive nor harmful to the equipment and appliances. (3.2.3)

4.10.3.2.4 Fire extinguishers shall be situated ready for use at easily visible places, which can be reached quickly and easily at any time in the event of a fire, and in such a way that their serviceability is not impaired by the weather, vibration or other external factors. Portable fire extinguishers shall be provided with devices which indicate whether they have been used. (3.2.4)

4.10.3.3 Spare charges (3.3)

4.10.3.3.1 Spare charges shall be provided for 100 % of the first 10 extinguishers and 50 % of the remaining fire extinguishers capable of being recharged on board. (3.3.1)

4.10.3.3.2 For the extinguishers which cannot be recharged on board, additional portable fire extinguishers of the same quantity, type, capacity and number as determined in paragraph 3.2.1 above shall be provided in lieu of spare charges. (3.3.2)

4.10.3.4 Specific requirements from *Directive 2009/45/EC* (3.100)

4.10.3.4.1 Fire extinguishers containing an extinguishing medium which either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons or gives off gases which are harmful to the environment shall not be permitted. (3.100.1)

4.10.3.4.2 The fire extinguishers shall be suitable for extinguishing fires which are possible in the vicinity of the fire extinguisher location. (3.100.2)

4.10.3.4.3 Portable fire extinguishers provided for use in accommodation or service spaces shall so far as practicable have a uniform method of operation. (3.100.3)

4.10.3.4.4 Periodic inspection of fire extinguishers

The Administration of the Flag State shall ensure that portable fire extinguishers shall be periodically inspected, function-tested and pressure-tested.

For inspection of fire extinguishers see *Publication 29/I – Guidelines for Periodic Inspections of Fire-Extinguishing Systems and Appliances Used on Ships.*

4.10.4 Fixed fire-extinguishing systems (4)

4.10.4.1 Types of fixed fire-extinguishing systems (4.1)

4.10.4.1.1 Fixed gas fire-extinguishing systems (4.1.1.1)

Fixed gas fire-extinguishing systems shall comply with the provisions of the *Fire Safety Systems Code*.

4.10.4.1.2 Fixed high-expansion foam fire-extinguishing systems (4.1.1.2)

Fixed high expansion foam fire-extinguishing systems shall comply with the provisions of the *Fire Safety Systems Code*.

4.10.4.1.3 Fixed pressure water-spraying fire-extinguishing systems (4.1.1.3)

Fixed pressure water-spraying fire-extinguishing systems shall comply with the provisions of the *Fire Safety Systems Code*.

4.10.4.1.2 Where a fixed fire-extinguishing system not required by this chapter is installed, it shall meet the requirements of the relevant regulations of this chapter and the *Fire Safety Systems Code*. (4.1.2)

4.10.4.2 Closing appliances for fixed gas fire-extinguishing systems (4.2)

Means shall be provided to close from outside the protected space all openings which may admit air to, or allow gas to escape from, the protected space.

4.10.4.3 Storage rooms of fire-extinguishing medium (4.3)

When the fire-extinguishing medium is stored outside a protected space, it shall be stored in a room which is located behind the forward collision bulkhead and is used for no other purposes. Any entrance to such a storage room shall preferably be from the open deck and shall be independent of the protected space. If the storage place is located below deck, it shall be located no more than one deck below the open deck and shall be directly accessible by a stairway or ladder from the open deck. Spaces which are located below deck or spaces where access from the open deck is not provided shall be fitted with a mechanical ventilation system designed to take exhaust air from the bottom of the space and shall be sized to provide at least 6 air changes per hour. Access doors shall open outwards and bulkheads and decks including doors and other means of closing any opening therein, which form boundaries between such rooms and adjacent enclosed spaces, shall be gastight. For the purpose of the application of tables 9.1, 9.2, 9.3 and 9.4, in Reg. II-2/C/9, such storage rooms shall be treated as fire control stations.

4.10.4.4 Specific requirements from *Directive 2009/45/EC* (4.100)

.1 Where the volume of free air contained in air receivers in any space is such that, if released in such space in the event of fire, would seriously affect the efficiency of the fixed fire-extinguishing system, an additional quantity of fire-extinguishing medium shall be provided.

.2 Suppliers of fixed fire-extinguishing installations shall provide a description of the installation, including a checklist for maintenance, in English and in the official language(s) of the flag State.

.3 The quantity of the fire-extinguishing medium shall be checked at least once a year by either an expert authorized by the Administration, the supplier of the installation or a recognized organization.

.4 The periodic checking which is carried out by the ship's chief engineer or organized by the ship's management shall be entered in the ship's logbook stating the scope and the time of such checking.

.5 The Administration of the flag State shall ensure that the spaces in which the CO_2 batteries are located will be properly arranged as regards their access, ventilation and communication equipment. It shall take the necessary safety measures regarding the construction, installation, marking, filling and testing of CO_2, cylinders piping and fittings and for control and alarm equipment for such installation. All doors to spaces protected by CO_2 installation shall be marked 'This space is protected by a CO_2 installation and shall be evacuated when the alarm equipment comes into operation'.

For inspections of fixed gas fire-extinguishing systems see *Publication 29/I – Guidelines for Periodic Inspections of Fire-Extinguishing Systems and Appliances Used on Ships.*

4.10.5 Fire-extinguishing arrangements in machinery spaces (5)

4.10.5.1 Fixed fire-extinguishing systems (5.1)

Machinery spaces of category A shall be provided with any one of the following fixed fire-extinguishing systems:

.1 a gas system complying with the relevant provisions of paragraphs 4.1.1.1, 4.2, 4.3 and 4.100, or an equivalent water-based system, complying with the provisions of IMO MSC/Circ.1165 as amended;

.2 a high-expansion foam system complying with the relevant provisions of paragraph 4.1.1.2;

.3 a pressure water-spraying system complying with the relevant provisions of paragraph 4.1.1.3.

4.10.5.2 Additional fire-extinguishing arrangements (5.2)

4.10.5.2.1 Machinery spaces of category A shall be provided with at least one set of portable air-foam equipment consisting of an air-foam nozzle of an inductor type capable of being connected to the fire main by a fire hose, together with a portable tank containing at least 20 litres of foam-making liquid and one spare tank. The nozzle shall be capable of producing effective foam suitable for extinguishing an oil fire, at a rate of at least 1,5 m^3 per min. (5.2.1)

4.10.5.2.2 There shall be in each such space, approved foam-type fire extinguishers, each of at least 45 litres capacity, or equivalent, sufficient in number to enable foam or its equivalent to be directed on to any part of the fuel and lubricating oil pressure systems, gearing and other fire hazards. In addition, there shall be provided a sufficient number of portable foam extinguishers or equivalent which shall be so located that no point in the space is more than 10 metres walking distance from an extinguisher and that there are at least two such extinguishers in each such space. (5.2.2)

4.10.5.3 Additional requirements (5.5)

Each machinery space shall be provided with two suitable water fog applicators which might consist of a metal L-shaped pipe, the long limb being about 2 m in length, capable of being fitted to a fire hose, and the short limb being about 250 mm in length, fitted with a fixed water fog nozzle or capable of being fitted with a water spray nozzle.

When heated oil is used as heating medium, it may be additionally required that boiler rooms are equipped with permanently-installed or portable equipment for local systems for jet spraying of water under pressure or the spreading of foam above and below the floor for fire-extinguishing purposes.

4.10.5.4 Fixed local application fire-extinguishing systems (5.6)

4.10.5.4.1 Machinery spaces of category A above 500 m^3 in volume shall, in addition to the fixed fire-extinguishing system required in this Reg. II-2/C/10, be protected by an approved type of fixed water-based or equivalent local application fire-fighting system, based on the guidelines in IMO MSC/Circ.913 '*Guidelines for the approval of fixed water-based local application fire-fighting systems for use in category A machinery spaces*'. In the case of periodically unattended machinery spaces, the fire-fighting system shall have both automatic and manual release capabilities. In the case of continuously manned machinery spaces the fire-fighting system is only required to have a manual release capability. (5.6.2)

4.10.5.4.2 Fixed local application fire-fighting systems are to protect areas such as the following without the necessity of engine shutdown, personnel evacuation or sealing of spaces:

.1 the fire hazard portions of all internal combustion machinery,

.2 boiler fronts,

.3 the fire hazard portions of incinerators and

.4 purifiers for heated fuel oil. (5.6.3)

4.10.5.4.3 Activation of any local application system shall give a visual and distinct audible alarm in the protected space and at continuously manned stations. The alarm shall indicate the specific system activated. The system alarm requirements described within this paragraph are in addition to, and not a substitute for, the detection and fire alarm systems required elsewhere in this chapter. (5.6.4)

4.10.6 Fire-extinguishing arrangements in control stations, accommodation and service spaces (6)

4.10.6.1 Sprinkler and water-spraying systems (6.1)

4.10.6.1.1 Ships carrying more than 36 passengers shall be equipped with an automatic sprinkler, fire detection and fire alarm system of an approved type complying with the requirements of paragraph 6.1.100 or with the IMO *Guidelines for an approved equivalent sprinkler system* as given in IMO Resolution A.800(19), in all service spaces, control stations and accommodation spaces, including corridors and stairways. Alternatively, control stations where water may cause damage to essential equipment may be fitted with an approved fixed fire-extinguishing system of another type. Spaces having little or no fire risk such as voids, public toilets, carbon dioxide rooms and similar spaces need not be fitted with an automatic sprinkler system. (6.1.1)

4.10.6.1.2 In ships carrying not more than 36 passengers, reference is made to Reg. II-2/C/7 subparagraph 5.3.2. (6.1.2)

4.10.6.1.3 A fixed pressure water-spraying fire-extinguishing system complying with the provisions of the *Fire Safety Systems Code* shall be installed on cabin balconies of ships to which Reg. 5.3.4 applies, where furniture and furnishings on such balconies are not as defined in subparagraphs 40.1, 40.2, 40.3, 40.6 and 40.7 of Reg. II-2/A/3. (6.1.3)

4.10.6.1.4 The automatic sprinkler, fire detection and fire alarm systems shall be of an approved type, complying with the provisions of the *Fire Safety System Code*.

For **C and D Class** ships of less than 40 metres in length and with a total protected area of less than 280 m^2, the Administration of the Flag State may specify the appropriate area for sizing of pumps and alternative components. (6.1.100)

4.10.6.2 Spaces containing flammable liquid (6.3)

4.10.6.2.1 Paint lockers shall be protected as follows:

.1 a carbon dioxide system, designed to give a minimum volume of free gas equal to 40 % of the gross volume of the protected space;

.2 a dry powder system, designed for at least 0,5 kg powder/m^3;

.3 a water spraying or sprinkler system, designed for 5 litres/m^2 min. Water spraying systems may be connected to the fire main of the ship; or

.4 a system providing equivalent protection, as determined by the Administration of the flag State.

In any case the system shall be operable from outside the protected space. (6.3.1)

4.10.6.2.2 Flammable liquid lockers shall be protected by an appropriate fire extinguishing arrangement approved by the Administration of the flag State. (6.3.2)

4.10.6.2.3 For lockers of a deck area of less than 4 m^2, which do not give access to accommodation spaces, a carbon dioxide portable extinguisher sized to provide a minimum volume of free gas equal to 40 % of the gross volume of the space may be accepted in lieu of a fixed system. A discharge port shall be arranged in the locker to allow the discharge of the extinguisher without having to enter into the protected space. The required portable fire extinguisher shall be stowed adjacent to the port. Alternatively, a port or hose connection may be provided to facilitate the use of fire main water. (6.3.3)

4.10.6.3 Deep-fat friers, boiling and roasting apparatus:

When deep-fat friers, boiling and roasting apparatus are installed and used in spaces outside the main galley, the Administration of the flag State shall impose additional safety measures with regard to the specific fire hazards associated with the use of this type of equipment.

Deep-fat cooking equipment shall be fitted with the following:

.1 an automatic or manual extinguishing system tested to an international standard in accordance with Publication *ISO 15371:2009 on fire-extinguishing systems for protection of galley deep-fat cooking equipment*;

.2 a primary and backup thermostat with an alarm to alert the operator in the event of failure of either thermostat;

.3 arrangements for automatically shutting off the electrical power upon activation of the extinguishing system;

.4 an alarm for indicating operation of the extinguishing system in the galley where the equipment is installed; and

.5 controls for manual operation of the extinguishing system, which are clearly labelled for ready use of the crew. (6.4)

4.10.7 Fire-extinguishing arrangements in cargo spaces (7)

4.10.7.1 Fixed gas fire-extinguishing systems for general cargo (7.1)

4.10.7.1.1 Except as provided for in paragraph 7.2, the cargo spaces of passenger ships of 1,000 gross tonnage and upwards shall be protected by a fixed carbon dioxide or inert gas fire-extinguishing system complying with the provisions of the *Fire Safety Systems Code* or by a fixed high expansion foam fire-extinguishing system which gives equivalent protection. (7.1.1)

4.10.7.1.2 In ships of less than 1,000 gross tonnage, the arrangements in cargo spaces shall be to the satisfaction of the Administration of the flag State, provided that the ship is fitted with steel or equivalent material hatch covers and effective means of closing all ventilators and other openings leading to the cargo spaces. (7.1.2)

4.10.7.2 Fixed gas fire-extinguishing systems for dangerous goods (7.2)

A ship engaged in the carriage of dangerous goods in any cargo spaces shall be provided with a fixed carbon dioxide or inert gas fire-extinguishing system complying with the provisions of the *Fire Safety Systems Code* or with a fire-extinguishing system which, in opinion of the Administration of the flag State, gives equivalent protection for the cargoes carried.

4.10.7.3 Fire fighting for ships designed to carry containers on or above the weather deck (7.3)

4.10.7.3.1 Ships shall carry, at least one water mist lance. (7.3.1)

4.10.7.3.1.1 The water mist lance shall consist of a tube with a piercing nozzle which is capable of penetrating a container wall and producing water mist inside a confined space (container, etc.) when connected to the fire main. (7.3.1.1)

4.10.8 Firefighter's outfit (10)

4.10.8.1 Types of fire-fighter's outfits (10.1)

4.10.8.1.1 Fire-fighter's outfits shall comply with the *Fire Safety Systems Code*. (10.1.1)

4.10.8.1.2 For each breathing apparatus a fireproof lifeline of sufficient length and strength shall be provided capable of being attached by means of a snaphook to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when the lifeline is operated. (10.1.2)

4.10.8.2 Number of fire-fighter's outfits (10.2)

4.10.8.2.1 **Class B** ships and **Class C** and **Class D** ships of 40 metres in length and above shall carry at least two firefighter's outfits. (10.2.1)

4.10.8.2.2 In addition, the following requirements shall apply:

.1 In ships of 60 metres in length and above, in addition there shall be provided, if the aggregate of the lengths of all passenger spaces and service spaces on the deck which carries such spaces is more than 80 metres, or, if there is more than one such deck, on the deck which has the largest aggregate of such lengths, two firefighter's outfits and two sets of personal equipment for every 80 metres, or part thereof, of such aggregate of lengths.

In ships carrying more than 36 passengers, two additional firefighter's outfits shall be provided for each main vertical zone, except for stairway enclosures which constitute individual main vertical zones and for main vertical zones of limited length in the fore and aft end of a ship which do not include accommodation spaces, machinery spaces or main galleys. (10.2.2)

4.10.8.2.3 Two spare charges shall be provided for each required breathing apparatus except as follows:

(i) **Class B** ships of less than 40 metres in length need carry only one spare charge for each required breathing apparatus.

(ii) The total spare storage capacity of free air on board ships carrying five or more breathing apparatus need not to exceed 9 600 litres.

(iii) Ships that are equipped with suitable located means for fully recharging the air cylinders free from contamination need carry only one spare charge for each required breathing apparatus and the total spare storage capacity of free air on board need not to exceed 4 800 litres. (10.2.5)

4.10.8.3 Storage of fire-fighter's outfits (10.3)

4.10.8.3.1 The firefighter's outfits or sets of personal equipment shall be so stored as to be easily accessible and ready for use and, where more than one fire-fighter's outfit or more than one set of personal equipment is carried, they shall be stored in widely separated positions. (10.3.1)

4.10.8.3.2 At least one firefighter's outfit and one set of personal equipment shall be available at any one such position. (10.3.2)

4.10.8.4 Fire-fighter's communication (10.4)

For ships required to carry on board at least one fire-fighter outfit, a minimum of two two-way portable radiotelephone apparatus for each fire party for fire-fighter's communication shall be carried on board. For LNG fuelled ships or ro-ro passenger ships with closed ro-ro cargo spaces or special category spaces, those two-way portable radiotelephone apparatus shall be of an explosion-proof type or intrinsically safe.

4.10.8.4.1 When the Administration of a flag State considers that the carriage provisions in this Reg. II-2/C/10 are unreasonable and/or technically unsuitable on board a ship, such ship may, in compliance with the provisions in Article 9(3) of Directive 2009/45/EC, be exempted from one or more of the requirements in this Reg. II-2/C/10. (10.100)

4.11 Structural integrity (Reg. II-2/C/11)

4.11.1 Purpose (1)

The purpose of this Reg. II-2/C/11 is to maintain structural integrity of the ship preventing partial or whole collapse of the ship structures due to strength deterioration by heat. For this purpose, materials used in the ships structure shall ensure that the structural integrity is not degraded due to fire.

4.11.2 Material of hull, superstructures, structural bulkheads, decks and deckhouses (2)

The hull, superstructures, structural bulkheads, decks and deckhouses shall be constructed of steel or other equivalent material. For the purpose of applying the definition of other equivalent material as given in article 2 (za) of *Directive 2009/45/EC*, the 'applicable fire exposure' shall be according to the integrity and insulation standards given in the tables 9.1 to 9.4 of Reg. II-2/C/9 subparagraphs 2.2.3 and 2.2.4. For example, where divisions such as decks or sides and ends of deckhouses are permitted to have 'B-0' fire integrity, the 'applicable fire exposure' shall be half an hour.

4.11.3 **Structure of aluminium alloy** (3)

However, in cases where any part of the structure is of aluminium alloy, the following shall apply:

.1 The insulation of aluminium alloy components of 'A' or 'B' class divisions, except structure which is non- load-bearing, shall be such that the temperature of the structural core does not rise more than 200 °C above the ambient temperature at any time during the applicable fire exposure to the standard fire test.

.2 Special attention shall be given to the insulation of aluminium alloy components of columns, stanchions and other structural members required to support lifeboat and life-raft stowage, launching and embarkation areas, and 'A' and 'B' class divisions to ensure:

.2.1 that for such members supporting lifeboat and life-raft areas and 'A' class divisions, the temperature rise limitation specified in paragraph 3.1 shall apply at the end of one hour; and

.2.2 that for such members required to support 'B' class divisions, the temperature rise limitation specified in paragraph 3.1 shall apply at the end of half an hour.

4.11.4 **Machinery spaces of category A** (4)

4.11.4.1 **Crowns and casings** (4.1)

Crowns and casings of category A machinery spaces shall be of steel or equivalent material construction and shall be insulated as required by tables included in Reg. II-2/C/9, as appropriate. Openings therein, if any, shall be suitably arranged and protected to prevent the spread of fire.

4.11.4.2 **Floor plating** (4.2)

The floor plating of normal passageways in machinery spaces of category A shall be made of steel or equivalent material.

4.11.5 **Materials of overboard fittings** (5)

Materials readily rendered ineffective by heat shall not be used for over board scuppers, sanitary discharges, and other outlets which are close to the waterline and where the failure of the material in the event of fire would give rise to danger of flooding.

PART D
ESCAPE

4.12 Notification of crew and passengers (Reg. II-2/D/12)

4.12.1 Purpose (1)

The purpose of this Reg. II-2/D/12 is to notify crew and passengers of a fire for safe evacuation. For this purpose, a general emergency alarm system and a public address system shall be provided.

4.12.2 General emergency alarm system (2)

A general emergency alarm system, required by Reg. III/3, paragraph.1, shall be used for notifying crew and passengers of a fire. (2)

4.12.3 Public address systems (3)

A public address system or other effective means of communication complying with the requirements of SOLAS Reg. III/6.5, as amended, shall be available throughout the accommodation and service spaces and control stations and open decks.

4.13 Means of escape (Reg. II-2/D/13)

4.13.1 Purpose (1)

The purpose of this Reg. II-2/D/13 is to provide means of escape so that persons on board can safely and swiftly escape to the lifeboat and liferaft embarkation deck. For this purpose, the following functional requirements shall be met:

.1 safe escape routes shall be provided;

.2 escape routes shall be maintained in a safe condition, clear of obstacles; and

.3 additional aids for escape shall be provided as necessary to ensure accessibility, clear marking, and adequate design for emergency situations.

4.13.2 General requirements (2)

In no case shall lifts be considered as forming one of the required means of escape. (2.2)

4.13.3 Means of escape from control stations, accommodation spaces and service spaces (3)

4.13.3.1 General requirements (3.1)

4.13.3.1.1 Stairways and ladders, corridors and doors shall be arranged to provide ready means of escape to the lifeboat and life-raft embarkation deck from all passenger and crew spaces and from spaces in which the crew is normally employed, other than machinery spaces. (3.1.1)

4.13.3.1.2 A corridor, lobby or part of a corridor from which there is only one route of escape shall be prohibited. Dead- end corridors used in service areas which are necessary for the practical utility of the ship, such as fuel oil stations and athwartship supply corridors, shall be permitted,

provided such dead-end corridors are separated from crew accommodation areas and are inaccessible from passenger accommodation areas. A part of a corridor that has a depth not exceeding its width is considered a recess or local extension and is permitted. (3.1.2)

4.13.3.1.3 All stairways shall be of steel frame construction, except where the Administration sanctions the use of other equivalent material. (3.1.3)

4.13.3.1.4 If a radiotelegraph station has no direct access to the open deck, two means of escape from or access to such station shall be provided, one of which may be a porthole or window of sufficient size or another means. (3.1.4)

4.13.3.2 Means of escape (3.2)

4.13.3.2.1 Escape from spaces below the bulkhead deck (3.2.1)

4.13.3.2.1.1 Below the bulkhead deck, two means of escape, at least one of which shall be independent of watertight doors, shall be provided from each watertight compartment or similarly restricted space or group of spaces. Exceptionally one of the means of escape for crew spaces that are entered only occasionally may be dispensed with if the required escape route is independent of watertight doors. In such a case the sole means of escape shall provide safe escape. (3.2.1.1)

4.13.3.2.2 Escape from spaces above the bulkhead deck (3.2.2)

Above the bulkhead deck there shall be at least two means of escape from each main vertical zone or similarly restricted space or group of spaces, at least one of which shall give access to a stairway forming a vertical escape.

4.13.3.2.3 Direct access to stairway enclosures (3.2.3)

Stairway enclosures shall have direct access with the corridors and be of a sufficient area to prevent congestion, having in view the number of persons likely to use them in an emergency. Within the perimeter of such stairway enclosures, only public toilets, lockers of non-combustible material providing storage for safety equipment and open information counters are permitted. Only public spaces, corridors, public toilets, special category spaces and open ro-ro cargo spaces to which passengers can have access, other escape stairways required by paragraph 3.2.4.1 and external areas are permitted to have direct access to these stairway enclosures.

4.13.3.2.4 Details of means of escape (3.2.4)

4.13.3.2.4.1 At least one of the means of escape required in the subparagraphs 3.2.1.1 and 3.2.2 shall consist of a readily accessible enclosed stairway, which shall provide continuous fire shelter from the level of its origin to the appropriate lifeboat and life-raft embarkation decks, or to the uppermost weather deck if the embarkation deck does not extend to the main vertical zone being considered. In the latter case, direct access to the embarkation deck by way of external open stairways and passageways shall be provided and shall have emergency lighting in accordance with Reg. III/5, paragraph.3 and slip-free surfaces underfoot. Boundaries facing external open stairways and passageways forming part of an escape route and boundaries in such a position that their failure during a fire would impede escape to the embarkation deck shall have fire integrity, including insulation values, in accordance with tables 9.1 to 9.4, as appropriate. (3.2.4.1)

4.13.3.2.4.2 Protection of access from the stairway enclosures to the lifeboat and life-raft embarkation areas shall be provided either directly or through protected internal routes which have fire integrity and insulation values for stairway enclosures as determined by tables 9.1 to 9.4, as appropriate. (3.2.4.2)

4.13.3.2.4.3 The widths, number and continuity of escapes shall be in accordance with the requirements of the *Fire Safety Systems Code*. (3.2.4.5)

4.13.3.2.5 Marking of escape routes (3.2.5)

4.13.3.2.5.1 In addition to the emergency lighting required by Reg. II-1/D/42 and III/5.3, the means of escape including stairways and exits, shall be marked by lighting or photoluminescent strip indicators placed not more than 0,3 metres above the deck at all points of the escape route, including angles and intersections. The marking must enable passengers to identify all the routes of escape and readily identify the escape exits. If electric illumination is used, it shall be supplied by the emergency source of power and it shall be so arranged that the failure of any single light or cut in a lighting strip will not result in the marking being ineffective. Additionally, all escape route signs and fire equipment location markings shall be of photoluminescent material or marked by lighting. The Administration of the flag State shall ensure that such lighting or photoluminescent equipment have been evaluated, tested and applied in accordance with the *Fire Safety Systems Code*. (3.2.5.1)

4.13.3.2.5.2 In ships carrying more than 36 passengers the requirements of subparagraph 3.2.5.1 of this Reg. II-2/D/13 shall also apply to the crew accommodations. (3.2.5.2)

4.13.3.2.6 Normally locked doors that form part of an escape route (3.2.6)

4.13.3.2.6.1 Cabin and stateroom doors shall not require keys to unlock them from inside the room. Neither shall there be any doors along any designated escape route which require keys to unlock them when moving in the direction of escape. (3.2.6.1)

4.13.3.2.6.2 Escape doors from public spaces that are normally latched shall be fitted with a means of quick release. Such means shall consist of a door-latching mechanism incorporating a device that releases the latch upon the application of a force in the direction of escape flow. Quick release mechanisms shall be designed and installed to the satisfaction of the Administration of the flag State and, in particular:

.1 consist of bars or panels, the actuating portion of which extends across at least one half of the width of the door leaf, at least 760 mm and not more than 1 120 mm above the deck;

.2 cause the door latch to release when a force not exceeding 67 N is applied; and

.3 not be equipped with any locking device, set screw or other arrangement that prevents the release of the latch when pressure is applied to the releasing device. (3.2.6.2)

4.13.3.2.7 Evacuation analysis for passenger ships (3.2.7)

4.13.3.2.7.1 Escape routes shall be evaluated by an evacuation analysis early in the design process according to the '*Revised Guidelines on evacuation analyses for new and existing passenger ships*' (MSC.1/Circ.1533), as amended. This analysis shall apply to:

.1 ro-ro passenger ships; and

.2 other passenger ships carrying more than 36 passengers, unless the accommodation spaces do not have cabins, are located in one deck only and there is just one assembly station. (3.2.7.1)

4.13.3.2.7.2 The analysis shall be used to identify and eliminate, as far as practicable, congestion which may develop during an abandonment, due to normal movement of passengers and crew along escape routes, including the possibility that crew may need to move along these routes in a direction opposite to the movement of passengers. In addition, the analysis shall be used to demonstrate that escape arrangements are sufficiently flexible to provide for the possibility that certain escape routes, assembly stations, embarkation stations or survival craft may not be available as a result of a casualty. (3.2.7.2)

4.13.3.3 Emergency escape breathing devices for ships of 40 metres in length and above (3.4)

4.13.3.3.1 Emergency escape breathing devices shall be carried, complying with the *Fire Safety Systems Code*. (3.4.1)

4.13.3.3.2 At least two emergency escape breathing devices shall be carried in each main vertical zone. (3.4.3)

4.13.3.3.3 In ships carrying more than 36 passengers, two emergency escape breathing devices, in addition to those required in subparagraph 3.4.3 shall be carried in each main vertical zone. (3.4.4)

4.13.3.3.4 However, subparagraphs 3.4.3 and 3.4.4 do not apply to stairway enclosures which constitute individual main vertical zones and for the main vertical zones in the fore or aft end of a ship, which do not contain spaces of categories (6), (7), (8) or (12) defined in Reg. II-2/C/9 subparagraph 2.2.3. (3.4.5)

4.13.4 Means of escape from machinery spaces (4)

4.13.4.1 Means of escape (4.1)

Two means of escape shall be provided from each machinery space. In particular, the following provisions shall be complied with.

4.13.4.1.1 Escape from spaces below the bulkhead deck (4.1.1)

Where the space is below the bulkhead deck the two means of escape shall consist of either:

.1 two sets of steel ladders as widely separated as possible, leading to doors in the upper part of the space similarly separated, and from which there is access to the appropriate lifeboat and life-raft embarkation decks. One of these ladders shall be located within a protected enclosure that satisfies Reg. II-2/C/9 subparagraph 2.2.3, category (2) or Reg. II-2/C/9, subaragraph2.2.4, category (4), as appropriate, from the lower part of the space it serves to a safe position outside the space. Self-closing fire doors of the same fire integrity standards shall be fitted in the enclosure. The ladder shall be fixed in such a way that heat is not transferred into the enclosure through non-insulated fixing points. The protected enclosure shall have minimum internal dimensions of at least 800 mm × 800 mm, and shall have emergency lighting provisions; or

.2 one steel ladder leading to a door in the upper part of the space from which access is provided to the embarkation deck and additionally, in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being operated from each side and which provides access to a safe escape route from the lower part of the space to the embarkation deck.

4.13.4.1.2 Escape from spaces above the bulkhead deck (4.1.2)

Where the space is above the bulkhead deck, the two means of escape shall be as widely separated as possible and the doors leading from such means of escape shall be a position from which access is provided to the appropriate lifeboat and life-raft embarkation decks. Where such means of escape require the use of ladders, these shall be of steel.

4.13.4.1.3 Dispensation from two means of escape (4.1.3)

The Administration of the flag State may dispense with one means of escape from any such space so long as either a door or a steel ladder provides a safe escape route to the embarkation deck, due regard being paid to the nature and location of the space and whether persons are normally employed in that space. A second means of escape shall be provided in the steering gear space when the emergency steering position is located in that space unless there is a direct access to the open deck.

4.13.4.1.4 Escape from machinery control rooms (4.1.4)

Two means of escape shall be provided from a machinery control room located within a machinery space, at least one of which will provide continuous fire shelter to a safe position outside the machinery space.

4.13.4.1.5 Ladders and stairways (4.1.5)

The underside of stairs in machinery spaces shall be shielded.

4.13.4.1.6 Escape from main workshops within machinery spaces (4.1.6)

Two means of escape shall be provided from the main workshop within a machinery space. At least one of those escape routes shall provide a continuous fire shelter to a safe position outside the machinery space.

4.13.4.1.7 The ladders required under subparagraphs 4.1.1, 4.1.2 and 4.1.3 can be made of equivalent material to steel if located in a protected enclosure fire-insulated according to the tables included in Reg. II-2/C/9, as appropriate. (4.1.100)

4.13.4.2 Emergency escape breathing devices for ships of 40 metres in length and above (4.3)

4.13.4.2.1 Within the machinery spaces, emergency escape breathing devices shall be situated ready for use at easily visible places, which can be reached quickly and easily at any time in the event of fire. The location of emergency escape breathing devices shall take into account the layout of the machinery space and the number of persons normally working in the space. Reference is made to the *Guidelines for the performance, location, use and care of emergency escape breathing devices (EEBD)* in IMO MSC/Circ.849. (4.3.1)

4.13.4.2.2 The number and location of these devices shall be indicated in the fire control plan required in Reg. II-2/E/15, subparagraph 2.4. (4.3.2)

4.13.4.2.3 Emergency escape breathing devices shall be carried, complying with the *Fire Safety Systems Code*. (4.3.3)

4.13.5 Means of escape from special category spaces and open ro-ro cargo spaces to which any passengers carried can have access (5)

4.13.5.1 In special category spaces and open ro-ro cargo spaces to which passengers can have access the number and disposition of the means of escape both below and above the bulkhead deck shall be to the satisfaction of the Administration of the flag State and, in general, the safety of access to the embarkation deck shall be at least equivalent to that provided under subparagraphs 3.2.1.1, 3.2.2, 3.2.4.1 and 3.2.4.2. Such spaces shall be provided with designated walkways to the means of escape with a breadth of at least 600 mm, and where practicable and reasonable those designated longitudinal walkways shall raise at least 150 mm above the deck surface. The parking arrangements for the vehicles shall maintain the walkways clear at all times. (5.1)

4.13.5.2 One of the escape routes from the machinery spaces where the crew is normally employed shall avoid direct access to any special category space. (5.2)

4.13.5.3 Hoistable drive-up/down ramps to platform decks must not be capable of blocking the approved escape routes when in lowered position. (5.100)

4.13.6 Means of escape from ro-ro cargo spaces (6)

At least two means of escape shall be provided in ro-ro cargo spaces where the crew are normally employed. The escape routes shall provide a safe escape to the lifeboat and liferaft embarkation decks and shall be located at the fore and aft ends of the space.

4.13.7 Additional requirements for ro-ro passenger ships (7)

4.13.7.1 General (7.1)

4.13.7.1.1 Escape routes shall be provided from every normally occupied space on the ship to an assembly station. These escape routes shall be arranged so as to provide the most direct route possible to the assembly station, and shall be marked with symbols related to life-saving appliances and arrangements, adopted by IMO by Resolution A.760(18) as amended. (7.1.1)

4.13.7.1.2 The escape route from cabins to stairway enclosures shall be as direct as possible, with a minimum number of changes in direction. It shall not be necessary to cross from one side of the ship to the other to reach an escape route. It shall not be necessary to climb more than two decks up or down in order to reach an assembly station or open deck from any passenger space. (7.1.2)

4.13.7.1.3 External routes shall be provided from open decks, referred to in paragraph 7.1.2, to the survival craft embarkation stations. (7.1.3)

4.13.7.1.4 Where enclosed spaces adjoin an open deck, openings from the enclosed space to the open deck shall, where practicable, be capable of being used as an emergency exit. (7.1.4)

4.13.7.1.5 Escape routes shall not be obstructed by furniture or other obstructions. With the exception of tables and chairs which may be cleared to provide open space, cabinets and other heavy furnishings in public spaces and along escape routes shall be secured in place to prevent shifting if the ship rolls or lists. Floor coverings shall also be secured in place. When the ship is underway, escape routes shall be kept clear of obstructions such as cleaning carts, bedding, luggage and boxes of goods. (7.1.5)

4.13.7.2 Instruction for safe escape (7.2)

4.13.7.2.1 Decks shall be sequentially numbered, starting with '1' at the tank top or lowest deck. These numbers shall be prominently displayed at stair landings and lift lobbies. Decks may also be named, but the deck number shall always be displayed with the name. (7.2.1)

4.13.7.2.2 Simple 'mimic' plans showing the 'you are here' position and escape routes marked by arrows shall be prominently displayed on the inside of each cabin door and in public spaces. The plan shall show the directions of escape, and shall be properly oriented in relation to its position on the ship. (7.2.2)

4.13.7.3 Strength of handrails and corridors (7.3)

4.13.7.4 Handrails or other handholds shall be provided in all corridors along the entire escape route, so that a firm handhold is available every step of the way, where possible, to the assembly stations and embarkation stations. Such handrails shall be provided on both sides of longitudinal corridors more than 1,8 metres in width and transverse corridors more than 1 metre in width. Particular attention shall be paid to the need to be able to cross lobbies, atriums and other large open spaces along escape routes. Handrails and other handholds shall be of such strength as to withstand a distributed horizontal load of 750 N/m applied in the direction of the centre of the corridor or space, and a distributed vertical load of 750 N/m applied in the downward direction. The two loads need not be applied simultaneously. (7.3.1)

4.13.7.5 The lowest 0,5 metres of bulkheads and other partitions forming vertical divisions along escape routes shall be able to sustain a load of 750 N/m to allow them to be used as walking surfaces from the side of the escape route with the ship at large angles of heel. (7.3.2)

PART E
OPERATIONAL REQUIREMENTS

4.14 Operational readiness and maintenance (Reg. II-2/E/14)

4.14.1 Purpose (1)

The purpose of this Reg. II-2/E/14 is to maintain and monitor the effectiveness of the fire safety measures the ship is provided with. For this purpose, the following functional requirements shall be met:

.1 fire protection systems and fire-fighting systems and appliances shall be maintained ready for use; and

.2 fire protection systems and fire-fighting systems and appliances shall be properly tested and inspected.

4.14.2 General requirements (2)

At all times while the ship is in service, the fire protection systems and fire-fighting systems and appliances shall be maintained ready for use.

A ship is not in service when:

.1 it is in for repairs or lay-up (either at anchor or at port) or in dry-dock;

.2 it is declared not in service by the owner or the owner's representative; and

.3 if there are no passengers on board.

4.14.2.1 Operational readiness (2.1)

4.14.2.1.1 The following fire protection systems shall be kept in good order so as to ensure their required performance if a fire occurs:

.1 structural fire protection including fire resisting divisions and protection of openings and penetrations in these divisions;

.2 fire detection and fire alarm systems; and

.3 means of escape systems and appliances. (2.1.1)

4.14.2.1.2 Fire-fighting systems and appliances shall be kept in good working order and readily available for immediate use. Portable extinguishers which have been discharged shall be immediately recharged or replaced with an equivalent unit. (2.1.2)

4.14.2.2 Maintenance, testing and inspections (2.2)

4.14.2.2.1 Maintenance, testing and inspections shall be carried out based on the guidelines in IMO MSC.1/Circ.1432, as amended, and in a manner having due regard to ensuring the reliability of fire-fighting systems and appliances. (2.2.1)

4.14.2.2.2 A maintenance plan shall be kept on board the ship and shall be available for inspection, whenever required by the Administration of the flag State. (2.2.2)

4.14.2.2.3 The maintenance plan shall include at least the following fire protection systems and fire-fighting systems and appliances, where installed:

.1 fire mains, fire pumps and hydrants including hoses, nozzles and international shore connections;

.2 fixed fire detection and fire alarm systems;

.3 fixed fire-extinguishing systems and other fire-extinguishing appliances;

.4 automatic sprinkler, fire detection and fire alarm systems;

.5 ventilation systems including fire and smoke dampers, fans and their controls;

.6 emergency shut down of fuel supply;

.7 fire doors including their controls;

.8 general emergency alarm systems;

.9 emergency escape breathing devices;

.10 portable fire extinguishers including spare charges; and

.11 firefighter's outfits. (2.2.3)

4.14.2.2.4 The maintenance programme may be computer-based. (2.2.4)

4.14.3 Additional requirements (3)

For ships carrying more than 36 passengers, a maintenance plan for low-location lighting and public address systems shall be developed in addition to the maintenance plan mentioned under paragraph 2.2.

4.15 Instructions, on-board training and drills (Reg. II-2/E/15)

4.15.1 Purpose (1)

The purpose of this Reg. II-2/E/15 is to mitigate the consequences of fire by means of proper instructions for training and drills of persons on board in correct procedures under emergency conditions. For this purpose, the crew shall have the necessary knowledge and skills to handle fire emergency cases, including passenger care.

4.15.2 General requirements (2)

4.15.2.1 Instructions, duties and organization (2.1)

4.15.2.1.1 Crew members shall receive instructions on fire safety on-board the ship. (2.1.1)

4.15.2.1.2 Crew members shall receive instructions on their assigned duties. (2.1.2)

4.15.2.1.3 Parties responsible for fire extinguishing shall be organised. These parties shall have the capability to complete their duties at all times while the ship is in service. (2.1.3)

4.15.2.2 On-board training and drills (2.2)

4.15.2.2.1 Crew members shall be trained to be familiar with the arrangements of the ship as well as the location and operation of any fire-fighting systems and appliances that they may be called upon to use. (2.2.1)

4.15.2.2.2 Training in the use of the emergency escape breathing devices shall be considered as a part of on-board training. (2.2.2)

4.15.2.2.3 Performance of crew members assigned fire-fighting duties shall be periodically evaluated by conducting on- board training and drills to identify areas in need of improvement, to ensure competency in fire-fighting skills is maintained and to ensure the operational readiness of the fire-fighting organization. (2.2.3)

4.15.2.2.4 On-board training in the use of the ship's fire-extinguishing systems and appliances shall be planned and conducted in accordance with provisions of Reg. III/19.4.1 of *SOLAS 1974*, as amended. (2.2.4)

4.15.2.2.5 Fire drills shall be conducted and recorded in accordance with the provisions of Reg. III/19.3.5, III/19.5 and III/30 of *SOLAS 1974*, as amended. (2.2.5)

4.15.2.2.6 In ships subject to Reg. II-2/C/10, paragraph 10, breathing apparatus cylinders used during drills shall be refilled or replaced before departure. (2.2.6)

4.15.2.3 Training manuals (2.3)

4.15.2.3.1 A training manual shall be provided in each crew mess room and recreation room or in each crew cabin. (2.3.1)

4.15.2.3.2 The training manual shall be written in the working language of the ship. (2.3.2)

4.15.2.3.3 The training manual, which may comprise several volumes, shall contain the instructions and the information required in paragraph 2.3.4 in easily understood terms and illustrated wherever possible. Any part of such information may be provided in the form of audiovisual aides in lieu of the manual. (2.3.3)

4.15.2.3.4 The training manual shall explain the following in detail:

- **.1** general fire safety practice and precautions related to the dangers of smoking, electrical hazards, flammable liquids and similar common shipboard hazards;
- **.2** general instructions on fire-fighting activities and fire-fighting procedures including procedures for notification of a fire and use of manually operated call points;
- **.3** meanings of ship's alarms;
- **.4** operation and use of fire-fighting systems and appliances;
- **.5** operation and use of fire doors;
- **.6** operation and use of fire and smoke dampers; and
- **.7** escape systems and appliances. (2.3.4)

4.15.2.4 **Fire control plans** (2.4)

4.15.2.4.1 In all ships general arrangement plans shall be permanently exhibited for the guidance of the ship's officers, showing clearly for each deck the control stations, the various fire sections enclosed by 'A' class divisions, the sections enclosed by 'B' class divisions together with particulars of the fire detection and fire alarm systems, the sprinkler installation, the fire-extinguishing appliances, means of access to different compartments, decks, etc. and the ventilating system including particulars of the fan control positions, the position of dampers and identification numbers of the ventilating fans serving each section. Alternatively, the aforementioned details may be set out in a booklet, a copy of which shall be supplied to each officer, and one copy shall at all times be available on board in an accessible position. Plans and booklets shall be kept up to date, any alterations being recorded thereon as soon as practicable. Description in such plans and booklets shall be in the official language of the flag State. If the language is neither English nor French, a translation into one of these languages shall be included. In the case the ship is engaged on domestic voyages in another Member State, a translation into the official language of that port State, if this language is neither English nor French, shall be included.

The information to be provided with the required fire control plans and booklets and the graphical symbols to be used for the fire control plans shall be in accordance with the IMO Resolutions A.756(18) and A.952(23), as amended. (2.4.1)

4.15.2.4.2 A duplicate set of fire control plans or a booklet containing such plans shall be permanently stored in a prominently marked weather tight enclosure outside the deckhouse for the assistance of shore side fire-fighting personnel. (2.4.2)

4.16 **Operations** (Reg. II-2/E/16)

4.16.1 **Purpose** (1)

To provide information and instruction for proper ship and cargo handling operations in relation to fire safety, operational booklets shall be provided on board.

4.16.2 **Fire safety operational booklets** (2)

4.16.2.1 The required fire operational booklet shall contain the necessary information and instructions for the safe operation of the ship and cargo handling operations in relation to fire safety. The booklet shall include information concerning the crew's responsibilities for the general fire safety of the ship while loading and discharging cargo and while underway. For ships carrying dangerous goods, the fire safety booklet shall provide reference to the pertinent fire-fighting and emergency cargo handling instructions contained in the *International Maritime Dangerous Goods Code*. (2.1)

4.16.2.2 The fire safety operational booklet shall be written in the working language of the ship. (2.3)

4.16.2.3 The fire safety operational booklet may be combined with the training manuals required in Reg. II-2/E/15, subparagraph 2.3. (2.4)

PART G
SPECIAL REQUIREMENTS

4.17 Special requirements for helicopter facilities (Reg. II-2/G/18)

Ships equipped with helidecks shall comply with the requirements of Reg. 18 of Part G of the SOLAS Chapter II-2, as amended.

4.18 Special requirements for ships carrying dangerous goods (Reg. II-2/G/19)

The requirements of Reg. 19 of Part G of the SOLAS Chapter II-2, as amended, shall apply, as appropriate, to passenger ships carrying dangerous goods.

4.19 Protection of special category and ro-ro cargo spaces (Reg. II-2/G/20)

4.19.1 Purpose (1)

The purpose of this Reg. II-2/G/20 is to provide additional safety measures in order to address the fire safety objectives of this chapter for ships fitted with special category and ro-ro cargo spaces. For this purpose, the following functional requirements shall be met:

.1 fire protection systems shall be provided to adequately protect the ship from the fire hazards associated with special category and ro-ro cargo spaces;

.2 ignition sources shall be separated from special category and ro-ro cargo spaces; and

.3 special category and ro-ro cargo spaces shall be adequately ventilated.

4.19.2 General requirements (2)

4.19.2.1 Application (2.1)

4.19.2.1.1 In addition to complying with the requirements of Regulations in Parts B, C, D and E, as appropriate, special category and ro-ro cargo spaces shall comply with the requirements of this Reg. II-2/G/20. (2.1.1)

4.19.2.1.2 Vehicles with fuel in their tanks for their own propulsion may be carried in cargo spaces other than special category or ro-ro cargo spaces, provided that all the following conditions are met:

.1 the vehicles do not use their own propulsion within the cargo spaces;

.2 the cargo spaces are in compliance with the appropriate requirements of Reg. II-2/G/19; and

.3 the vehicles are carried in accordance with the *International Maritime Dangerous Goods Code*. (2.1.2)

4.19.2.2 Basic principles (2.2)

4.19.2.2.1 The basic principle underlying the provisions of this Reg. II-2/G/20 is that as normal main vertical zoning may not be practicable in special category and ro-ro cargo spaces, equivalent protection must be obtained in such spaces on the basis of a horizontal zone concept and by the

provision of an efficient fixed fire- extinguishing system. Under this concept, a horizontal zone for the purpose of this Reg. II-2/G/20 may include special category spaces on more than one deck provided that the total overall clear height for vehicles does not exceed 10 metres. (2.2.1)

4.19.2.2.2 The requirements of paragraphs 3, 4 and 7 of Reg. II-2/C/9 for maintaining the integrity of main vertical zones shall be applied equally to decks and bulkheads forming the boundaries separating horizontal zones from each other and from the remainder of the ship. (2.2.3)

4.19.3 Precaution against ignition of flammable vapours (3)

4.19.3.1 Ventilation system (3.1)

4.19.3.1.1 Capacity of ventilation systems (3.1.1)

There shall be provided an effective power ventilation system for the special category and closed ro-ro cargo spaces sufficient to give at least 10 air changes per hour. The number of air changes shall be increased at least to 20 during loading and unloading of vehicles.

4.19.3.1.2 Performance of ventilation systems (3.1.2)

4.19.3.1.2.1 The power ventilation system shall be separate from other ventilation systems. The power ventilation system shall be operated to give at least the number of air changes required in paragraph 3.1.1 at all times when vehicles are in such spaces, except where an air quality control system in accordance with paragraph 3.1.2.4 is provided. Ventilation ducts serving such cargo spaces capable of being effectively sealed shall be separated for each such space. The system shall be capable of being controlled from a position outside such spaces. (3.1.2.1)

4.19.3.1.2.2 The ventilation shall be such as to prevent air stratification and the formation of air pockets. (3.1.2.3)

4.19.3.1.2.3 For all ships, where an air quality control system is provided based on the IMO *Revised design guidelines and operational recommendations for ventilation systems in ro-ro cargo spaces* (MSC/Circ.1515), as amended, the ventilation system may be operated at a decreased number of air changes and/or a decreased amount of ventilation. This relaxation does not apply to spaces to which at least ten air changes per hour is required by paragraph 3.2.2 of this Reg. II-2/G/20 and spaces subject to SOLAS II-2/19.3.4.1. (3.1.2.4)

4.19.3.1.3 Indication of ventilation systems (3.1.3)

Means shall be provided to indicate on the navigating bridge any loss or reduction of the required ventilating capacity.

4.19.3.1.4 Closing appliances and ducts (3.1.4)

4.19.3.1.4.1 Arrangements shall be provided to permit a rapid shutdown and effective closure of the ventilation system in case of fire, taking into account the weather and sea conditions. (3.1.4.1)

4.19.3.1.4.2 Ventilation ducts, including dampers, shall be made of steel and their arrangement shall be to the satisfaction of the Administration of the flag State. Ventilation ducts that pass through horizontal zones or machinery spaces shall be 'A-60' class steel ducts constructed in accordance with subparagraphs 7.2.4.1.1 and 7.2.4.1.2 of Reg. II-2/C/9. (3.1.4.2)

4.19.3.1.5 Permanent openings (3.1.5)

Permanent openings in the side plating, the ends or deckhead of special category or ro-ro cargo spaces shall be so situated that a fire in the special category or ro-ro cargo space does not endanger stowage areas and embarkation stations for survival craft and accommodation spaces, service spaces and control stations in superstructures and deckhouses above the special category or ro-ro cargo spaces.

4.19.3.2 Electrical equipment and wiring (3.2)

4.19.3.2.1 Except as provided in paragraph 3.2.2, electrical equipment and wiring, if fitted, shall be of a type suitable for use in explosive petrol and air mixtures. (3.2.1)

4.19.3.2.2 In case of other than special category spaces below the bulkhead deck, notwithstanding the provisions in paragraph 3.2.1, above a height of 450 mm from the deck and from each platform for vehicles, if fitted, except platforms with openings of sufficient size permitting penetration of petrol gases downwards, electrical equipment of a type so enclosed and protected as to prevent the escape of sparks shall be permitted as an alternative on condition that the ventilation system is so designed and operated as to provide continuous ventilation of the cargo spaces at the rate of at least ten air changes per hour whenever vehicles are on board. (3.2.2)

4.19.3.3 Electrical equipment and wiring in exhaust ventilation ducts (3.3)

Electrical equipment and wiring, if installed in an exhaust ventilation duct, shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.

4.19.3.4 Other ignition sources (3.4)

Other equipment which may constitute a source of ignition of flammable vapours shall not be permitted.

4.19.4 Detection and alarm (4)

4.19.4.1 Special category spaces (4.3)

4.19.4.1.1 An efficient patrol system shall be maintained in special category spaces. In any such space in which the patrol is not maintained by a continuous fire watch at all times during the voyage, there shall be provided a fixed fire detection and fire alarm system of an approved type complying with the requirements of Reg. II-2/C/7, subparagraph 2.2. The fixed fire detection system shall be capable of rapidly detecting the onset of fire. The type and the spacing and location of detectors shall be determined taking into account the effects of ventilation and other relevant factors. After being installed, the system shall be tested under normal ventilation conditions and shall give an overall response time to the satisfaction of the Administration of the flag State. (4.3.1)

4.19.4.1.2 Manually operated call points shall be spaced so that no part of the space is more than 20 metres from a manually operated call point, and one shall be placed close to each exit from such spaces. (4.3.2)

4.19.5 Structural protection (5)

Notwithstanding the provisions of Reg. II-2/C/9, subparagraph 2.2, in ships carrying more than 36 passengers, the boundary bulkheads and decks of special category and ro-ro cargo spaces shall

be insulated to 'A-60' class standard. However, where an open deck space (as defined in Reg. II-2/C/9, subparagraph 2.2.3(5)), a sanitary or similar space (as defined in Reg. II-2/C/9, subparagraph.2.2.3(9)) or a tank, void or auxiliary machinery space having little or no fire risk (as defined in Reg. II-2/C/9, subparagraph 2.2.3(10)), is on one side of the division, the standard may be reduced to 'A-0'. Where fuel oil tanks are below a special category or ro-ro cargo space, the integrity of the deck between such spaces may be reduced to 'A-0' standard.

4.19.6 Fire extinction (6)

4.19.6.1 Fixed fire-extinguishing system (6.1)

4.19.6.1.1 Ro-ro cargo spaces, which are not special category spaces and are capable of being sealed from a location outside of the cargo spaces, shall be fitted with one of the following fixed fire-extinguishing systems:

.1 a fixed gas fire-extinguishing system complying with the provisions of the *Fire Safety Systems Code*;

.2 a fixed high-expansion foam fire-extinguishing system complying with the provisions of the *Fire Safety Systems Code*; or

.3 a fixed water-based fire-fighting system complying with the provisions of paragraph 7.2.4 of the *Fire Safety Systems Code* and paragraphs 6.1.2.1 to 6.1.2.4. (6.1.1)

4.19.6.1.2 Ro-ro cargo spaces not capable of being sealed and special category spaces shall be fitted with an approved fixed water-based fire-fighting system complying with the provisions of paragraph 7.2.4 of the *Fire Safety Systems Code* which shall protect all parts of any deck and vehicle platform in such space. Such a water-based fire- fighting systems shall have:

.1 a pressure gauge on the valve manifold;

.2 clear marking on each manifold valve indicating the spaces served;

.3 instructions for maintenance and operation located in the valve room; and

.4 a sufficient number of drainage valves. (6.1.2)

4.19.6.1.3 The Administration of the flag State may permit the use of any other fixed fire-extinguishing system that has been shown, by full-scale test in conditions simulating a flowing petrol fire in a special category or ro-ro cargo space, to be not less effective in controlling fires likely to occur in such a space. Such fixed pressure water- spraying system or other equivalent fire-extinguishing system shall comply with the provisions of IMO Resolution A.123(V) and the IMO MSC.1/Circ.1430 '*Revised guidelines for the design and approval of fixed water-based fire-fighting systems for ro-ro spaces and special category spaces*', as amended, shall be taken into consideration. (6.1.3)

4.19.6.1.4 In view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or decks consequent on the operation of the fixed pressure water-spraying system, the following arrangements shall be provided:

.1 in special category and ro-ro cargo spaces above the bulkhead deck, scuppers shall be fitted so as to ensure that such water is rapidly discharged directly overboard, taking into account the guidelines of IMO MSC.1/Circ.1320 '*Drainage of fire-fighting water from*

enclosed vehicle and ro-ro spaces and special category spaces for passenger and cargo ships', as amended*.

.1.1 discharge valves for scuppers, fitted with positive means of closing operable from a position above the bulkhead deck in accordance with the requirements of the *International Convention on Load Lines* in force, shall be kept open while the ships are at sea.

.1.2 any operation of the valves referred to in subparagraph 6.1.4.1.2.1 shall be recorded in the logbook.

.2 in special category and ro-ro cargo spaces below the bulkhead deck, the Administration of the flag State may require pumping and drainage facilities to be provided additional to the requirements of Reg. II-1/C/35-1. In such case, the drainage system shall be sized to remove not less than 125 % of the combined capacity of both the water spraying system pumps and the required number of fire hose nozzles, taking into account the guidelines of IMO MSC.1/Circ.1320 '*Drainage of fire-fighting water from enclosed vehicle and ro-ro spaces and special category spaces for passenger and cargo ships*', as amended. The drainage system valves shall be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells shall be of sufficient holding capacity and shall be arranged at the side shell of the ship at a distance from each other of not more than 40 metres in each watertight compartment. (6.1.4)

* This Circular should be also taken into account for open ro-ro cargo spaces as appropriate.

4.19.6.1.5 For ro-ro cargo spaces and special category spaces, where fixed pressure water-spraying systems are fitted, means shall be provided to prevent the blockage of drainage arrangements, taking into account the guidelines of IMO MSC.1/Circ.1320 '*Drainage of fire-fighting water from enclosed vehicle and ro-ro spaces and special category spaces for passenger and cargo ships*', as amended. (6.1.5)

4.19.6.2 Portable fire-extinguishing equipment (6.2)

4.19.6.2.1 Portable extinguishers shall be provided at each deck level in each hold or compartment where vehicles are carried, spaced not more than 20 metres apart on both sides of the space. At least one portable fire extinguisher shall be located at each access to such space. (6.2.1)

4.19.6.2.2 In addition, the following fire extinguishing appliances shall be provided in special category and ro-ro cargo spaces:

.1 at least three water-fog applicators; and

.2 one portable foam applicator unit complying with the provisions of the *Fire Safety Systems Code*, provided that at least two such units are available in the ship for use in such space. (6.2.2)

5 RETROACTIVE REQUIREMENTS FOR PASSENGER SHIPS

5.1 General

5.1.1 This Chapter applies to new and existing ships (see definitions in 2.5.5 and 2.5.6) the keel of which was laid or which were at a similar stage of construction before 19 September 2021.

5.1.2 Requirements of this Chapter concern: protections against noise, emergency towing procedures, ships using low flashpoint fuels and ships built in an equivalent material.

5.1.3 Ships compliance with the applicable retroactive requirements (except 5.2.4), shall be confirmed by PRS surveyor not later than at the next *Ship Safety Certificate* renewal survey.

5.2 Particular requirements

5.2.1 **Protection against noise** (Reg. II-1/A-1/4) (R 3-12)

CLASS B, C AND D SHIPS CONSTRUCTED ON OR AFTER 1 JANUARY 2018

Ships of 1600 gross tonnage and above shall be constructed to reduce on-board noise and to protect personnel from the noise in accordance with the IMO *Code on noise levels on-board ships*, adopted by the Maritime Safety Committee by resolution MSC.337(91), as may be amended by the IMO.

5.2.2 **Protection against noise*** (Reg. II-1/C/15) (R 36)

* Refer to the *Code on Noise levels on Board Ships*, adopted by IMO Resolution A.468(XII).

NEW CLASS B, C AND D SHIPS NOT COVERED UNDER REGULATION II-1/A-1/4 (i.e. 5.2.1)

Measures shall be taken to reduce machinery noise in machinery spaces to acceptable levels. If this noise cannot be sufficiently reduced the source of excessive noise shall be suitably insulated or isolated or a refuge from noise shall be provided if the space is required to be manned. Ear protectors shall be provided for personnel required to enter such spaces.

5.2.3 **Emergency towing procedures** (Reg. II-1/A-1/5) (R 3-4)

CLASS B SHIPS

.1 Ships shall be provided with a ship-specific emergency towing procedure. Such a procedure shall be carried aboard the ship for use in emergency situations and shall be based on existing arrangements and equipment available on board the ship.

.2 The procedure (refer to the '*Guidelines for owners/operators on preparing emergency towing procedures*' (MSC.1/Circ.1255) shall include:

.1 drawings of fore and aft deck showing possible emergency towing arrangements;

.2 inventory of equipment on board that can be used for emergency towing;

.3 means and methods of communication; and

.4 sample procedures to facilitate the preparation for and conducting of emergency towing operations.

5.2.4 **Ships using low flashpoint fuels** (Reg. II-1/G/1) (R 57)

NEW CLASS B, C AND D SHIPS [AND EXISTING CLASS B] SHIPS

Ships, irrespective of the date of construction, converted to using or which undertake to use gaseous or liquid fuel having a flashpoint lower than otherwise permitted under Reg. II-2/A/10, subparagraph.1.1, shall comply with the requirements of the *IGF Code*, as defined in SOLAS II-1/2.28. These requirements shall be complied with and confirmed by PRS surveyor before commencing using such fuel.

5.2.5 **Ships built in an equivalent material** (Art. 6, sec. 6)

Ships built in an equivalent material (see definition in 2.5.14) before 20 December 2017 shall comply with the requirements of the *Directive 2009/45/EC*, as amended, by 22 December 2025.

6 ANNEX
GUIDELINES FOR SAFETY REQUIREMENTS FOR PASSENGER SHIPS AND HIGH-SPEED PASSENGER CRAFT FOR PERSONS WITH REDUCED MOBILITY

In applying the below guidelines PRS will follow the IMO MSC/Circ.735, entitled '*Recommendation on the design and operation of passenger ships to respond to elderly and disabled persons' needs*' as far as reasonable and practicable.

1 Access to the ship

The ships should be constructed and equipped in such a way that a person with reduced mobility can embark and disembark easily and safely, and can be ensured access between decks, either unassisted or by means of ramps, elevators or lifts. Directions to such access should be posted at the other accesses to the ship and at other appropriate locations throughout the ship.

2 Signs

Signs provided on a ship to aid passengers should be accessible and easy to read for persons with reduced mobility, (including persons with sensory disabilities), and be positioned at key points.

3 Means to communicate messages

The operator should have the means onboard the vessel visually and verbally to provide announcements, such as those regarding delays, schedule changes and on-board services, to persons with various forms of reduced mobility.

4 Alarm

The alarm system and alarm buttons must be designed so as to be accessible by and to alert all passengers with reduced mobility, including persons with sensory disabilities and persons with learning disabilities.

5 Additional requirements ensuring mobility inside the ship

Handrails, corridors and passageways, doorways and doors shall accommodate the movement of a person in a wheelchair. Elevators, vehicle decks, passenger lounges, accommodation and washrooms shall be designed in order to be accessible in a reasonable and proportionate manner to persons with reduced mobility. (Annex III)